Promoting healthy ageing in care homes

mixed methods feasibility exploration of engaging older residents in arts-based activities using digital health technology

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Promoting healthy ageing in care homes: mixed methods feasibility exploration of engaging older residents in arts-based activities using digital health technology

By

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PROLOGUE

This prologue is used to establish the context and background details of my story that ties into my PhD journey. I am fortunate that I had the unprecedented opportunity to work on a project that was at the cutting edge of research and innovation within the health and residential care sectors. This project was an academic interuniversity research project between Coventry University and the University of West of England. This thesis communicates my PhD journey of exploring, developing and testing the feasibility of innovative technology alongside exploring the unique culture of care homes. This thesis is not merely a critical argumentation and it may look descriptive in some places because the aim was to provide replicable & practical knowledge.

This interdisciplinary thesis crosses the boundaries between the arts, health, technology and social sciences, therefore, may look non-traditional to some researchers. It was an interfaculty multidisciplinary research project between the University's Department of Health and Life Sciences (HLS) and the Centre for Trust Peace and Social Relations (CTPSR. Therefore, the supervisory team was comprised of personnel from both faculties. Despite difficulties in managing a multidisciplinary team, it added value and knowledge. I had a multidisciplinary team of supervisors who were more familiar with some approaches than others. Therefore, keeping in mind the needs of multiple academic disciplines, the challenge was to find the most suitable language without compromising the needs of the involved disciplines. A blended approach has been taken using a combination of the first-person and third-person, to reflect the interdisciplinary nature and the mixed methods approach blended both subjective reporting and reflection and objective exploration and interpretations. APA 7th edition was used for referencing method. In this thesis, all figures and tables were created by me (the author) and wherever I adapted, I cited it with reference. Hyperlinks were used for internal and external cross-reference. Footnotes are utilised for explaining or defining wherever required. My PhD was a challenging task due to my family commitment as a mother of five children, wife and daughter in law. I regularly travelled from Manchester, where I live, to Coventry, where I completed this research. I was elected as the Postgraduate Research Officer that added additional responsibility and polished my interpersonal and leadership skills. I received a 'Gold Award for Leadership' and 'Award of Excellence' and became a certified reviewer. I was awarded a 'Fellowship of the Royal Society for Public Health' and became an Associate Fellow of the Academy of Higher Academy. This would not have been possible without my full dedication to complete this thesis and ambition to improve the lives of older people. I found this interdisciplinary research inspiring and productive leading to new knowledge.

DEDICATION

My thesis is dedicated to my parents, grandparents and father-in-law, who are no more with me in this world, yet I owe my life to them. I also dedicate my thesis to my husband Zaka, my beloved children Munibah, Mariah, Raihan, Raabiah and Sidrah for their constant support and unconditional love.

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I express my gratitude to Professor Andy Turner who also provided guidance and support during my PhD. I am also very grateful to Professor Ala Szczepura for her valuable feedback and encouragement. My special thanks go to Professor Richard Cheston from the University of West of England for providing his valuable advice and spending his invaluable time in supervising my project and to Dr Kim Bul who spent time reading my drafts and providing valuable feedback. I am very thankful to Dr Kelly Murphy for granting permission to use ArtOnTheBrain app for a limited time and Dr Kate Duncan at City Arts for giving unconditional permission to use Armchair Gallery app. My sincere thanks go to all the residents and care home staff for their participation in my research (their identity is not revealed due to ethical reasons of anonymisation). I am thankful to the staff at Doctoral College and CTPSR, Sam Carter, Jessica Northey, Kelly, Chris Bark and Darren Flynn. I am also very thankful to all my friends especially Jasmine Peak for her friendship and their moral support. My family also deserves my thanks because without their help I could not have achieved much in my life. I am highly thankful to my husband Zaka who always supports me and for his unfaltering confidence in my abilities to succeed in my chosen career. Similarly, I heartily thank my kids particularly my youngest daughter Sidrah. She was 6 months old when I started this research and now she can equally share the joy of my achievements with other kids. Finally, I am grateful to all who navigate this doctoral thesis.

ABSTRACT

Despite numerous health benefits of arts, cognitive, creative, cultural and digital health activities for older people, the care home population is often ignored and neglected from benefiting activities available outside of care homes. Age-friendly arts-based well-being software applications (apps) were found to provide digital health solutions by bringing museum arts and cognitive activities within care homes. Literature showed limited information about Arts-based digital (ABD) interventions for older people in care homes (OPLICH) in the UK. To fulfil the knowledge quest, this thesis aimed to explore the feasibility and impacts of ABD intervention on OPLICH. Formal ethical approvals were sought for three interconnected studies to answer exploratory research questions. **The first** study, evidence-based realistic review used an extensive literature search including mixed qualitative and quantitative methods. It revealed heterogeneousness and poor-quality studies for ABD interventions. A knowledge gap was found for a single theory and method to encompass ABD interventions. Two ABD apps, Armchair Gallery and ArtOnTheBrian were identified that were tailored for older people and incorporated culture (museum arts) and cognitive activities (games). Adapting the 'Hierarchy of Needs' and 'Healthy ageing' model, an empirical, 'Needs-based Healthy Ageing Model' (NBHAM) was created and tested as a theoretical framework of this research. **The second** focus group and consultation study aimed to assess residents, staff and research partners' needs and readiness for ABD interventions. 17 people (9 staff & 8 residents) participated in the 3 focus groups study across two care homes. The results revealed the suitability of the Armchair Gallery app for the ABD intervention. **The third** mixed-method feasibility study was aimed to explore the health and social impacts of ABD activities in care homes using the Armchair Gallery app. The collaborative approach and involving care staff helped in refining the protocol for the ABD intervention. An experimental design (before and after) was used for the 6 weeks trial. 25 people (2 facilitators, 11 residents and 12 staff) were recruited. Using the idea of 'Living Lab', the researcher lived in the care home to deliver the ABD intervention. Two groups of 4-6 residents used the Armchair Gallery app for the weekly 45-60 minutes group ABD activities using iPads for six weeks. The activities blended traditional arts, crafts, cultural and cognitive activities. Multiple subjective and objective evidence-based data collection tools were used. Statistical (quantitative) and thematic (qualitative) analysis helped in triangulation and data validation. Most recruitment and retention targets were achieved. ABD intervention revealed positive changes in the quality of life, mental well-being, cognition, computer use, mood and emotions of the participating residents. Improvement in residents and staff's confidence and social interaction was reported. The intervention was found enjoyable, empowering and engaging. The app was easy to learn and use. Overall, the ABD intervention was feasible and acceptable. This thesis has laid the foundation for future larger ABD intervention trials with its empirical theoretical model 'NBHAM' and presenting exploratory findings of the feasibility of ABD intervention in a replicable and transparent manner.

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LIST OF ACRONYMS

Acronyms			
ABD	Art-Based Digital	NHS	National Health Service
ADL	Activities of Daily Living	NICE	National Institute for Health and Clinical Excellence
App	Software Application	NIHR	National Institute for Health Research
ArtsObS	Art Observation	OECD	Organisation for Economic Co-operation and Development
CI	Cognitive impairment	ONS	Office for National Statistics
CIND	Cognitive impairment with no dementia	PRISMA	Preferred Reporting Items for Systematic Review and Meta-Analysis
CIRCA	Computer Interactive Reminiscence and Conversation Aid	OPLICH	Old People Living In Care Homes
CPQ	Computer Proficiency Questionnaire	OPWND	Older people without dementia
CQC	Care Quality Commission	PICOTS	Population, intervention, condition, outcomes, time and settings
CTPSR	Centre for Trust Peace and Social Relations	PIS	Participant's information sheet
DDRI	Data-Driven Research Innovation	PWCI	People with cognitive impairment
EQ-5D-5L	European Quality of Life-5 Dimensions-5 level response	PWCIND	People with Cognitive Impairment but no dementia
GCCWOT	Greater Cincinnati Chapter Well-Being Observation Tool	PWD	People Living with Dementia
GDS	Geriatric Depression Scale	QoL	Quality of Life
GDPR	General Data Protection Regulation	RCT	Randomised Controlled Trial
HLS	Health and Life Sciences	REF	Research Excellence Framework
INTERDEM	Intervention for Dementia	SCIE	Social Care Institute for Excellence
MCI	Mild Cognitive Impairment	SPSS	Statistical Package for the Social Sciences
mHealth	Mobile Health	SWEMWBS	Short Warwick-Edinburgh Mental Well-being Scale
MMSE	Mini-Mental State Examination	UN	United Nations
MoCA	Montreal Cognitive Assessment	UK	United Kingdom
NBHAM	Needs-Based Healthy Ageing Model	WHO	World Health Organisation

GLOSSARY

Term	Definition within the thesis
Activity	Everything that one can 'do' to keep emotionally and physically well and give meaning to life.
App, Application	A software application that can be used on a laptop, tablet, or computer.
Art Activity	The enriching and creative activity of self-expression
Arts-based activity	Arts-based creative, cultural and digital activities using digital equipment (iPads) with the intended outcome of improving the well-being and quality of life.
Art Therapy	Psychotherapy to improve health using art media by an art therapist.
Bias	An unfair tendency to select something over others to yield the desired outcome.
Care homes	Any institution or care facility which provides accommodation and care for older people who are unable to look after themselves, residents have their own room or flat and share a common communal lounge.
Care provider	Organisations or housing associations that are registered with either CQC or with the Homes and Communities Agency to provide a regulated activity or physical assistance.
Care staff	All care home workers are employed to provide care services to residents.
Co-designing	A research approach that involves stakeholders to meet the needs of the research participants
Cognition	The use of conscious mental processes.
Cognitive decline	The process of deterioration of cognitive functioning such as difficulties with memory, day-to-day functioning and language along with a continuum, of 'normal' 'age-related', but the decline is not severe enough to be diagnosed as dementia.
Cognitive Functions	It refers to the activities of the brain that enable knowledge such as memory, attention, language, reasoning and problem-solving.
Cognitive impairment	A condition in which deterioration of cognitive functions are associated with difficulties with memory, language and day to day activity.
Comorbidity	Presence of more than one disease or disability or poor health or medical conditions simultaneously.
Dementia	A syndrome affecting thinking, memory, behaviour other cognitive abilities and behaviour that interferes with the ability to perform everyday activities (WHO, 2020e).
Digital health	Using digital technology to improve health
Digital health intervention	Using digital technology for safe, practical and scalable interventions to improve health.
mHealth or eHealth	Use of electronic devices or wireless devices such as mobile phones or tablets to improve health outcomes, health research, or health care services.
E-leisure	Leisure time, activity, or behaviour that occurs using technology.
Ethnic minority	People from different racial or cultural backgrounds who are in a minority such as Black, Asian and mixed living in the UK.
Extra care housing	Purposefully built or adapted single occupancy accommodation occupied or owned under an occupancy agreement.
Feasibility	The extent to which an innovation is successfully carried out or used within a particular setting (Weiner et al., 2017).
Feasibility study	A study that can help the researcher to prepare a full-scale trial or intervention.

Findings	Conclusions, summaries, or impressions reached after an investigation or examination of data.
Frail	A vulnerable person is affected by the misbalance between the factors maintaining and threatening health.
Frailty	A dynamic state that affects human functioning resulting in an increased risk of adverse outcomes in older people
Functional disability	The difficulty in performing activities of daily living causes adverse effects on older people's health and well-being.
Generalise	The ability to draw conclusions and make statements that can have a general application.
Health	Maintaining or regaining physical, mental, emotional, social and spiritual well-being
Health intervention	An act performed for a person or population with a purpose to improve, maintain or promote *health*, adapting and maintaining functioning or *health* conditions (WHO, 2015b).
Healthy ageing	To promote physical, cognitive, social, spiritual health of older people with a focus on improving overall QoL and well-being in a supportive living environment. (Oliver, Foot & Humphries, (2014).
Health Promotion	Social and environmental health interventions to benefit and protect health and QoL by preventing and addressing the root cause of ill-health (WHO, 2016)
Health Technology	A method used to promote health; prevent and treat disease and improve rehabilitation or long-term care using electronic or digital technologies.
Infer	Conclude or deduce information from reasoning and evidence and not from explicit statements.
Innovation	A set of behaviours, ways of working and routines associated with administrative technologies to produce an outcome (e.g. health improvement; administrative efficiency; cost-effectiveness; user experience) (Greenhalgh et al., 2004, p. 40).
Interdisciplinary research	A mode of research whose scope is beyond a single discipline and which integrates information, data, techniques, tools from two or more than two disciplines to advance knowledge (Pfirman & Martin, 2010).
Intervention	A programme, service or product to change or influence people's health, environmental choices and behaviours
Leisure activity	Using free time for activities outside the daily routine voluntarily
Meaningful activities	Leisure, social and physical activities tailored to a person's preferences and needs (NIHR, 2013)
Meaningful change	An improvement in health outcomes or a beneficial positive change that is meaningful to an individual and may be statistically calculated.
Mental Health	A state of mental well-being in which individuals realise their potential and cope with life stresses.
Mild cognitive impairment	People with some signs of cognitive impairment without any diagnosis of dementia (Chertkow et al., 2008)
Morbidity	A state of diseased/disability that results in poor health, frailty and dependency (Gov UK, 2018).
Nursing care	The provision or the planning, supervision or delegation of care provided by a nurse.
Older people	People age 65 or over.
Outcome	Change in health recorded after an action
Prevalence	Population proportion with a particular condition
Population Ageing	A phenomenon of the increasing proportion of older people in the population.

Public Health	The art/science of preventing disease, improving life and promoting health using organised efforts and making informed choices (WHO, 2012a).
Quality of Life	Wellness that includes indicators i.e., physical function, cognition and pain
Randomisation	A method through which study participants are assigned to a study based on chance alone.
Reminiscence	Act or activity or the process of recalling past.
Research	An original study or investigation to gain knowledge, information and understanding to find answers to a problem and reporting.
Residents	People living in care homes or residential or nursing homes.
Residential settings	A living place for older people is provided by residential care providers.
Resilience	Capacity or quality to adjust to a loss and effective adaptation to adverse conditions or trauma or stress, despite significant difficulties (Windle et al., 2012; Van Woerden et al., 2020).
Sampling	Recruited process for selecting participants or locations for research.
Social care	Practical support or care for people with physical or learning disabilities, or physical or mental illness.
Social isolation	An inadequate quantity and quality of human interaction or social relations with others at the individual, group, community level in a social environment.
Successful ageing	Ageing well with good cognitive, social and functional health having a good quality of life and well-being
Training	Information was provided to share skills and approaches for the activity.
Therapy	The treatment of physical or social or mental disease or disorders (Collins, 2009)
Well-being	A holistic positive physical, mental and social, spiritual experience of individuals

CHAPTER 1: INTRODUCTION AND BACKGROUND

This chapter provides an introductory background of this exploratory research focused on promoting healthy ageing among 'Older People Living in Care Homes' (OPLICH) using 'Arts-Based Digital' (ABD) activities. This chapter sets the scene, provides definitions used in this PhD thesis and shows the complexity of this interdisciplinary research. Lastly, a functional matrix guides the reader through the remainder of the thesis.

1.1 Population ageing and burden on health and social care system

Due to rising life expectancy, the number of older people around the world has been dramatically increasing (World Health Organisation [WHO], 2015). The fast growth of the population aged 60 and over compared to all younger age groups and the reduction in fertility has caused the population structure to shift (WHO, 2017a), a phenomenon described by the United Nations (UN, 2017a) as 'population ageing'. Population ageing is an important challenge faced by public health in the 21st century (WHO, 2012a). To understand the magnitude of the problem, the older population has already increased to over 1000 million globally (UN, 2019). Also, the population aged 60+ is further expected to rise to 1402 million by 2030 and further to 2092 million by 2050 (UN, 2017a), when it will represent over a fifth of the world's population (Figure 1).

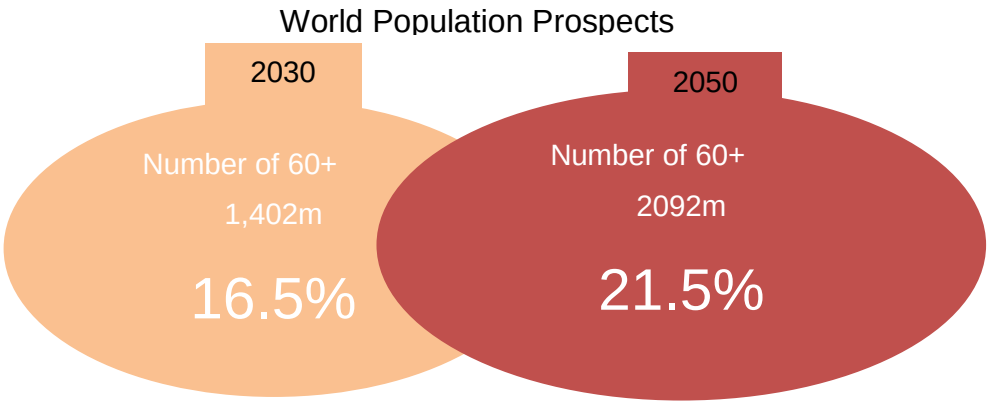


Figure 1 World population prospects for age 60+ (UN, 2017a)

As a corollary of the population ageing in the United Kingdom (UK), more than 1 in 3 older people face difficulties in undertaking activities of daily living (ADL) unaided, resulting in functional disability (Age UK, 2017a; Millán-Calenti et al., 2010). The Office for National Statistics (ONS, 2018a) indicates that there will be an increase of around 8.6 million people aged 65 years and over in 50 years in the UK. Among them, the fastest-growing age group

is the over 85s which will be double (3.2 million) by mid-2041 and treble by 2066 making up 7% of the UK population (ONS, 2018b). UK population data shows that there were a higher number of people aged 90 and over in England and Wales compared to Scotland and Northern Ireland (ONS, 2014b). Regardless of the regional difference in the population, the growth of older people with complex care needs is projected to increase. An increasing number of people are reaching ages 85 and over with morbidity and dementia (Kingston et al., 2018). Hence, population ageing was considered a challenge for public health (WHO, 2020b).

1.2 What does ageing and old person mean?

Ageing is a complex phenomenon (Foo et al., 2019; Fulop et al., 2010). Therefore, it is necessary to understand 'ageing' itself to comprehend the impact of population ageing. In chronological terms, age is described as the amount of time that has passed from birth in years. However, chronological age is a poor proxy for the level of dependency in a population (UN, 2017b). Biologically people age at different rates as older people are diverse in activity and functional capacity. Therefore, various categories of older age groups were used in the literature without a single definition of 'older'. Despite being labelled as 'old', the group of older people is heterogeneous (Motti et al., 2013). Age UK (2019a) used the term "older" for persons aged 65 years and above. According to Poscia et al. (2015), age 60 or 65 years is the start of old age. The Organisation for Economic Co-operation and Development (OECD, 2020) also used age 65 years and over for reporting the older population. Likewise, age 65 years and over is used internationally to calculate the old-age dependency (UN, 2017b).

Indeed, ageing is neither a disease nor a condition (Taneva et al., 2014). However, some people age successfully, whereas others show an ageing-related decline. For example, a person aged 75 could be normal and healthier than a person aged 60 as highlighted by the (National Health Service [NHS] England, 2019). Considering ageing is a heterogeneous process, older people are a diverse population with a range of health needs. Despite that, the chronological age may not be accurate in reflecting individuals true functional age (Foo et al., 2019), disease statistics show that the likelihood of being unhealthy or experiencing complex health conditions and comorbidity increases with age (ONS, 2018a). Therefore, statistics show that 94% of the UK care home population are aged 65 years and over (Lievesley et al., 2011). Therefore to keep consistency in ageing research, older people in this thesis are also referred to as people aged 65 years and over.

1.3 What does health mean for older people?

Though the definition of 'health' has no consensus (Bagaria et al., 2020), commonly, health is defined as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (WHO, 1946, p.19-22). However, researchers are advised to use an appropriate concept of health for the target population (Skinglely et al., 2012). For an ageing population in the modern world, chronic diseases became a norm (McDermott, 2020). Moreover, when older people are at a higher risk for accelerated decline in physical and cognitive abilities (Fulop et al., 2010), WHO's definition looks limited. For Huber et al. (2011) health for older people is the ability to adapt and self-manage. However, this definition ignores mental, social and physical well-being challenges that require consideration. Holistically, health and wellness are multi-dimensional that include physical, intellectual, emotional, environmental, social, and spiritual dimensions (Swarbrick, 2006). Hence, the health definition in this thesis includes wellness and resonates with Swarbrick's (2006) definition of wellness for adapting and adjusting mental, physical, spiritual and social well-being to maintain or regain meaningful activities to promote health.

The census shows that only 50% of those aged over 65 years, living in the UK, reported their health to be "very good" or "good" compared to a high percentage (88%) of the rest of the population (ONS, 2017). With age, older people become functionally, cognitively and physically frail (Fulop et al., 2010; Rockwood et al., 2006). Cognitive and physical frailty are dynamic, multi-dimensional health deficits (physical, cognitive, psychological or/and social or multiple) resulting in the decreased activities of daily living (Clegg et al. 2013; De-Roeck, 2020; Rockwood & Mitnitski, 2011). Frail older people, at greater risk of disability, require significant health and social care resulting in care home admission to cope with daily life (Comas-Herrera et al., 2007; Fulop et al., 2010). Despite that not all older people become frail and frailty is not dependent on age (Mulla & Montgomery, 2020), 10% of those over 65 years are frail in England (Clegg et al., 2013), which increases to 50% for over 85 (Age UK, 2017b) and to 65% for over 90 years (Gale et al., 2015). These figures show that the risk of frailty increases with age (Puts et al., 2017). Therefore, promoting health in this population is a priority in the world (WHO, 2020c).

The forecast trends in life expectancy combined with population trends in chronic diseases such as dementia are constantly increasing the burden of disability and dependency (Guzman-Castillo et al., 2017; WHO, 2012b). Chronic conditions are 58% more prevalent among older adults compared to age groups under 40 (14%) (Age UK, 2019a; The King's fund, 2018a). The increasing comorbidity, frailty and complexity of care have resulted in an

increased number of care home admissions and an increased demand for care homes (Age UK, 2019a; Holthe et al., 2007). To comprehend the intensity of the increasing problem, the number of older people with care needs is predicted to increase by 25% by 2025 (Guzman-Castillo et al., 2017). Approximately 421,000 people live in UK care homes due to some function or mental disabilities (Laing & Buisson, 2017) and figures are set to increase given the UK's ageing population (National Institute for Health and Care Excellence [NICE], 2013). Approximately 46.8 million people live with dementia (PWD) worldwide (Alzheimer's Society, 2016). In the UK alone, approximately 850,000 people are living with dementia and the number is expected to increase to more than one million by 2025 (Alzheimer's Society, 2020), which will cause a significant impact on health and social care (The King's fund, 2018a). The high costs of care in ageing populations especially due to dementia have increased interest in health promotion and preventive measures in the older population (WHO, 2012b).

While achieving ideal health may not be possible for older people, particularly for older people in care homes (OPLICH), adapting and adjusting to modern life to maintain or regain meaningful activities may be possible (McDermott, 2020). As meaningful activities are mentioned as leisure, social and physical activities tailored to a person's preferences and needs (NIHR, 2013), a personal holistic health approach was taken for this thesis to promote healthy ageing.

1.4 Care home settings for older people in the UK

Due to the frailty and/or physical and/or mental dependency of older people, they require residential care homes (Lievesley et al., 2011). In the United Kingdom (UK) care homes are the main provider of long-term care for frail older people including those who previously would have been the responsibility of the NHS (Dudman et al., 2018). Recognition of the complexity facing residential care homes: a practitioner inquiry. Primary health care research & development, 19(6), 584-590. The provision of care for frail older people is an area of particular importance for public health in the UK (NHS, 2019 & 2020; ONS, 2014a). Broadly, in the literature, 'care home' is used as an umbrella term for a place where old people live, socialise and are cared for. Searching the literature, no universally accepted terminology to define different care settings for older people was found. The term 'care home' varies across different geographical parts as well as from facility to facility. Similarly, the ownership, culture, ethos and the kinds of people who live in care homes vary hugely (Age UK, 2012; CQC, 2015). In this thesis care home refers to 'any institution or residential care facility which provides accommodation and cares for older people who are unable to

look after themselves, residents have their own room or flat and share a common communal lounge.' Though a shift is found in the provision of care from the public sector to the private and voluntary sector (Johnson et al., 2010), both public and private care homes provide a source of residential care for older people in the UK (Lievesley et al., 2011).

Care homes can be separated into two broad categories, nursing homes and residential homes. However, there is a great overlap between 'nursing' and 'residential' care. Nursing homes provide personal and on-site nursing care whereas residential homes, provide only personal care with no nursing care. There are approximately 6,023 residential homes without nursing and 4,699 with nursing facilities in the UK (Age UK, 2019b). In the UK approximately 103,000 older people in care homes live without nursing and 69,000 with nursing care (ONS, 2013a). Nursing care homes can be further registered as specialising in dementia care, where the staff care for a larger number of residents with dementia (Luff et al., 2011). However, it is not just dementia care homes, almost all care homes have a proportion of PWD (Luff et al., 2011). The first international survey showed that 63% of the care home residents lived with dementia or a serious problem with memory in the UK (BUPA 2009). While the recent survey showed that it increased to 70% (Alzheimer's Society, 2020 & 2019b & 2020; Griffiths, et al., 2020). Dementia causes disability in later life and it is a more common cause than cardiovascular disease, cancer and stroke (Alzheimer's Society, 2019b). Dementia costs £26 billion/year which will raise with the ageing population (Alzheimer's Society, 2019a).

In the UK, care settings provide various types and levels of care depending on the requirements of older people (The Quality Commission [CQC], 2015). However, in the literature, most studies made no distinction between nursing and care homes. A significant overlap was found regarding the care need and health status among care home residents. The Quality Commission (CQC), who provide a regulatory framework and inspection methodology for all adult care in England, divide the wide range of settings according to the service and occupancy into five categories (CQC, 2015) which are; (i) Supported Living, (ii) Extra Care Housing, (iii) Domiciliary care, (iv) Care home without nursing and (v) Care home with nursing. Table 1 presents a summary of different types of care homes in the UK according to the provision of personal and nursing care.

Table 1 Care settings for older people in the UK

Summary of care settings for older people in the UK (Andrews et al., 2013; Cagney & Cornwell, 2018; Care homes, 2019, CQC, 2020)					
	Care homes without nursing			Care homes with nursing	
Type of living	Extra care/Retirement houses	Supported living	Domiciliary care	Nursing home	Dementia care
Nursing Or Medication management	Highly unlikely	Unlikely	Unlikely Separate agreements	Highly likely	Highly likely
Personal care	Likely / Separate agreements	Available on demand	Likely on demand	High level of care	High level of care
Accommodation / flat ownership	Occupancy agreement	Shared/ Own/Rent	Own/rent	Highly unlikely	Highly unlikely
Support for Activities of Daily Living	Highly unlikely	Highly likely Staff available 24hours	Visiting arrangements	Highly likely	Highly likely
Provision of balanced Meals	Highly unlikely	Unlikely	Highly unlikely	Highly likely	Highly likely

1.5 Why the focus is on promoting healthy ageing in care homes?

The ageing population is increasing physically and cognitively dependent population (Daly et al., 2020). The poor health of older people brings challenges for both health and social care systems (WHO, 2018). Like the rest of the world, the care home population is also ageing. The UK census 2011 revealed an increase to 59.2% of older people aged 85 and over living in care homes, compared to 56.5% in 2001 (ONS, 2014a). Regarding the gender difference fewer females but more males, aged 65 years and over were residing in care homes in 2011 compared to 2001 (ONS, 2014a). There is a care crisis in the UK (Age UK, 2019b). Due to functional and cognitive disabilities, an increasing number of older people in the UK will end their lives in a care home (Age UK, 2019a). Publicly funded care homes for older aged over 65 years are projected to increase to 280,000 by 2040 (Wittenberg et al., 2018). This shows the importance of promoting preventive health interventions in care homes to decrease the increasing burden on the health care system.

Regardless of the different terms used for the care homes across different geographical areas, the resources and experience provided by the care setting impact the experience of ageing of older people. Though age is the risk factor for chronic diseases, social isolation made the care home population even more vulnerable as highlighted across the world (WHO, 2020a). Vulnerability increases the risk of suffering harm (Bogota et al., 2017). Therefore, for the vulnerable and disadvantaged care home population, the urge has been given to create caring environments that foster healthy ageing in care homes (WHO, 2020a). On this point, it is necessary to mention that, precisely for this multidimensional and

complex thesis, a single definition of healthy ageing could not justify the broad framework of reference for ageing. In this thesis, the concept of healthy ageing is an inclusive concept that has combined 'healthy', 'successful', 'active', ageing. Hence, 'healthy ageing' was defined as promoting physical, cognitive, social and spiritual health of older people with a focus to improve overall QoL and well-being in a supportive living environment (Oliver et al., 2014).

As the environment is an important determinant of health (WHO, 2020b), the living environment of a care home shapes and influences the well-being of older people (Andrews et al., 2013). Although not all, for many older people the living environment of care homes and the negative impact of institutionalisation causes adverse psychological and physical effects (Harmand et al., 2014). Older people in care homes often face a series of challenges (Claire et al., 2008), negatively influencing their resilience impacting their effective negotiating, adaption and managing abilities to trauma, stress or difficulties (Windle et al., 2012).

The previous census showed that care home residents had limited activities of daily living (ADL) compared to those who lived in private households (ONS, 2014a). The exact reasons for the decline in the health of OPLICH were unclear (Harmand et al., 2014). The difficulties of performing ADL could be due to physical and mental limitations, but it was linked with their restricted mobility due to living in care homes (Duffin, 2012). Moreover, the mobility of older people was linked with the well-being of older people (Nordbakke & Schwanen, 2014). Therefore, finding innovative ways for frail older people who live with complex health needs to improve their quality of care is urgently required (Maenhout et al., 2020). As an essential element of a quality care service, excellence in social care urges spending time purposefully and enjoyably (Social Care Institute for Excellence [SCIE], 2017). Therefore, even the latest research advocates that interventions should be delivered in care homes to improve residents' quality of life (QoL) and well-being (Quan et al., 2020). Hence, the target population for this research are the older people in care homes - a unique population living in a unique environment requiring innovative health interventions.

Chronic conditions, comorbidities, social isolation and cognitive impairments increase with population ageing. Hence, the UK Government (Gov) showed concerns and mentioned that without significant steps to improve health, disability and ill-health will increase in the UK (Gov UK, 2018; Robertson, 2019). Therefore, the focus of public health is on promoting healthy ageing to prevent a further burden on existing health and social care services

(WHO, 2020b). To promote successful ageing, maintaining a physically and intellectually active and engaged lifestyle is necessary (Hertzog et al., 2008). Regardless of variations in the literature about overlapping concepts of healthy, successful, cognitive and active ageing, the main purpose of healthy ageing is to maintain functional abilities to enable well-being in older age (WHO, 2020b). Health Promotion[1] among older people is to enable them to increase their control over their health through health interventions to protect and benefit health and QoL, which is not merely focused on cure or treatment, but also on preventing the root cause of ill health (WHO, 2016). Promoting health among frail older people is necessary to reduce the health burden on the social care system (NHS, 2020). Hence, for the effective promotion of health and well-being for older people, the literature highlights the need for new research (Walters et al., 2017).

1.5.1 Promoting healthy ageing through arts and technology

WHO declared '2020–2030' as the 'Decade of Healthy Ageing' (WHO, 2020d). Hence, promoting the health of older people is a priority to reach its' objectives (Rudnicka et al., 2020). Based on the vision of the UK Public Health "prevention is better than cure". Therefore, activities that can help maintain and sustain the good physical and mental health of older people become vital to reduce any further burden on the health and care system (Public Health England, 2018). Researchers were advised to target their preventive interventions at high-risk groups (Platt et al., 2017). Therefore, the target population for this research was a high-risk group of older people in care homes who are often neglected in both community and hospital-based interventions. As engagement in leisure and social activities is an important indicator of the QoL and well-being in care homes (Ho et al., 2019; Tak, 2015). Due to the potential value of the art interventions, arts provide powerful tools to engage older people in meaningful activities and to increase their sense of personal identity, share experiences and insights with others in addition to improving social engagement and well-being (Greaves & Farbus, 2006; Ho, et al., 2019; Schneider et al., 2019). Hence, increasing interest and usage has been seen in arts-based research (Jones et al., 2020).

In recent years, mobile health ('mHealth') interventions have shown a global rise. Though the definition of mHealth is unclear, it refers to medical or health care interventions that are delivered primarily through mobile devices (Park, 2016). Mobile health has not only been

[1] Health Promotion' is the intervention to help enable people to gain more control over their health and to protect and increase health and quality of life by prevention of ill-health (WHO, 2016).

used to improve the quality of care but also to promote positive changes in health behaviours to adopt active and healthy ageing, preventing age-related diseases and conditions (Zhaoa, 2018). This explains the potential of digital activities on the well-being of older adults to meet the challenges presented by increasing older populations and the demand for health and social care services.

Despite various benefits of stimulating art activities, often older people living in care homes (OPLICH) are not engaged in these activities (Goll et al., 2015). They are socially excluded from participation in cultural and creative activities, widely available in the outside world (Goll et al., 2015; Wood et al., 2005). Older people living in care homes often find it difficult to visit a museum for example, due to their health, immobility or a lack of transportation. To some researchers, social isolation is the lack of engagement with others (Haga, et al., 2014). For others, it is the deprivation of social connectedness (Zavaleta & Samuel, 2014). Regardless of the differences in defining social isolation, care home populations are recognised as socially and culturally isolated and are a worldwide concern. However, technology can provide a solution and eliminate barriers due to distance (Age UK, 2014). Arts-based digital apps can increase the access of care home residents to art galleries (Duncan et al., 2018).

Although there is a digital divide between young and old people (Bobrowicz-Campos, & Matos, 2020), with technological advancements, digital platforms have provided opportunities to develop new programmes tailored to older populations (Caprani et al., 2012; Humphrey et al., 2017). The new technologies that have been particularly tailored to meet the specific needs of older adults have already been introduced, known as "Gerontechnology" providing a solution to this problem **(**De Regge et al., 2020). Human-centred and technology-driven approaches recognise that social and material components are relationally entangled and inseparable (Peine et al., 2021). Therefore, with the advance of technology, positive change was seen in the use of digital technologies by older people (Duncan et al., 2018). Digital technology is now being used for viewing art, exploring culture, inspiration, socialisation and well-being, especially for those who cannot visit such museums. Taking part in digital art can help to reduce the negative emotions and the exclusion that some care home residents experience both in the real and the digital world (Duncan et al., 2018). There are mixed paid and free apps available in the market which allow a virtual tour of art galleries and museums. This makes these valuable venues accessible for older people in care homes, a population often excluded from the community or hospital-based interventions. However, not all applications (apps) are suitable for older

people with cognitive impairment. Only a limited number of apps were available that were suitable for older people with dementia like Armchair Gallery or ArtOnTheBrain. They provide an opportunity to virtually view the artwork from different museums. These apps were designed for older people and can be used by people with cognitive impairment and/or early dementia (Duncan et al., 2018; Murphy et al., 2017). However, limited knowledge about the impact of ABD on older people in care homes indicates the need to explore its health and social impact on the older people in care homes.

1.6 The research context

Ageing is inevitable (Formosa, 2019), therefore the focus of this thesis is on promoting healthy ageing. Due to the increasing numbers of age-friendly technologies, there has been an increased interest in researching the beneficial effects of arts, culture and creative digital activities, which in short can be called arts-based digital (ABD) activities. Although the importance of digital health research has been highlighted to promote health and well-being (Mason et al., 2015), there was limited robust evidence about its health impacts on the care home population.

Although older people are often reluctant to use new technology, age-friendly digital or innovative technologies can be used in combination with traditional arts to engage older people who have never used digital technology due to functional or cognitive disabilities (Dix, 2018). This encourages older people to virtually visit museums and explore new technology who cannot physically visit museums as used by Duncan et al. (2018). Around 228 older people from different living settings participated in 72 creative Armchair Gallery workshops. The living settings included community, care homes, assisted living settings, retirement houses, day centres and memory cafés. Duncan et al. (2018) used a qualitative method to test multisensory activities with digital activities and found that the Armchair Gallery app can provide opportunities for older people to be heard and listened to, express themselves, and promotes individual choices. Knowing the potential of arts-based digital activities in promoting the health and well-being of older people, the current research is aimed to provide practical knowledge about combining traditional arts with the digital arts to improve well-being and socialisation among older people in care homes. In this research, the term ‘arts’ refers to any visual, creative art, digital art, music, craft, cultural, storytelling, multisensory, reminiscence activity that promotes healthy ageing. To increase the digital and arts inclusion of older people in care homes and to turn the potential of ABD activities, a better understanding of how to conduct ABD interventions in care homes were needed.

Arts interventions have been continuously innovated and art appreciation based on museums and art galleries are an innovative way of art intervention which have been developed over the past decade. Having the ambition to help older people in care homes innovatively, the emerging concept of arts-based digital activities was utilised in which arts, culture, creativity, craft, visual and virtual arts were blended using digital technology. The human-centred and technology-driven approach recognises that social and material components are inseparable (Peine et al., 2021). As an emerging topic, limited information was published for ABD interventions as most research were ongoing. Therefore, this thesis has made use of a realistic review because a realistic review examines the evidence in the light of ongoing research (Munn et al., 2018). This method was used to understand the context of arts-based digital interventions, in which research was conducted, and aided to explore the achieved outcomes in previous research.

Several age-friendly software applications (apps) were available in the market. However, the realistic review revealed a limited number of age-friendly arts-based digital apps. Only two inspiring old age-friendly well-being apps, 'Armchair Gallery' and 'ArtOnTheBrain' apps were found in which arts, culture and cognitive activities were combined. These apps bring artworks and museums close to people who cannot visit museums. Therefore, through these apps, one can virtually visit museums and play cognitive games. These apps could be used to engage older people in meaningful activities without needing any art therapists which are often a requirement for art therapy. One app the 'Armchair Gallery app' was freely downloadable and the other was a web-based ArtOnTheBrain' app that required a subscription. Both apps were previously tested by older people. These apps could be used by older people with normal cognitive and cognitive impairment. Both were unique in providing arts and culture-based cognitive and social activities. Though tested by the apps developers, limited information was available about their trials in the UK care homes. Hence, exploring the impact of ABD interventions on older people livening in care homes were needed due to the knowledge gap in this area.

Unlike any other digital intervention, ABD interventions combine traditional art activities with digital activities. Using a person-based approach the activities can be tailored for older people. Though traditional arts and crafts could have multiple definitions, in this thesis, it means the traditional style of painting using pen, pencil, and colours or making things using craft materials for a multi-sensory stimulation. Participants were encouraged to use iPads and styli to create digital arts using different freely available colouring or painting software or games like colorfy etc. They virtually visited museums, art galleries, sculpture parks and

viewed artworks as part of the Armchair Gallery app. A theme talk related to the artwork from the selected museum or art galleries was used for meaningful social activities in the care settings.

Despite potentially enormous implications for art, the use of digital technology in arts is not yet sufficiently researched (Zubala et al., 2021). Research in care homes was highlighted as complex (Luff et al., 2011), yet it is gaining increasing interest in public health research. However, it is unique and the importance and need for researching in care homes were revealed from the literature review mentioned in Chapter 2. Hence, the focus of this research was to design innovative health interventions for older people living in care homes. By taking a collaborative approach, the plan was to involve staff and residents so they could feel part of this research. The activity should be fit for the target population and their environment (Lyubomirsky, 2007; Seligman, 2012). However, not all activities are equally suitable for older people in care homes. Therefore, the focus was to create activities meaningful for the participants. Therefore it became vital to assess research participants' needs before selecting suitable activities for research participants. Literature review revealed multiple theories that were used for arts and digital interventions by researchers, but no consensus was found on a single theoretical framework (Nafis et al., 2018a). For example, Duncan et al. (2018) utilised the TimeSlips model for their arts-based digital activities. However, this model was only relevant to the storytelling or reminiscence part of the activity and does not cover the multi-sensory and creative art elements of the activities. As the theoretical and conceptual framework should guide and align with all parts of the research (Adom et al., 2018) single theory did not find suitable to encompass complex ABD intervention in this research.

After considering several potentially relevant theories, the ABD intervention was anchored on models focused on human needs and healthy ageing. Hence, a new theoretical framework the 'Needs-Based Healthy Ageing Model' (NBHAM) was developed and used for the complex ABD intervention. This model was based on the human needs' model, Maslow's model (1987) and the 'Healthy Ageing' model WHO (2020b). It focuses on maintaining and developing the functional ability to enable wellbeing in older age based on human needs. It created a new model of the 'Needs-based Healthy Ageing Model' (NBHAM). The focus of this model was on the physical, social, emotional, and self-fulfilment needs (creativity and happiness) of older people. The empirical theoretical framework model was tentatively built based on the literature review and my initial fieldwork. The theoretical framework (NBHAM) encompasses all stages of ABD interventions. While

focused on promoting healthy ageing, it describes the needs of the research population with technology and creativity for promoting healthy ageing in care homes.

Despite the complexity of technology interventions for health, Poscia et al. (2018) concluded digital interventions as the most successful interventions among all other interventions for older people in their systematic review. Although several benefits of arts-based digital apps are mentioned in the literature, evidence was scarce about their acceptability and health impact (i.e., well-being, QoL and cognition) on older people in care homes. However, too much strong focus on the main evaluation can neglect the feasibility research (MRC, 2018). Due to the limited published information about ABD interventions in care homes, a feasibility study of complex ABD interventions was vital to explore and understand the practical issues of developing, piloting and reporting to fill the knowledge gap. The term feasibility studies are increasingly used for informed planning and decisions in a definitive trial (Sim, 2019). Whereas the 'pilot' study is used for a study having a control group and randomisation to resemble the intended trial (Whitehead et al. 2014). However, feasibility and 'pilot' studies are commonly used interchangeably to describe any preliminary studies (Whitehead et al., 2014; Sim, 2019).

As limited information was available about combining arts and digital activities in care homes, the exploratory study design was more suitable for this research to lay the base of larger trials. Though there was a difference in opinion about the feasibility and pilot studies in health and social disciplines. For social scientists, there is hardly any difference between pilot and feasibility studies, while for health scientists, feasibility studies are separated from pilot studies with/without a control group and/or randomisation. However, both health and social scientists agree that a feasibility study is vital in assessing the practicalities, feasibility, valuing and progressing to a larger trial or evaluation study (Hallingberg et al., 2018; Whitehead et al., 2014). Though conducting pilot or feasibility studies do not guarantee success in the main study, they increase the likelihood of success. Hence, feasibility is the extent to which innovations can be successfully carried out or used within a given set (Weiner et al., 2017). Due to the limited knowledge regarding ABD intervention trials in care homes, this research was expected to provide vital information about the development of ABD interventions to promote healthy ageing in care homes and to lay the foundation for future studies.

1.7 Using the concept of 'Living Lab'

This research used an innovative concept of 'living lab' for collecting data and for taking a person-centred approach to the ABD intervention. The living lab was an open research concept based on the participant-centred approach and stakeholders' active involvement to bring multiple perspectives from the stakeholders and give power to the research process (Higgins & Klein, 2011; Leminen, 2015; Ståhlbröst & Holst, 2013). Although the term 'Living Lab' is commonly used, I do not agree with this term. There are two reasons for it. First, ethically the term 'lab' does not look appropriate for a living environment like a care home. Second, the research participants should not be considered as testing objects for an experiment. However, the living lab idea was appealing because I could relate it to real-life research. This concept was fitting well with the idea of involving residents, using carers and staff's experiences and knowledge for developing the intervention in real-life care home settings. The living lab concept was stimulating because its key principle is openness and it stresses generating an innovation process that is as open as possible (Leminen, 2015). Later in the research, this approach proved to be the key to the successful intervention embedded in the theoretical model (NBHAM). As an ethnographic approach is useful to describe and analyse the personal experience and useful to understand cultural experience (Ellis & Adams, 2011), this research took an ethnographic approach to report the researcher's interaction with staff and residents.

1.8 Research aim and objectives

Exploratory research is required for testing new concepts (Maenhout et al., 2020). Due to the limited published information about the ABD intervention in the UK care homes, this research aimed to explore the potential for arts-based digital innovation (using Arts-based digital well-being Apps) to promote healthy ageing in care homes.

1.9 Research questions

Using an iterative process, I revised the research questions several times before finalising them. Knowledge gained from field observation and consultation process helped in refining these primary exploratory research questions:

Q1: What is the feasibility of ABD intervention in real-life care settings?

Q2: What are the impacts of ABD intervention on older people in care settings?

Q3: Is the ABD intervention socially acceptable by staff and residents?

Questions kept broad as a broad research question helps in developing the necessary knowledge and provides a base for future research. Hence, to answer these questions, the research was based on three independent, yet interlinked studies which were fully based

on ethical guidelines. Three formal ethical approvals were obtained from Coventry University. First for literature review (P62915), second for focus groups (P78338) and third, for the feasibility study and pilot trial (P79498). Though this research was conducted in six steps. Though looks linear, it was an iterative process. The main questions were answered taking a systematic approach and objectives were set for each step.

1.9.1 Step 1: Exploration

The research process started with the following objectives:

- To conduct a literature review to find existing evidence about ABD intervention and theories.
- To conduct an empirical realistic review on arts-based digital intervention and identify the arts-based digital apps and knowledge gap.

1.9.2 Step 2: Planning

The research focus shifted towards planning and field exploration of care homes and investigation of their needs assessments and readiness for the ABD intervention. The planning stage objectives were set as:

- To identify the most suitable care home location (setting) for the ABD intervention.
- To consult and conduct focus groups (with care home staff, carers and residents) to assess their needs for ABD intervention and to identify the most suitable arts-based digital app.
- To develop a protocol for the feasibility trial of ABD intervention and refine it by care home staff's consultation.

1.9.3 Step 3: Experimentation of ABD intervention

In the third phase, the focus was shifted towards the experimentation and testing of ABD intervention as a feasibility study to answer the research question following objectives were set:

- To recruit staff and residents to participate in the 6 week ABD intervention in the selected care home.
- To facilitate 45-60 minutes weekly ABD activities for 6 weeks using selected arts-based digital app.
- To collect data before and after the ABD intervention including observational data before, during and after each ABD activities session and test different outcome tools for exploring the impact of ABD intervention on the health of older residents in the care home.

1.9.4 Step 4: Data analysis and exploring the outcomes for the ABD trial

The trial study included health outcomes which are the changes recorded in health after an action (Stuckey & Nobel, 2010). During the fourth phase, the outcome data analysing was done and the following objectives were set:

- To analyse the quantitative data and then qualitative data and convergent them at the end.
- Compiling results to reveal the impact of ABD intervention on participants.

1.9.5 Step 5: Evaluation and reflection

In the final stage of ABD intervention, the focus was on the process evaluation and the objectives set as:

- To evaluate the research process and triangulate findings to uncover the potential impact of ABD intervention on residents and staff.
- To identify the challenges of researching in real-life care home settings.

1.9.6 Step 6: Dissemination

At the end of this research, the output was presented in the form of this thesis for sharing knowledge with other researchers. A summary of the above six steps is illustrated in figure 2 to provide the project outline.

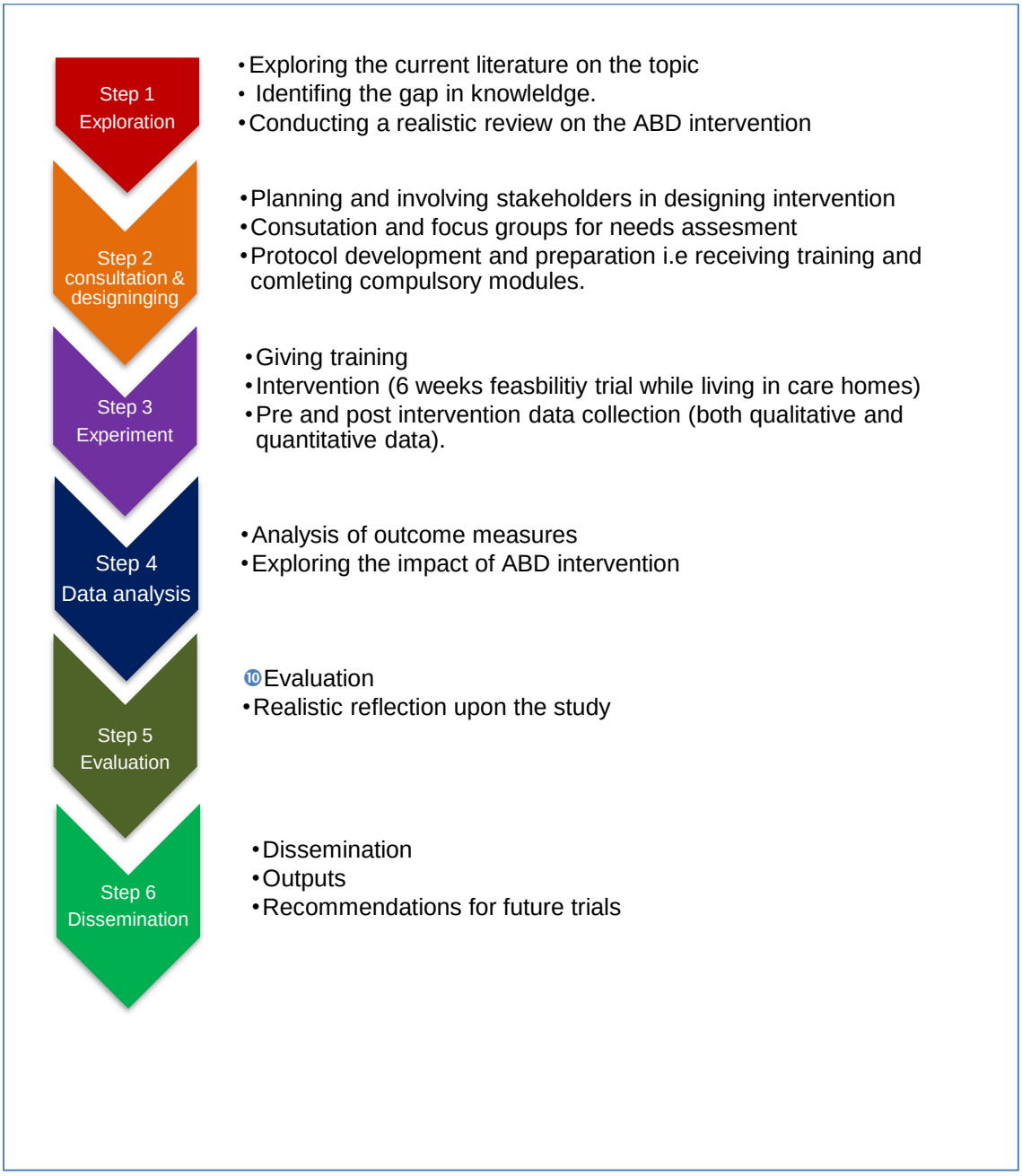


Figure 2 PhD Research project plan

1.10 The complexity, scope and significance of the thesis

This thesis is closely aligned with the strategies of research partners (the group of care homes), Coventry Healthy City initiative, and Coventry University's membership of the Active and Healthy Aging EU network. This research aimed to explore and impact our understanding of Arts-Based Digital (ABD) interventions in real-life care home settings. It explores ABD activities and strengthens creativity, arts, culture and digital technology in care homes. 'The goal was to optimise the QoL and well-being of older people in care homes.

Interdisciplinary research integrates information from multiple disciplines (Pfirman & Martin, 2010). As a single discipline could not encompass the diversity of the ABD activities, the use of an interdisciplinary approach was preferred over the transdisciplinary approach as it maintains the demarcation and benefits from each discipline (Choi & Pak, 2006; Newman et al., 2016). Therefore, this research obtains knowledge from multiple disciplines, hence the scope of this interdisciplinary thesis is beyond one discipline. This interdisciplinary research study is situated at the intersection of 'Digital Health' (mobile health or mHealth), 'Gerontechnology' (apps developed for older people), and 'Arts' (visual and creative arts) and 'Social Sciences' (older people in care homes) as illustrated in Venn diagram (Figure 3). The knowledge has been drawn from Health' specifically public health which is focused on promoting greater health (physical, emotional and mental), preventing disease (dementia) using organised efforts and making informed choices (care home staff and residents). This innovative interdisciplinary research is planned to be informative, innovative and extend the knowledge.

Digital interventions are complex interventions by nature due to their multiple components (Kaufman et al., 2006, Murray et al., 2016; Pagliari, 2007), when it was combined with traditional arts and craft in ABD intervention and arts for health interventions, it added to the complexity of the research. When literature was reviewed, limited information was found about the theoretical framework and standardised tools to measure the impact of ABD. This research was targeted at the vulnerable older population living in care homes that made it a 'high-risk research'. Hence, getting ethical approval was another challenge to overcome for this research. Researchers recognised the complexity of researching in care homes (Dudman, et al., 2018). Moreover, involving research partners from a busy care home environment and working with a multidisciplinary research team made this research extremely challenging. However, I consider challenges as opportunities and my goal to improve the health of older people kept me motivated. Arts, wellness and public health are

mentioned as complex areas of research (Stuckey & Nobel, 2010). Considering the complexity of the research topic, a combined interdisciplinary approach was found appropriate for this research.

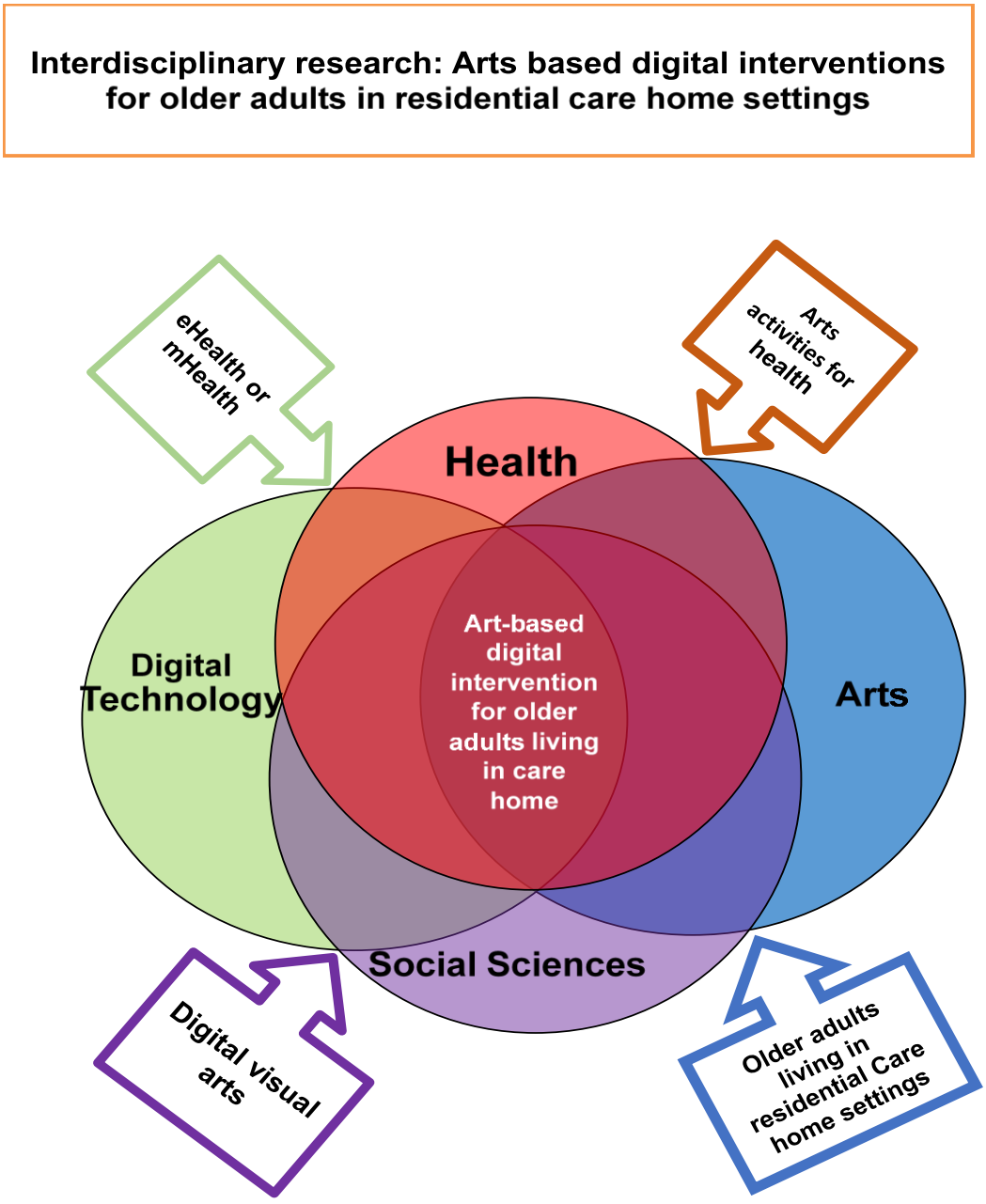


Figure 3 A Venn diagram to illustrate interdisciplinary ABD intervention

Despite being motivated by the impact of PhD research and its expected benefits for older people, maintaining motivation became a challenge due to the complexity of this research. The multidisciplinary supervisory team, which has an interdisciplinary background, guided me to familiarise myself with different approaches that satisfy the disciplines involved in this research. Indeed, the support from supervisors and reading books such as Fenby-Hulse et

al. (2019) and support from other PhD researchers assisted in maintaining my motivation. My readiness to take challenges, my good communication, organisation, project management skills and teamwork helped me to overcome issues and complete the project in the given time. This thesis provides information about the ABD intervention and its potential impact on the QoL and well-being of older people. I am hopeful that my research will contribute to the ever-challenging area of multidisciplinary research in care homes. I am also confident that this thesis will help other researchers, carers, facilitators, care home managers and policymakers to offer innovative meaningful ABD activities to improve the lives of older people.

1.11 Thesis outline

After outlining a broader view of this interdisciplinary research, Chapter 2 further extends knowledge about the arts and digital health interventions for older people and related theories by reviewing the literature to satisfy relevant disciplines. Chapter 3 explores ABD interventions using a realistic review. Chapter 4Chapter 4 Theoretical framework and focus groups present the development of a theoretical framework for this research. It also presents the methodology as well as findings from the focus group study. Planning, designing and experimentation of ABD intervention are described in Chapter 5. The data analysis and findings from the quantitative data and qualitative data are presented and discussed in Chapters 6 and 7 respectively. Chapter 8 realistically evaluates the research while Chapter 9 recaps and presents conclusions, strengths, limitations and recommendations for further research.

CHAPTER 2 EXPLORATION OF THE LITERATURE

After introducing the context of this thesis in the first chapter, this chapter further extends knowledge on the topic through secondary desk-based research using a literature review. This chapter also explores different theories from current literature which were used for arts, technology and health interventions.

2.1 Contextual background

The literature review was started by developing a conceptual framework because it justifies conducting research (Varpio et al., 2020). However, a conceptual framework is a much wider term that surrounds important aspects of the research basis (Mensah, 2020). Therefore, the literature was searched for the conceptualisation of different terms used to describe ageing and the health of older people. Disciplinary differences were revealed about the importance of a conceptual framework. For example, for social scientists, the conceptual framework should be described in more detail (Ravitch & Riggan, 2017). While health scientists only briefly described it in their published papers. In this interdisciplinary research, conscious efforts were made to satisfy the norms of relevant disciplines.

The literature search revealed that historically, ageing research was divided into health and social care, but recently both are integrated (Woo, 2019). Similarly, the early literature showed that the utilisation of arts in health care began just over 60 years ago when it was primarily used for communicating health messages to the public after World War II (Helfand, 1990). However, there was an increasing trend of using arts for health in recent years (Fraser & Sayah, 2011; Bennington et al., 2016; Greenawalt et al., 2019). Different databases from health, social science, arts and digital disciplines were selected to identify the terms used to describe the health of older people. The literature showed a lack of uniformity in describing common terms as they were used interchangeably with several interpretations to explain them. American authors tend to use the term ‘successful ageing’, while UK authors interchangeably use ‘active’ or ‘healthy’ ageing to describe ageing well. However, WHO has replaced the term active ageing with healthy ageing (WHO, 2020b). However, the terms have different meanings and contexts as discussed later in section 2.5. Therefore, to promote healthy ageing, understanding of risk factors that impact the health of older people was necessary. Hence, common risks factors impacting the health of older people and their relationship to the health of older people were identified and mentioned in the sections below.

2.2 Approaching health of older people from health discipline

Ageing, an inevitable part of life, is neither a disease nor a condition and often older people are more knowledgeable and experienced (Taneva et al., 2014). Therefore, population ageing presents opportunities as well as challenges. However, the positive aspect of ageing i.e., the growing numbers of older people without any significant needs for support was rarely highlighted in the literature. Healthy older people are often actively engaged in interpersonal relations and contribute to their community (Daly et al., 2020). The literature review revealed some overlapping concepts with different terms and definitions for ageing like 'active', 'successful' and 'healthy for age-related health research (see section 2.5). Few common terms are used interchangeably by health scientists to describe the health of older people such as 'functional disability', 'frailty', 'chronic conditions' such as 'cognitive impairment' and 'dementia'.

2.2.1 Functional disability and frailty

Functional disability and frailty were used interchangeably in literature to describe the health of older people. However, these are distinct terms. For example, functional disability was described as a distinct concept which concerns the capabilities that enable people to do what they value (WHO, 2020e). Kingston et al. (2012) mentioned that older people find difficulty in performing activities of daily living due to a decline in physical and mental function which causes adverse effects on their health and well-being. Millán-Calenti et al. (2010) and Rockwood et al. (2006) found that functional disabilities increase morbidity, dependency, risk of disability and care home admission. This shows the importance of promoting functional abilities among older people.

Though frailty and morbidity are related, they are two different concepts (Villacampa-Fernandez et al., 2018). Considering frailty, it was referred to as becoming weak, delicate and vulnerable to poor health in older age (Gwyther et al., 2018). It is a concept that was scarcely used in the literature for older people before 1980 as mentioned by Gobbens et al. (2010) and Santos-Eggimann & Sirven, (2016). However, current research shows that not all older people become frail, therefore frailty is not dependent on age (Mulla & Montgomery, 2020). NICE (2015a) highlighted that frail older people are at higher risk of a sudden deterioration in their physical and mental health. Cognitive decline was also linked with frailty (Malmstrom & Morley, 2013). Literature showed that older people move to care homes to cope with daily living because of their complex care needs and frailty (Fulop, et al., 2010; Future Hospital Commission, 2013; Rockwood, et al., 2006; Rockwood & Mitnitski, 2011; NHS England, 2018a; NICE, 2015a). Hence, frailty was an important

determinant of health among older people (Stanko et al., 2017). On a positive note, Gobbens et al. (2010) highlighted that frailty is reversible. Frailty indicators such as a change in care level were found to be dependent upon activity level (Puts et al., 2017). This indicates that increased activity levels can help in reducing frailty among older people. Sometimes in literature, the boundaries between frailty and cognitive frailty are crossed and the terms are used interchangeably (De Roeck, 2020). Though in literature cognitive frailty was mixed with frailty, it was found to be a distinct concept that can occur independently from physical frailty (De Roeck et al., 2020; Legdeur et al., 2016; Scharre, 2019). Hence, NSH (2020) highlighted the need for new research for increasing cognitive functions, decreasing frailty, using meaningful activities, promoting health and supporting older people and improving care and preventing all types of frailty.

2.2.2 Chronic conditions: cognitive impairments & dementia

Ageing was found to play the largest role in determining the risk of chronic conditions (Kojima et al., 2016; Age UK, 2019) causing disabilities and dependency (Guzman-Castillo, et al., 2017; Kojima et al., 2019). Among all chronic conditions, cognitive impairment (CI) and dementia were the most discussed terms in literature, particularly for older people in care homes. These were used to describe the health of older people. Therefore, it was necessary to understand the difference between CI and dementia.

Dementia is a syndrome affecting thinking, memory, behaviour and cognitive abilities that interfere with the ability to perform everyday activities (WHO, 2020e). Mild cognitive impairment (MCI) was described as a possible risk path or a precursor to more severe CI and dementia (Lee & Chi, 2016, Olivari et al., 2020). Due to the growing number of people with cognitive impairment, an increasing number of people with dementia was found causing physical, mental and emotional impacts on health, putting an extra burden on public health (WHO, 2019b). Literature was full of arguments about the stages of CI and dementia, but there was no clear boundary to differentiate between CI and dementia. To conceptualise, Figure 4 illustrate the different terms used for cognition in old age. Despite disagreements on the demarcation between different levels of CI, it remained important to simplify the CI for researchers from non-health backgrounds. As shown in Figure 4, stage one refers to no impairment in which the person does not experience memory loss, movement or cognitive difficulties. Although the very mild cognitive decline was commonly considered as age-related normal cognition, mild cognitive impairment (MCI) is often referred to as cognitive impairment with no diagnosis of dementia (CIND) (Alders et al.,

2020; Chertkow et al., 2008). CIND or MCI can deteriorate to develop dementia (Brannan et al., 2013; Díaz-Mardomingo et al., 2017).

Figure 4 Cognition levels in old age (Mokhber, 2019; Chertkow et al., 2008)

Indeed, the prevention of all chronic conditions are equally important, dementia is a known and more common cause of disability in old age and has no evidence-based cure (Alzheimer's Society, 2019b; Rukes & Fowler, 2020, Olivari et al. 2020). Dementia is a progressive syndrome of deterioration of cognitive function beyond the expected normal ageing affecting thinking, orientation, memory, comprehension, language, judgement and learning capacity without affecting consciousness (WHO, 2020e). According to Kumar et al. (2018), frailty is an effect of functional changes that occurs over a lifetime due to ageing and increases the risk of chronic diseases such as dementia. Though age is the strongest risk factor for CI, there are other risk factors for dementia, such as depression, social isolation, loneliness and cognitive inactivity (Griffiths et al., 2020; Sutin et al., 2020; WHO, 2020e). In the absence of a cure for dementia, the prevention of CI was found to be the principal goal (Olivari et al., 2020). Table 2 summarises, common findings for different stages of CI to make clear differentiation from dementia.

Table 2 Different levels of cognitive impairments

(Chertkow et al., 2008; Díaz-Mardomingo et al., 2017; Scharre, 2020; Unverzagt et al., 2007; Olivari et al., 2020)

Although many trial studies showed inconsistent evidence, Wang et al. (2012) claimed to found a robust association of mental activity with the risk of dementia. However, consistently increasing demand for early interventions to delay dementia or to prevent the transition from MCI to dementia for older people and PWCI was clear from this literature review (Brannan et al., 2013, Wang et al., 2012, Livingston et al., 2017). This shows the importance of designing effective and targeted early preventive interventions to maintain or improve cognitive function and/or at least delay the onset of CI and dementia in frail older people who are at risk for dementia.

2.3 Approaching health of older people from social sciences discipline

From social sciences, the two most common terms were found to describe the health of older people (i) loneliness (ii) social isolation.

2.3.1 Loneliness and social isolation

With the rapid increase in population ageing, social isolation and loneliness of older people were found to be the major issues (Clayton, 2018). Shankar et al. (2011) and Winningham & Pike (2007) mentioned older people in care homes (OPLICH) as a greater risk population of experiencing social isolation and loneliness. Other researchers mentioned that loneliness and social isolation resulted in poor health outcomes such as QoL (Cornwell & Waite, 2009; La Grow et al., 2012; Nummela et al., 2011; Sutin et al., 2020) and increased the risk of dementia (Tilvis et al., 2012).

Though the difference between social isolation and loneliness was not clear in the literature, social isolation was considered as a personal experience or subjective feeling (Age UK, 2018d; Gov, 2018). It was linked to a devastating impact on physical and mental health such as depression and CI and dementia (Holt-Lunstad et al., 2010), increased hospital admissions, premature admission to residential care (Age UK, 2018d) and the risk of mortality (Luo et al., 2012; Patterson & Veenstra, 2010). Conversely, social interaction was described as the process of action and reaction between people (Raymond, 2019). Social isolation was considered as the objective quantity of relationship (Age UK, 2018d). According to Winningham & Pike (2007), the majority of older people in care homes experience disruptions to social support networks which threatens selfhood due to limited opportunities for social interaction and self-expression (Zavaleta & Samuel, 2014). The social exclusion was worse for those with functional disabilities as well as people with CI due to functional disabilities which further limited their opportunities for socialisation. (Kingston et al., 2012). However, Teh and Tey (2019) showed that participating in leisure activities helps in preventing feelings of loneliness among older people.

2.4 Approaching health of older people from arts discipline

Arts researchers highlighted the importance of art and culture for health and in this sense, the most discussed topic was cultural isolation among older people (Archibald & Kitson, 2020, Crossick & Kaszynska, 2016; Veissière et al., 2020).

2.4.1 Cultural isolation

Archibald & Kitson, (2020) mentioned culture as an integral domain of art. Although the culture was not defined throughout the world in the same way, culture was mentioned as the ability to engage with others for social life, a shared norm, habits, values, beliefs, learned patterns of behaviours and expectations learned and maintained (Veissière et al., 2020). Arts and cultural activity became an increasing feature in Britain and the UK is a place where arts meet culture. While culture is rooted in well-being (Crossick & Kaszynska, 2016). Cultural isolation was found as another significant issue for older people especially those in care homes. However, only a handful of researchers developed indices of well-being that included culture as a top-level concern. Museums or sculpture parks were considered historic places (Veissière et al., 2020). Despite that UK was found to be rich with several museums and art galleries, which could be visited by the public (Recupero et al., 2019), inequality in accessing the arts and culture was highlighted in the literature (Crossick & Kaszynska, 2016). Inequality among older people in care homes was linked with functional or cognitive frailty particularly in accessing museums for older people (Age

UK, 2018a; Smiraglia, 2016; Recupero et al., 2019). A lack to take part in cultural and creative activities was lined with reduced QoL (Cutler et al., 2011). Hence, the value of cultural activities is increasingly recognised in the literature. Considering the digital culture, older people are also invisible from the digital leisure culture that also presents opportunities to learn and play (Hebblethwaite, 2017). Moreover, considering the older people living in care homes, they are even often unable to participate in cultural and digital activities and neglected in community-based interventions causing further cultural isolation. Concerning the health of older people, the common risk factors found after the literature review of the relevant disciplines are presented in Table 3.

Table 3 Summary of risk factors impacting the health of older people

	Common health risk factors for older people						
	Functional disability	Frailty	Cognitive frailty / Cognitive impairment	Long term conditions/ Dementia	Loneliness	Social isolation	Cultural isolation
Definitions	The difficulty in performing activities of daily living (Kingston, et al., 2012) or inability to do what people value (WHO, 2020c)	Becoming weak, delicate and vulnerable to poor health in older age (Gwyther et al., 2018).	A dynamic, multi-dimensional concepts- a risk state with several health deficits in physical, cognitive, psychological or/and social or multiple domains of human functioning (Clegg et al. 2013, De-Roeck, 2020).	A syndrome affecting thinking, memory, behaviour other cognitive abilities and behaviour that interfere the ability to perform everyday activities (WHO, 2020e).	A subjective feeling related to the difference between one's desired levels of social contact and actual level of social contact and linked to the perceived quality of relationships (Age UK, 2018d).	The objective number or amount of social contact of a person hence, the quantity and not the quality of relationships (Age UK, 2018d).	Neglected or inability to participate in the cultural activities and creative activities (Age UK, 2018a, Smiraglia, 2016; Recupero et al., 2019).
Impact	Increases morbidity and dependency (Millán-Calenti et al., 2010), the risk of disability, hospitalisation and care home admission (Rockwood, Mitnitski, Song, Steen & Skoog, 2006).	Increases risk of sudden deteriorations in mental and physical health (NICE, 2015), disability, long-term care home admission, hospitalisation and death. (Future Hospital Commission, 2017; Rockwood, Mitnitski, Song, Steen & Skoog, 2006).	Decreased activities of daily living and an increased risk of adverse outcomes (Rockwood & Mitnitski, 2011).	Complex and challenging health problems makes older people forgetful, frail (Lindsay et al., 2019), disable and dependent (Guzman-Castillo, et al., 2017). overburden public health and social care systems (Age UK, 2017; Kelly & Kenny, 2018; Kojima et al., 2019	Devastating impact on health and the QoL, poor health (Cornwell & Waite, 2009; La Grow et al., 2012; Nummela et al., 2011),), physical and mental health (depression and dementia) (Holt-Lunstad et al., 2010), increase hospitalisation, early admission to residential care (Age UK 2018d) and risk of mortality (Luo et al., 2012; Patterson & Veenstra, 2010; Tilvis et al., 2012).	Disruptions to social support networks threats to selfhood, (Winningham & Pike, 2007) limiting opportunities for self-expression and social interaction (Zavaleta & Samuel, 2014) losing the ability to drive, socialisation. (Kingston, et al., 2012).	Impact the QoL of older people including those living with cognitive impairment (Cutler et al., 2011).

2.5 Active, successful, functional and healthy ageing

Due to the focus of this research on promoting health among older people, literature was explored for common terms used for promoting healthy ageing. Four common terms were found in the literature for health promotion and preventive intervention to improve the health of older people in different disciplines, i.e., (i) Successful Ageing (ii) Functional Ageing (iii) Healthy Ageing and (iv) Active Ageing. These are equivalently complex concepts that were used interchangeably without an agreement on their definitions.

'Successful Ageing' was described as the "low probability of disease and disease-related disability, high cognitive and physical functional capacity and active engagement with life" (Rowe & Kahn, 1997, p. 433). Successful ageing is used in gerontology research (Woo, 2019; Rowe and Kahn (2015). Successful ageing was linked to personal well-being and life satisfaction mostly through socialisation (Fernández-Ballesteros et al., 2019; Wong, R., 2018). However, researchers like Dillaway and Byrnes (2009) took a critical stance and warn against the political agenda behind this term. Moreover, cognitively successful ageing includes the ability to remember things without difficulty which is a common problem in old age (Dillaway & Byrnes (2009). Another relevant term 'Successful cognitive ageing' was used in the literature. It means ageing with good QoL, well-being and high-level social participation, independence in performing activities of daily living, free of chronic diseases or with only mild cognitive or functional impairment and no or little disability (Wong, R., 2018). Though the theory of successful ageing looks attractive, Fullen et al. (2018) argued that the criteria used for underlying successful ageing did not well predict self-rated health, happiness and life satisfaction does not align with older people' well-being. Calasanti (2016) critiqued that Rowe and Kahn's successful ageing model is unsuccessful as it does not accept the old age realities and it presents that older people are sick and they cannot learn new things for their cognitive health.

Healthy ageing was commonly used in frailty research (Woo, 2019). For health scientists, 'Healthy Ageing' means developing and maintaining functional abilities to enable well-being in older people (Sadana & Michel, 2019; WHO, 2020b). Frailty occurs as an effect of changes that occurs over a lifetime due to ageing, increasing social health and effective targeted intervention can prevent or delay the onset of chronic diseases such as dementia. In this sense, functional ageing does not differ from healthy ageing. However, the concept of functional age was used to reflect a person's position in the ageing process and did not relate to chronological age (Kuo et al., 2020). Hence, the focus of WHO and public health is on "healthy ageing. The concept of healthy ageing was described as enabling people to

maintain or preserve their functional ability throughout their lives and do what they identify as important for them (WHO, 2020b). However, to a large extent, it depends if the individual has access to additional functioning from a supportive environment (Kuo et al., 2020). A critique of the healthy ageing model is that despite promoting innovation in research, it is insufficiently financially supportive and overly bureaucratic for implementation (Rudnicka et al., 2020). Faber (2015) highlighted the need to improve images of ageing, stereotyping and biases by healthy ageing. Yet, compared to successful ageing, healthy ageing is an inclusive concept that captures the spirit of preserving physical and cognitive function (Wong, R., 2018). Hence, more accurately describes ageing. Although the WHO's definition shows the link between functional ability and well-being, it does not include spiritual well-being which plays an important role in functional ability and well-being (Thauvoye et al., 2018; Louca et al., 2021).

Researchers used the term 'Active Ageing' to describe 'Healthy Ageing'. The activity was mentioned as an important pillar of healthy ageing (WHO, 2020b). However, this term was used by health scientists for prevention and promotion in health to optimise opportunities for enhancing the QoL of older people (Fernández-Ballesteros et al., 2013; Poscia et al., 2015; WHO, 2004). Additionally, active ageing refers to the process of lifelong learning, participation and enhancing the QoL of older people (Faber, 2015). Active ageing recognises the equality of opportunities, the rights of older people their diversity and respect that fulfils human rights principles such as self-fulfilment, independence, dignity, participation and care (Faber, 2015). Hence, Faber (2015) and Bengtson & Settersten (2016) described active ageing research as preventive and restorative for addressing the needs across the range of individual capacity and resources. However, healthy ageing has replaced the previous focus on active ageing as healthy ageing also emphasises the need for action and enabling older people (WHO, 2020e).

Table 4 Conceptualising health promotion in ageing population

Healthy ageing and/or (WHO; 2020b; O'Neill, 2019)	**Functional ageing** (Kuo et al., 2020)	**Active ageing** (Faber, 2015; Fernández-Ballesteros et al., 2013; Poscia et al., 2015; WHO, 2004)	**Successful ageing** (Rowe & Kahn, 2015)
• Developing and maintaining functional, mental, social and spiritual health to enable well-being in older people	• Developing and maintaining physical, psychological and cognitive health	• QoL • Participation • Security • Optimising opportunities • Lifelong learning	• Participation • Contribution to society • Resilience

The above discussion shows inequity and diversity for describing various terms or definitions for healthy, successful or active ageing in the literature. Though the terms and concepts were overlapping they were focused on promoting health in older people (Table 4). This also indicates the importance of promoting health among older people through healthy ageing. The concept presents in this thesis for healthy ageing is multidimensional and combines functional, active and successful ageing.

2.6 Health interventions to promote the health of older people

Though the concept of healthy ageing was clear it was still not clear on how to promote healthy ageing and which intervention would be required. Hence, literature was reviewed for health interventions to promote healthy ageing among older people. The literature showed several types of health interventions both clinical and non-pharmacological. However, scientists have provided evidence that non-pharmacologic interventions improve activity and functions and reduce caregiver burden (Jo & Song, 2015; Ryan et al., 2020; Steinbeisser et al., 2020). Non-pharmacological interventions in non-clinical community settings were also found helpful in reducing social exclusion and improving well-being to benefit health, normalcy and equality in older people (Camic & Chatterjee, 2013; Mittelman & Epstein, 2012). Moreover, Power (2014) recommended non-pharmacological interventions to apply for a person-centred approach in care. Due to the greater significance of non-pharmacological interventions for older people, it became the most suitable choice for this thesis. Like every older person, those in care homes have the right to age well and live a healthy life that cannot be denied. (Kydd & Fulford, 2020). Hence, the focus of this thesis was promoting health among older people using a non-pharmacological intervention.

In this context, three overlapping concepts of non-pharmacological interventions were derived for a preventive health-promoting approach towards healthy ageing among older people. These approaches are: (i) meaningful arts-based activities for older people (ii) digital well-being technology (iii) playful learning. However, both conceptually and theoretically, these approaches were used differently in disciplines, therefore, it became necessary to understand these concepts to understand this thesis.

2.6.1 Meaningful arts-based activities for older people

Activity is defined as everything that one can do to keep emotionally and physically well and give meaning to a person's life. Steptoe & Fancourt (2019) described meaningful activities as things people want to do or things that they consider worthwhile. Leisure activity or the use of free time for voluntary activities, other than the daily routine, was mentioned as one

of the major components of healthy ageing (Wang & Pei, 2012). While other researchers associated withdrawal from leisure activity with cognitive decline (Murphy et al.., 2017). Humphrey et al. (2017) found meaningful activities greatly beneficial for older people with cognitive impairment and carers in their approach to care. A low level of leisure activities was linked with depression in older people (Verghese et al., 2006). According to Han et al. (2016) individualised leisure and social activities can benefit older people in several ways i.e., by promoting engagement, improving the effectiveness and reducing both withdrawn behaviours and agitation. Hence, Age UK's 'index of well-being in later life' highlighted the importance of maintaining meaningful engagement in older people (Age UK, 2018a).

Among the various meaningful activities, arts were at the top (Age UK, 2018a; Clift, 2012). However, as mentioned by Skingley et al. (2012) the literature on arts and health lacks a single definition of arts. According to Basting (2006, p. 16), art is "any medium used for creative expression" which includes, painting, theatre, dance, poetry, music and so on). Art activities were found to include diverse activities within a single study. Although researchers used the word 'art' to refer to a single form of art, it was also used by researchers to describe different forms of arts such as Cowl & Gaugler (2014) who defined 'arts' to include multiple forms of arts such as music, dance movement, drama, visual arts, creative arts or the combination of different arts and culture activities. NICE mentioned arts separately with gardening and baking activities (Russell, 2019). However, researchers included different activities in arts such as gardening and physical activities (Young et al., 2016), mental exercise (Orrell et al., 2014) and social interaction (Schneider et al., 2018). Hence, the review shows that the term 'arts' is flexible and used to describe multiple forms of arts in a single study.

Two terms, 'Art Therapy' and 'Art Activity' were frequently used in the literature. Some researchers discussed art as a single form of art. While others used it for multiple forms of arts. However, most researchers used multiple media and used the term "arts" to include multiple forms of arts in a single study as used by Mahendran et al. (2017). Regardless of the differences of these terms, there was a crucial division between art therapy and an art activity. The term "Art Therapy" was found to be a relatively new term in the UK which was described as the creative and enriching activity of self-expression and occupying people's time in joyful activities (Bennington et al., 2016; Magniant, 2004; Orr, 2012; Wang et al., 2016). Art therapy was revealed as a product-oriented approach (Magniant, 2004; Mahendran et al., 2017) such as the intended outcome of improving QoL (Beard, 2012). Moreover, in most countries, art therapy can only be delivered by an art therapist with a

degree in art therapy and requires accreditation and registration according to the rules and requirements of the country (Alders et al., 2011; Carlton 2014; Kallmonowitz & Potash, 2010). Art therapists are professionals who follow the standard code of ethics and standards. On the other side, 'art activities' were used as leisure activities without requiring a professional art therapist (Rubin, 2005). In this sense, arts are used for fun activities rather than clinical therapy and their primary goal is creating artwork within a friendly learning environment. Hence, the definition of art therapy or activity depends on its' focus either on treatment outcomes (e.g. behavioural improvements and reduction of symptoms) or the process of art as a leisure activity (Beard, 2012). Despite all differences in the role of arts as activity or therapy, creativity itself could be therapeutic (Rubin, 2005).

On this point, it is important to differentiate different arts-based interventions. Involving multiple arts, arts-based interventions were divided into two groups. First, 'active' in which participants actively participated or created art or actively engaged in the activity as used by Schneider et al. (2018) or Ullán et al. (2013). Second, 'passive' like viewing artwork or engagement as an appreciative audience as used by Camic et al. (2014) and Kinney & Rentz (2005). Despite differences in using arts, both active and passive participation in arts was linked with wellness, higher QoL and social support (Ho et al., 2019, MacPherson et al. (2010); Schneider et al. (2018). Similarly, Mittelman & Epstein (2009) found improvement in mood. Eeklaar et al. (2012) highlighted the improvement in cognition. Researchers found improvement in well-being and associated them with augmented self-efficacy, improved memory and increased communication and self-esteem in older people and people with cognitive impairment after the arts-based activities (Camic et al. 2018; Young e al., 2016).

Steptoe & Fancourt (2019) linked meaningful activities to well-being. Winstead et al. (2014) concluded that a greater activity level is associated with greater well-being and happiness. Palacios-Ceña et al. (2016) presented meaningful activities as part of identity for the older people in care homes and showed that the activities helped them recover a sense of belonging, Zhao et al. (2019) stated meaningful activities as an essential requirement for good care. Based on the benefits of activity in later life, Age UK (2018a) emphasised maintaining meaningful activities for healthy ageing. However, research showed that care home residents indicated either little or no activities are being undertaken in these settings (Claire et al., 2008). Older people in care homes are often disconnected from the environment outside their care homes which can be due to several reasons. Lack of easy access to a park or garden or the frailty, lack or incapacity of resources, lack of staff to

coordinate activities outside of the care homes is few among the list (Gowans et al., 2007). According to WHO (2019a), provision and access to the arts can be ensured across the life course in care settings to help promote good health and well-being.

Arts-based activities were described as low-intensity, non-invasive, holistic, cost-effective and low-risk options within health care (WHO, 2019a). Cohen-Mansfield et al. (2011) and Roswiyani et al. (2017) showed the benefits of arts' activity on cognition, behaviour, spiritual health and self-worth. Windle et al. (2012 & 2014) and McFadden & Basting (2010) also highlighted the positive role of arts on loneliness and resilience among older people. Positive health effects of arts interventions were also highlighted by WHO (2019a) for promoting good health, preventing mental and physical health challenges. Taylor (2017) and Young et al. (2016) found that arts could be drawn on existing assets or resources and could be integrated into person-centred care to address complex challenges to healthcare. Researchers mentioned arts-based activities for bringing sensory pleasures and useful for reducing loneliness, improving social bonding, lifting mood, confidence, friendship, emotional stimulation, intellectual fulfilment and decreasing difficulties with memory and depression (Cowl & Gaugler, 2014; Curtis, 2018; Harper & Hamblin, 2010). They also recommended using arts-based activities to keep people motivated and as independent as possible.

Consistent evidence suggests that health interventions using arts can stimulate and improve the cognitive functioning of older people including people with cognitive impairment (MacPherson et al., 2010; Tyack et al., 2015; Schneider et al., 2018; Young et al., 2015). Researchers found good evidence that arts-based activities benefit cognition and QoL (Aguirre et al., 2013; NICE, 2006; Orrell et al., 2014). Overall, the literature revealed a general agreement that arts have links to the well-being of older people and this research support it is safe to be used to provide benefits to the older population. Under the WHO healthy ageing concept, alignment of health to the needs of older people in care homes is important (Wong, R., 2018). Therefore, stress was given to focus on the new strategic methods and approaches to healthy ageing for the effective promotion of the health and well-being of older people (Walters et al., 2017).

Focusing on healthy ageing, arts-based creative and cultural interventions were considered as non-pharmacological approaches to improve health (Beard, 2012; Cowl & Gaugler, 2014). Wang & Li (2016) described art appreciation that involves cultures (such as museums and/or art galleries) as 'innovative'. Art gallery visits with a facilitative guide and

discussion were forms of interventions that had been adopted in the UK (Camic et al., 2014; Eekelaar et al., 2012). Age UK (2018a) stressed offering cultural and creative activities and well-being in later life and included craft as a category of creative engagement on its own in which women found more involved than men. However, most studies did not mention the traditional art activity excluded people with physical and CI who lack the required strength, coordination and control to grip pencils, pens and paintbrushes. Similarly, despite mentioning the benefits of arts-based activities, it was difficult to attribute them to a single art form and often culture was not included even when mentioned a combination of arts. Though quests remained about the impact of an individual form of arts and/or cultures, the literature revealed that a single form of art might not be suitable to fulfil the needs of all older people. Therefore, a combination of arts might be a suitable option for the unique older population in care homes.

Arts interventions involving visual art or classic artworks, art appreciation and the creation of art by the older people were found to improve self-esteem, mood, and found to reduce the burden of caregivers and were associated with health benefits, (Wang & Li, 2016). Wheatley & Bickerton, (2017) mentioned that even less frequent engagement in activities exhibiting cultural characteristics such as museums or historical sites have a positive association with life satisfaction. Researchers like Astell et al. (2010a), Bennington et al. (2016), Camic & Chatterjee (2013), Mittelman & Epstein (2009) and Ryan et al. (2020) used photograph albums, music, artefacts, tactile activities like painting and even museum visits were used to stimulate long-term memory and communication or even for remembering past.

'Reminiscence' or recalling the past has been used for promoting positive interaction among older people including those with cognitive impairment (Ryan et al., 2020). Reminiscence was found to be useful for promoting positive shared experience, stimulating discussion, supporting older people and their carer in developing a mutually supportive and caring relationship (Chiang et al., 2010; Gibson, 2004; Fels & Astell, 2011; Fritsch et al., 2009; Ryan et al., 2020). Similarly, Chiang et al. (2010) used reminiscence in care homes and reported that it brought well-being and reduced loneliness and depression. Tan (2018b) combined art-making and exploring the heritage collection of a museum to reawaken memories and found that sharing promoted the integration of self through the resolution of the past and promoted personal expression. Fritsch et al. (2009) used photographs containing images from the past for storytelling as a creative and communicative intervention. Participants unfolded the sequence of a story in response to questions asked

by the facilitator to produce a longer story and helped participants to produce endings for their own stories. Fels & Astell (2011) found that despite having difficulty recalling and discussing current events, it was easier to speak about memories from earlier in the lives of people with cognitive impairment facilitating self-reflection and self-awareness leading to empowerment. Though Gowans et al. (2007) discussed the positive engagement of older people and mentioned the importance to avoid any possibility of the participant becoming confused, lost or frustrated, limited information about any negative event or impact of ABD activities was found in other studies. Astell et al. (2010b) used storytelling for reminiscence as a model of conversation for people with cognitive impairment and their caregivers, but missing older people without CI. Windle et al. (2017) concluded that art engagement helped in expression and supported resilience and abilities to adapt or manage difficulties and stresses among older people. However, as a common trend, the negative impact of arts was not mentioned.

The traditional style of reminiscence intervention can be time-consuming and can require organisation, collection and storage of reminiscence material (Chiang et al., 2010). Technology to support reminiscence is a growing field of research (Edmeads & Metatla, 2019). Digital technology has the potential to provide a vibrant reminiscence activity (Lazar, 2015). Ryan et al. (2020) found health benefits of personalised reminiscence using a tablet device to stimulate visual and hearing senses such as audio recordings, photographs, videos, music and historical material for reminiscence. However, the study population did not include older people with age normal cognitive and only included people with mild and moderate CI. Kapitan (2009) explored emotional content as an integrative mind-body experience and explained storytelling as a creative arts activity to connect individuals to their experiences and the acts of creation. Phillips et al. (2010) used a randomised control trial for storytelling intervention in a nursing home with older people and their carers. They found that creative activities showed significant increases in engagement, pleasure, alertness, socialisation and interaction with staff. Similarly, Taylor (2017) highlighted the versatility of arts for effectively improving engagement and health and stated that arts carry no risks or side-effects, toxicity or contraindications, therefore, they can meet CQC standards. However, no information was given to support this evidence. The complexity of arts-based interventions (Stuckey & Nobel, 2010) and their effectiveness to reduce adverse psychological and physiological outcomes (Stuckey & Nobel, 2010) was mentioned. However, the extent to which the health status was enhanced, or its impact on spiritual health was not mentioned in the literature. Therefore, Kandinsky (2012) highlighted that spiritual health was ignored in arts-based health research.

2.6.2 Playful learning for older people

Learning is an important pillar of both active and healthy ageing (Beard et al., 2016, Rudnicka et al., 2020). 'Play' is an important driver in human cultural development (Tsekleves & Darby, 2020). A relatively new term 'playful learning' was found in the literature. According to Kaufman et al. (2020), playful learning can help to break down barriers, but also open communication and actively engage older people and enhance their learning experience by encouraging collaboration, creativity and inquiry. Nussbaum (2007) found that playful activities make a person able to laugh, learn, play and enjoy activities. A UK survey revealed that people age 65 years preferred to play a game such as puzzles, quiz and board games (Chang et al., 2015; Singhal et al., 2003) and Kim et al. (2020) mentioned that playful learning supplement and complement traditional public health interventions. Ryan et al. (2020) found that although older people needed regular support, learning new skills such as learning how to use digital technology and learning different tools brought positive health outcomes.

According to Kaufman et al. (2020), digital playful learning sparks exploration, curiosity and discovery to elevate mental health. Bourassa et al. (2017) mentioned that the activity level can predict the cognitive level and the incidence of cognitive impairment (CI). Despite the limitation of good quality evidence for efficacy, Martínez-Alcalá et al. (2018) revealed that frequent participation in cognitively stimulating activities reduced cognitive impairment in older people. Brown (2010) talk about playful learning as the fertiliser of the brain. Similarly, Woods et al. (2012) stated that both older people and PWCI can benefit from a variety of enjoyable mental activities which generally stimulate concentration, thinking and memory.

Emphasis was given on cognitive activities because they can reduce the risks of CI and dementia in older people both with normal cognition and with cognitive impairment (WHO, 2017c). Tardif & Simard (2011) mentioned that cognitively stimulating activities can enhance general cognitive and social functions and promote older people's health. Martínez-Alcalá (2018) discussed the role of cognitive stimulation in preserving and maintaining cognitive functions in both healthy and people with cognitive impairment by boosting their preserved skills and cognitive capacity. Hence, researchers advised older people to play mental games for their healthy ageing to slow down the decline in memory and thinking in people with CI (Woods et al., 2012; Kaufman et al., 2020). Moreover, digital technology was highlighted as effective and less labour-intensive compared to traditional, pencil and paper and cognitive training approaches (Gates et al., 2019; Giuli et al., 2017; Kueider et al. 2012). Williams, (2018) mentioned cognitive stimulation as a key aspect of

arts programmes. Cognitive activities were linked with a lower risk of developing mild cognitive impairment (Verghese et al., 2006). In a systematic review, Tardif & Simard, (2011) recommended cognitive stimulating activities for healthy ageing.

2.6.3 Digital well-being technology for older people

Past literature revealed a critical view of technology. For example, Slegers (2006) discussed computer anxiety as a factor that prevents older people from using new technology. Petrina et al. (2008) showed their concerns about older people who had no experience with interactive digital technologies and associated slower cognitive capacities with old age could create challenges in using technology. Luxton et al. (2011) raised concerns about the mental health apps' security as a major issue. While others warned that the use of digital technology could be an isolating or excluding experience for people. However, in the same era, researchers like Caprani et al. (2012) presented a positive view. Thielke, et al. (2012) highlighted technology as necessary for healthy ageing as digital health technologies improve health, well-being and QoL of older people. Mostly observational and surveys studies provided evidence of health benefits, yet there was little robust evidence of improving health as highlighted by Zanaboni et al. (2018). Technology for arts was not common in the past. However, with the advance of technology and availability of user-friendly mobile technology for arts, scientists have started recommending it for older people as new devices can be adapted for older people including those with hearing and visual difficulties (Cook & Polgar, 2014). Technology for arts, such as using colours across the digital screen, encourages movement, experimentation and exploration, hence cognitively engaging participants through arts (Diment & Hobbs, 2014).

In comparison to younger people, older people were less frequent technology users, therefore there was a digital divide (Age UK, 2018). Researchers highlighted that rapidly evolving digital technology which is becoming simpler and easy to use with more user-friendly devices has great potential for technology to help older people (Free et al., 2013; Leroi, 2018; Maiden et al., 2013). Duncan et al. (2018) mentioned that technology has the potential to build opportunities for interactive, face-to-face human experiences and to provide an opportunity to bridge the generational digital divide. Kaufman et al. (2020) showed that the number of older people using technology is increasing. Similarly, Age UK (2018) highlighted that an increasing number of older people like using the internet in the UK. Approximately 5825 care homes had internet access (Care Home, 2019). Duncan et al. (2018) and Murphy et al. (2019) highlighted that many older people and PWCI were not only familiar with, but also benefited from using technology.

‘Digital health’ was a common term used in literature. According to Kostkova (2015), digital health is “the use of technologies to improve health, wellness and healthcare in population. Researchers highlighted digital technology as the most common way of promoting active and healthy ageing (Free et al., 2013; Maiden et al., 2013; Mathews et al., 2019). The increasing power and functionality of mobile technologies have opened the possibilities of meeting the needs of older people through the development of new software applications. Kostkova (2015) mentioned digital health as a ‘Grand Challenge’, yet according to Murray et al. (2016), digital health technology can provide practical, safe, scalable and cost-effective interventions to improve health. Similarly, Peek et al. (2015) recommended technology for active and healthy ageing. Thielke et al. (2012) showed that digital health technologies can promote the QoL and well-being and of older people, improve health. Yardley et al. (2016) used digital technology and found improvement in communication. Barham (2018) mentioned that online reminiscence app found improvements in older people’s well-being and health gave users the confidence to use new technology. Similarly, West and Michie (2016) also mentioned the role of technology in stimulating and enhancing human creativity such as visual arts to generate useful health outcomes.

‘Mobile Health’ (mHealth), which works on wireless devices, was used for health interventions. ‘Mobile health’ or ‘mHealth’ were used interchangeably with ‘Digital Health’. Park (2016) described mobile health as using mobile devices to deliver interventions. WHO (2011) highlighted the importance of m-Health apps which operate on either a mobile or wireless device, to improve health outcomes and health care. Astell et al. (2016) used a touchscreen Computer Interactive Reminiscence and Conversation Aid (CIRCA) with a variety of choice of reminiscence materials for older people with cognitive impairment and found increased in interactions and communications. Literature showed that mobile devices were not only used to improve the quality of care but also to promote active healthy ageing and bring positive changes in health, preventing age-related diseases and conditions (Park, 2016; Zhaoa et al., 2018). Legge (2016) used mobile devices for low vision and showed that they can customise and optimise displays for older people. Moussa et al. (2017) conducted a literature review and found that mobile health technology was reliable for people living with cognitive impairment and also feasible to be used by care home residents. Tyack et al, (2015) and Murphy et al. (2019) compared the group engagement of digital art technology with the traditional arts and craft activities. However, Murphy et al. (2019) did not publish statistical data of the RCT until I finished my review. Alzheimer’s Society (2014) highlighted the benefits of technology such as enhanced physical and mental well-being and the QoL

of older people even those with CI and their carers. The use of mobile tablets to improve health outcomes and health research was recommended by WHO (2011).

Several studies have shown an increase in life satisfaction decreased levels of loneliness and increased wellness with digital interventions (Kueider et al., 2012; Lazar, 2015; Millán-Calenti et al., 2015; Morrell, 2002). According to Genoe et al. (2018) benefits of digital technology and leisure overlaps. Although the sample size was small, Kerssens et al. (2015) found that participants were very interested in technology and it can support older people both with and without CI. According to Livingston et al. (2017), technological interventions have the potential to improve care, but they should not replace social contacts. Duncan et al. (2018) stated that the new technology can offer multisensory experiences, intuitive touchscreen participation and discussion tools. Cook & Polgar (2014) and Damant et al. (2017) both concluded that technology provided excellent opportunities for older people with disabilities, therefore frail older people should benefit from technology. Torous & Firth (2018) showed that digital health enables new perspectives to participate in advancing health care. Damant et al. (2017) highlighted the need for developing novel interventions because they can help in preserving cognitive function, maintaining QoL and independence in old age. According to Age UK, (2014) mobile applications can provide an opportunity to eliminate barriers due to functional disability, therefore, can be a solution to loneliness. Fernández-Mayoralas et al., 2015) and Zavaleta & Samuel (2014) found that activities reduced social isolation and loneliness among older people in care homes. Band et al. (2019) and Zavaleta & Samuel (2014) found that activities not only were socially connected but also enhanced and improved well-being and QoL by improving social connectedness and reducing loneliness.

Nimrod and Adonis (2012) found that the use of digital technology appeared to have several benefits for older people, such as entertainment, building relationships and coping with stress associated with ageing. Though technology and cognitive impairment are viewed as two different areas that do not usually go together, the mHealth technologies and apps help older people and people with MCI by offering a unique opportunity for intervention in old people (Hane et al., 2017). Unverzagt (2007) showed that digital interventions have the possibility of maintaining and improving cognitive function and prevent or delay the progression of CI. Researchers used technology to improve cognitive function by targeting functional impairments and mentioned that it can help people with cognitive impairment to retain independence and to improve overall cognitive function (Peek et al., 2016; Newell et al., 2009). Several studies have shown an increase in life satisfaction decreased levels of

loneliness and increased wellness with digital interventions (Kueider et al., 2012; Lazar, 2015; Millán-Calenti et al., 2015; Morrell, 2002).

The literature review showed positive impacts of arts and technology (Alders et al., 2011). Considering several benefits of digital technology, the UK government's policy is to maximise the digital inclusion of older people (Gov, 2018). According to Age UK (2018), the use of digital technology among older people has increased substantially over the last few years. However, older people are often excluded from exploring technology (Coleman et al., 2010; Ihm & Hsieh, 2015; Musselwhite et al., 2016). Age UK (2012) highlighted that older people in care homes are often disadvantaged in using technologies and the digital exclusion of older people is disempowering and diminishing their QoL. Therefore, the UK government stressed increasing the technological readiness of residential care homes. Therefore, the UK's 'Get Connected programme' aimed to promote digital technology among older people in care homes and stress to stimulate and engage older people including those with cognitive impairment (SCIE, 2017). However, only very little attention was given to technology research to improve the QoL and well-being of frail older people (Hebblethwaite, 2017). Critically, the negative impact of technology was not mentioned by most researchers. This may be because technology is constantly evolving and new safer software are increasingly becoming available reducing these risks. Hence, even older people with cognitive impairment can successfully interact with technology independently (Alders et al., 2011 & 2016).

The literature review also revealed that arts for health are typically complex due to their multiple components and having multiple aims (Murray et al., 2016). Considering the designs used for arts-based activities, mostly a quantitative method was used to measure outcomes in which data was presented in the form of tables, graphs and statistics. However, the quantitative evaluation often does not provide a complete picture of the impact (Daykin et al., 2013). Nor it has explained the effects of the arts-based intervention. Only a small number of studies used qualitative evaluation such as participants' feedback, interviews and reflective observations which provided useful information about participants' experiences. They were used to highlight important process issues and helped to identify the unintended and intended impacts of digital health intervention. However, the use of qualitative methods to support the impact of arts-based health interventions were not well understood as highlighted by Daykin et al. (2013). Hence, in most studies, the purpose of qualitative research was not clear for reporting qualitative findings.

Overall, the literature review showed heterogeneity for mentioning arts and different forms of arts were presented in separate studies using either visual arts (Adams-Price & Morse, 2018; Barfarazi et al., 2020; Bolwerk et al, 2014) or storytelling (Fritsch et al., 2009) or leisure traditional game activities such as puzzles, quiz and board games (Chang et al., 2015) or cognitive games (Kaufman et al., 2020). Even if they included arts then cultural element was missing in them. Most researchers did not mention the delivery method such as using a professional art therapist. Therefore, no difference was made between art therapy and art-activity interventions. Most interventions were conducted within hospitals rather than in community settings. Even when community settings were used, care homes were not included. There was limited evidence that people in care homes were offered to undertake activities of their interest, which were offered to the local community (Kydd & Fulford, 2020). King et al. (2017) conducted a longitudinal study to evaluate the impact of reminiscence on the physical and mental health of older people. Though researchers agreed that arts-based interventions were beneficial for promoting well-being in older people including PWCI, little attention had been given to the health needs of frail older people in care homes. In general, the literature review showed a limited number of longitudinal studies. It also lacked good quality and robust design in arts and digital health research for older people.

2.7 Exploring theories for arts-based digital activities

Theories are important for all scientific endeavours (Wong, G., 2018). Hence, theories were explored for ageing research. Though the theoretical framework was not mentioned in all articles. O'Neill et al. (2020) and Wong, G., (2018) mentioned that theory could be a meaningless word or merely a guess or not comprehensive for some people. However, for researchers, theory offers a specific perspective or viewpoint which helps researchers to understand the problem and the data analysis in scientific research and provide a mandatory framework for research which makes research results more concrete and relevant offering a specific perspective or viewpoint (Adom et al., 2018; Mensah, 2020). Hence, with the exploration of ABD interventions, exploration of their theoretical framework was essential in this research. Due to heterogeneous theoretical frameworks used by the researchers, it was not possible to discuss all theories which had been explored during the literature review. However, theories relevant to the ABD interventions were extracted in an attempt to incorporate the theoretical framework for ABD interventions. Researchers based their studies from one or more theories such as 'Activity Theory of Ageing', 'Model of Health' or 'Healthy Ageing', 'Theory of Activity' and 'Central Human Capabilities', TimeSlips model, Theory of Cognition For digital health intervention 'Theory of Cognition', 'Modernisation

Theory', 'Unified Theory of Acceptance' and 'Use of Technology'' were commonly used (Table 5). Whilst an in-depth analysis of the multiple prevailing theories is beyond the scope of this thesis, theories that were appeared to be highly relevant for conceptualising the ABD intervention focused on the health of older people, are briefly discussed in the next sections.

Despite multiple theories applied in healthy ageing research, it revolved around two main models (Power, 2015). This approach for a more holistic viewpoint focused on maintaining personhood throughout one's life (Mitchell & Agnelli, 2015). The well-being model of personhood was used to transform care homes into life-affirming communities rather than institutions (Power, 2015). However, they were two parallel tracks of thought, yet deeply related to each other. According to Power, (2015), one cannot be truly successful in ageing research pursuing one of these tasks without engaging with each other. The Model of Health has presented both as a single theory and as a combination of healthy and active ageing (WHO, 2020b). The 'Activity theory of Ageing' was adapted by researchers, practitioners and caregivers for older people (Bengtson & Settersten, 2016; Fernández-Mayoralas et al., 2015; Humphrey et al., 2017; Recupero et al., 2019). According to this theory, older people are encouraged to do meaningful activities and asked to continue doing the activities they enjoy and maintain social interactions (Bengtson & Settersten, 2016; Teh & Tey, 2019). Researchers presented their positive views on meaningful activities as these can be greatly beneficial for older care (Humphrey et al., 2017). Despite that this theory has elements of learning (Formosa et al., 2019) which is an important aspect of healthy or active ageing (WHO, 2020d). In this model, the health of older people is facilitated through four interrelated sub-components (i) something worthwhile to do (ii) the ability to do it (iii) appropriate external resources and (iv) a positive attitude. In this context what matters for the model of health, is not just what condition is present, but also something about the broader ability to participate and engage in meaningful activity.

Rowe and Kahn (2015) model of successful ageing involved three main factors: (1) being free of disease or disability (2) having high cognitive and physical abilities, and (3) interacting with others in meaningful ways. According to Rowe and Kahn (2015), the 'theory of successful ageing' belongs to three categories of older people; (a) those who live with disability and disease (b) those without severe disability or diseases, but they experience other age-related changes in cognitive and physical functions putting them at high-risk (c) those who maintain high levels of functioning and are at low risk for cognitive and physical impairment throughout their lives (Rowe & Kahn, 2015). It highlights positive ageing and emphasises individuals' ability to age successfully (Katz & Calasanti, 2015). However, the

criteria used in the theory for underlying successful ageing poorly defined life satisfaction, happiness and self-rated physical health (Fullen et al., 2018). Furthermore, the model overemphasises deficit such as functional physical and capacities and negative image of frailty stereotypes for age and ageism (Calasanti, 2016). According to Katz & Calasanti (2015), the theory of successful ageing eradicates the narrative of decline and burden.

'Theory of Central Human Capabilities' focused on well-being, was often used for arts engagement research. To understand, it was simplified as the capability to do, the ability to choose with a goal of flourishing well-being (Nussbaum, 2007). Most arts interventions were grounded on the human capacity where a person created something which helps in self-actualise and in finding meaning (Kapitan, 2009). This approach was used to think of the arts as influencing overall well-being both directly, through developing the capabilities of play and senses, imagination and indirectly through thought. In central human capabilities, health, emotions, senses, thoughts, imagination, affiliation, living with and towards others are the key elements (Nussbaum, 2007). The key cognitive processes involved in perceived visual arts were highlighted in the central human capabilities (Leder et al., 2004). However, Kleist (2010) raised concerns about the capabilities approach regarding the understanding and meaning of 'capability' as it lacks the environmental factors which facilitate arts activities.

Researchers used cognitive activities for health interventions (Boller & Belleville, 2018). Considering the cognitive domain of arts for health, the 'Theory of Cognition' was found focused on problem-solving (Koestler, 1964). It was used for interventions that involved cognitive activities as cognition mediates both the internal state of subjective well-being and the expression of subjective well-being (Stock et al., 1986). According to Zaidel (2010), arts stimulates and engage multiple cognitive processes. This model suggests that the viewing of the art activates many distinct cognitive capacities and translates into cognitive outputs and/or emotional reactions (Zaidel, 2010). This theory was used for creative activities for older people as well as people with cognitive impairment (Windle et al., 2017) and also where the focus was on mental health such as the use of memory and scaffolding learning (Ifenthaler et al., 2011). However, there were few foundational problems of computational creativity particularly in creative information exploration (Dubitzky et al., 2012). Moreover, research like ABD interventions focused to improve quality of life, social and spiritual health, and this theory may not encompass holistic health.

Fritsch et al. (2009) used the TimeSlips model for storytelling as a communicative method for discussing memories and reminiscing, 'TimeSlips' *is* a creative expression process as a social activity that focused on communication, creativity and improvisation among PWCI (Kim et al., 2020). This model creates connections with other people by sharing their experiences and finding common things or points of similarity (Fels & Astell, 2011). TimeSlips model was used by the researcher for activities with older people and PWCI and their caregivers and found beneficial (Duncan et al., 2018; Fels & Astell, 2011; George & Houser, 2014; Kim et al., 2020). This model was used to create connections with other people by sharing their experiences and finding common things or points of similarity in creative storytelling interventions (Fels & Astell, 2011; Kim et al., 2020). TimeSlips model, as a creative expression process supports the collective creation of an imagined story by the group participants (Fritsch et al., 2009). However, the TimeSlips model did not cover the complex ABD intervention which combines storytelling activity with other creative and craft activities. Therefore, Duncan et al. (2018) combined TimeSlips Model with the Theory of Change. 'Theory of Change' was commonly used for digital intervention (Michie et al., 2017). Duncan et al. (2018) used this theory during the Armchair Gallery app to observe behavioural change using a qualitative method. However, expecting long term behavioural change in a short duration workshop may not be a suitable choice for evaluating a behaviour change as it often requires long-term interventions.

Literature from both social science and digital or computer sciences is directed towards the classic 'Modernisation Theory' (Cowgill & Holmes, 1972; Fritzsche & Vogler, 2020; Goorha, 2017; Mitchell & Agnelli, 2015; Mocan 2018). Though this theory was mainly referred to by the social scientist, it was also commonly used by the arts and health researchers where sophisticated technology was the central subject for their research (Mocan, 2018). However, there were several limitations when using this theory for the complex ABD intervention. First, technology was used as a means for arts-based activities to improve mental and social health. Hence, technology was not the focus of research. Second, the modernisation theory implies the deterministic approach rather than a developed framework (Fritzsche & Vogler, 2020). Thirdly, for the experiment, an arts-based digital software was used while in this theory, limited information was given about the software so is considered as having limited value (Goorha, 2017). Fourthly, this theory was used by a scientist mainly for behavioural change and adaptability of technology for longer-term interventions. Likewise, the 'Unified Theory of Acceptance', the 'Use of Technology' and 'Diffusion Theory' (Nilsen, 2015) were frequently used by the health and technology scientists to employ evaluation of the digital interventions for implementation research as the predictable

patterns of adoption (Rogers, 2003). However, these theories were mainly useful to employ when the focus of the studies was on the evaluation of digital technology as used by Peek et al. (2016).

Maslow presented his model of human needs in 1947 as a concept of human needs (Maslow, 1947). It satisfies human needs progressively (McLeod, 2020). Researchers like Crockett (2013) successfully used digital interventions for older people. Hale et al. (2019) used Maslow's model of human needs as a framework for residents' wellness and recommended using it for wellness activities for older people in care homes. According to Power (2015), it has the potential to meet older people's physiological needs. Boggatz (2020) also used Maslow's theory to promote QoL and well-being. However, there are some misconceptions regarding Maslow's Motivational Hierarchy and Maslow's later work which may be underestimated (McLeod, 2020). Researchers raised their concerns related to the methodological limitation. These include: undertaking a qualitative biographical analysis; using a small sample size; a sample that was dominated by educated White males etc. These limitations can make any research prone to bias, reduce the validity of the data obtained and transferability in other cultures (King-Hill, 2015). However, it may be incorrect to Judge Maslow's theory based on scientific testing or an inaccurate description of the theory (Koltko-Rivera, 2006). Therefore, Tay and Diener (2011) tested Maslow's theory by surveying a large sample size representing all major regions of the world during 2005-2010. The results revealed that although the ordering of the needs within the hierarchy may not be correct, they support Maslow's model and concluded that universal human needs exist regardless of cultural differences (Tay & Diener, 2011).

Going back into the history of Maslow's model, the psychological theory was borrowed or greatly influenced by the Blackfoot Nation, a highly successful and developed society (Blackstock, 2011; Brown, 2014). Researchers like Brown (2014) took a critical stance by saying that Maslow misrepresented the original Blackfoot Nation version as Maslow's Model, the peak of human development is self-actualisation while in the Blackfoot Nation self-actualisation was placed as the foundation for individual and community health (Blackstock, 2011). Critically reviewing, Louca et al. (2021) stated that Maslow's model seems to better fit the Western societies, based on individualism, rather than the Eastern societies based on collectivism. Compton (2018) argued that instead of community actualisation the model is based on individual actualisation and transcendence. However, there are major differences between First Nations and Maslow' Model. These include the difference in time, inter-connection of reality. The First Nations believe that simple principles

explain complex phenomena like humanity (Blackstock, 2009). Researchers also argued that the triangle is a tipi and not a triangle and the tipi in the Blackfoot always went up in human development (Blackstock, 2011; Michel, 2014). It is worth mentioning that the famous pyramid of Human's needs is commonly used, but Maslow himself never used it (Desmet & Fokkinga, 2020). Literature review revealed that the image was first used by McDermid (1960) to explain how money motivates a man. Sosteric & Raktovic (2020) rejected the pyramid and reclaimed Maslow's Model of human needs by suggesting circles of seven independent 'essential needs'. While Indigenous thinkers argued that human needs are not equally hierarchical and through Indigenous eyes re-interpreted Maslow's hierarchy of needs using circular representation (Blackstock, 2011; Cross, 2007).

While spirituality refers to a person's investigation for a life of purpose and meaning, a large number of researchers argued that Maslow neglected spiritual needs (Louca et al., 2021). Maslow himself reflected spirituality as one of the most important parts of the humanistic approach by mentioning it as a core component of human essence in his later work (Maslow, 1970). Supporting Maslow, Gold (2013) stated that spirituality is embedded in self-actualisation. Others argued that spiritual and religious needs are important elements of personal needs and are associated with mental and psychological fitness. Hence obtained a higher level in human's development. Louca et al. (2021) defended Maslow and stated that Maslow himself identified in his later work that the needs' order is not rigid and can be flexible based on individual differences or external circumstances. For example, for a person need for self-esteem may be more important than love but for others, creative needs may overtake the most basic needs. However, researchers argued that happiness, an important factor in human life, is not obvious in Maslow's model. While others replied that happiness is hidden in self-actualisation. In reality, 'self' in Maslow's model might be misinterpreted as an individualistic perspective of life. To support, Louca, et al. (2021) mentioned that Maslow (1970) expanded his model and added the self-transcendence level that seems more compatible with the notion of spirituality and the ability to commit themselves to a higher goal. Other researchers criticised that Maslow did not develop a final coherent theory and self-actualisation intertwined deeply with self-transcendence. According to Koltko-Rivera (2006), Maslow recognised self-transcendence as a motivational step even beyond self-actualisation and that self-transcendence is the need to move beyond oneself. In Maslow's expanded hierarchy theory, self-transcendence was placed after self-actualisation, making it the highest level in the hierarchy (Sosteric & Raktovic, 2020). Compton (2018) highlighted criticism on the individuality of Maslow' Model which was raised by other researchers. This is because highly self-focused or self-

actualised people are focused on their own development and achievements (Louca et al., 2021). Self-actualised people try to develop to the full of their potential and self-transcendent helps to fully understand the cross-cultural difference (Koltko-Rivera, 2006). People fulfil their transcendent needs by helping others as they are so confident that their lower-level needs are being met satisfactorily. Therefore, they feel comfortable helping others to fulfil others' needs even though if it does not personally impact them and help to communicate to the world and other people (Louca et al., 2021). This has important consequences for Maslow's theory and makes Maslow's theory more comprehensive. It brings a broader and deeper understanding of the motivational roots of selflessness, social progress, wisdom, multiculturalism and integration of religion and spirituality (Koltko-Rivera, 2006).

To summarise Maslow's model, human needs include physiological and biological needs (food, drink, warmth, shelter, etc.); safety needs (security); love and belongingness needs (friendship, love and affection); affiliating (being a group member, friends, family); esteem needs (self-esteem i.e. dignity, achievement, being valued by others); cognitive needs (learning, knowledge and understanding); aesthetic needs (appreciation and nature); self-actualisation needs (personal potential, self-fulfilment, transcendence needs beyond the personal self, helpfulness, religious, spirituality, etc.). On this point, it is necessary to mention that humans are complex, wilful and powerful beings, therefore human needs may not fit in a linear framework (Louca et al., 2021). Therefore, Sosteric & Raktovic (2020) argued the hierarchy and put them in circles and named them as essential human needs. To summarise, Figure 5 illustrates the human needs using the extended Model of Maslow (Maslow, 1987; McLeod, 2020).

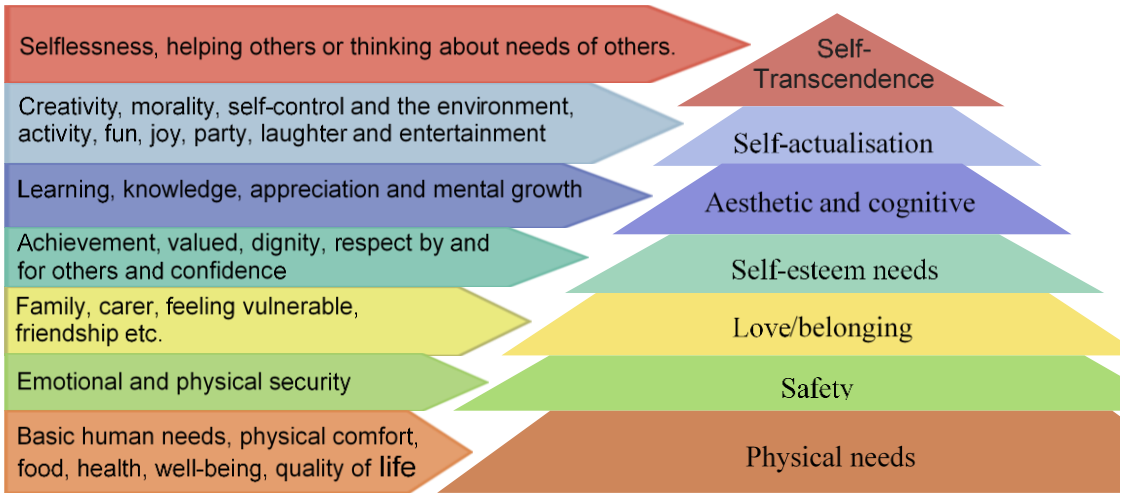


Figure 5 illustration of The Human Needs (adapted from, Maslow 1970; McLeod, 2020)

The literature review revealed that some researchers used single, while others used multiple theories to inform the complex arts-based research. However, only a small number of researchers used theory to shape every stage of their research process, including the development of their research questions, methods selections, data collection, data analysis and conclusions. The strength and resonance of Maslow's ideas were clear in innovative research across a wide range of human research. Therefore, it was difficult to see the influence on attitudes towards ageing and in meeting older people's needs for healthy ageing. Mostly the focus is on the basic human needs, suggesting meeting the basic survival needs of older people. However, the higher-level needs in Maslow's model are also related to healthy ageing by nurturing happiness, thriving and flourishing them, hence, improving older people's lives (Hale et al., 2019). Table 5 presents a summary of all relevant theories which found useful for making an informed decision when developing a theoretical framework for ABD interventions and it will also be useful for other researchers in future ABD trials.

Table 5 a theoretical matrix to guide ABD intervention

Theory	What is it about?	Focus on	Critical view
Healthy Ageing (WHO, 2020b; O'Neill, 2019)	An intervention to improve the health of older people if the activity worthwhile to do, the ability to do it and has a positive attitude and external resources for it.	Focus on healthy ageing	Despite promoting innovation in ageing, research is insufficiently financially supportive and overly bureaucratic for implementation (Rudnicka et al., 2020).
Activity Theory of Ageing (Bengtson & Settersten, 2016)	An activity for older people if meaningful then they will continue doing the activities as they enjoy it.	Focus on meaningful activities	WHO (2020b) replaced active ageing with healthy ageing
Theory of successful ageing (Rowe & Kahn, 2015).	This includes older people: (a) those who live with disease and disability; (b) those without severe disability or disease, but experience of other age-related changes in physical and cognitive functions that place them at high-risk; and (c) those who maintain high levels of functional abilities and low risk for physical and CI throughout their lives.	Functional physical and capacities and negative image of frailty stereotypes for age and societal ageism.	Does not align with older people's own well-being and quality of life but poorly defines life satisfaction, happiness and self-rated physical health (Fullen et al., 2018). Negative image of old age and stereotypes for age that older people cannot learn (Calasanti, 2016)
TimeSlips model (Anne Basting, 1995; Kim et al., 2020, Duncan et al., 2018)	Creative group storytelling a social activity that focuses on communication, creativity and improvisation.	Reminiscence and creativity	Activities mainly focused on past memories or storytelling, but often do not include learning capabilities
Theory of Change (Duncan et al., 2018; Michie et al., 2017).	Change to achieve the intended impact leading to the outcomes identified in the short, medium and long terms.	Changing behaviour	Only shows how interventions change behaviour. Useful for implementation research as preconditions for achieving the long-term goal.
Human needs Model (Maslow, 1970 & 1987, model Crockett, 2013, McLeod, 2020)	To meet older people's physiological needs, safety, belonging, self-esteem and self-actualisation	Basic human needs, including creativity and quality of life	Focused on essential human needs but not specifically focused on healthy ageing or maintaining functions
Central Human Capabilities for Well-being (Nussbaum, 2007)	Ties the principles of senses, imagination and thought to improve well-being.	Imagination and thought to create and increase new human capital	Neglected environment and lack the understanding and meaning of 'capability' to facilitate arts activities (Kleist, 2010)
Theory of Cognition (Koestler et al., 1964)	Art activities, for being creative, as a basis for human life are effective for cognition and learning in old age	Being creative and learning during the activity using cognitive abilities	Foundational problems of computational creativity such as exploring creative information etc. (Dubitzky et al, 2012)
Unified Theory of Acceptance and Use of Technology (Peek et al., 2016) Diffusion of Innovations Theory or 'Diffusion Theory' (Nilsen, 2015)	An activity is accepted if the residents perceive usefulness and ease of use and have facilitating conditions and suitable for age and sex. Activity is more likely to be taken up in practice by end-users if it is easy to use compatible with values and needs straightforward to use and if they can see its impacts.	Relates to the acceptability and usability of the art-based digital app. Compatibility of new interventions to implement in practice.	Only focus on the evaluation of digital technology and predictable patterns. Employ evaluation of the digital interventions (Peek et al., 2016) or for implementation research (Rogers, 2003).
Modernisation Theory (Cowgill & Holmes,1972; Goorha, 2017; Mocan, 2018)	The innovative way of playful intervention helps to understand the degree of modernisation in the society and to the social change of older people.	Digital technology as an innovative way of art intervention can bring a social change	It implies the deterministic approach rather than a developed framework (Fritzsche & Vogler, 2020). Limited value for software (Goorha, 2017). More useful for behavioural change and adaptability of technology for longer-term interventions.

2.8 Conclusion of the literature review

Though people age differently, major concerns included a higher prevalence of age-related functional and CI frailty (Clegg et al., 2013); chronic conditions such as CI and dementia (Bateman et al., 2017); increasing dependency due to disability sufficient to interfere with activities of daily living resulting in care home admissions (Chiong-Rivero et al., 2011; Cornelis et al., 2017). Due to the absence of effective treatment for CI and dementia (Olivari et al., 2020), the focus of new research is on delaying cognitive decline and preventing dementia using non-pharmacological interventions and on innovative methods of promoting healthy ageing (Bateman et al., 2017). The literature review showed that the concept of healthy, successful and active ageing was overlapping. Healthy ageing was found to be a broader concept that refers to both functional and active ageing to promote the functional, mental, cognitive, emotional, social and spiritual health of older people. Despite the absence of unified nomenclature and heterogeneity of published literature on arts, culture and digital health technology, the promising benefits of arts-based activities for improving healthy ageing were evident from the literature. Although the importance of health, QoL, well-being, social and cultural isolation of older people in the literature was acknowledged, the promotion of healthy ageing in a care home by engaging them in a meaningful multi-dimensional ABD intervention was not explored in the literature. Hence, there was a need for new research to develop an integrated theoretical framework for developing ABD intervention to maintain and improve QoL, cognition and social engagement of older people. Therefore, ABD intervention remained a matter for further investigation requiring evidence-based research.

CHAPTER 3: A REALISTIC REVIEW

The knowledge gap about ABD intervention was revealed from the literature review. Responding to the gap, there was a need to collect relevant information about ABD interventions by conducting evidence-based secondary research. This chapter presents the methodology and findings of the realistic review conducted to build the foundation of ABD intervention for older people living in care homes (OPLICH). The last section of this chapter presents the knowledge gap and the rationale of this research.

3.1 Decision matrix for the secondary research method

Interventions should be based on evidence that the interventions are beneficial (Craig et al., 2008). Hence, following the guidelines for developing complex interventions (MRC, 2019), this research was started with the collection of relevant information to lay a solid evidence-based foundation for the ABD intervention. The literature review revealed that despite a growing body of evidence in recent research to support the use of the arts in ageing research, there was a general lack of clarity regarding how art-based digital interventions work, what outcomes one can expect and what outcomes can be sought. The challenge was to find the most appropriate and practical method to design a review study that could be both systematic and replicable. Following the published guidelines of secondary evidence-based research (Grant & Booth, 2009; Munn et al., 2008), different methods of the literature review were considered and a decision matrix was prepared (Appendix A). The methods included systematic reviews both single and mixed method, rapid review, critical review, umbrella review, mapping review and systematised review. After reviewing the advantages and disadvantages of each method, a table was created to list reasons for considering and rejecting/selecting reasons (summary in Appendix A). In reality, human responses could be different to interventions in different environments or circumstances (Pawson, 2005). Although commonly used, systematic reviews were not possible due to limited published literature for ABD interventions and also because the focus of these reviews is assessing the quality of published literature rather than providing practical information about the interventions. In this sense, a realistic review was more suitable because it provides an analysis to explain what works in an intervention in different circumstances, how an intervention works and in what respects it works and what impacts it is expected to have (Pawson, 2005). In short, a realistic review provides information about the underlying assumptions of an intervention (Pawson, 2005). Hence, it was concluded that a realistic review would be the most suitable method to provide practical information about the ABD intervention to make well-informed decisions for developing the protocol. This method was also suitable because it not only helps to collect all available

evidence systematically but also helps in the preliminary assessment of the scope and potential size of the available literature. However, realist reviews do not provide simple answers to complex questions (Pawson, 2005). As a relatively new approach, realistic reviews are not fully established. Yet, they are useful to provide a detailed, rich and practical understanding of complex interventions, therefore more useful when planning programmes (Pawson, 2005). They also guide on quality assurance to improve quality and consistency in research (Greenhalgh et al., 2015).

3.2. Study 1: A realistic review of ABD interventions

This realistic review aimed to explore the available information about the ABD interventions and to find a suitable theoretical framework for ABD intervention. The objectives were set as (i) to identify available research on the topic of ABD interventions and methods of incorporating health benefits (ii) to explore outcomes and impact of ABD intervention (iii) to find a theory to build ABD interventions.

3.2.1 Methodology of the realistic review

The literature review complied with the regulation and formal ethical approval was sought from Coventry University (P62915). Unlike a systematic review, the searches were constantly updated to include new research throughout this project and were not dependent upon a single search. Though Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) guidance is mainly used for systematic reviews (Moher, 2015), this realistic review has also used PRISMA to keep a record of search results (Appendix D). Abstracts were assessed based on the inclusion/exclusion criteria (Table 6).

Table 6 Criteria for considering studies for the realistic review of ABD intervention

Inclusion criteria	Exclusion criteria
• Age ≥ 60 years • Sex= any • Location= any (home, care home or community settings etc.) • Condition= Normal ageing, normal cognition, cognitive impairments • Intervention type= Arts activity, Arts-based cognitive activity, arts activity using technology, Touchscreen e-PAD art-based digital interventions or touchscreen-based art interventions, activities • Duration of intervention= any • Study design= any	• Age < 60 years • Condition: Additional psychiatric disorders (such as mania, psychosis etc.) or physical incapability to participate in the intervention, severe mental health problem or life-threatening illness • Intervention type= clinical or pharmacological

The research questions were developed using the key search terms using population, intervention, condition/control/comparator, time and settings (PICOTS) (Appendix B) as it increases the robustness of reviews (Campbell et al., 2020). Using the PICOTS, the review questions were defined to make this review replicable for future robust reviews. A quality assessment checklist, for both qualitative and quantitative papers, was prepared (Appendix C) adapting the Critical Appraisal Skills Programme (CASP, 2017). However, neither the focus of this realistic review was on the quality assessment nor it was used as an inclusion criterion. Therefore, no study was rejected based on its poor quality as the focus was exploration and gathering as much information as possible to guide my own ABD intervention trial. On this point, it is important to mention that to search 'older people, People age 60 years and over were included instead of 65, as initially defined for an older person, just to avoid missing studies in which researchers used age 60 years and over to determine an older person. In total, 12 articles were included in the realistic review. Articles included reports, conference papers and other grey literature which are often rejected in systematic reviews based on their quality judgments. Due to the heterogeneity of the interventions and outcomes, a meta-analysis was not possible. Using the realist review principles, experts in the field were consulted who guided me to relevant reports and other conference articles. For this realistic review, a systematic and replicable approach was taken for producing results. As a relatively new area of research, experts were consulted and constant search for new literature was continued until the end of this project. Even grey literature was included and literature was rejected based on its quality to collect all relevant evidence as it is allowed in a realistic method (Grant & Booth, 2009). A search strategy that was used for this review is given in Table 7.

Table 7 Realistic review search strategy

Review questions
• What does the Arts-Based Digital (ABD) activity mean? • What are the arts-based digital apps and which devices are suitable for ABD interventions for older people? • What are the methods of ABD interventions mentioned in the literature? • What is the theory evidence of ABD interventions?
Search terms strategy
Key search terms were identified from the initial literature review which were systematically used to obtain the relevant published paper from different data sets. Key search words were kept broad using all alternate synonyms, Boolean operators (AND, OR) and truncation symbols*, MeSH terms and tailored to each database to ensure that as many relevant papers as possible are retrieved, **Limitations:** Studies written in English. No time limitation was applied when last searched in Nov 2019
Search data bases
MEDLINE, EMBASE, CINAHL, EBSCO and PsychINFO, SCOPUS, Allied and Complementary Medicine Database, Art & Architecture Complete, Cochrane Library, Design & Applied Arts Index (DAAI). Grey literature: Reference lists, grey literature Google and Google scholar' and the following websites were also search for grey literature. http://www.cultureandwellbeing.org.uk/cadn, http://www.artscouncil.org.uk, http://www.canterbury.ac.uk/Research/Centres/SDHR/Home.aspx, http://www.artsforhealth.org/ http://www.changingageing.org/, http://www.creativeaging.org/, http://www.creativescotland.com http://www.ageuk.org.uk
Additionally, expert were consulted such as Kate Duncan contacting by emails and other experts by direct contacts during conferences.
Selection criteria
Journal, trade journal, reports and reviews, Introductions, letters and comments, abstracts, theoretical papers or any studies reporting arts-based digital health interventions for older people
Exclusion criteria
Population below 60 years, Intervention with pharmacological or clinical trial or interventions for older people with severe other mental problems, duplicates
Inclusion criteria
Older population focused on healthy ageing and arts, digital and health interventions.
Search results
CINAHIL Complete:131, PsycINFO: 110, MEDLINE:168, Allied and Complementary Medicine Database: 43, Art & Architecture Complete:28, Academic Search:114, SCOPUS:193, Design & Applied Arts Index (DAAI): 27, Cochrane Library Trials and Technology Assessments:30, Google scholar:25,200

3.2.2 Avoiding risk of bias

The risk of bias was avoided by using two or more reviewers because it reduces the risk of bias (Higgins, 2011; Moher et al., 2015). Another reviewer (JP) independently selected the articles and all disagreements on the risk of bias or quality assessment were resolved by a third reviewer (moderator). A data extraction sheet was constructed to extract data from the articles to address questions which include data relating to study design, participants, intervention, outcome and limitation of the study in structured form PICOTS (Appendix E). The synthesis of findings included qualitative, quantitative and mixed findings for a narrative approach as it was found useful by other researchers (Greenhalgh et al, 2004).

3.2.3 Findings of the realistic review

This realistic review has used mixed methods and took a narrative approach to report combined findings. Regarding the findings of the realistic review, some overlapping information related to ABD intervention was found which was previously found and mentioned in the literature review. However, some information that was missing in the previous literature review were revealed in the realistic review. The following sections present the main findings from the realistic review which were required for developing ABD intervention.

3.2.3.1 What does the Arts-Based Digital (ABD) Activity mean?

Though the arts-based activities were facilitated by digital or mobile technology by several researchers, the term ‘Arts-based digital; Activity’ intervention were not mentioned in the literature. Some called ABD activity a ‘recreational activity’ (Murphy et al., 2017), while others just mentioned visual arts for ABD activity (Tyack et al., 2015). However, one thing was commonly mentioned that combing or blending arts and digital technology can be productive, creative and enabling. Using digital health technology for innovative arts activity is an interdisciplinary bridge between different streams of practice as used by researchers (Duncan et al., 2018; Murphy et al., 2019; Lazar, 2015; Leuty, 2013). Tyack et al. (2015) used an art-viewing well-being app on a tablet with a small sample size of 12 older people and carers five times over a 2-week. Despite no significant pre-post differences, a consistent trend towards increased improvement, especially for wellness and interestedness suggested that the ABD intervention was effective for older people in care homes. With the advance of technology, the arts have become more suitable for older people even for those with CI. Leuty et al. (2013) also indicated the benefits of integrating computer technology for arts in improving cognition. Gowans et al. (2007) developed a software CICRA and found that participants enjoyed physically interacting with the digital

device and were successful in promoting conversation. They use 3D wireframe modelled virtual environments and photographic and found it engaging, enjoyable and relaxing for PWCI (Gowans, 2007).

Among a large number of available arts-based apps, only a limited number of apps were found focused on health. Among them, only a few apps were found suitable for older people like Tangible Memories, Book Creator for iPad, Art Set, The Brushes app, Swirlicity, Let's create! Pottery HD and Koi Pond HD Lite etc. However, only two apps, Armchair Gallery and ArtOnTheBrain apps included arts, culture, cognitive, creative and digital playful activities in one app which were developed for older people including PWCI. Armchair Gallery app was a freely available app while the ArtOnTheBrain app was a subscription-based online app. At the time of conducting this research, only limited information was available about developing ABD intervention and its feasibility in UK care homes. Hence, an exploratory feasibility study was required to understand the feasibility and impact of ABD intervention in real-life care homes in the UK.

Duncan et al. (2018) delivered ABD activities sessions to enable inspiration, imagination, creativity, enjoyment and celebration. ABD activities provided older people with an opportunity to engage in a modern digital art activity. While Murphy et al. (2020) used pre and post design. Though they checked the significance with a small sample size, all other studies evaluate change by comparing data before and after the intervention. However, for evaluation, a simple pre and post test scores comparison was too limited and did not consider probable measurement error or other bias factors. Moreover, it did not include details of qualitative data analysis methods and did not mention the theoretical framework. Murphy et al (2020) used trained recreational therapists to deliver ArtOntheBrain activity. Unlike Murphy et al. (2020), Duncan et al. (2018) used art therapists to deliver Armchair Gallery app sessions. However, it did not require professional art therapists to use the Armchair Gallery activity.

Reminiscence was found to be an important part of ABD activities. Duncan et al (2018) used the TimeSlips model for storytelling for ABD activities. However, considering other aspects of ABD activities, the model was inadequate and did not consider the key constructs which are mentioned in Table 8. Hence, despite being useful for creativity and storytelling activity, other domains of the multidimensional ABD activities were not covered with this model. Conversely, Murphy et al. (2017) did not mention any theoretical framework for their interventions. Moreover, the acceptance of technology in the healthcare domain

was also not mentioned. Hence, the realistic literature review revealed a lack of a suitable theoretical framework to guide the ABD intervention in this review.

This realistic review showed studies and surveys despite providing evidence of the benefits of digital health, little robust evidence from randomised controlled trials of improved health outcomes was reported. Mobile health interventions targeting cognitive impairment lacked quantitative health outcomes as mostly qualitative case studies were used. Similar findings were mentioned by another research (Bateman et al., 2017). A lack of consensus was found on which outcomes are important for ABD interventions. In this review, several innovative mHealth app interventions for older people were found but they were rejected due to lack of focus and any measure of health. Lazar (2015) showed an increase in life satisfaction decreased levels of loneliness and increased wellness with digital interventions. Astell et al. (2016) studied 30 older people to evaluate the impact of familiar and non-familiar games on a tablet and found that regardless of familiarity 90% of participants enjoyed playing games on a tablet. In general, studies were in favour of using technologies for older people and concluded that technological interventions are quite promising to engage old people in activities. Therefore, an increasing concern was found in the literature that older people in care homes were disadvantaged in using new technologies related to arts and culture (Duncan et al., 2018; Murphy et al., 2019).

The focus of new Gerontechnology[2] research was on applying traditional arts and crafts with digital art and culture primarily focused on improving health. An ABD intervention was a relatively new concept in which arts, culture, creativity and digital technology were used in combination Duncan et al. (2018) and Murphy et al. (2019). They blended different types of arts, culture and craft and mentioned that it could be effective at capturing the imagination of older people and creating well-being outcomes particularly for those who are not appealed by traditional social activities. Different ABD apps made it possible to bring arts, culture, cognitive and digital playful learning activities for older people including older people with cognitive impairment (Murphy et al., 2019; Duncan et al., 2018). Murphy et al. (2019b & 2020) tested ArtOnTheBrain in Canada and America, but complete results were not available until I last searched in November 2020. While Duncan et al. (2018) used the Armchair Gallery app in care homes during the development phase. They used digital activities such as learning, playing, solving puzzles to stimulate multiple cognitive

[2] Gerontechnology: Applying technology to ageing issues, with a primary focus on healthy ageing and maintaining independence for older people (Leroi et al., 2018).

processes. In cognitive stimulation, the group was asked to involve in activities that were designed to increase social and cognitive function. However, no peer-reviewed material was published about the effectiveness of the Armchair Gallery App.

Although arts and digital technologies were used for both creativity and learning new skills most researchers used arts and digital technology as two separate interventions. Researchers agree that a virtual themed talk of the art galleries and ABD activities have the potential of providing benefits (Duncan et al., 2018; Murphy et al., 2017). However, no robust evidence was provided about their efficacy. The realist review indicated that ABD intervention was considered complex and lack high-quality studies on ABD research. The realistic review revealed heterogeneity not only in design but the quality of published papers and their findings for describing arts and digital health for older people.

Literature showed only a little understanding of ABD activities and their potential benefits. Researchers used qualitative observations (Duncan et al., 2018) and other studies used mixed method studies (Murphy et al., 2018 Fancourt & Poon 2016). ABD intervention used MoCA, GDS, SWEMWBS and EQ-5D-5L as used by Murphy et al. (2017) and ArtsObS as used by Fancourt & Poon (2016) to evaluate the impact of the arts-based interventions on older people. Correlation method, Wilcoxon signed-rank tests were used for data analysis. This review found inconsistencies in the health outcomes to evaluate ABD intervention targeted at the older population. The most used health outcomes included; QoL, well-being, cognitive function and mood. Even when the positive impact of ABD intervention on health and well-being were documented, there remained a gap in the understanding of the impact of ABD intervention on the QoL and well-being of older people in care homes. As healthy ageing was set as a priority by WHO for 2020-2030 (WHO, 2020d), the need for new research to inform the feasibility and impact of innovative arts-based digital activities for older people was clear. ABD activities had multiple aspects such as cognition, creation, physical, sensory, discussions, storytelling, speech, recreation, relaxation, social, spiritual, religious, cultural, communication and reminiscence. Examples of each area of focus of ABD activities are given in table 8.

Table 8 Different aspects of art-based digital activity

Different aspects of the art-based digital activity	
Focus	Example of activity
Cognition	Memory games, (picture matching, pairing animal, remembering the activity sequence. Learning new computer skills.
Creation	Creative Artwork (digital) and craft activities (making model etc.)
Physical	Encouraging mobility through group activities in different parts of the building. Interactive multisensory games
Multi-sensory	Smell, taste, hearing, touch and visual(sight)
Speech/ words	Discussions
Recreational	Virtual cookery, gardening, pets, reading. Watching videos, looking at a large picture, art appreciation, making art, music
Relaxation	Variety of techniques (using a touch screen, relaxation routines). Reading Viewing sceneries, garden, playing music etc.
Social	Group activities, socialisation, playing together. Carer working with the resident sharing their likes, dislike and past.
Spiritual religious	Making digital art (Mandala pairing animal of Noah's Ark)
Cultural activities	Virtual visits to art museums, galleries and natural parks
Communication Discussions	Making stories, thematic conversation using interesting visual art objects conversation. reminiscence
Fun/play	Games to arts, other link or apps for entertainments
Reminiscence	Recalling past memories. Using artwork to link with museums, artists, past life and/or history using theme-based discussion

3.2.3.2 Devices used for ABD intervention

For ABD research for older people, researchers used both desktop and mobile devices. The arts in care homes 'Imagine' programme used mobile technology for achieving long term cultural change for care homes (Dix et al., 2018; Randall, 2015). In the Imagine (2016) programme 573 care home residents participated, but it was led by professional artists. Murphy et al. (2017) used both computers and tablets for their arts intervention. Compared to desktop computers, mobile devices were commonly used by researchers. Some designed a mobile station for their intervention Leuty (2013). The issues of malware in smart devices are important for the safe delivery of the intervention (Suarez-Tangil et al., 2014). However, neither safety issues nor any other negative impact of ABD intervention was mentioned in the studies included in the realistic review. Researchers commonly used mobile (Alders et al., 2011; Cook & Polgar, 2014; Dupláa et al., 2017; Leroi, 2018; Murphy et al., 2017) However, for the ABD intervention, an informed decision was required for which advantages and disadvantages mentioned in the literature were collected in Table 9. This acted as a decision matrix for selecting a suitable device for ABD intervention.

Table 9 Devices for digital-art interventions

Advantage and disadvantage of digital devices for art interventions			
Technology type	**Usability**	**Advantage**	**Disadvantage**
Desktop computer with mouse and keyboard	• Easy access to the internet, web-based activities, internet or web-based games • -Word processing (e.g. writing stories), viewing and editing photos) • -Printing,	• -Easy to print. • -One-to-one and group activities are possible. • -Need connection to TV or projector and speakers for group activity. • -No battery issues.	• -Difficult to move or to take to other locations • -Keyboard and mouse require good manual dexterity • -Less intuitive to use than touchscreen technology.
Tablet/ Laptop computer Mobile	- Easy access to the internet, • Apps available (i.e. arts-based apps) • -Sensory games • -Can view and edit photos • -Can be used for games drawing	• -Portable, more intuitive touchscreen technology • -Can be used by PWCI and motor impairments. • -New software available in the market used with Wi-Fi or mobile data. • -One-to-one and group activities are possible. • -Can be connected to TV or bigger screen.	• -Difficult to print using a mobile phone, • -Hard to type on small screen. • -Wireless keyboards can help. • -Screens hard to read in bright light, • -Can be heavy depending on screen size • - Short battery life

3.2.3.3 Identification of ABD apps

The benefits of mobile digital apps were clear from the literature review in which researchers recommended using digital technology for older people (Alders et al., 2011; Cook & Polgar, 2014; Dupláa et al., 2017; Leroi, 2018; Murphy et al., 2017). Though there were countless software applications available in the app stores and some apps were successfully used for older people including PWCI. Such as ‘My House of Memories’, ‘InspireD’, ‘Playlist of Life’, ‘MindMate’, ‘Art Therapy Draw’ and ‘Memory Tracks’, online apps like ‘Book of You’. Most apps found improvements in older people’s health and well-being after using apps. Using new technology increases users’ confidence (Barham, 2018). However, most apps lack culture in them. Only two apps were found to have culture and cognitive activities in them. First, the ArtOnTheBrain app (Duncan et al., 2018; Murphy, 2017, 2018 & 2019) and second, the Armchair Gallery app (Arts Council UK, 2015; Duncan et al., 2018). They include museum arts or virtual visits to art and culture venues, cognitive and learning activities for ABD interventions. Through these apps, users were able to view artwork or to take a digital tour of a cultural venue and explore some of the UK’s best art collections. These apps were tested by older people during their development phase but had not been trialled as health interventions in UK care homes.

(i) ArtOnTheBrain app

ArtOnTheBrain app was developed by Baycrest. It was an online subscription-only software application (app), developed for people with mild or moderate dementia. The app aimed to promote health and a desire to try other activities and to expand older people's interests (Murphy, 2019). The ArtOnTheBrain app was based on museum artwork and themed arts-based activities that could be played using a computer or tablet (Murphy, 2019). The activities also included learning, puzzle-solving, storytelling and socialising with the discussion around the artwork to promote health by involving older people and PWCI in enjoyable recreational activities (Murphy et al. 2017). The app had three activities, learn, play and mingle. There was another activity for writing a story on how the artwork made the player feel that could be shared with other app users (Murphy et al. 2017). Though the complete results of RCT were not available until I last checked for my review, Murphy et al (2020) published the results of the feasibility test of ArtOnTheBrain in the United States using 31 participants (25 females and 6 male) using both partner play and group settings. No theory was mentioned to support the research, yet post-intervention self-reported well-being revealed a significant probability of improvement in one or more well-being indicators ($p < 0.05$). However, cognitive status did not influence the outcome. The findings demonstrated that ABD activities can promote accessibility and may be effective for older people.

(ii) Armchair Gallery app

The Armchair Gallery app was developed by City Arts Armchair Gallery in the UK. It was a downloadable app that could bring artworks and museum tours closer to older people who are unable to visit the actual locations. The pilot trial of the Armchair Gallery App was successful (Dix et al., 2018). According to Duncan et al. (2018), the app was a great way to enable older people to see and interact with specially selected artworks and artefacts from seven different cultural venues of the UK using a tablet/iPad. Unlike, ArtOnTheBrain app, the Armchair Gallery app could be downloaded from the website and had 18 interactive activities. For instance, players can colour a Canaletto, design a Hepworth-inspired sculpture and take a selfie with Lowry's Head of a Man'. The app had a full set of instructions for creative activities that can be used by carers. Older people and PWCI worked with artists to create the app and tested it in the development phases. Unlike ArtOnTheBrain which had only digital activities, the Armchair Gallery app was combined with traditional activities and contents directed towards other ABD apps. The 3D models provide interactive activities, enhancing the experience and sculptural qualities of the artworks. Duncan et al. (2018) though published the benefits of the Armchair Gallery app when tested in Nottingham and found it to have socially engaged residents who shared explorations, kept participants

cognitively active by offering a mixture of challenge and pleasure (Arts Council UK, 2015). However, the report did not present any evidence-based tool for data collection. The TimeSlips model was integrated into the app. The Armchair Gallery app activity was designed in different themes and had information and themed questions on art appreciation and portraits tailored for older people and people with cognitive impairment. Table 10 compares and contrast the properties of Armchair Gallery and the ArtOnTheBrain app.

Table 10 Properties of Armchair Gallery and ArtOnTheBrain Arts-based digital apps

App properties	Armchair Gallery app (Duncan et al., 2018; Dix et al. 2018)	ArtOnTheBrain app (Murphy et al., 2017, 2018, 2020)
Population suitability	Suitable for older people and people with cognitive impairment and dementia.	Suitable for older people and people with mild cognitive impairment but no mention of dementia.
Suitability for care home	Tested and suited for care home residents	Not mentioned
Suitability for cognitive needs	Cognitive and health needs mentioned including dementia	Cognitive needs included mild cognitive impairments
Augmented reality and 3D	Augmented reality and 3D models of artwork	Augmented reality for viewing art work
Instructions	Instructions with links to tutorial videos and other apps	Tutorial vide (Ralph provides instructional tutorials)
Award	Nottinghamshire Heritage Award for New Audiences	Runner up prize for the most innovative solution at Hacking Health Toronto
Play scenario	Versatile and adaptable. It can be used alone, one-on-one or for a group activity	Can be used alone, one to one or for group activity
Compatibility	Tablet (iPad and android)	Desktop computer and tablet device
Offline/online	Downloading required and once downloaded can be used offline	Online web-based only
Cost	Free	Required subscriptions
Training opportunities.	App developers offered training/workshops for facilitators	No formal training offered to use the app for facilitators
Cultural and Heritage	UK Museum Chatsworth House • Dulwich Picture Gallery • Newstead Abbey • Mr Straws House • The Lowry • Pitt Rivers Museum • Yorkshire Sculpture Park	Artwork from multiple sources and museum form the United States (Boston Museum of Fine Art) from Canada (Art Gallery of Ontario), from the artist Rafael Goldchain and open-source visual artwork material
Play	Cognitive games (matching pairs, catching apples)	Cognitive games (Crossword, word search, puzzles)

3.2.4 Strength and limitation of realistic literature review

Due to a lack of high quality published literature on ABD activities that include culture and playful cognitive activities, this realistic review was not only practical but also has the strength of collecting data from many data sets and grey literature including expert consultations. To the best of my knowledge, this comprehensive realistic review was the first to examine the ABD intervention for older people focusing on healthy ageing.

Inclusiveness of a variety of articles qualitative, quantitative and mixed research which has provided a richer picture is the strength of this review. Methodological robustness has increased the credibility of its results. This realistic review has not only provided useful information to lay the foundation for developing ABD intervention but also described it in a replicable manner for other researchers. Despite that, this review has only revealed a preliminary assessment of the potential of ABD intervention and the scope of available research literature on ABD intervention. This was not focused on formal quality assessment because the aim was to collect as much information as possible. Due to the heterogeneity and poor quality of published articles about ABD intervention only narrative analysis was done as no meta-analysis was possible. The limitation of this review was the inadequate knowledge about the ABD intervention studied, particularly about the health interventions for OPLICH to promote healthy ageing. As the topic is constantly gaining interest, another systematic review might be possible in the future, when more peer-reviewed published articles will be available as evidence-based research rests on the pillar of systematic reviews (Munn, et al., 2018).

In conclusion, the realistic literature review revealed diverse and heterogeneous literature about ABD interventions. The term was not commonly used in the current research. Moreover, a precise definition of ABD interventions was absent in the literature. Most studies had relatively small populations. However, ABD activities were used to refer to various kinds of arts and devices. Furthermore, there was no agreement on methods, theoretical framework and outcome measures for ABD interventions. Despite the interest in innovative ABD activities, information was missing about methods and theories to develop ABD intervention. This realistic review also found that among the numerous available ABD apps, only a limited number of apps included arts, culture and cognitive game activities. Among those, only two the ArtOnTheBrain and the Armchair Gallery apps were found to be tailored for older people and PWCI. However, their feasibility in UK care homes was not established. Despite recognising the benefits of ABD interventions, older people in care homes are often neglected from social, cultural and digital activities causing negative impacts on their health and well-being. Little research to improve the digital and social inclusion of older people in care homes indicates the need for new targeted interventions for this forgotten population.

3.3 Summary

The Health goal set by WHO (2019a) was to ensure people-centred high-quality health care to reduce health inequalities and to strengthen public health. However, an innovative

approach to healthy ageing was recommended to achieve this goal (Cagney, & Cornwell, 2018; WHO, 2020a). Multidisciplinary research utilising innovative methods have been getting popularity in health and social science (Holmes et al., 2020). Researchers highlighted the need for developing new effective methods of promoting healthy ageing to improve the well-being and QoL of older people in care homes (Griffiths et al., 2020; Walters et al., 2017; Wong, R., 2018). Arts and creativity can also be used innovatively for promoting health. However, older people in care homes were commonly found excluded or neglected from participation in arts, cultural and creative activities, which were widely available in the outside world or excluded in the community-based interventions (Cook & Polgar, 2014; Kydd & Fulford, 2020). Despite researchers' increasing interest in using technology for arts in health research and WHO (2017c) promoting the use of technological innovations in care homes, the care home population were deprived of ABD intervention. Gerontechnology researchers like Duncan et al. (2018) and Murphy et al. (2017) pilot-tested ABD apps to bring arts, culture and technology closer to older people. However, there was limited information for ABD interventions in care homes, particularly in the UK. This shows an urgent need for new interdisciplinary research to explore the feasibility of ABD intervention in care homes. With a quest to fill the knowledge gap of ABD interventions in care homes and to respond to the call for innovative research in care homes, this research was conducted for older people in care homes.

CHAPTER 4 THEORETICAL FRAMEWORK AND FOCUS GROUPS

The literature review revealed consensus and a knowledge gap for a suitable theoretical framework to lay the foundation of ABD interventions. This chapter presents the process of developing a theoretical framework, the consultation process and the focus group study for assessing the needs of the potential research participants. The planning and designing process adopted for the ABD intervention is also mentioned to help readers to understand the complexity of this research.

4.1 Philosophical perspective and research paradigm

Exploration has a different meaning in different disciplines. However, exploration in this multidisciplinary research was used as a broad, systematic, purposive, undertaking designed to discover or lead to understand or describe the idea of ABD interventions. This exploration was required because traditional ways of using arts and culture might not be suitable for frail older people, advancement in technology has changed the world, yet the ABD interventions were poorly understood. The underlying philosophy of this project was the blended model of traditional art and craft activities with digital cultural and creative activities instead of using just traditional art activities. To simplify the ABD interventions for older people in care homes Figure 6 helps to understand the focus of this thesis.

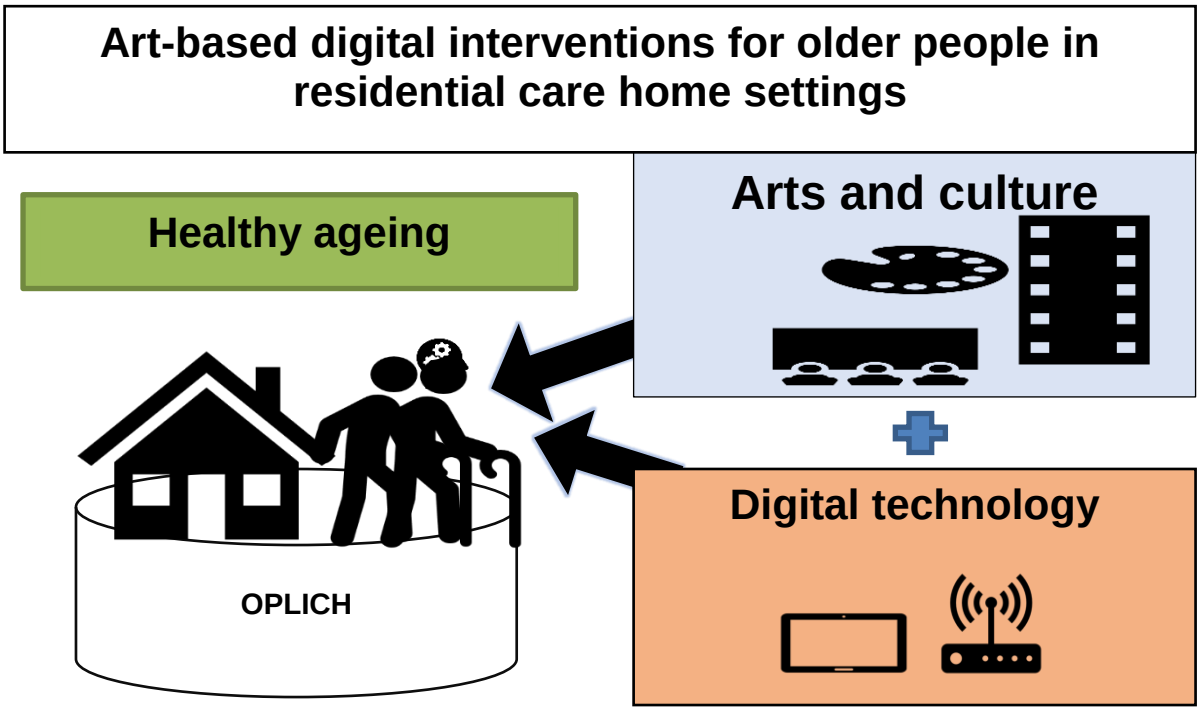


Figure 6 Arts-based digital intervention for healthy ageing in care homes

The potential challenge in this research was to set around ontology (reality) and epistemology to constitute knowledge. To resolve this issue, different epistemological approaches were considered in this thesis. Epistemology directs how research questions would be answered regarding the validity of knowledge using legitimate methods to produce knowledge. Newman et al. (2016) recommended drawing research on a range of research methods that represent different epistemological positions. While it is necessary to remain sufficiently open and flexible to allow exploration in feasibility studies (Craig et al., 2008), initially the choice of design was open. Reflecting on the realistic aims of this research and answering the broad exploratory research questions in real-life care home settings, it became vital to find an appropriate design to avoid research dangers and wasting resources as recommended by Daykin et al. (2013). Despite considering both the positivist and non-positivist approaches for developing the methodology, the exploratory research questions could not be answered using a single method. Duncan et al. (2018) used only the qualitative method which was inadequate in addressing the research problem and lacked generalisability. However, combining both positivist and non-positivist approaches could be challenging for interdisciplinary research spread across the health, arts, technology and social sciences disciplines. A positivist approach was included in this research because it helps to explain, predict and describe the research (Suri, 2013). Combining it with the non-positivist approach, a qualitative method was associated with both interpretive and objective because it attributes the meanings in the social world (Suri, 2013).

4.2 Adapting Human Needs and Healthy Ageing Model

Identifying a guiding framework is recommended and useful to inform the digital health interventions to logically develop and connect the concepts (Varpio et al., 2020; Yardley et al., 2015). Multiple theories were considered to develop a solid theoretical framework for ABD interventions as previously discussed in Chapter 2 and summarised in Table 5. For example, 'The determinants of health', a framework which is commonly used for public health (NIHR, 2012) was considered. However, it was a population focus rather than an individual focus model and it best works for causal pathways to diseases (NIHR, 2012). In the absence of consensus on a single pre-existing theory to encompass and support a broad and complex concept of ABD interventions, the 'Grounded Theory' was also considered. However, using an inductive approach, researchers can engage with several theories in a single program of research (Varpio et al., 2020). Using Grounded Theory was avoided as some existing theories could be combined to develop a foundation for interdisciplinary ABD interventions. Hence, an inductive approach was taken to guide the

development of the theoretical framework for ABD interventions. In this inductive approach, the theory was not fixed and was constantly evolving. Theories collected from relevant disciplines were mentioned in Chapter 2 (Table 5). The inductive approach shaped thinking for selecting appropriate theories. A Venn diagram helped in mind mapping (Figure 7).

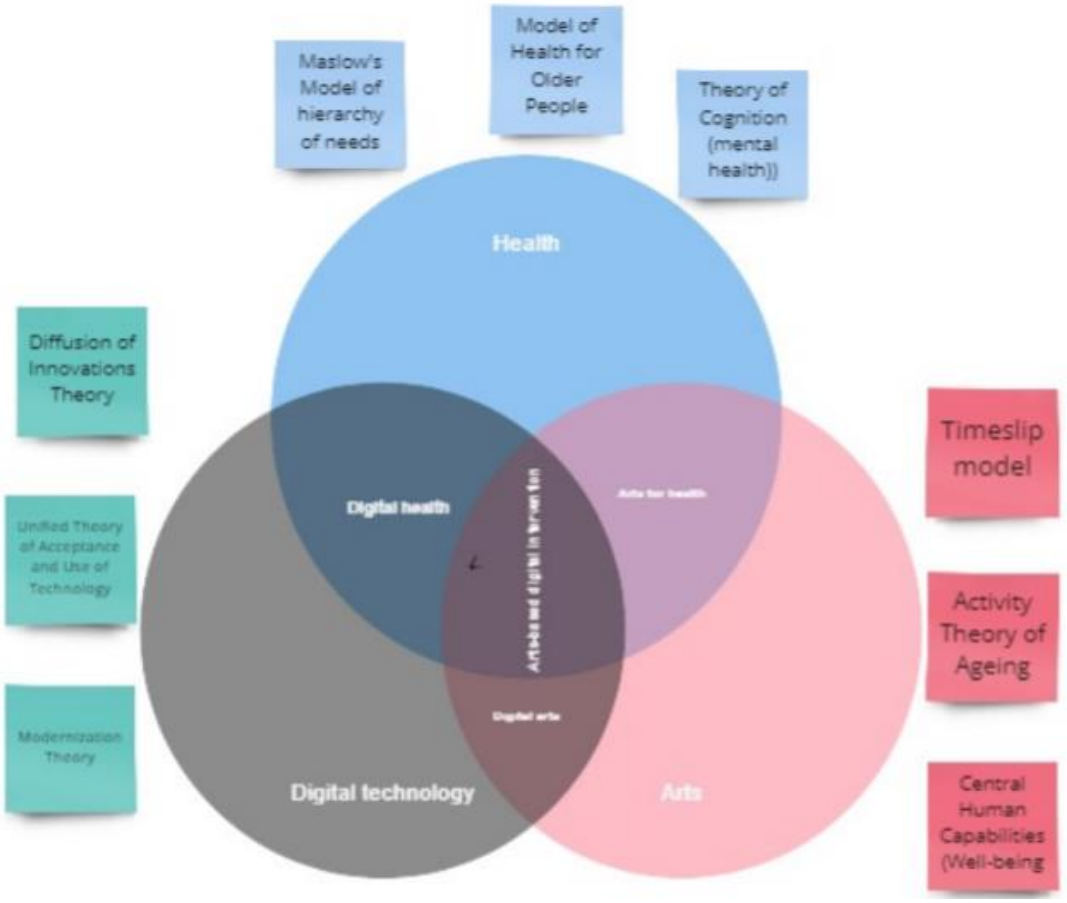


Figure 7 Subjective inductive approach for developing theoretical framework

It was highlighted that activities should be meeting the needs of the care home population (Ross, 2018). As Crockett (2013) mentioned, Maslow's model is useful for developing activity in a meaningful way and for addressing the needs of older people. This research has used the extended human needs model (Maslow, 1987) which is a more comprehensive model (Louca et al., 2021; Sosteric & Raktovic, 2020). It recognises self-transcendence, art appreciation, play and fun needs (Maslow, 1987). The extended model of human needs had a broader understanding of humanity, wisdom, social progress and spirituality Koltko-Rivera, 2006). As the current research was focused on connecting older people living in care homes with other residents as well as with their culture, the extended model was appropriate as self-transcendence in this model is about connectedness both with the outer and inner world (Sosteric & Raktovic, 2020). Thus, it was a more integrated multicultural approach. However, researchers argued about the levels of human needs. For

example, Power (2015) gave security more importance because he refers security to both physical safety/shelter and emotional security of older people that arises from the trust, respect and a sense of belonging. As both physical and emotional safety were important in the current research, safety was kept after basic human needs. Similarly, cognitive needs or the need to learn are also important as people have the desire to explore and learn new things to understand their world (Louca et al., 2021). Without fulfilling the cognitive needs, it may become difficult to reach self-actualisation. In the extended model (Maslow, 1987), self-actualisation is complex that can include personal growth and gaining knowledge to understand the world around a person (Sosteric & Raktovic, 2020). As Maslow extended model included cognitive needs, it became more applicable to address the learning needs of older people. It is also vital to mention that human needs are complex and non-linear (Louca et al., 2021; Sosteric & Raktovic, 2020). For cognitive researchers, human development is dynamic like two steps forward, one step back that shifts world view. Maslow's (1987) extended model, self-transcendence, aesthetic and cognitive needs ranked higher in the human needs model. This issue was considered by Maslow (1987) himself because he mentioned that the needs' order is not rigid and flexible based on circumstances or/and individual differences. The knowledge of the criticisms of Maslow's model has allowed to recognise its weaknesses and to get the benefit of individual human needs. As illustrated in Figure (8), the current research took the human needs model with a flexible approach to satisfy the need of older people based on individual differences or/and circumstances.

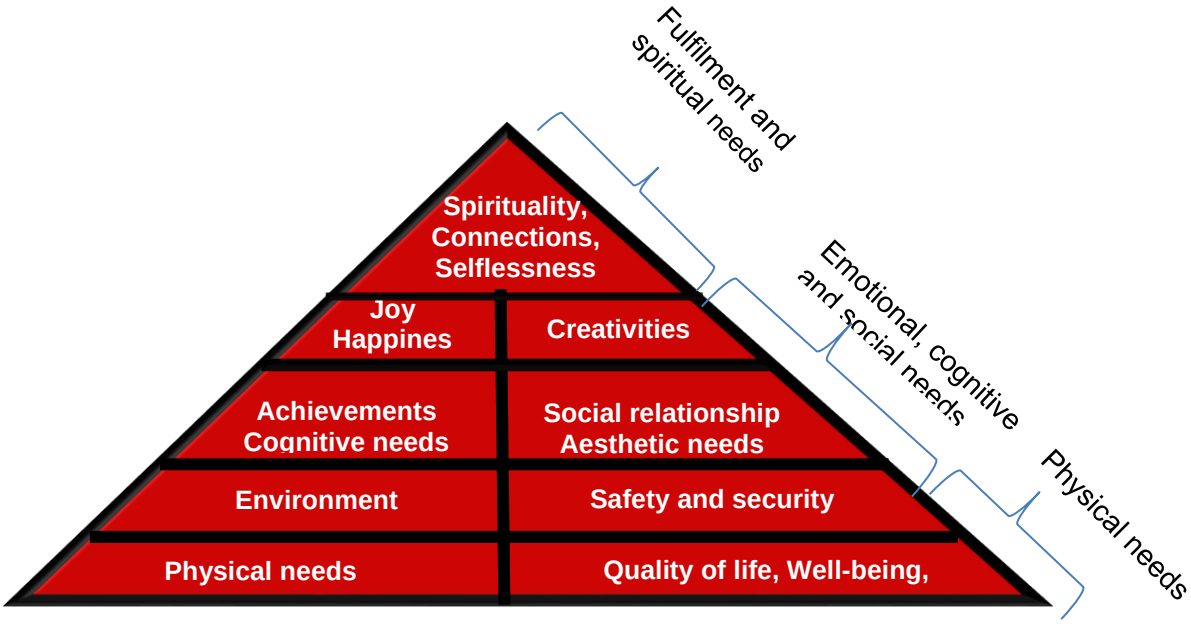


Figure 8 Adapted Model of Human Needs (Maslow, 1970, 1987; Power, 2015)

Despite fulfilling the essential human needs, a person centre approach towards healthy ageing was required in this research to meet research participants' needs and to answer research questions focused on healthy ageing. Moreover, as King-Hills (2015) concluded that the needs model may not fulfil the requirement of this research and that it may not be a 'one size fits all approach. Under the WHO healthy ageing concept, the alignment of health interventions to the needs of older people are important pillars (Wong, R., 2018). In this way, the 'Theory of Healthy Ageing' provides four pillars to consolidate the holistic model of Healthy Ageing presented in this thesis (Illustrated in Figure 9).

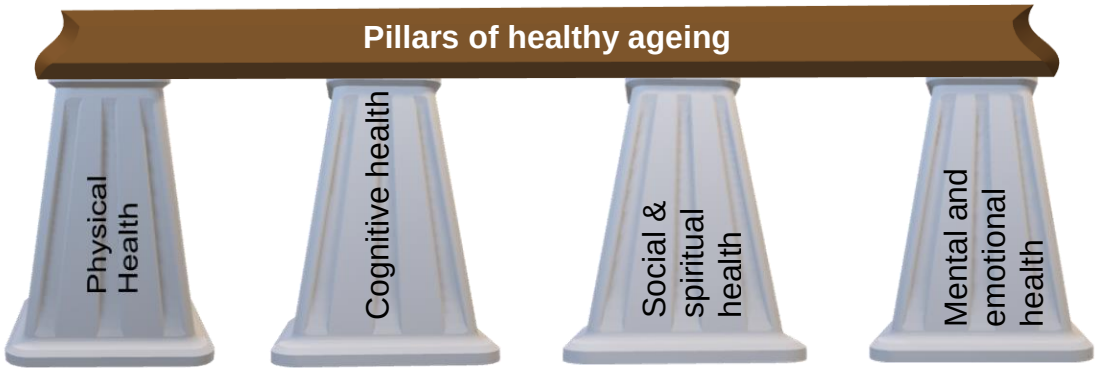


Figure 9 Pillars of Healthy Ageing

The 'Healthy Ageing' model alone could be used to guide ABD interventions. However, as chronic illness and frailty have become a norm in modern society, particularly for older people in care homes, this model could not fulfil the needs of the care home population. Therefore, social, physical, mental and emotional challenges require adaption and adjustments to maintain or regain what is meaningful to older people for healthy ageing (McDermott, 2020). It is not uncommon to use Maslow's hierarchy of needs in combination with another model.

Power (2015) recommended using Maslow's Model in combination with the well-being model. However, well-being is part of the quality of life are included in the essential human needs. To overcome these challenges, ABD activities adopted a personalised needs-based approach and constructed an empirical model, the 'Needs-Based Healthy Ageing Model' (NBHAM) for providing meaningful activities to older people which include people with cognitive impairment. This empirical theoretical framework model was tentatively built based on literature review and initial fieldwork. This theoretical framework encompassed all stages of ABD interventions and considered physical, emotional, social and self-fulfilment needs. While the focus remained on promoting healthy ageing, it describes the needs of

the research population with technology and creativity. To conceptualise, the current research used a pyramid to illustrate the essential needs of older people helps human needs. However, their positions are fixed and can be moved according to the circumstance and needs at the moment. Therefore, the needs levels are kept flexible based on the person centre approach (Figure 10).

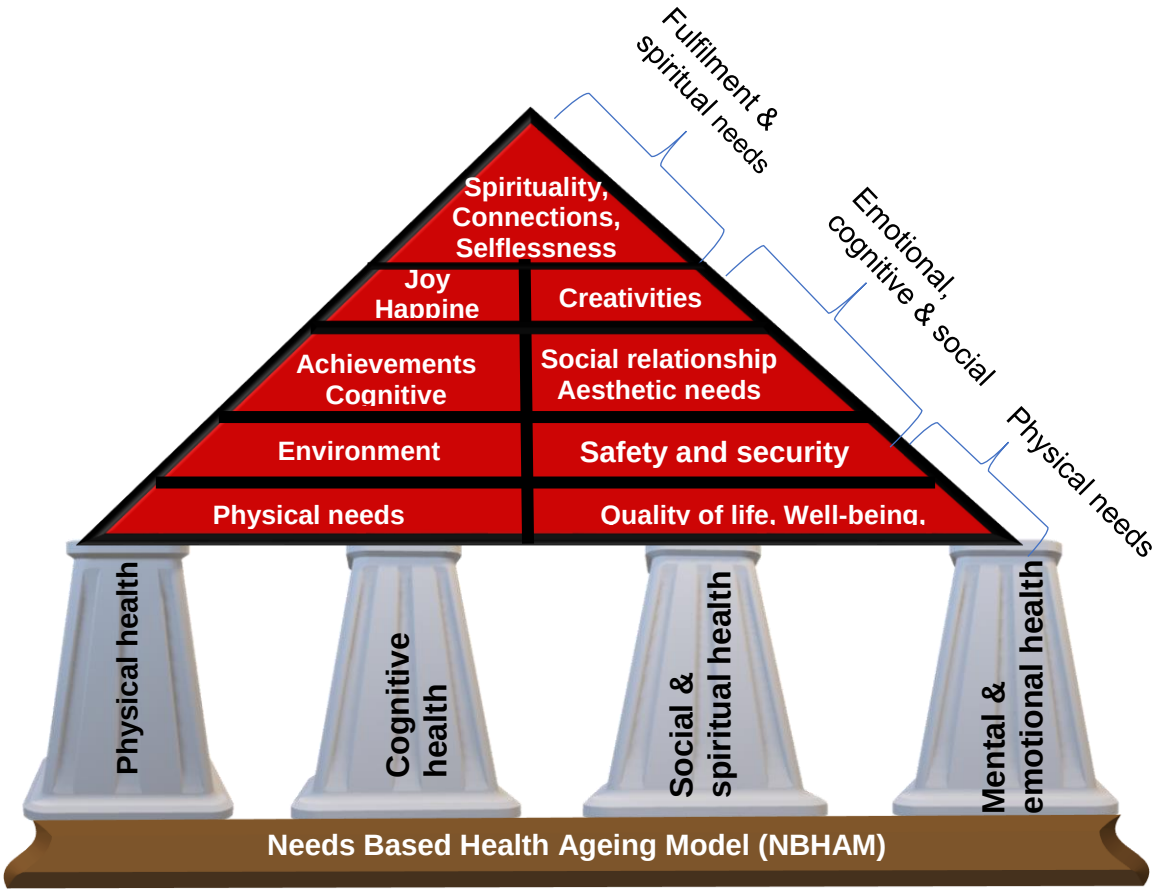


Figure 10 Needs-based Healthy Ageing Model (NBHAM)

4.3 Selecting an appropriate design for the primary research

The literature review provided evidence that ABD interventions were beneficial for the health of older people (Duncan et al., 2018; Murphy et al., 2019; Tyack et al, 2015). While the first study, the realistic review, identified two apps that could be used for the ABD interventions. Both arts and digital health interventions present unique methodological challenges (Windle et al., 2017; Zanaboni et al., 2018). Therefore, before deciding on a design, research questions were refined according to the kind of knowledge this research sought to generate before choosing a method (Elwood, 2010). Thus, after deciding the research questions, the challenge was to select an appropriate research methodology for

ABD interventions. Questions arose, what counts as evidence in the context of arts and health of older people in care homes about ABD interventions. The challenge was to explore the health outcomes of the ABD interventions in two diverse types of residential settings whilst the functional and cognitive levels of the sample population were unknown. There were different perspectives on interdisciplinary research. Both qualitative and quantitative methods were considered as these were the most used methods in the evaluation research. Although they were two different modes of data collection, each had its own strengths and weaknesses. The participatory research method was also considered. In this method, individuals and communities understand and change themselves and their environment experientially (Suri, 2013). This method was successfully used for creative ageing research by several researchers (Bradfield, 2020; Broome et al., 2018; Edmeads & Metatla, 2019; Mihailidis et al. (2010). However, this method was not suitable because the focus was to promote activities rather than changing residents or their environment. Moreover, the methods associated with this approach had the difficulty of reducing researchers bias (Suri, 2013). The other difficulty in this research was the researchers' limited access to the care home residents. Hence, this approach was not possible in this research. Table 11 summarises the philosophy and logical model of this research.

Table 11 Philosophical and logical research model used for this thesis

A logical model for the primary research				
Paradigm	Ontology	Epistemology	Focus	Method
Positivism	ABD interventions can provide cultural, arts and digital activities for older people in care homes	To know the feasibility and practicality of ABD intervention and its health impacts	What works for ABD intervention in real-life residential setting? What are health impact of ABD intervention (e.g. QoL, Well-being)	Quantitative
Constructivist	It is known that social isolation and loneliness can influence health	Discover other factors including social factors to impact change	Why any change occurred?	Qualitative
Pragmatic	Meaningful activities may be useful for older people in care homes	The best method is that which can brings more information about the ABD intervention for older people in care homes	What is practically feasible about the ABD intervention in care homes and what change the ABD intervention can bring?	Mixed methods

It is not uncommon in interdisciplinary research that a pre-dominated epistemology is reinforced by others (Newman et al., 2016). Hence, deliberate efforts were made to collect data in parallel and the positivist and non-positivist findings were integrated to obtain results to support and validate each other as it is a preferred method (Mitchell & Agnelli, 2015). Often researchers attempt to undertake qualitative research with older people without understanding the complexities (McKeown et al., 2010). Therefore, the stance taken for this research is an example of countering the dominance of one epistemology to research projects through the use of epistemological pluralism (Harambam & Aupers, 2019). As recommended by Gaugler et al. (2018) mixed methods are useful in ageing research. Hence, this research adopted mixed methods, a research strategy that employs more than one type of research method (Elwood, 2010). Both qualitative and quantitative data collection, analysis and inference techniques were used for the breadth and depth of understanding about ABI.

4.4 Research phases

As research was conducted in real-life care homes, conscious efforts were made that the methods satisfy the needs of care home partners. However, care home management had their own understanding of the research to support their strategic objectives. This research also took guidance from the Medical Research Council (MRC, 2019; Craig et al., 2008) for complex intervention the consultation process and the focus group study helped to overcome this issue and laid the foundation for the next trial study. Using NBHAM a better understanding was required about the needs of care home staff and residents.

The mixed methods approach was a decision in terms of its implementation without mixing the boundaries between different disciplines. An epistemology, that might be unique to the intervention, was not attempted. This was because it is often challenging and difficult to publish the results in a high-ranking disciplinary journal which is an important factor if researchers are to score highly within the UK Research Excellence Framework (REF, 2018). Mixed methods are recommended for research across multi-disciplinary boundaries because this method encourages thinking outside the box (Elwood, 2010). The universalistic discourse concerning the advantages of mixed methods was appealing. Hence, for the feasibility and pilot trial of ABD intervention, mixed methods were more suitable because they combine both qualitative and quantitative research approaches (Johnson et al., 2007). Therefore, the first qualitative research, the focus group study was followed by a mixed method trial study. Reflecting upon the guidelines for undertaking and evaluating complex interventions (MRC, 2019), this research endeavoured to build on

NBHAM theory and research through a mixed-methods study design. The mixed methods approach was justified in terms of answering the exploratory research questions.

The research started with conceptualisations as mentioned in earlier chapters because the conceptualisation of an intervention confirms methodologies (Miller et al., 2008). Although initially expected that the research would be a linear process (Figure 2), it proved to be a multidimensional complex research process as shown in (Figures 11 & 12). Through an iterative approach was taken to simplify the research was designed to conduct in the following six steps:

Step 1: Exploration (identification of literature for a gap in knowledge mentioned in Chapter 1, 2 and 3)

Step 2: Planning (consultation, focus groups for needs assessment receiving training and protocol development (Chapter 4)

Step 3: Experimentation of the ABD intervention (Chapter 5)

Step 4: Data analysis and findings of ABD intervention (Chapter 6 and 7)

Step 5: Evaluation and reflection upon the research (Chapter 8)

Step 6: Dissemination and recommendations (Chapter 9)

Although all six steps were important in this research, the project planning, reporting and dissemination demanded more time and thoughts as they play vital roles in health interventions (Daykin et al., 2013). As research progressed, the project was found to be iterative as illustrated in Figure 11.

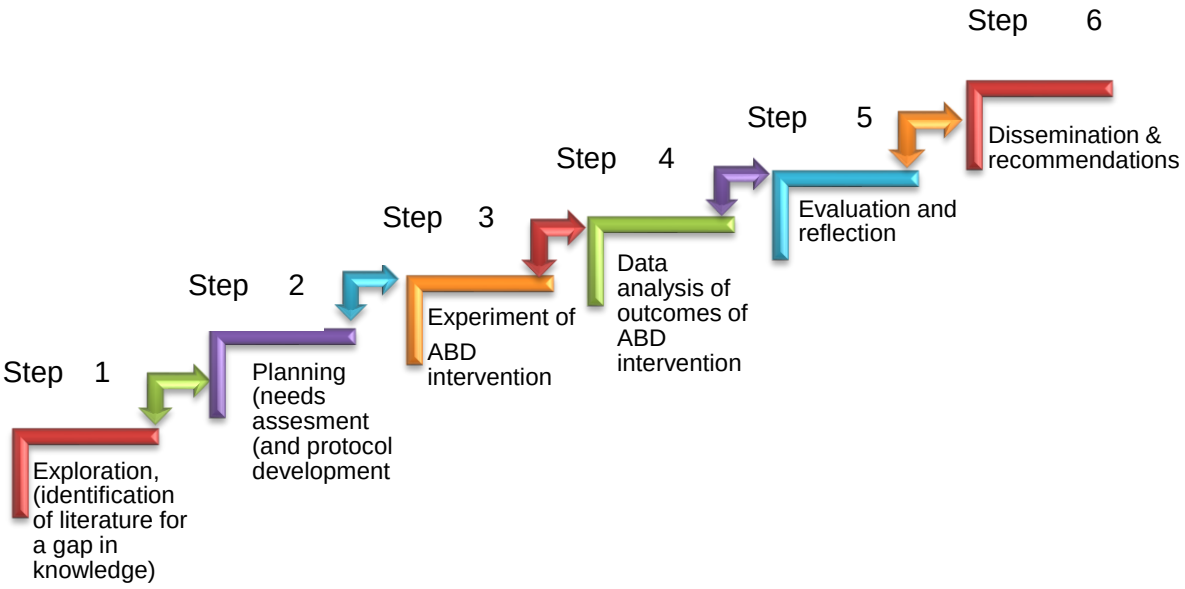


Figure 11 Research as an iterative process

As research changes with time (Wilkinson, 2019), conscious efforts were made to constantly evaluate the research which helped in recognising where the research process needed to change its direction and where the pinch points might be. Indeed, ABD intervention was a complex intervention, and the awareness of its complexity was beneficial from the point of planning, designing and conducting research. As complex interventions often do not follow a linear sequence (Craig et al., 2008), a non-linear project plan, which was divided into four interrelated parts which can be understood with the concept mentioned by Craig et al. (2008). As illustrated in Figure 12, planning and consultation was the first step which was based on the needs assessment of the research population as recommended by NSH (2018). This was followed by experimentation, evaluation and dissemination.

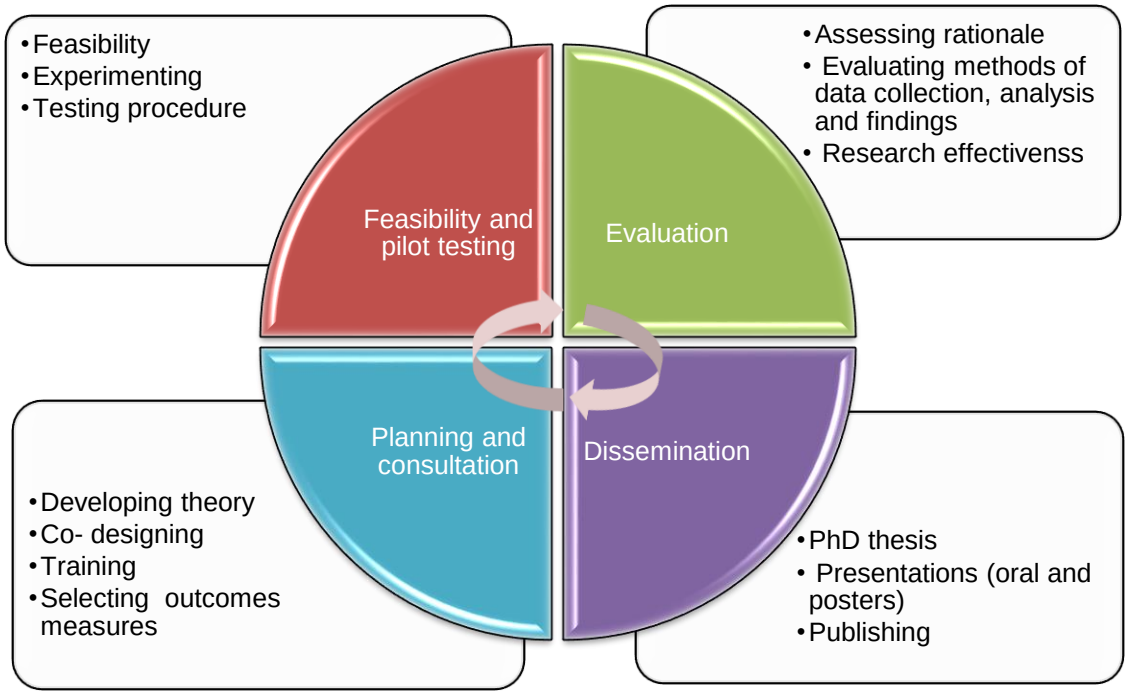


Figure 12 Project of ABD intervention model adapted from Craig et al. (2008)

A detailed plan was prepared for each stage of research to conduct research systematically. The focus of the activity was changed at each step, yet the activities were linked with each other. For example, the literature search was continued until the end of the research to guide this research. Table 12 presents a research plan and the focus of activities. It also shows that before conducting any intervention exploration for demand is vital which is followed by needs assessment and ABD interventions. Experimentation was evaluated by testing efficacy and acceptability as care homes value efficiency (Brownie & Nancarrow, 2013). Follow-up was aimed to explore implementation and integration after ABD interventions.

Table 12 Activity focus at different stages of research

Activity focus at different stages of research	
Area of focus	**Activity**
Literature exploration	Continuous literature search and contacting experts to get their advice.
Needs assessment and practicalities	Consultation, field notes to know the care home settings and the extent of demand of ABD interventions, their readiness in real-life condition, resources & staff required involving stakeholder to determine whether the ABD intervention can be deployed in real-life care home settings and how easily the intervention would be for them. Training staff to facilitate ABD activities. Resourcing digital equipment
Experimentation or testing	Pre-post design to evaluate small-scale ABD interventions to test efficacy using evidence-based questionnaire and observations as a method to compare outcomes before and after the intervention
Data analysis to explore efficacy	Analysing whether ABD interventions can be delivered in care home settings and yield better outcome associated with ABD interventions. Effectiveness analysis
Acceptability	Interview with participants to understand how this intervention would fit with the care plan and routinely offered activities Quantitative data analysis, thematic analysis for the satisfaction of the intervention group
Integration	Follow-up visits to see if ABD activities were being used after the intervention and its post intervention benefits and disadvantages
Implementation	Dissemination and sharing knowledge

As the process is important for the feasibility studies (Bowen et al., 2009), for practicality, the research process was divided into three different phases (i) pre-experimental phase (ii) experimental phase and (iii) post-experimental phase. As recommended by Craig et al. (2008) and Hoffmann et al. (2014), a detailed description of each component of the intervention was planned and mentioned in the sections below to increase replicability and to enable evidence synthesis. Broadly, the research was divided into pre-intervention, intervention and post-intervention. Table 13 presents a summary of these three phases which includes methods used in each phase of this research.

Table 13 Study design and phases of ABD intervention

Research design and Phases			
Phase	Phase 1 (Pre-intervention)	Phase 2 (Intervention)	Phase 2 (Post-intervention)
Intervention activities	- Researcher's training to deliver ABD intervention for OPLICH. Seeking ethical approval -Introduction and briefing about the project -Consultation meeting with the care homes management -Planning and arranging focus groups Creating and refining protocol for the trial study. -Staff's training -Resourcing equipment and materials.	-Recruitment, screening and making groups for trial. -Preparing equipment (iPads) i.e., downloading the required apps for the ABD activities. -Resourcing materials for the ABD activities. -Facilitating activities twice a week for two different groups (Each group participated in ABD activities, once a week for 45-60 min for 6 weeks). -Supporting staff to manage ABD intervention.	Post-test data collection using reflective survey and interviews)
Quantitative methods	Pre-test quantitative data collection	Quantitative observational data collection	Post-test quantitative data statistical analyses
Qualitative methods	Focus group/ formal and informal interviews	Qualitative observational data collection. Field observations to record process and challenges	Staff and participants' interviews for any immediate impact of the intervention. Analysing data:
Mixed analysing & knowledge construction	Analysing interviews and field notes.	Analysing quantitative data (questionnaires) and qualitative data (interviews and field notes).	Analytical interference, knowledge production & dissemination

4.5 Research settings

Two big care home providers in the West Midlands became the research partners for this research. Among several care homes, only two residential care homes were selected for this project as they were expected to have some infrastructure to conduct research. One was an extra care residential setting as an independent living care home (A) and the other was a care home for older people with physical or mental frailty (Care Home B).

4.5.1 Care home A (Extra Care Residential Home)

The Extra Care Residential Homes (A) consisted of 75 apartments developed and managed by a big group of care providers. This location was selected as it was an independent living setting and the care provider claimed to provide a supportive environment for cognitive Impairment by its design and landmark to assist older people. There was a single mixed-use community Hub that integrated public spaces with the shared resident spaces with an ability to draw people in from the High Street. The focal point was the easily accessible

restaurant, cafe and activity rooms which were located on the ground floor. Though the lower floors were for both residents and public use, the upper floors were exclusively for the secure use of the residents and their guests. The setting provided social spaces and a healthy environment to promote community integration and inclusiveness. It had a scheme for older people with a mixed tenure. It was mobility and sight friendly for the old people. It also achieved a QC very good rating at the start of the intervention.

4.5.2 Care home B (Residential Care home)

The care home 'B' could accommodate 86 residents and it was subdivided into six households over three storeys for up to 14 people. Each household had a communal lounge, a kitchen and a communal dining room where residents could access shared facilities in communal areas throughout the home. One household was a 'Re-enablement' unit. This was reserved for older people who have been discharged from the hospital to build up their strength and mobility. At the time of research, 77 older people were living at the care home varied in terms of their physical needs and impairments. Only 64 residents were permanent residents and among them, 32 were living with dementia. The population in the care home were older people 65 years and over who were unable to live independently due to their chronic conditions, physical disabilities, sensory or cognitive impairments or dementia, hence frail and required nursing or personal care. They were either experiencing age-normal cognitive decline or living with mild cognitive impairment (MCI). Although MCI is a grey area between normal cognition and dementia, it is a known risk factor for dementia (Chertkow et al., 2008, Díaz-Mardomingo et al., 2017). More than half (69%) were short-term residents. 'Short term' means being provided with accommodation in the care home for less than eight weeks to receive respite care. According to Age UK (2019b) 'respite care' means care for older people who need extra support following an illness or operation, or when their regular carer took a break. 'Temporary residents' mean their stay was not intended to be permanent and was unlikely to exceed 52 weeks and 'permanent resident' means that their stay was neither short-term nor temporary.

4.6 Gaining ethical approval

To access care homes and to use ABD apps, care home management and apps developers were contacted and formal approval was sought from the gatekeepers. As research involved working with human subjects, ethical approval was required. Formal ethical approval was taken from Coventry University for the focus groups (P78338) as determined by the regulatory framework of governance and institutional review processes. While

researching in care homes, I was mindful of the common quote used in care homes, “residents do not live in our workplace - we work in their home.” As a researcher should be flexible and willing to share the role of staff and residents (Heath, 2018; Streiner & Sidani, 2011), I worked flexibly and empathetically. National Institute for Health Research (NIHR, 2015a recommended that the staff should not be taken away from their care work, I made conscious efforts to arrange meetings in advance and during less busy hours. Thus, the care of residents was not compromised.

4.7 Engaging research partners and consultation: A collaborative approach

Though little is published about working in partnership with care homes, the collaborative approach is not uncommon in arts interventions in the UK. A collaborative approach is suggested for a complex study (Mumuni et al., 2016; NIHR, 2015a) because it is useful to make research more relevant and grounded to help the study in succeeding. Researchers like Nyström et al. (2018) used a collaborative approach and recommended it. Therefore, a collaborative approach was taken in this research. The foundation of this research was based on NBHAM in which participants’ needs assessment was the starting point for developing ABD interventions. Only two ABD apps, the (ii) Armchair Gallery app and (i) ArtOnTheBrain app were found suitable for this research.

Initial meetings at both care settings were aimed to introduce the researcher. However, due to the busy schedules of the staff, it took longer than expected to organise these meetings. In the introductory meetings, the project was explained with its potential benefits for the care home and residents. For the initial introductory meetings, a personalised approach was taken for each care home as research partners. Using PowerPoint presentations, a summary of the project and the benefits of ABD interventions (revealed from the literature review) was given.

4.7.1 Interdisciplinary research and transdisciplinary thinking

The need to challenge disciplinary assumptions and boundaries is highlighted in Gerontechnology research (Manchester, 2021). This research took an interdisciplinary approach and transdisciplinary thinking helped in understanding stakeholders’ points of view and to realise their problems. Using a recommended approach of collaboration and involving all stakeholders (Mumuni et al., 2016), care home management and app developers were involved in the planning phase before designing the trial. Stakeholders were involved from the beginning of this research and their interaction helped in transdisciplinary thinking. The app developers and the care home management shared their

experience of working with the older population. Their advice played an important role in making informed decisions and delivering this research. However, based on the research tradition and the experiences of other researchers (Nyström et al., 2018; Halvorsrud et al., 2019) basic assumptions were made about research such as gaining knowledge can vary among stakeholders. Additionally, challenges in a collaborative approach and involving stakeholders in a complex intervention were expected from the start. Such as difficulty in sharing knowledge between stakeholders having a different level of knowledge and interests, role clarity, relationships, organisational norms, cultural differences and expectations for research output were a few obvious challenges in this interdisciplinary research.

4.8 Study 2: Focus groups

The realistic review study (first study) revealed a gap in knowledge about the feasibility of ABD intervention, the second study (focus group) was aimed to assess potential participants' needs. Commonly in the field of gerontology, researchers come into a care home, recruit residents and provide interventions at times and locations of their choice (Power, 2015). However, this approach was not wildly successful as it leaves no room to express oneself. For this reason, consideration was given to access participants' needs. Using NBHAM resonated with ABD intervention ideology for providing creative activities in a secure living environment and gave importance to individual needs. Hence, needs assessments were important in the planning process which helped to comprehend the picture of the care home environment and their practical willingness. This step guided planning and helped in conducting the ABD intervention in a busy care home environment. It was an essential step in developing ABD intervention, particularly for vulnerable frail care home residents. De Medeiros and Basting (2013) recommend using subjective/individual experience in arts and health research. Focus groups are useful in creative ageing (Bradfield, 2020). Hence, focus groups were considered as an appropriate approach to assess the potential participants' needs (care home staff and residents).

This study aimed to check the initial feasibility of ABD apps and to explore the readiness of the two care homes (who initially showed their interest in participating in the project) before any pilot testing for the ABD intervention. There were several reasons to use the focus group approach. First, the focus group can reveal people's values and perceptions (Ochieng et al., 2018). Therefore, it could help to understand participants' needs, explore and test the suitability and practicality of the two selected ABD apps and gain insights into the potential of ABD interventions. One was an Extra Care setting (4.5.1 Care home A

(Extra Care Residential Home) and the other was a residential Care Home (4.5.2 Care home B (Residential Care home). Second, a focus group could be used in multiple ways such as it can be an informal discussion. Hence, this term was used as a synonym for semi-structured both for one-to-one and for group interviews (Ochieng et al., 2018). Third, a focus group help in generating discussion in which one idea sparks another idea (Carlsen & Glenton, 2011). Fourth, the focus group is a useful technique to increase the efficiency of the qualitative data and is considered high in its validity (Bryman, 2008). Focus groups informed what the participants think and allowed the data collection from several people at once. For the focus group study, two apps were selected. One ArtOnTheBrain app (web-based scribed app) and the other Armchair Gallery app (free downloadable app).

4.8.1 Methodology for the focus group study

Risk assessment was done before the focus groups (Appendix F). A moderator guide was created to guide and structure the group discussion. The first stage of sampling is to clearly define the target population (Taherdoost, 2016). The care home population was targeted in this research. However, there were challenges with access to the care home population and their ability to participate in the discussion probability or randomisation sampling within the time constraints of this research was not possible. Despite considering several other sampling methods, the convenience sampling method was selected as it was mentioned as a more practical and easier approach based on who is available and ready to participate (Taherdoost, 2016). However, the convenience sampling method could have an impact on the validity (Finch et al., 2014) and the generalisability (Babbie, 2012). For the qualitative study, the sampling strategy was purposeful because in this method people can be selected to provide important information that cannot be obtained from others (Taherdoost, 2016). After getting ethical approval, four focus groups were arranged between December 2018 and May 2019 in the participating research partners. One in care home A and three in care home B. The timing and venue for the focus groups were determined by the care home organisations that agreed to participate. In terms of timings and venues of the focus groups, a flexible approach was taken to meet care home staff and participants' requirements as flexibility can improve access to research (Heath, 2018).

4.8.1.1 Recruitment and retention in the focus group study.

The recruitment target of the focus group size was set as 6-10 participants because it is an ideal size for a focus group that allows all members to speak as mentioned by Carlsen & Glenton (2011). Based on the topic and groups of participants, Rabiee (2004) recommended over recruit by 10- 25%, the target set to recruit 8-10 people for each focus

group. The date, time and venue with each care home was confirmed in advance as it minimises non-attendance (Rabiee, 2004).

For consistency of the focus groups and due to the difficulties in accessing care homes, the flyer (Appendix G) and the participant's information sheet (Appendix H) were sent to the managers of both participating care homes' (A and B) to invite residents. Care homes management was requested to display flyers on the notice board and to distribute them to the potential participants to invite for the focus groups. For getting informed consent, participants' information sheets with consent forms were also provided. Deputy Managers, lifestyle coaches/activity coordinators and residents (potential participants) were invited to the focus group. In the Extra Care home (Care home A), the manager informed that residents were invited to use a flyer by displaying it on the notice board and by distributing them to the residents through their doors.

In the first focus group at the Extra Care Residential Home (A), 7 residents who initially showed their interest in participating in the focus group, no resident came to attend the discussion on the given date and time. Out of the four staff members who initially agreed to participate only one was available. One was absent due to an emergency leave and the other apologised for not attending due to their workload. Therefore, only one activity coordinator and one manager were available for the discussion. However, only two participants could not serve the purpose of a focus group. Therefore, a flexible approach was taken and participants agreed to answer the focus group questions. Hence, similar questions were asked from them which were planned to use in the focus group (Appendix J). In the second group, 3 staff members (1 Male and 2 female) and 1 male resident participated. The third focus group was cancelled due to staff being unable to attend and bring residents from their households. In the fourth focus group, 11 participants (7 residents and 4 staff) were recruited in the care home B which included (4 males and 6 females), but one resident withdrew from the study. Participants who were withdrawn from the study, their data was destroyed and not included in the study. Overall, 9 staff and 8 residents participated in the focus group study.

4.8.1.2 Focus groups discussions.

An information sheet (Appendix H) was provided with flyers. Before starting the discussion, the informed consent form (Appendix I) was distributed to the participants of the focus group. The discussion was started with a brief introduction as the participants were not known to me before the focus group. Later, I explained the aim and objectives of the focus

group. Participants were informed that there was no right or wrong direction to make them feel comfortable. After a brief description of the project, ABD apps were demonstrated and later the participants were given opportunities to explore the ABD app. Only in the first focus group, both ArtOnTheBrain and Armchair Gallery apps were demonstrated and explored by the participants while only one app was explored in the other two. As a focus group helps to generate discussion and spark new ideas (De Medeiros & Basting, 2013), participants were encouraged to say what they feel when using and exploring the apps. In the second group, only the ArtOnTheBrain app was demonstrated followed by exploration and discussion. Staff provided valuable feedback about the app. However, the resident left the discussion in the middle and withdrew from the study. The discussion was guided by the previously planned questions in the moderator guide (Appendix J) to explore participants' views about the ABD activities. The focus was to stimulate and empower the group members to share their points and encourage participants to explore new technology and new apps.

The fourth focus group was conducted in Care Home B. Cake, biscuit, tea and coffee were provided for hosting by the Care Home (B) management. In this focus group, only the Armchair Gallery app was explored and the discussion remained limited about residents' needs, their likes and dislikes about the app. It also helped to introduce the researcher and to develop relationships with care home staff and potential participants. Most participants actively participated in the discussion and enjoyed exploring the group activity. The focus provided conversational opportunities for residents to explore the Armchair Gallery app. It helped in looking at the selected app both from the staff and residents' point of view. Care was taken that one or two members do not dominate the discussion or direct the discussion in the irrelevant direction, yet it was not possible to give equal time to each participant due to the diversity in cognitive and physical abilities of the participants. Although the focus group was audio-recorded audio files were difficult to transcribe due to the noise disturbance as carers were helping participants with hearing and cognitive difficulties. As Colucci (2007) mentioned, focus groups can be a fun activity, I also found that it was not only fun for the researcher or moderator, but also for participants who were actively involved in the activity.

4.8.1.3 Data analysis for focus groups.

The data analysis of the focus group incorporated the interview data obtained during the consultation as the same questions were used to guide the focus group as were used in the semi-structured interviews. As interviews were mostly informal and the inconsistencies

in the focus groups as one focus group was informal and could not be traditionally moderated due to numbers of people with hearing difficulties. Hence, the thematic analysis was neither done nor possible due to the issues in transcribing the data. There was a lot of background noise during the focus group and the audio recording was of poor quality with a lot of noise disturbance. The noise was due to multiple residents talking together and carers speaking loudly to help participating residents with hearing and physical difficulties. Only directed and conventional content analysis was done. The main focus of the content analysis was the staff and residents' needs assessments and selecting an appropriate ABD app for the trial study. Some data were difficult to transcribe. Field notes helped to validate the data. Hence, the content analysis was done systematically as recommended by Elo et al. (2014) and Assarroudi et al. (2018). Data were categories for apps, residents, staff and data related to ABD intervention (such as questionnaires).

4.8.2 Findings from consultation, interviews and focus groups

Field notes, informal interviews and focus group study helped to gain insights into residents and staff needs. They also helped to explore different residential care settings including care and extra care and investigated the readiness of the residential care home settings for ABD intervention. It was also clear from this study that a lack of staffing might be a challenge for researching in real-life settings. Hence, extra time would be required for conducting a larger trial as recruiting staff would be even more challenging in these settings in the busy care home setting. They also need extra time to plan activities as the schedules are usually made for the next few months to promote activities in their care home.

Regarding the suitability and readiness of care homes, at the time of research, both care homes despite having broadband connections Wi-Fi signals were low and exploring the web-based ArtOnTheBrain became difficult. Care home 'A' as an independent living setting, management had no formal data to inform how many residents own their own digital device, i.e., mobile or tablet or computer/laptop. There was no provision of computer/tablet by the care home management because the cost transfers to the residents. Hence, there was no single common computer/laptop which could be used by the researcher/residents for the digital activity. Additionally, there was no big screen that could be connected with the researcher's laptop for any group activities. In the extra care home (A), the residents had easy access to the computer located in the public library, which was a part of the wider building. However, the library did not belong to the care home. Hence, using computers located in the public library for the ABD intervention not only required a separate ethics approval from the health authority which could take a considerable extra time, but also it

was outside the care home setting. Hence, for this research, which was the focus at care homes, this option was considered. At extra care home (A), the Wi-Fi signals were very weak in residents' flats. Hence, they come to the lounge to use the internet which was the best place to get Wi-Fi signals. However, the common lounge area was used by residents to watch TV. There was no other suitable place for the group activity twice a week for 6 weeks at the extra care setting. Any digital activity using an online or web-based application such as the ArtOnTheBrain app requires suitable equipment and good Wi-Fi. However, no suitable equipment or digital device was available in both the care home and the extra care settings. In Care home A, the staff mentioned that despite offering regular activities neither every resident was interested in participating in these activities nor their participation was regular and the activities were joined by different residents each time. Therefore, it was clear that it would be highly unlikely that the same residents would come to participate in the ABD activities every week once or twice for 45-60 minutes regularly for 6 weeks. The discussion enforced Head & Lanza's (2015) findings that for any intervention in care home settings, recruitment and retention are usually very low.

Care home B self-identified as technologically innovative. However, there were issues with the availability of digital equipment and signals with the freely available Wi-Fi. The staff mentioned that most residents did not own their devices. For this study, sourcing digital equipment or mobile devices for the ABD intervention became difficult. This showed that even with the willingness of the research partners, the modern care homes that published themselves as technology-enabled, might not be practically ready for digital interventions. It was clear from this study that adherence to any kind of ideal model of formal briefings and distribution of information at the outset of the next study would be infeasible.

As Colucci (2007) mentioned, a focus group can be a fun activity, participants enjoyed the focus group. The focus group study helped to assess the potential of ABD apps. The staff and resident explored both apps ArtOnTheBrain & Armchair Gallery apps in two different care home settings. Reflecting views about the apps together with insights about ABD interventions were gathered using a focus group approach. During the first focus group, only the online app ArtOnTheBrain was explored with three staff and one resident. The ArtOnTheBrain app was not downloadable on a digital device, it could only be used with good Wi-Fi connections. Though the ArtOnTheBrain app provided a gateway for relatives and family members to log in remotely to read stories and comments shared by others which were only available through a subscription. The downloading time for viewing pictures was dependent upon the broad band's speed. Furthermore, the staff mentioned that logging into the website using an ID and password would be difficult for their residents and for the

care home staff to manage and keep a record of each participant in their busy schedule. The demo of the ArtOnTheBrain app shown to one of the care home residents with hearing difficulty was unable to understand the audio even with the highest volume level due to Canadian accent The ArtOnTheBrain app was subscription only and was not available in the market for everyone. Participants could invite their friends to join their social circle. The focus group was centred on the positives and concerns of ABD activities with a particular focus on using ABD apps and the availability of technology in care settings.

The game includes puzzles and word search activities with three difficulty levels easy, medium and hard level. However, there was no difference in the difficulty level for word search i.e., had the same questions. Therefore, one participant who tried using different difficulty levels was quite disappointed. The “writing a story” activity could be used to comment on how the artwork made the user feel. However, those comments which included emotions and sensitive information could be seen by other users. For the “mingle” activity, the ‘thumbs up’ icon for “like” and thumbs down icon for “dislike”, were hardly noticeable due to their small size while there was no symbol/icon for selecting an “undecided” option. The activity coordinator felt that it would be difficult for their residents to use the ArtOnTheBrain website without any assistance or technical support. Participants also found difficulty in understanding the audio of the ArtOnTheBrain application as recorded in a Canadian accent. Participants showed concerns that it might be even more difficult for their residents. The tab ‘clues’ had no information to help to find the correct answer, but there were no clues to answer the question and there were the same questions under the heading of ‘clue’.

It was obvious that residential care settings, whether extra care or residential care homes, both were busy places and faced staff shortages. However, residents, care home managers and staff, who took part in the focus groups, provided valuable data to plan ABD intervention appropriate for their care homes. Through comparing the two ABD apps selected for the trial study, the web-based application (ArtOnTheBrain app) was not suitable for the intervention in both care home and residential settings due to the weak Wi-Fi signals and unreliable internet. The app needed adaptation for the UK population. However, there was a lack of time and finances to adapt the app (ArtOnTheBrain) for the UK population.

Regarding the readiness of care homes, becoming a research partner was a new initiative for care home management. This study showed that the care home partners were not fully equipped for a digital intervention as they claimed in the beginning. It was obvious that the availability of digital devices for ABD intervention would be a challenge. Regarding the

selection of a suitable app, the ArtOnTheBrain application was not suitable which required good Wi-Fi signals. Even in the strongest Wi-Fi signal area, it took a long time to open the ArtOnTheBrain website and the researcher was unable. Due to the technical issues, one could not see all contents of the ArtOnTheBrain on a laptop in a normal view until the zoom size was reduced to 75% which made font size even smaller and more difficult to read particularly for older people. Pictures' size could be enlarged, but there was no option to view pictures on full screen. The audio accent was difficult to understand by the participants particularly for the resident with hearing difficulty even the activity coordinator found audio instruction difficult to understand.

The ArtOnTheBrain app had three activities, learn, play and mingle. The learning activity was challenging for older people as it was written in complex English and compound and long sentences were used. Though there was an option to get a clue to answer the question, no clue was available to answer the question. The play activity tab had no instruction on how to answer the question. Therefore, the activity coordinator found it difficult to answer the question without any instruction and raised her concerns that it would be even more difficult for their residents to navigate the ArtOnTheBrain application. The care home staff, who explored the ArtOnTheBrain, also mentioned that the application looked difficult for them and maybe even more difficult to use by their residents (who have some degree of cognitive impairment). For example, one carer said, "It might not be easy for them to use this app without any support". The other staff member said, "I feel that residents will also need one to one support to use this app." They also stated that they would need initial training on how to use ABD apps before participating in a trial study.

On the other hand, the Armchair Gallery app was freely downloadable. It had clear and easy instructions to facilitate activities. It had six tabs for six sets of activities starting from the introduction and ice-breaking activities to the activities at the end to celebrate each session. Staff liked the inclusion of multisensory and craft activities within the app. Figure 13 is a screenshot of the six sets of activities provided in the Armchair Gallery app.

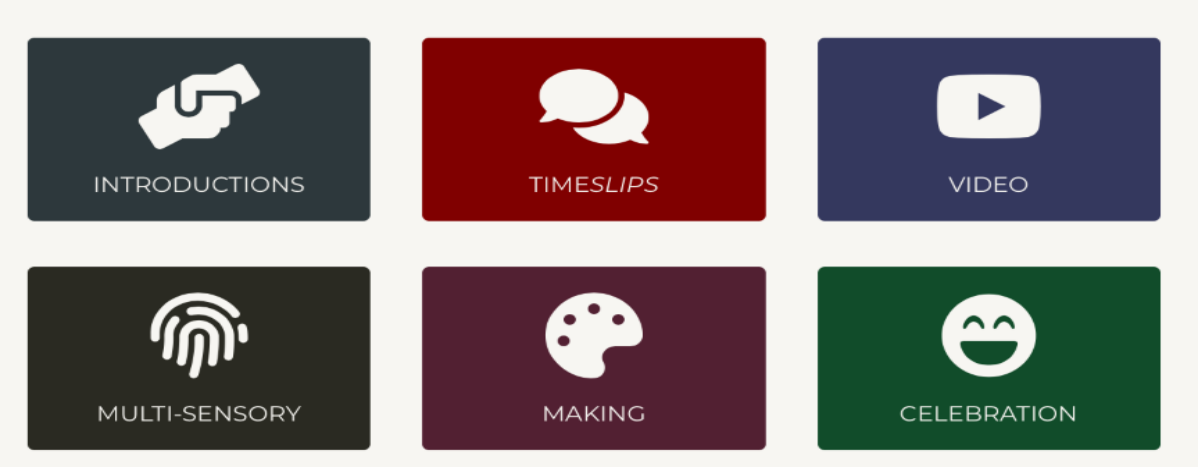


Figure 13 Arts-based digital activity design in Armchair Gallery app

Participants enjoyed video tours presented such as Chatsworth House, Dulwich Picture Gallery, Mr Straws House, Newstead Abbey, The Lowry, Pitt Rivers Museum and Yorkshire Sculpture Park as shown in Figure 14.

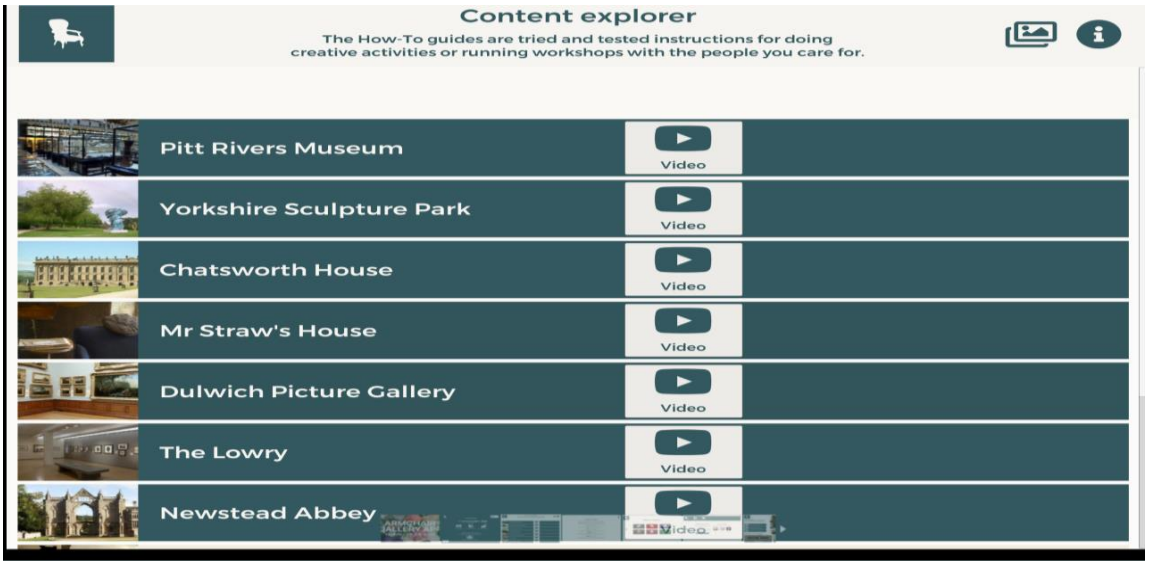


Figure 14 Content explorer in Armchair Gallery app

The staff liked the option to choose from four difficulty levels easy, difficult, hard and advanced and they found instructions clear to follow and easy for facilitating the activities (Figure 15)

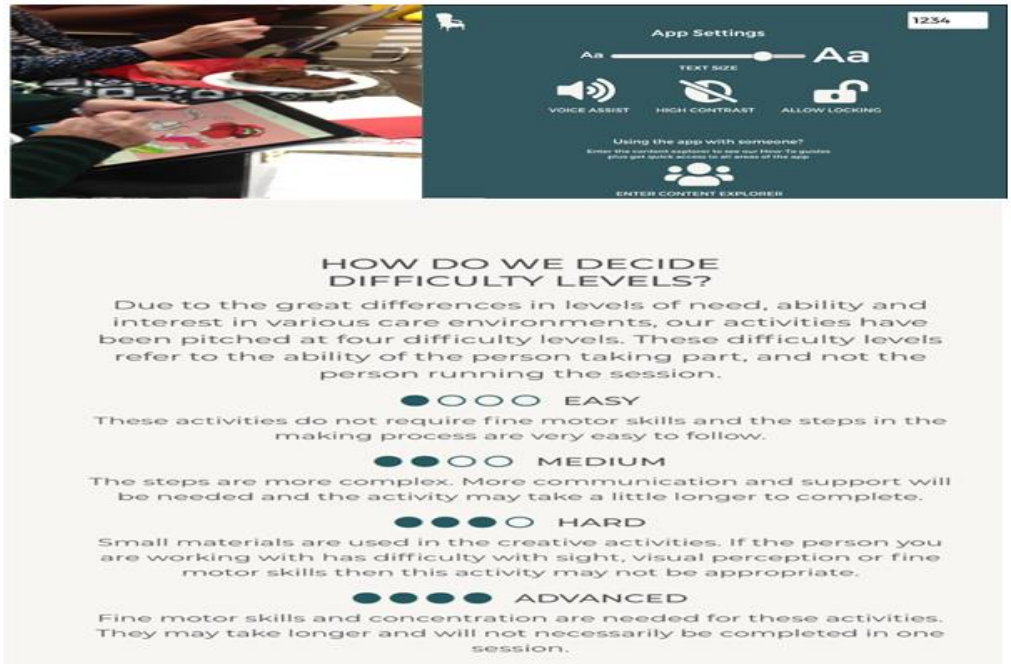


Figure 15 Instructions for deciding difficulty levels in Armchair Gallery app

The Armchair Gallery app had 18 interactive activities that were used by participants during focus groups such as colouring a Canaletto, designing a Hepworth-inspired sculpture and taking a selfie with Lowry's 'Head of a Man' making an apple pie. As NICE recommended using gardening and baking arts activities for older people including those with dementia (Russell, 2019), the Armchair Gallery app included virtual gardening and baking activities. The Armchair Gallery app was tailored to encapsulate the individual qualities of the venues. The activities in the app considered different needs of older people such as multi-sensory elements, ease of use and accessibility in response to people's health and cognitive needs. Staff liked the themed activities for engaging residents which they thought were useful for their residents. Figure 16 illustrated a set of learning, cognitive, fun activities that were linked with the 1920's recipe book.

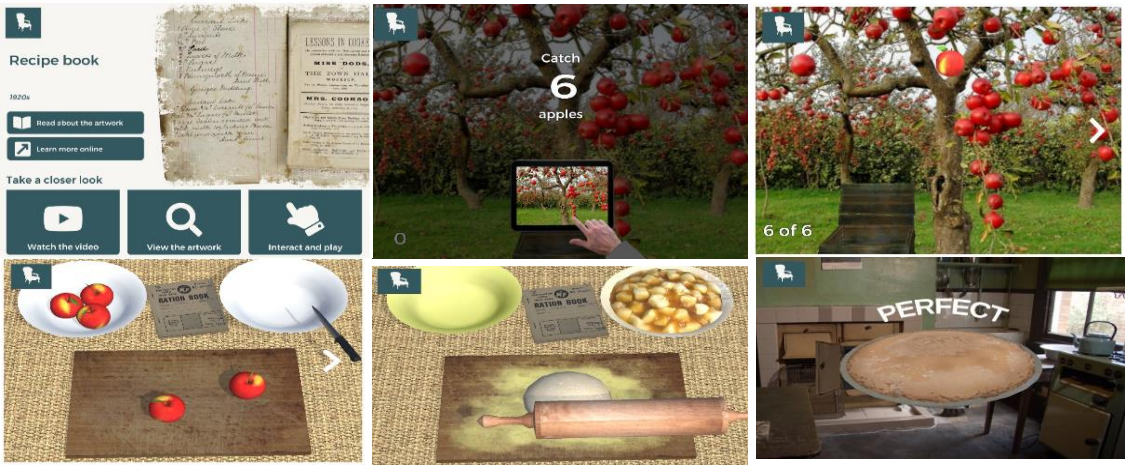


Figure 16 Example of themed linked activities using Armchair Gallery **app**

The staff, who explored both apps, mentioned the Armchair Gallery app as more engaging than ArtOnTheBrain. In contrast to the ArtOnTheBrain app, the Armchair Gallery app had craft activities that were themed with other cultural and multisensory activities. The staff liked the instructions in the Armchair Gallery app for getting materials for craft and multisensory activities and the links for other apps and videos for arts and craft activities in the app (screenshot in Figure 17).

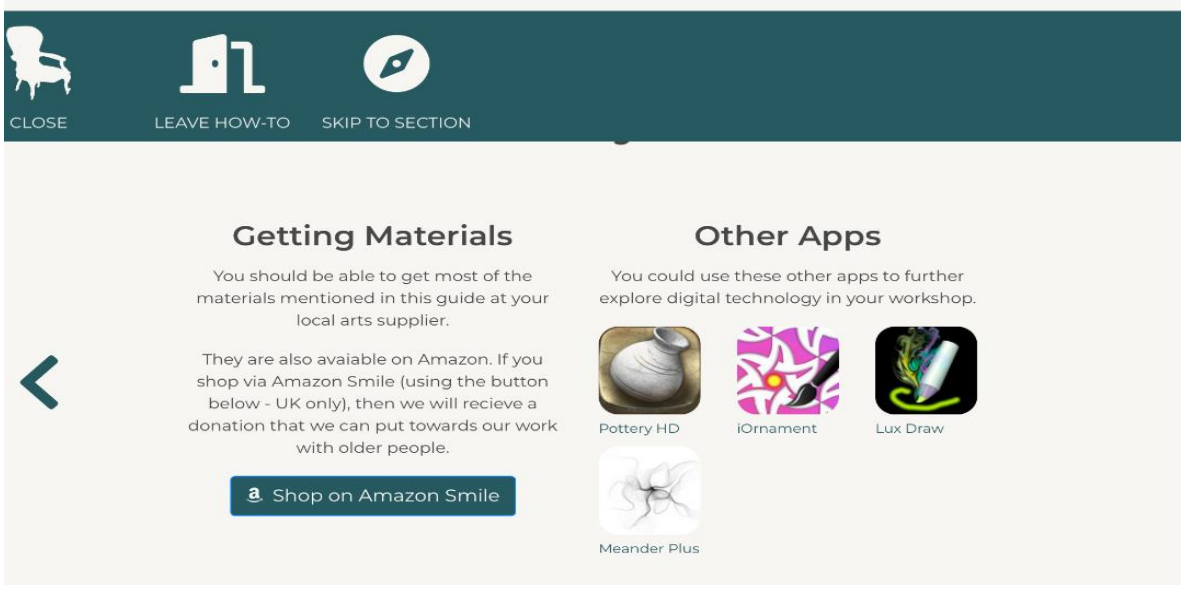


Figure 17 Links to other apps and getting material within Armchair Gallery app

Information zone is necessary for a digital app (Kaufman et al., 2020). The study showed that the information zone in the ArtOnTheBrain app had no clear instruction except navigating video. Compared to it, the Armchair Gallery app contained everything needed to understand how the app works and options to choose the difficulty level were given in the app. However, the staff mentioned that it might be difficult to read all the information to use the app in the busy care home environment. As staff often had no extra time to navigate and read the instruction, training became vital for an innovative ABD intervention. A separate report was prepared to inform research partners about the outcome of the focus group study. This study indicated that most residents did not own any laptop or computer or tablet and there was a lack of digital equipment for any ABD intervention in both care home settings. To conclude, this study revealed that the Armchair Gallery app was more suitable compared to the web-based ArtOnTheBrain app for the ABD intervention in the care homes. Table 14 summarises findings related to the two ABD apps used during the focus groups.

Table 14 Focus group study findings for ABD apps

App properties	Armchair Gallery app	ArtOnTheBrain app
Suitability for care home population	Suitable for older people in care homes as worked offline once installed	Suitable for older people but required internet connection with good Wi-Fi signals for mobile device
Availability	Available free	Need subscription, commercially, Pro phase
Accessibility	download for iPad and android	
Commercial/Cost	Free	Required subscription
Activities	Video, learning, Augmented play, painting, story-telling and celebration	Learning, puzzles-solving, storytelling and socialising
Difficulty level	Four levels (Easy, medium, hard and advance)	Three levels (Easy, medium and hard)
Suitability for cognitive needs	Cognitive and health needs mentioned including dementia	Cognitive needs included MCI but not suitable for dementia.
Augmented reality and 3D	Augmented reality and 3D models of artwork	Augmented reality.
Instructions	Instructions with links to tutorial videos and other apps	Virtual tutorial
Learning activities	Description/history of the art-work and documentary report. Reading and listening	History of the selected art and artist. Reading. Writing about own story
Instructions for activity	Clear instructions suited to be used by residents or carer for care home staff for their resident	Guided tour and instruction to be used by older people but no group activity instruction
Group/individual use	Versatile and adaptable. It can be used alone, one-on-one or for a group activity	Could not be used alone, one to one or for group activity
Links to other apps	Given in the app	No link to other supporting app
Instructions/manual for facilitators	Provided in the app for both, individual and group activity	No instruction in the app for facilitators only guided tour for individual use.
Cultural and Heritage	UK Museum and sculpture Park	Artwork from museums
Learning activities	Videos, reading and listening	Reading and writing
Cognitive activities	Pairing, catching apples, balancing, virtual gardening and cooking	Crossword, word search, puzzles
Socialisation	Suitable for group activities and everyone can download to play together	Group activities were possible including online activities but subscription was required to post comments, opinion and stories on social network
Spiritual	Noah's Arch, animal pairing activity	Learning about Jewish artists' and their art-work
Storing artwork	Artwork can be printed and saved	No printing option given.
Multisensory elements	Yes	No
Craft activities	Yes	No
Links to other apps	Yes	No

4.8.3 Strengths and limitations of the focus group study

Staff working in different roles from two different care home settings participated in the research who shared their experiences of working with the older population and the challenges of involving residents in activities. Staff and residents both added to the knowledge by giving their point of view. This study served its purpose by providing valuable information to lay the foundation for the next ABD intervention study. However, as the recruitment was done by staff, the chances of bias selection could not be neglected. For example, inviting only cognitively normal residents, residents who were motivated to use and value digital apps or who were more interested in arts or avoiding residents who never used any digital technology or residents who do not like seeing strangers in their care home etc. As several carers were helping residents with physical and cognitive impairments, it was not possible to reduce noise level hence, the audio recording was of poor quality. This might have influenced the robustness of data analysis.

4.9 Summary

As research progresses, new ideas and knowledge develop. The first phase of the study was aimed at preparing a ground for the ABD intervention. The new combined theoretical framework of NBHAM was tentatively used knowing that it would likely be adjusted with the progress of research. Meetings were organised to introduce and involve research partners. The second step was to explain the study and to outline what the research project would require from them. To ensure that the intervention is easy to deliver individual formal and informal interviews of the managers and staff were conducted and field notes were recorded which provided valuable insights in assessing care homes readiness for this research. The consultation processes enabled stakeholders to develop a sense of ownership and involvement from the start, which was important for the successful delivery of the ABD intervention. As the third step, focus groups were conducted with staff and residents of extra care and care home to access both staff and the potential participants' needs. Findings from the initial field survey, consultation meetings and the focus groups showed that the 'Care Home A' was not suitable for the ABD intervention trial study and that the staff and residents liked the Armchair Gallery app more than the ArtOnTheBrain app. Regarding ABD sessions, staff preferred group weekly activities compared to individual or twice a week activities.

CHAPTER 5: FEASIBILITY TRIAL OF THE ABD INTERVENTION

Often information about how the intervention was developed is sparse. Therefore, a comprehensive, systematic and transparent approach for developing ABD intervention is reported in this chapter. This is to enhance understanding of the ABD intervention development process. This chapter presents strategies used for recruitment and the methods used for data collection, as well as the data analysis. This chapter is important to understand the process and the complexity of ABD intervention before moving on to the findings of the ABD intervention trial.

5.1 Methodology for ABD intervention trial study

Indeed, there is a disagreement between researchers about the terms ‘feasibility’ and ‘pilot’, 'feasibility' in this thesis was used as an overarching term to describe a preliminary study for ABD intervention. The intention was to provide as much information as possible for future larger trial studies. The feasibility included pilot testing for efficacy signals. Camic et al. (2014) also successfully used a pre-test and post-test design in a mixed methods study for art-viewing in the art gallery. The mixed methods design has the potential to address the complexity in research (O’Sullivan, 2019). Therefore, for the complex ABD intervention, mixed methods were more appropriate. The feasibility study aimed to collect as much data as possible to explore the ABD intervention by using mixed methods and data triangulation to inform future trials. Triangulation is an important reason for selecting a mixed methods design (Morgan et al., 2019; O’Sullivan, 2019). As Morgan (2019) indicated triangulation helps to explain the outcomes but it lacks clarity and can have multiple meanings. Despite its complexity, it helped to capture a more complete picture of the potential impact of ABD interventions. Although the data collection was parallel, the practicalities of the research

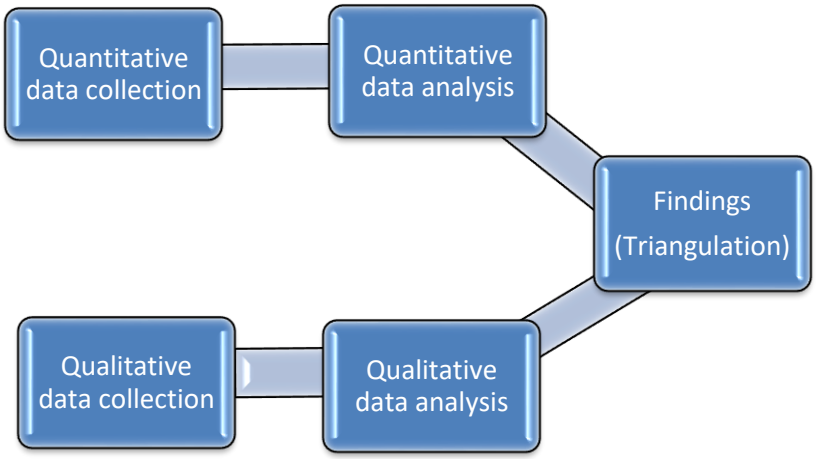


Figure 18 Mixed methods strategy for pilot trial

process did not divert the original intention of using both methods. Both quantitative data and qualitative data were collected in parallel while their findings were triangulated at the end to validate and support each other as illustrated in Figure 18.

5.1.1 Involving staff in planning the ABD intervention

ABD interventions are complex interventions (Nafis et al., 2018b) and complex interventions work best if they are tailored to the local circumstances (Craig et al., 2008). Considering the demographic differences of care home settings (Chapter 1, section 1.4), staff engagement to guide the researcher, who was unfamiliar with their unique cultural protocols, was necessary to assess research participants' needs. Other researchers who involved older people in co-designing found that cognitive impairment is not an obstacle for co-designing (Duncan et al., 2018; Tsekleves et al., 2020). Co-design suggests researchers, from across disciplines, join to provide better care and support for older people (Manchester, 2021). Therefore, the initial plan was to involve participants in co-designing for the targeted ABD intervention. However, due to the limited access of researchers in care homes, this approach could not be fully applied. Yet, a collaborative approach was taken by involving care home staff and management to plan a targeted intervention. This was because the collaboration of care home staff in a research project can help with overcoming practical problems as they feel a responsibility for the research going ahead (NIHR, 2015b). Hence, when approaching the care homes, the focus was on how the study would benefit residents currently or in the future as recommended by NIHR (2018a). Hence, took an approach that was sympathetic to the care home community.

5.1.2 Developing a protocol for the ABD intervention

Despite a lengthy process, appropriate consideration of the practical issues of developing, feasibility or piloting, evaluating and reporting complex interventions are important (MRC, 2019). Therefore, a considerable amount of time was spent in planning the ABD intervention as greater attention should be given to early phase piloting in complex health research (Oakley et al., 2006). Due to limited published research in care homes, exploration of the potential impact and efficacy was necessary before investing in larger trials. Estimating effects in a feasibility study are controversial (Sim, 2019). Hence, researchers like Whitehead et al. (2014) argued that feasibility studies should not estimate feasible effect sizes. Hence, the effect sizes of the intervention are usually not examined in the feasibility studies as they have not been adequately powered to test the effectiveness of the intervention (Eldridge et al., 2016b). Using NBHAM at each level helped to understand the

relevance with age-related needs of frail older people with arts (creativity) and digital technologies with a focus remaining on promoting healthy ageing.

A clear protocol was prepared to ensure consistency in the ABD intervention. Although a randomised controlled trial (RCT) is known as a robust design and useful for comparing efficacy in medical research, protocols for gathering data are equally important (Pieterse, 2020). Therefore, due to the limited published information for ABD intervention in the UK care homes, a feasibility study design was more suitable for this project. The final decision about the experimental design was taken after consultation with the care homes. From the results of the focus group study, the Armchair Gallery app was found as a suitable app for the ABD intervention. It was found to be an interactive, freely available, downloadable app that was designed to be used for older people. Being a new area of research, there was a clear need to develop a protocol for the trial and specify a plan of various stages of the research in detail before starting the intervention. Hence, an initial protocol for the ABD intervention was prepared.

5.1.2.1 Refining the protocol

Care home managers usually obtain detailed profiles of residents' lives and interests on admission to develop appropriate social needs' care plans (McKeown et al., 2006). For the ABD activities session, it was important to understand the residents and to know the kind of activities that potential participants would prefer because care home communities are very diverse and could pose a challenge in terms of their needs (Nafis et al., 2021). Han et al. (2016) suggested using a collaborative approach and involving carers to identify personally meaningful activities for older people. Valuable advice from the care home manager and the staff was obtained to see the suitability of the outcome measurements for their residents. Conscious efforts were made to meet the care home requirements and progressively refined the protocol following the discussion and consultation with the care home staff as previously done by Surr et al. (2016). For example, the initial plan to conduct a randomised controlled trial was changed to a feasibility study after conducting the focus groups. Similarly, the initial protocol included a control group (activities as usual) which was removed from the plan based on staff recommendation and recruited challenges in care homes. Though the initial plan was to conduct a 12 weeks trial, care home partners preferred weekly sessions and a short project for six weeks only. Other changes included replacement of a questionnaire (well-being tool WEMWBS was replaced by a shorter version SWEMWBS); the wording in the information sheet was simplified so the residents could easily understand the information and the final documents were specifically adapted

and designed for use in the care homes, an observation tool (ArtsObS) was added; changing the initial plan of twice a week (30 minutes activity) to the once a week activity 45-60 minutes activity to encourage greater compliance. However, there were differences in views about the need for protocol among the staff involved in the research. For example, top management found the protocol helpful while a few care home staff members did not read the documents due to their busy schedule and some found it frustrating.

A pre and post-test experimental design were selected as it incorporates a range of different outcome measures to examine the impact of the ABD intervention as previously used by researchers to explore the feasibility of the ArtOnTheBrain app (Murphy et al. 2017, 2018 & 2019). The ABD intervention was focused on residents' preferences and interests as suggested by Han et al. (2016). In this research, staff and residents' motivation and social learning skills were promoted as conscious efforts were made to include a socio-cultural learning perspective because people learn when participating in social activities (Eraut, 2012; McLean et al., 2011). Hence, instead of individual, group activities were planned as they provide a positive effect including building a closer relationship between socially excluded residents (Eckert et al., 2009). As Minoi et al. (2019) highlighted that researchers should be aware of and more empathetic towards cultures especially when the intervention is based on Western contexts. To be more empathic, care home staff were consulted to design the ABD intervention. Following the consultation with the care home and taking an iterative approach, the protocol was refined multiple times. Hence, how the activity should be designed and what outcome measures should be used was determined by involving staff who engaged residents and discussed their availability and choice of time to participate in the activity. Thus, staff was directly involved and residents were indirectly involved in planning the activity sessions. Though care home management promotes a sense of community, it cannot guarantee against anti-neighbouring and stigmatisation based on different characteristics such as age, disability and class (Dobbs et al., 2008; Perkins et al., 2012). As staff better understand their residents, their prior knowledge about their residents' preferences and likes/dislikes was utilised for making groups and to plan activity sessions. The original intention was to group participants with similar cognitive function in one group as the research showed that the higher functioning residents often avoid frailer residents, especially those with cognitive impairment (Dobbs et al., 2008; Eckert et al., 2009). However, group members were able to join another group that mixed different cognitive and functional abilities in later sessions.

5.1.3 Living Lab: an ethnographic approach

The intervention works better if it is tried on the people who will ultimately receive it (Streiner & Sidani, 2011). This research has used an innovative 'Living Lab' approach which is recommended for real-life settings. This research was conducted in a real-life residential care setting. Ethnography is an emerging approach that is beneficial in contextualising and exploring older people's lives in care homes, understanding care homes' culture and capturing both staff and residents perspectives (Kamran, 2016). The approach was used for complex living settings in which participants and researchers were actively involved in studying a wider complex environment (Higgins & Klein, 2011). The living lab approach gives power to the research process (Leminen, 2015; Ståhlbröst & Holst, 2013). This approach was taken for innovative studies and novel technologies in complex settings in the real world (Higgins & Klein, 2011).

The living lab was a stimulating concept as the research setting was a real-life residential care home. This approach was suitable due to the nature of the work in the busy care home environment, the only possibility to conduct the trial was by the researcher living in the care homes during the intervention period and taking the responsibility to manage the intervention. Hence, as a researcher, I lived in the care home for six weeks to deliver the ABD intervention. I was responsible for managing equipment and helping staff to facilitate ABD activity sessions. For the risk assessment, it was considered that during my stay in the care home, I may witness some situations that could be emotionally distressing because residents can be distressed, disoriented, or could have a fall. However, there was no particular way of preventing this, rather as a researcher I was prepared and discussed explicitly with my supervisors and had a support plan.

As an ethnographic approach, vignettes are used, but they can be utilised as a stand-alone method for data collection in qualitative research (Gray et al., 2017). However, this method has challenges of differences in response related to beliefs and actions in real life and using mixed-method approaches clarifies this methodological issue by helping to understand actions in real life (Barter & Renolds, 1999). This method was used as it encourages even the quietest member to participate in qualitative research (Barter & Renolds, 1999). The focus of this research was to analyse the health and social impacts of ABD intervention on residents rather than generating information related to residents' behaviours. Therefore, field notes were only used to support and validate the quantitative data in this mix–methods research. Moreover, describing the living lab experience coherently was difficult as things were complex and diffuse. Arguably, it could be messy impacting the richness and

contextualisation as the real world is generative and complex (Law, 2004). Though it was not possible to give an in-depth analysis, section (7.5) was used to give views using ethnographic vignettes into the experience of living in a care home.

Despite numerous challenges particularly for getting access to care homes, this approach helped in involving residents and using staff's experiences and knowledge for developing and delivering the ABD intervention. Considering the openness of the living lab approach (Leminen, 2015), this research was conducted with an open mind and a flexible approach. Living lab experience also helped in staff recruitment as it increased the chance to meet staff working in different shifts. This approach also assisted in interviewing staff and residents during their free or less busy times. However, the living lab experience could have not been possible without the care home staff and management's support. They booked a guest room for the researcher for the duration of intervention and provided cooked food during that period.

5.1.4 Pre-intervention preparation

The pre-intervention phase encompassed developing the required skills and receiving training to conduct an arts-based trial in care homes. This included both researcher and staff's training, gaining ethical approval and communicating and coordinating the trial study with research partners. The preparation also involved resourcing the digital equipment for the intervention. Coventry University agreed to provide digital equipment i.e., iPads and styli for the period of ABD intervention and played a vital role in the ABD intervention.

5.1.4.1 Researcher's training

According to O'Carroll et al. (2017), researchers should seek to continually improve themselves with the competencies and skills they need to practice which may be achieved by formal training, workshops and e-learning. I sought knowledge not only for my personal development but also to effectively conduct this complex research. Training and advice included specialist methodology training for INTERvention for DEMentia (INTERDEM)" a pan European research group for early and timely detection of dementia. Though research methods vary by discipline, the emphasis on taking informed consent, ensuring accurate and honest data collection remains the same. However, older people can fluctuate in their ability to make decisions, so having a good working knowledge was essential for research in the frail older population. Therefore, to ensure the safety of vulnerable older people and to collect data correctly, I attended multiple training sessions and completed training offered by NIHR focused on 'The Process of Informed Consent'; 'Taking Informed Consent from

Adults Lacking Capacity' 'Good Clinical Practice Learning', 'Standards in Research' and 'Study Setup' and 'Safety Reporting'. I also completed compulsory modules specific for the care home workers using Autura e-learning, as a prerequisite to gain entry into the care home which had many residents living with dementia. The modules included: "Dignity in Care", "Dementia introduction", "Dementia engaging the person in meaningful activities, "Equality, Diversity and Inclusion", "Fire Safety", "safeguarding" and "Care certificate for handling information."

Additionally, I travelled to Spain and France and attended three training workshops for using arts for activities. I learned how to use arts and digital methods to actively involve participants in meaningful activities in real-life settings. This training also helped me in analysing data for this research. To facilitate ABD intervention using the Armchair Gallery app, I received training from City Arts to deliver an ABD intervention for older people, people with cognitive impairment. I learned about the TimeSlips model and Armchair Gallery app. I also completed the teaching module and received a fellowship from the Academy of Higher Education which helped in training care home staff. Using social learning teaching philosophy, I aimed to train staff not only during the training session but also during activity sessions. While participants were encouraged to learn new skills for using the latest digital technology (iPads) and ABD apps during the activity session. This indicates that the researcher's training plays a vital role in the successful delivery of the ABD intervention.

5.1.4.2 Ensuring regulatory, ethical and information governance.

Regarding the research ethics and governance process, the approval required a data collection plan. Therefore, a protocol was required for the feasibility study. The protocol was developed using relevant literature and using staff's comments received during focus groups. Using an iterative approach, a refined protocol was prepared. Formal ethical approval was given for the feasibility study from Coventry University's Research Ethics Committee (P79498) as determined by the regulatory framework of governance and institutional review processes. However, for this multidisciplinary research, ethics approval', was not straightforward. The first application was rejected and the second application was transferred to the experts in another faculty which caused delays. The ethics application was amended twice as it was difficult to calculate in advance exactly what the situation would be in a real-life care home setting. Indeed, the process of achieving ethical approval was time-consuming and difficult. I found it fairly accurate that even the most pessimistic estimate time to get the project off the ground should be multiplied by three as stated by Streiner & Sidani (2011). The delay in the approval process not only influenced the choice

of methods but also led to a reconsideration of the agreement with the research partners. As a result, it limited the availability of software applications and the number of locations that could be used for this research. As a time-limited PhD project, the delay not only reduced the time duration to collect and finish the research project but also limited the chances to include other research sites in the planned time.

Once the research ethics approval was given, the methods of the feasibility study were largely fixed, therefore, the data were collected in a strictly proscribed way. Working in a real-life setting and collecting data in a strictly planned manner introduced rigidity into the process of data collection. However, it might have not worked in a real-life situation if only one method of data collection or only one data collection tool was used. The rule, to cause no harm, protect human rights and enhance equity and personal safety were followed throughout this research. From a digital health perspective, the research complies with the General Data Protection Regulation (GDPR, 2018) for the governance of personal data. The GDPR framework stresses the importance of explicit consent to data processing (GDPR, 2018). Considering the frailty of the care home population, principles of the Mental Capacity Act (2005) were used to protect participants. However, there is no clear guidance on it how to obtain consent (Head & Lanza 2015). However, the care home management referred to this Act as part of their practice. Yet, the interpretation and application of this Act in care homes raised challenges for staff as previously highlighted by other researchers (Hinsliff-Smith et al., 2017; Manthorpe & Samsi, 2016). Due to the researcher's limited access to the care home residents, participants' capacity was assessed by care home staff. However, I ensured that all participants had been given both verbal and written information about the study before deciding to participate and signing the consent forms. Hence, all participants received information in clear and simple words (participant information sheet, Appendix L) to maintain transparency in this research.

This research resonates with Ellis (2007) for ensuring the confidentiality of the secrets revealed by the participants. For revealing participants' lives and protecting people with cognitive impairment, this research followed Guillemin & Gillam (2004). From an ethnographic point of view, it was guided by Goodwin, et al., (2003) who advised to be aware of researchers' own ethical dilemmas and to keep non-hierarchical relationships with the participants. Although dilemmas are often difficult to anticipate, being aware of my positionality, helped me to find my path through an ethical dilemma. After the introduction, I shared my stories before asking participants any questions to keep a balance in the relationship with participants. Knowing the ethical challenges of getting informed consent

in care homes as highlighted by Head & Lanza (2015), extra time was given to the consent process and informed ethical decisions were taken in this research

5.1.4.3 Staff's training to facilities ABD activities.

The care home system is known as complex (Luff et al., 2011), yet creative healthy ageing is rapidly expanding (Penny, 2018). Unlike other countries, the UK has no recognised accreditation system for arts providers within care settings. Equally, the care sector does not have a unified quality standard for working creatively with residents (Penny, 2018). Therefore, it was hard for care staff to find appropriate training for them. For this reason, it was necessary to train staff for the ABD intervention. Using the NBHAM training was tailored so the staff could feel empowered and have their needs met by incorporating their views and understanding their needs. Due to the busy care home environment, the timings, duration and style of training were kept flexible. Staff were eager to be involved and learn the methods for conducting the research and data collection techniques. The staff was trained to use the NBHAM guided activity to facilitate the activity as an ongoing training during the activity sessions. Furthermore, the staff were encouraged to lead ABD activity sessions based on residents' individual needs to empower them and after the first two sessions, staff were able to lead the ABD activities sessions and collect data. The training of care staff was not only focused on using the app, but also on how to engage participants in the creative use of the app. Active learning approaches were taken and staff's training involved the demonstration of using the Armchair Gallery app and how to use the standardised questionnaire for data collection. This built working relationships to enable staff to deliver the ABD intervention. To internally validate, the data was collected by both researcher and staff and staff who worked as co-researcher in this research.

5.1.5 The research setting and its demography

This pre-post experimental designed feasibility study took place in the residential Care Home (B) located in the West-Midlands, UK. As mentioned earlier in this chapter, the care home management showed great interest in participating in the research and was ready to accommodate the researcher for a period of intervention (6 weeks). According to the practical suitability for the project and based on the continuous interest in participating in the research, the care home B in which the previous focus group study was successfully conducted was selected for the feasibility study. There was a capacity to accommodate 86 residents in the 'Care Home B'. However, during the recruitment period, only 59 residents were living in the care home and it was only 69% filled with the residents. Among them, more than half (69%) were admitted with the diagnosis of dementia. This was not a surprise

because, in a previous survey, approximately two-thirds of UK care home residents were found to have dementia (Department of Health, 2013). Gender data analysis showed that females were in majority (76%) compared to males (24%). This was not a surprise as the previous care homes census have shown that the care home residents were predominately female aged over 65 years (BUPA, 2009; NIHR, 2018b).

Considering the ethnicity, the majority 95% (N=56) of residents in the care home were White (British English, Welsh, Scottish and Northern Ireland). There were only (N=1) 2% of Asian and Asian British and 3% other ethnic groups such as Arabs in the care home at the time of recruitment. However, there was no one (0%) from Black, African, Caribbean, or Black British Mixed or Multiple Ethnic groups (White, Black Caribbean, Black African and Asian). A detail of the demographic data was requested which was provided from the selected care home's record at the start of intervention which helped in recruitment plans (Table 15).

Table 15 Care home (B) demographic data

The study population in (Care home B)		
Category	Number	**Percentage**
Total residents	59 (Capacity= 86)	69%
Residents with a diagnosis of dementia	41	69%
Residents with no diagnosis of dementia	18	31%
Temporary residents	41	69%
Female	45	76%
Male	14	24%
White (English/Welsh/Scottish/Northern Island/British)	56	95%
Mixed/multiple ethnic groups (White & Black Caribbean; Black African; Asian)	0	0%
Asian/Asian British	1	2%
Black/African/Caribbean/Black British	0	0%
Other ethnic groups e.g. Arab	2	3%
Black/African/Caribbean/Black British	0	0%

5.1.6 Target sample size

The feasibility studies often collect information about the target sample size and whether the target was achieved. A sample size justification, a crucial element in the design of a trial, gives the minimum number of participants needed to meet the objectives of the trial (Billingham et al., 2013). Despite the importance of sample size, there was limited published guidance about the required sample size for a feasibility trial. An audit of feasibility trials in the UK showed that the sample size varies from 10 to 300 participants (Billingham et al.,

2013). However, the sample size of a feasibility study should be selected based on what is feasible (Hsu et al., 2015). Therefore, for this feasibly study in a real-life care home setting, a formal sample size calculation was not possible. Taking a collaborative realistic approach, after consultation with the care home management, it was accepted to settle for a lower number (10-12) used by a previous art-viewing project in care homes by Tyack et al. (2015). Though the target sample size was small (N=12), the expectation was that the impact of the ABD intervention would be larger. A low number is also helpful to guide potential amendments to the intervention if it did not lead to change in the chosen measures (Tyack et al., 2015). Being a mixed methods study, a low number was also more feasible to allow the researcher to collect both qualitative and quantitative data, enabling further exploration of the participants in addition to collecting data from staff about their experiences. The protocol was circulated to all research partners (protocol) which acted as an intervention manual. Activity rules (Appendix N) were also prepared using the tool kit for the activity in care homes (Drew, 2015; Duffin, 2012) to help facilitators to conduct ABD activities with a positive attitude. An activity log form was prepared to keep a record of the activity for each participant (Appendix O).

5.1.7 Recruitment for the feasibility study

Feasibility studies point to features of the intervention about the participant recruitment, retention, acceptability of the intervention to the participants and outcome measurement (Tickle-Degnen, 2013). Being an exploratory feasibility study, information was collected about the recruitment process. Therefore, with the outcomes, the focus of this feasibility study was also on the recruitment process and its potential problems. However, recruitment in care homes is mentioned as a complicated process that requires extra time (Davies et al., 2010). Hence, knowing the complexity, extra time was kept for recruitment when planning the intervention. However, due to the difficulty in accessing the care home, recruitment was only done in a limited time (one month). Flyer (Appendix K) was prepared and was sent to the Care Home's (A) manager. The recruitment was done in three different phases. However, as only one site was used and the recruitment was also done in 1 month hence, the rate was the same as the recruitment number therefore not mentioned separately.

5.1.7.1 First phase of the recruitment.

The target was to recruit at least two staff members to facilitate the activity and to collect data before, during and after the ABD activity session. Facilitators' recruitment criteria are mentioned in table 16.

Table 16 Recruitment criteria for facilitators

Recruitment criteria for facilitators
▪ Working as a staff member within the selected care home (Care home B). Being able to receive training before the intervention. ▪ Available at least for the intervention period (6 weeks). ▪ Have at least two hours of free time to conduct twice a week art-based digital group activity.

For the staff to participate there were several considerations which included the amount of time necessary to facilitate sessions and the ability to participate in data collection and validation. A key consideration for the staff participants was the ability to participate without compromising the routine delivery of care to the residents. While the activity time was 45-60 minutes, it was estimated that a facilitator would need a minimum of three hours to conduct the activity. It included time to bring participants to the activity area and taking them back to their rooms and collect data before and after the activity. Only a limited number of staff were available to work as a facilitator and could complete the six weeks trial. This was due to high numbers of agency staff and a small number of permanent staff who already booked their annual leaves during the period of intervention. The focus group study, in which the researcher worked as a moderator, worked as an introductory session for the potential participants. However, due to the restricted access to the residential care home and residents' busy schedules for each day, recruitment was mainly done by staff. Standardised protocol information for conducting the ABD intervention was provided to the staff involved in the intervention. The care home manager and deputy manager were involved to help with staff recruitment and with their help, two members of staff were recruited who received training to facilitate ABD activities in the first phase of intervention. Hence, the target of recruiting 2 facilitators in 1 month was achieved (100%). Both facilitators were interviewed at the end of the intervention (100% staff retention). However, as the target sample size was small and recruitment was in one specific research partner care home site, findings may not be generalised to other care home settings.

5.1.7.2 Second phase of recruitment.

Older people over 65, living in the chosen care home, were invited to participate in this research. The target was to recruit 12 participants to participate in the activity. The participants' recruitment design is summarised in Table 17.

Table 17 Participant recruitment design

Participants recruitment design				
Population	Population type	Location	Activity type	Target numbers of the activity participant
Age 65 and over in care home settings	Age-normal (Continuum normal ageing), ageing, cognitive decline, mild cognitive impairment	Residential care home West Midland, UK	Facilitator led group art-based digital activity	Activity participants (Residents) N=12 Post participation staff interview for member N=12

Participants were only excluded due to their inability to communicate verbally or those who were not able to attend all weekly sessions for the 6 weeks due to end of life/terminal illness or their short stay or a diagnosis of dementia or a recent or current episode of major mental illness. Similarly, they were excluded if not able to use their hands and arms sufficiently well to hold objects such as iPads or stylus and were not able to move to participate in the arts/crafts activities or had severe uncorrected sensory or communication difficulty. The details of inclusion and exclusion criteria are given in Table 18.

Table 18 Inclusion exclusion criteria for residents to participate in ABD intervention

Inclusion criteria	Exclusion criteria
• Residing in the chosen care home. • Able to give consent • Willingness and available to attend weekly sessions, one per week for 6 weeks (either during morning or afternoon depending on the group). • Able to see and hear and use hands and arms sufficiently well to participate in arts/crafts group activities	• Unlikely to be able to attend all weekly sessions for the 6 weeks due to short stay in care home • With a diagnosis of moderate to severe dementia • Inability to communicate verbally in English

The staff recruited to facilitate A ABD activities helped in the second phase of recruitment. The 2nd phase of recruitment took place between 17th May 2019 and 17th June 2019. Care home staff active involvement is one of the key strategies in making psychosocial interventions work (Lawrence et al., 2012). The flyers were prepared and sent to the care home manager to distribute to display and to give to the residents (Appendix K). However,

instead of distributing the flyers to all the residents, the staff used their prior knowledge and selected potential participants who were interested in technology using the inclusion criteria. The participants' information sheet also included visual information to simplify the study for older people with CI. This study has used purposeful sampling using research partner residential care home site. With the help of care home staff, the researcher evaluated whether individuals meet the study eligibility criteria and are deemed eligible to participate. As the study was designed to cover 6 weeks, the targeted population, within the selected care home B were only the long term or permanent residents because they were able to attend the weekly activity for the 6 weeks.

All eligible (N=18) residents were invited to the ABD activity, but only 11 residents showed their interest to participate in the weekly ABD activity. The researcher had no direct access to the potential participants, therefore, selection bias is not out of the discussion. The researcher was successful to get informed consent from all 11 participants (92%) using both verbal and visual descriptions of the study. Only one resident decided to withdraw after attending the first session. Though the researcher and care home staff encouraged her every week, she decided to withdraw from the study without giving any reason. A high 91% retention (N=10) and low (9%) withdrawal was seen for this study. To note, the recruitment findings cannot be generalised as recruitment was done in a single centre with no randomisation and the researcher was living in the care home.

From the care home record, only 13 permanent residents (a total of 18) were found to be eligible to participate in the six weeks activity. Eligible participants were invited by the staff. None of the recruited participants had any formal diagnosis of dementia. From 18 (30.5%) eligible residents 3 were male (17%) and 11 (61%) were female. Though care home staff had already informed potential participants about the study, the researcher approached them with the help of the carer home and explained again about the activity in simple and easily understandable words. The participants were given time to think and decide and later informed consent form was signed. The target recruitment number was 12 so that researcher can divide them into two different groups. A total of 11 residents gave their consent and agreed to participate in the 6 weeks trial.

5.1.7.3 Third phase of the recruitment.

The third phase of recruitment was the recruitment of staff for post-intervention interviews. Though in quantitative studies, sampling procedures are not rigidly prescribed, the recruitment of staff for the third phase of sampling was purposeful. Fossey et al. (2020)

showed that the care home staff, who involve in research, are vital to get an overall experience. Hence, the third phase of recruitment was to explore staff's observations and points of view about the ABD intervention and its impact on their residents. Although the purposeful sampling method does not allow generalisation it is ideal for exploratory research design (Taherdoost, 2016). Therefore, for purposeful recruitment, the target was to recruit staff who were good informant articulated, reflective and willing to share. Hence, in purposeful sampling, the target was staff caring for the participating residents or staff relevant to the activity. The recruitment criteria include: participant should be a staff member in the care home B, working/caring for the participating residents during the intervention period, able to understand English and ready to give an interview of 10-20 minutes in their free time. No further inclusion or exclusion criteria were applied for staff.

The target was to recruit equal numbers of staff/carers (N= 12) as used by Tyack et al. (2015). The aim was to collect feedback about the ABD intervention by conducting short reflective interviews. While living in the care home, I took the opportunity to brief staff about the project and showed the app on my iPad. The staff, who exhibited an interest in taking part, were reviewed with regards to the eligibility criteria of purposeful sampling. The recruitment of staff took place at the beginning of intervention in June 2019 until the end of the study in July 2019. Those who fulfilled the criteria and wished to take part were given the information sheets (Appendix L). The sheets explain the details of the project in simple words. It included an easy to understand visual description of the study and they were attached with the consent forms (Appendix M). Informed consent was obtained following the Coventry University policy and updated General Data Protection Regulation (GDPR, 2018).

Fourteen staff members, working in different shifts were recruited and achieved the recruitment target (117%). The recruited staff's role varied from housekeeping, caring for residents to managing the care home. A gender balance was found in staff recruitment and an equal number of males (N=7, 50%) and females (N=7, 50%) staff members were recruited in the second phase (Table 19).

Table 19 Recruitment results ABD intervention

Recruitment results for ABD intervention			
Category	Target Number (N)	Achieved number in a month	%
Pre-intervention staff recruitment for ABD activities			
Staff to facilitator	2	2 (Male=1, Female=1)	100%
Intervention target for residents to participate ABD activities			
Residents	12	11 (Female)	91%
Post ABD intervention recruitment of staff for interview			
Staff	12	14 (Male=7, Female=7)	117%

The recruited staff included carers, lifestyle coach, manager, deputy manager, cook, co-ordinator and cleaner, etc. and they all completed their interviews in their free time and happily answered the open-ended interview questions. As a feasibility study, investigating the willingness to participate is an important element (Saredakis et al., 2020). The recruitment process was undertaken in the residential care home B, an environment in which the residents were comfortable and where they were known to staff. Though recruitment indicated feasibility, it was not without any challenge. Achieving the recruitment target was only possible because the researcher was living 24 hrs in the care home and had access to meet residents and staff during their free time. Similarly, without the staff's involvement and their support, achieving the target would have not been possible. Table 19 summarises the recruitment results of this research.

5.1.8 Enrolment, intervention and assessment

The ABD intervention was a group intervention. There were several reasons to make ABD intervention a group intervention. Other researchers also preferred to work in groups during their research with older people because older people learn new skills by observing others and generate more natural situations during the experiment (Apted et al., 2006; Harada et al., 2013). Furthermore, aspects that bring pleasure to the lives of older people or people with cognitive impairments often involve small groups with similar interests like viewing art galleries and artwork (Harada et al., 2013). Therefore, people with similar interests can be matched into groups that hold regular sessions to promote social contact in care homes. However, large group activities do not work for everyone as older people can experience a fall in memory as found by Duffin (2012). Researchers like McLean et al. (2011) used small groups (4-6 people) for arts activities and found that it provided a positive effect, including building a closer relationship between socially excluded and carer. Hence, staff were involved in recruitment and making two groups for the ABD intervention trial study. Though follow-up visits were planned, the care home management did not respond to emails even after sending reminders until the end of the follow-up period. Being flexible and understanding the busy care home environment e researcher's final reminder was sent at

the end of the second month. However, no follow-up data were collected after 1 month as initially planned (Figure 19, Table 20).

Table 20 Summary of enrolment, intervention and assessment

Enrolment, intervention and assessment					
Study Period		Enrolment	Allocation	Activity	Post-intervention
	TIMEPOINT	Eligibility Screening (-T1)	Baseline (T1)	Intervention period	Post-Intervention (T2)
ENROLLMENT	Eligibility screen	Ability and willingness to participate in the research			
	Informed consent	Information given, taking Informed consent			
Intervention	Observation Well-being			ArtsObs GCCWOT	
ASSESSMENTS	Demographics	Background Survey			
	Cognitive assessment test		MoCA		MoCA
	Depression test		GDS-15		GDS-15
	Computer Proficiency Questionnaire		CPQ-12		CPQ-12
	Quality of Life		EQ-5D-5L		EQ-5D-5L
	Well-being		SWEMWBS		SWEMWBS
	Post-Participation Feedback/Interview				
	Post-participation Feedback Questionnaire				

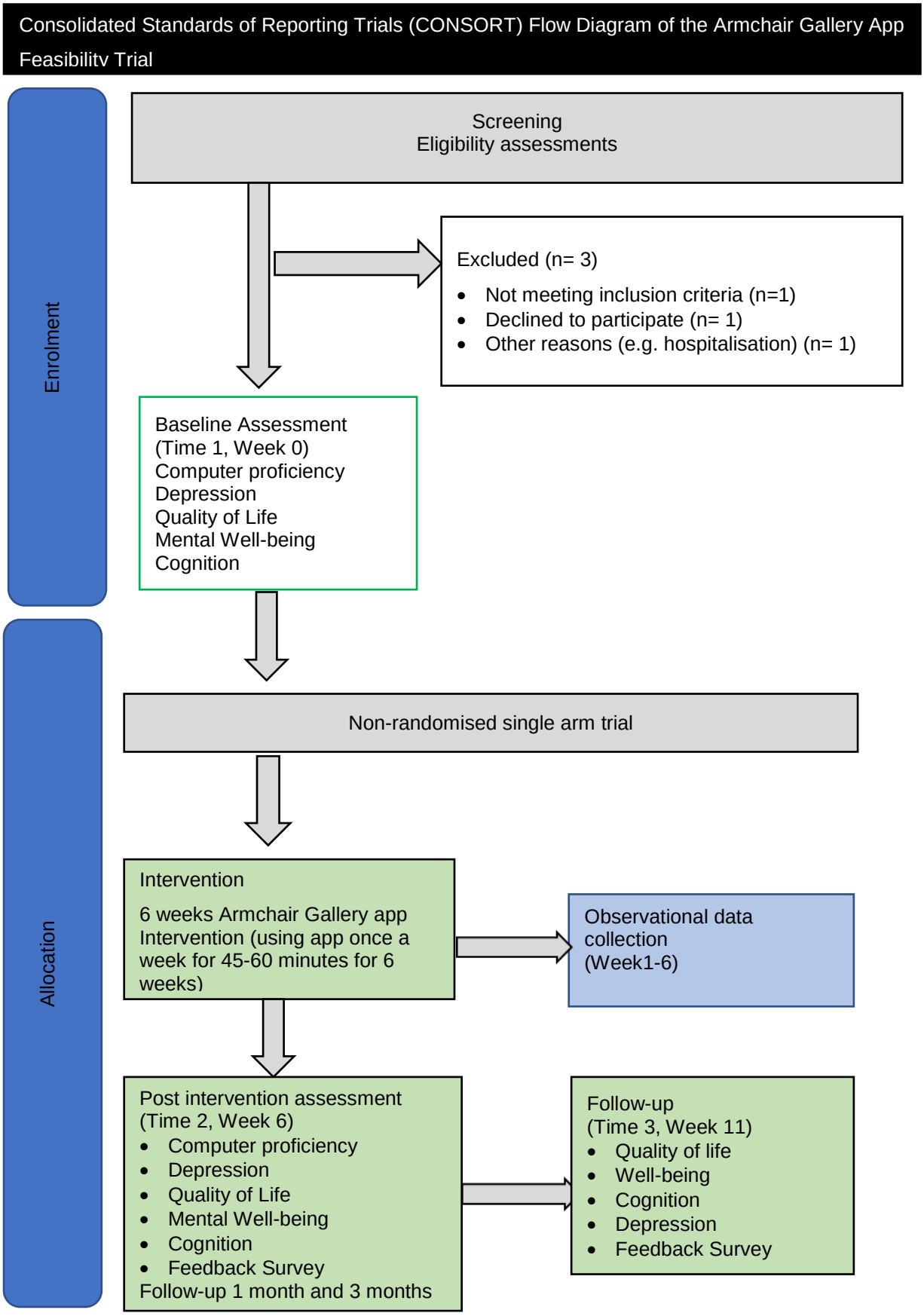
Key: ArtsObs: Arts observation CPQ: Computer Proficiency Questionnaire; GDS: Geriatric Depression Scale; MoCA: Montreal Cognitive Assessment; EQ-5D-5L: EuroQol-5 dimensions-5 Levels; WEMWBS: Warwick-Edinburgh Mental Well-being Scale. GCCWOT: Greater Cincinnati Chapter Well-Being Observation Tool

Informed consent was taken using a consent form (Appendix M) from the participants. Participants interested in undertaking the trial were requested to complete some questionnaires (Time -1) which include their current health status and functional status using a set of evidence-based questionnaires. Staff interviews were conducted to explore the social acceptance of the ABD intervention and its' impact on staff at T2. Both questionnaires and semi-structured interviews were focused on assessing both positives

and negatives of using the Armchair Gallery app. Questions included the difference between current and future use is important to access their confidence in using the app independently and what they would like in the app to do differently in the future such as other aspects of use not covered above. A follow-up visit to the care home was planned because studies with follow-up data can be highly informative as they help to determine whether short-term changes persist (Craig et al., 2008). Despite making all possible efforts to arrange visits to collect follow-up data at Time 3. However, due to the lack of response from the care home staff, I was unable to collect any follow-up data at both intervals. It may be due to the reason that iPads and styli were returned to the university after the trial was finished.

Consolidated Standards of Reporting Trials (CONSORT) statement was created (Figure 19). CONSORT is an evidence-based tool that has a minimum recommended set for reporting feasibility trials (Eldridge et al., 2016a; Moher et al., 2012). It offers a standard way to prepare reports of trial findings, facilitate complete and transparent reporting, critical appraisal and interpretation (Moher et al., 2012). Table 20 summarises the enrolment and data collection during different phases of ABD intervention. -T1 demonstrates eligibility screening, T1 pre-test baseline and T2 post-intervention data collection. CONSORT statement is presented in Figure 19.

Figure 19 CONSORT Flow diagram of the Arts-based digital trial



5.2 The ABD intervention (Experimental feasibility trial)

ABD intervention was a multi-domain intervention that combined arts, traditional arts, crafts, virtual reality and culture like museum companion. It was aimed to improve well-being, maintain functional ability, empower participants by learning new skills and promote healthy ageing in care homes. The ABD intervention included both passive and active engaging meaningful activities. Passive arts activities in the ABD intervention included viewing, arts, a virtual visit to museums and active arts and craft activities mean participating in traditional arts such as using colour, pencils and pens, etc. for creating arts on iPad using the software. Both active and passive arts were included as they are associated with better holistic well-being and social support as mentioned by Ho et al. (2019). Mobile wireless devices were used in this research. Once downloaded, the Armchair Gallery app, did not need any network. Hence, sessions were arranged based on the availability of the place rather than the coverage of the wireless network.

Group activities are vital for social health (Holthe et al., 2007). Hence, after consultation with staff, group activities were planned instead of individual activities. The group members were allocated using the carer and staff's prior knowledge as they knew their residents' interests, likes, dislikes and routines. The functional impairment can affect a person's ability to engage with different arts-based interventions and the level of cognition is also relevant to the ability to do a thing (Giebel et al., 2015). Hence, the level of difficulty for each participant was considered when designing the ABD intervention making it suitable for them. The group activities were tailored for the needs of the care home residents and staff such as timing, facilitators, mobility access and time to socialise. Hence, socialisation was at the heart of the activity when planning the programme. Groups were made based on the prior knowledge of the staff. Although the activities were structured, they were kept flexible, adapting to the needs, motivations and dynamics for each group and supporting the group to increase the confidence of participants to learn new things, improving their self-esteem and sense of achievement. The emphasis was on improving communication and relationships with staff and residents and among residents living in different households. Mixed groups with a wide range of creative abilities provided opportunities to learn from each other as social learning. Aspects of the ABD activities sessions were planned which include included sensory and tactile opportunities for people with different needs to engage with the Armchair Gallery app as used by Broome et al. (2017 & 2018) and Duncan et al. (2018). The Armchair Gallery app with other linked arts and crafts apps were downloaded.

Though Murphy et al. (2019) used ABD activity twice a week, other researchers like Bolwerk et al. (2014) found significant improvements in health outcomes in once a week visual activity. After consultation with care home staff, a weekly 45-60 minutes ABD intervention was more feasible. A timetable for 6 weeks, including themes for each week, was created. Though the timetable was scheduled, the exact place could not be fixed due to the busy care home environment. The activity place was changed every time based on the availability of the room and mobility access. The timetable was laminated and distributed among participants and personal reminders were given on the activity day (Figure 20).

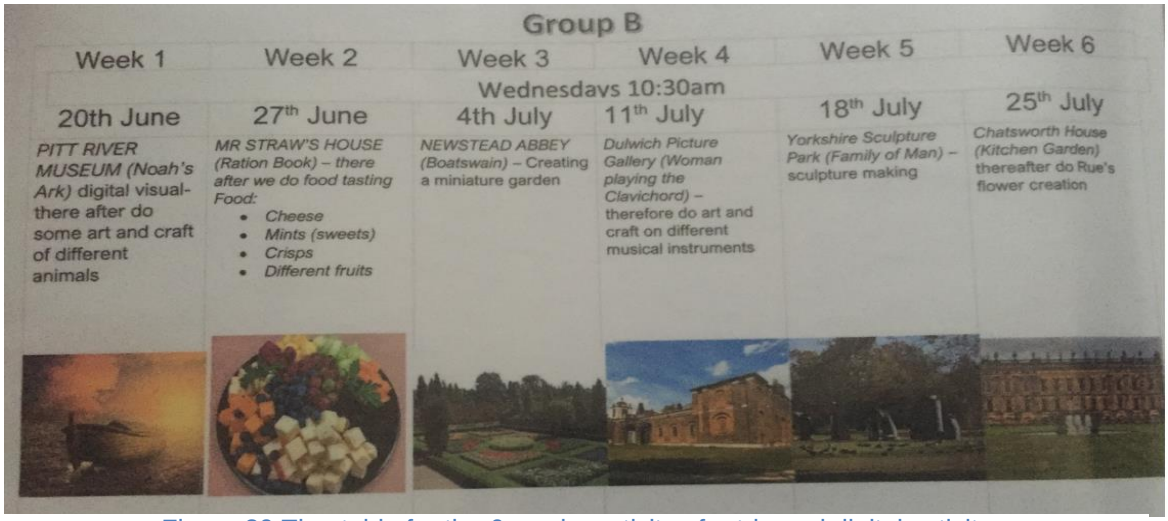


Figure 20 Timetable for the 6 weeks activity of art-based digital activity

5.2.1 ABD activity session

The participating residents were not known to the researcher before starting this research. Therefore, the focus groups conducted in care home 'B' served as introductory sessions. At the start of the sessions, participants were offered tea and coffee to make them comfortable with the environment. Biscuits, cheese, cake and fruits were also offered with the tea and used creatively for the multi-sensory game activity. Facilitating the sessions was challenging. However, it provided opportunities to make the passive art-viewing activity interactive and interesting fun activities. The staff involved in this research were supportive, but their caring responsibilities took priority. A person-centred approach was taken to make participants comfortable. I was mindful that not only the process is theoretically guided by NBHAM, but also the activity is meaningful for both residents and staff. As used by Duncan eta. (2018) each activity session was divided into eight parts. (i) Introduction (ii) Watching the video (iii) Viewing artwork (iv) Reminiscence and storytelling (v) Interactive activities/playing cognitive games (vi) Multisensory (vii) Making or craft activities (viii) Celebration. This model is presented in Figure 21.

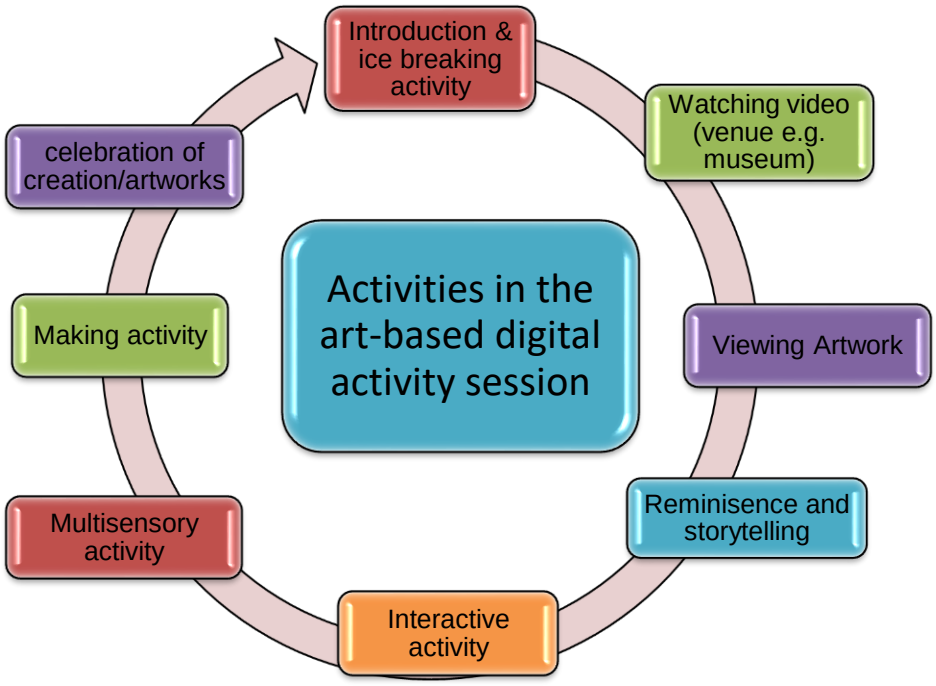


Figure 21 Art-based digital activity Model (Adapted from Duncan et al., 2018)

Each session started with an introduction and briefing about the activity session. Participants were given time to introduce themselves as an ice-breaking activity. For learning, themed questions related to art appreciation and portraits were asked which were tailored for the older people and PWCI. The staff and researcher worked together as facilitators to conduct the activity. After reading and watching the video of the venue and viewing pictures, participants were encouraged to use interactive activities. The interactive activities included playing games that were linked to each other. For example, the picture of the recipe book from Mr Straws House was linked to the game of catching apples in a box and cutting them. Then virtually rolling and baking to create a “Perfect Pie”. In this manner, art-viewing activities were blended with digital art-making activities to create something virtually.

There was limited availability of information related to the use of vignettes in a group artwork among older people in care homes. However, vignettes can be used both as an ice breaker to get participants talking to each other (Barter & Renolds, 1999) and as a technique to focus the conversation on a specific topic (Gray et al., 2017). Therefore, stories behind the artwork, in the Armchair Gallery app, were used as an ice-breaking activity and discussions around the artwork were aimed to help residents to make their own stories in response to open-ended questions. The discussion was themed, selected by the care home staff and primarily used the artwork to stimulate thoughts.

Regarding the game-based cognitive activities, participants were encouraged to use interactive digital games as they improve cognitive abilities (Schell & Kaufman, 2016). Such as matching games, catching apples in a basket dropping from a tree. The ABD activities included mentally stimulating exercises to use participants' existing skills and to offer new learning experiences. The interactive part of the activity was based on multisensory and motor stimulation as it is a promising approach for PWCI (Cruz et al., 2013). The mental/cognitive games were played in progressive order of difficulty, from the easiest to the most difficult. The challenge level of activity was set according to the cognitive level of the participants. Digital art-making activities were used in a 'real-time' context, using fingers to sculpt an object and then painting it with a selection of patterns or using a virtual garden environment. The activity was blended with the arts and craft activity, participants were given opportunities to use digital and non-digital options to create things. The touch screen interfaces allowed participants to make a sculpture that could be placed in the park or from 'digital clay' to sculpt a pot that can be finger painted as it spins. The "making" activity was another part of the session to help participants to use their imagination and creativity. Participants were asked to make things and describe their creations to other group members to improve communication. A person-centred approach was taken which is recommended for digital interventions (Kaufman et al., 2020). Hence, issues were resolved for screen glare by appropriate settings for screen display, navigation and readability based on users' feedback.

As the multi-sensory environment provides stimulation and imagination (Marti et al., 2007), a selection of multi-sensory activities was experienced by the participants. For example, the multi-sensory game 'Guess what is in your hand' was played before starting the art-making activity. The facilitators were creative and flexible while playing the guessing games. Participants were asked to close their eyes and guess an object of different textures such as a biscuit and piece of fruit (Figure 22).

Figure 22 Multi-sensory exploration using Armchair Gallery app

The games and multisensory stimulation served as affective cues to stimulate smell, auditory, taste and visual senses during the ABD activities sessions. First, participants were asked to listen and smell to guess and later given to touch and taste and lastly to open their eyes and see it. As part of multi-sensory exploration, such as sound, participants used digital music and playing musical instruments. There were instructions for the facilitator in the app to explore sound and links to other music videos and apps. This multi-sensory fun game activity encouraged participants to use multiple senses such as sound, smell, touch, taste and sight to guess the objects (Figure 23).

Figure 23 Making an apple pie using Armchair Gallery app

In the NBHAM considering the hierarchy level of needs, spiritual and religious needs are important elements of personal needs which are embedded in self-actualisation (Gold, 2013). Moreover, spiritual health contributes to the well-being of older people (Thauvoye et al., 2018). Therefore, the first session was focused on this topic of Noah's Ark which helped in finding a common ground to start the discussion. The activity was followed by the animal pairing cognitive game activity which also helped them to remember things as it was aimed to improve cognitive function (Figure 24).

Figure 24 Noah's Ark interactive cognitive game activity

The final part of each activity was celebrating participants' achievements. For a grand celebration, at the end of 6 weeks trial, a formal award ceremony and dinner party were organised by the care home management (Figure 25). At this party, staff and participants received their completion certificates and celebrated their achievements.

Figure 25 Celebration at the end of activity and trial

5.3 Data collection tools

Health promotion is moving towards the evidence-based interventions that have been evaluated for both efficacious and effective (Bowen et al., 2009; Cowley & Whittaker, 2020). According to England (1994, p.82), 'research is a process, not merely a product'. In this sense, feasibility studies present information about the research process. Though understanding the development processes is important, it does not replace the evaluation of outcomes (Craig et al., 2008) which are known as the changes, benefits, or learning that take place as a result of an intervention or activity (De Vries et al., 2011). While focused on the process of developing ABD intervention, the impact of the intervention was not neglected. Evaluating the impact was necessary because feasibility studies not only rely on producing a set of findings that help determine whether the intervention should be recommended, but also test efficacy (Bowen et al., 2009). However, exploring the efficacy is not universally observed in practice for feasibility studies (Sim, 2019). Exploring the potential impact of the ABD intervention was necessary for this feasibility study to inform and reflect upon for the future large-scale trial in care homes.

Often researchers use indirect evidence such as retrospective reports. However, this method has limitations in recalling experiences and can impact the validity and reliability of data (Chang, 2008). The observational notes recorded in the researcher's diary were written during my stay in care homes increases the quality of this research because 'memory fades as time goes' as stated by Chang (2008, p. 5). Therefore, I used my diary to collect observation and field notes during my stay in the care home. However, it is important to mention that narratives are stories about the past, written from a particular point of view at a specific point in time. Thus every story is situated and partial (Ellis & Adams, 2011). Therefore, as a direct observer, I collected direct evidence and reflected upon my observation later after other data were analysed to avoid bias reflection. The information about culture and emotions collected in this way could not be captured without living in a care home. I took the responsibility for collecting data and completing the paperwork as the care home staff were unable to fit it into their workloads. In this way, I distributed staff's burdens and built closer relationships with them.

Most evidence-based outcome measures were used because they allow testing the process, its feasibility, acceptability and impact (Dunphy et al., 2019). The most straightforward for statistical analysis could be using a single primary outcome or using a small number of secondary outcomes as mentioned by Craig et al. (2008). However, this method does not provide a satisfactory assessment of the intervention success and cannot

represent the best way of data collection particularly for a complex intervention with effects across multiple domains (Craig et al., 2008). Moreover, to determine the factors that can intervene in the success of intervention multiple outcome measures from different sources can be combined that do not share the same weaknesses (Craig et al., 2008). Therefore, mixed methods using quantitative and qualitative methods and using both subjective and objective outcome tools helped to collect evidence about the impact of complex ABD intervention. In real-life care home settings, multiple assessments are necessary to assess the practicality (Devine & Lloyd, 2016). Also, because a single primary outcome does not make the best use of the data and cannot pick up possible unintended consequences (Craig et al., 2008). As researchers decide the most important outcomes (Craig et al., 2008), multiple evidence-based measures were selected by me based on the required information about the impact of ABD intervention. Wherever required, permission was sought from the concerned organisations to use their data collection tools. Some adaptations were made, particularly for care home settings, to make observational tools suitable for this research. For example, the font style and size were changed, wordings were simplified, text space and tick boxes were added in the ArtsObS (Appendix T) and the GCCWOT (Appendix U).

5.3.1 Screening and the demographic questionnaire

Demographic data were collected not only to see the eligibility but also to get information about participants' health problems using the demographic questionnaire (Appendix P). The survey questionnaire was used for both screening and collecting basic information. Health outcomes based on their well-being and QoL (physical disabilities, limitation in activities, pain symptoms), mental distress (anxiety/depression). Anxiety/depression are important as they increase the risk of dementia (Kuring et al., 2020). Participants' age, sex, ethnicity, education level, medical history and subjective health rating were recorded. Except for the demographic data, the impact of the trial was assessed by repeating outcome measures at two different points in time, before and after the intervention took place. The following outcomes measures were used to access the impact of ABD intervention.

5.3.2 Primary outcomes

It is recommended to select data collection tools that accurately represent the outcomes and impacts of arts-based interventions (Skingley et al., 2012). Similarly, it is advised that the tool should have known properties to assess care home residents (Aspde et al., 2015). Therefore, methods employed to assess feasibility included process evaluation and outcome measures. As a pre-post intervention design, the scores achieved on these tests

before the intervention provided a baseline for comparison with the scores at the end of ABD intervention.

5.3.2.1 Quality of Life (QoL)

Despite several potential benefits of ABD intervention mentioned in the literature, the impact on QoL and the well-being of older people were not mentioned in the literature. Therefore, it was necessary to explore the impact of ABD intervention on QoL. QoL was mentioned as multi-dimensional in which different factors construe as its components (Maenhout et al., 2020). The construct QoL includes the well-being of individuals which often outlines positive features such as expectations for a good life which are guided by the goals, values and socio-cultural context in which people live (Szende et al., 2014). For this research, the self-perceived EQ-5D-5L tool was used as it can be completed quickly by residents and interviews and was suitable for participants with a wide range of health conditions (Appendix V). As the way health state was valued is different for around the world EQ-5D-5L value set produced according to England by the EuroQol Group (NICE, 2018). A guide for using the EQ-5D-5L scale was used to capture and analyse the QoL data.

The EQ-5D-5L (Appendix V) comprises five dimensions on the subjectively perceived QoL in areas of mobility, self-care, usual activities, pain/ discomfort and anxiety/depression (Usman, 2018). Participants report on a five-point scale. (i) No problems (ii) Slight problems (iii) Moderate problems (iv) Severe problems (v) Extreme problems. Using a visual analogue scale from 0 to 100, individuals are asked to assess momentary health state (100 indicates the best health state and 0 indicates the worst health state one can imagine). The responses to the five EQ-5D dimensions (i.e., health state) can be converted into a single number called an index value (Szende et al., 2014). The index value reflects the health state and how good or bad it is according to the preferences of the general population of a country. The collection of index values for all possible EQ-5D states is called a value set. Value sets were used to generate a visual analogue scale (VAS) (Appendix V).

5.3.2.2 Well-being.

Though to some researchers, well-being is separate from QoL, well-being is included in it as mentioned by Boggatz (2020). Based on NBHAM, well-being itself is a multifaceted phenomenon that includes mental well-being which further has multiple dimensions, such as emotional well-being (mood, happiness and depression) and cognitive well-being (Tov, 2018).

a) Self-reported subjective mental well-being.

According to Meléndez, et al. (2018) meaning of well-being could be different for normal healthy older people and people with MCI or dementia. The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS) was used for evaluating the impact of ABD intervention on mental well-being (Appendix S). It had good face validity and test-retest reliability (Koushede et al., 2019). SWEMWBS was frequently used for monitoring and for evaluating the impact on mental well-being (Stewart-Brown & Janmohamed, 2015; Tennant et al., 2007; Koushede et al., 2019). It covered 7-items and most concepts were associated with positive mental health, including positive affect, satisfying interpersonal relationships and positive functioning (Tennant et al., 2007). Each statement was measured along a 5-point Likert scale ranging from 1 (never) to 5 (always) over the previous two weeks. Questions were positively phrased such as “I’ve been feeling optimistic about the future”; “I’ve been dealing with problems well”; “I’ve been able to make up my mind about things” (Appendix S). For data analysis aw scores were transformed using the conversion table provided by tool developers (University of Warwick, 2019). Using total scores (7-35), results were categorical to evaluate mental well-being (high, average and low). A cut-point of 28 and above was used for high mental well-being. Wilcoxon signed-rank test and 3 points differences were used as the threshold for statistically meaningful change at the individual level as recommended by the University of Warwick (2019).

b) Observed or objective well-being.

For this study, both positive and negative components of well-being were planned to measure. The Greater Cincinnati Chapter Well-Being Observation tool (GCCWOT) was based on Lawton’s framework of well-being as the conceptualisation of well-being requires the expression of positive and negative components (Lawton, 1997). Algar et al.’s (2014) review of observation tools found that GCWBT is the most appropriate tool for assessing ABD interventions. Given the context of making these observations, a successful session was characterised by low-intensity levels of ill-being and high-intensity levels of well-being. Scripps adapted this tool for art-viewing intervention and Modified GCCWOT to collect data for each participant over six intervention sessions at 10-minute intervals. However, the tool was further adapted in this research to make it suitable for collecting data in a busy care home environment. For example, tick boxes were added against each statement and wordings were simplified with staff consultation to make it suitable to use by staff. The adapted version of the GCCWOT scale (Appendix U) comprised of 9 items assessing through direct observation in seven domains (i.e., sustained attention, interest, pleasure, negative affect, self-esteem, sadness, and normalcy) of well-being among participants as mentioned by Kinney and Rentz (2005). GCCWOT was administered as used by Jones et

al. (2016) and Kinney and Rentz (2005) to ensure all the observations are collected according to the same standards during the ABD intervention. Two care home staff members were trained to record observations. The operational definitions for a range of behaviours, as indicators of well-being, were reached through consensus such as enjoyment. Inter-rater reliability was measured by comparing the researcher and staff's given scores for the same participants after each activity session. Each participant was observed at a time, for one minute to record the indicators of well-being on a scale ranging from 0 (never demonstrates the indicator) to 4 (always demonstrates the indicator). It was followed by a minute for scoring before observing the next participant for a minute. Though the initial plan was to record each session, it was not possible to capture each participant with one/two cameras as the location of the activity was not decided until the last minute due to a complex and busy care home environment. The observation was done by both the researcher and the trained staff to ensure observational measures are used effectively to increase reliability.

c) Cognitive health.

Information about cognitive variables can help to design a targeted intervention (Meléndez, et al., 2018). Although the Mini-Mental State Examination (MMSE) has commonly been used to screen cognitive health, it has been criticised as a poor screening test (Dong et al., 2010). Therefore, the Montreal Cognitive Assessment (MoCA) was used as it was a sensitive validated measure of global cognitive function (Dautzenberg et al., 2020; Dong et al., 2010; MoCA Test, 2018). It was designed as a brief screening tool for Mild Cognitive Impairment. (Nasreddine et al., 2005). It was used because it serves not only as a screening tool but also assesses multiple cognitive domains (i.e., visuospatial, executive functions, attention, memory and language (Appendix R).

5.3.3 Secondary outcomes

Secondary outcomes were mood, happiness, engagement, depression, usability and acceptance of the app and staff's confidence.

5.3.3.1 Mood, happiness, engagement in ABD activities and staff's confidence

As the research was complex, it required the use of different techniques to collect evidence from residents who were less articulate about their experiences. To examine real-life processes, observation presents opportunities and outcomes of specific research interests without considering cognitive abilities (Algar et al., 2014). MacPherson et al. (2010) found

that when a systematic observation was used as one of the methodological approaches for art-viewing programmes, valuable and rich data was obtained during the sessions that may be missed by using standard questionnaires (QoL).

To measure participants' mood, happiness, engagement in ABD activities and staff's confidence, an observational tool was required ensuring a systematic approach to data collection. The Arts Observational Scale (ArtsObS) was used as it allows to collect observation systematically before, during and after the ABD activities (Fancourt & Poon 2016). This tool was used for observing music intervention and there was practice-based literature and experience to suggest that ArtsObS was an evidence-based mixed methods tool to evaluate arts activities in care homes (Fancourt & Poon 2016). This tool was selected as it was a non-intrusive tool for arts-based health interventions and was recommended by Public Health England (Daykin & Josh, 2016). It could be used for monitoring and evaluation of the impact of creative art activities on participants. Additionally, it permits the capturing of both quantitative and qualitative data fast and it is simple to complete so needs minimal training by staff in busy environments (Daykin & Josh, 2016).

Researchers mentioned this tool as a reliable tool for evaluating the impact of arts programmes in care homes (Fancourt & Poon 2016). ArtsObS was previously used for arts particularly for music interventions. Therefore, I adapted the tool to observe residents' engagement in arts viewing and art-making activities (Appendix T). Participants were observed if they look happy, content, animated, frustrated, agitated, or withdrawn. In addition to observing the process and content that evolved during the activity, nonverbal signs, such as tones of voice, facial expressions, energy level, degree of engagement and amount of enjoyment. As recommended by Holthe et al. (2007) and Cohen-Mansfield et al. (2011), participants were also observed systematically for their engagement using three categories (active, passive, others and disengaged). Strategies to increase trustworthiness were used as used by Holthe et al. (200), like giving enough time to ensure that the participants with CI were able to provide trustworthy information. Table 21 describes the observation criteria used to report participants' engagements with ABD activities.

Table 21 Type of engagement in ABD intervention

Type of Engagement	Description	Example
Active Engagement	Participating or commenting on the activity	Using iPad or commenting or listening or watching or reading about the pictures or using art materials or creating art
Passive Engagement	Not trying anything but responding or not touching the iPad or art-related material but appreciating others	Listening to the facilitator and answering the questions when asked during the activity but not actively participating
Other Engagement	Self-stimulated actions	Playing with fingers or clothes
	Participating in an uninvolved activity	Surfing the web, navigating to other apps
Disengagement	No activity	Sleeping, closing eyes, staring into space

5.3.3.2 Computer proficiency

Technology familiarity of the residents was assessed by testing computer proficiency. One prerequisite for effective and efficient digital intervention is being able to gauge levels of computer proficiency. The computer proficiency questionnaire CPQ-12 is a useful tool for training and research purposes, even among low computer proficient older people (Boot et al., 2015). CPQ-12 comprises 6 sub-scales to measure computer proficiency. The domains included computer basics, communication, printing, calendaring software, internet, and multimedia use (Boot et al. 2015). Each sub-scale consists of 2 questions. Participants were asked to rate their ability on these computer-related tasks on a 5-point Likert scale ranging from 1 (never tried) to 5 (very easily) as shown by Appendix Q.

5.3.3.3 Depression

According to the Royal College of Psychiatrists (2018), depression is the most common mental health condition among older people affecting more women than men aged 65+. Mental health issues are common in older people and around 2 in 5 OPLICH have depression, yet they are often not diagnosed (NIHR, 2013). Depression indicates a negative impact. The prevalence of depression is higher in care homes than in older people in community settings (O'Neill et al., 2020). However, depression is often an under-recognised condition in older people (Greenberg, 2007). Hence, depression was measured not only to see its' presence and severity but also to identify any negative effects of ABD intervention. The short 15-item scale Geriatric Depression Scale (GDS) (Appendix W) has been used as a screening tool by other researchers (Sheikh & Yesavage, 1986; Kurlowicz & Greenberg, 2007). Participants were asked to report how they have felt in the past week to each item with yes or no responses. The short GDS tool was used because it is a sensitivity test to

detect major depression using a cut-off point of 5/15 (Laudisio et al., 2018). This scale can be used in care homes which can be completed by the participant or can be administered by interview (Greenberg, 2007; Laudisio et al., 2018). The participants answered using binary yes/no responses, which were summed to give summary scores. The overall GDS ranges between 0 to15. A score of less than 5 indicated no depression and consider normal. Score 5-8 indicated mild, 9-11 moderate and 12-15 suggests severe depression as recommended by Greenberg (2007).

5.3.3.4 Usability of the ABD app

The usability of ABD apps is an important area to evaluate (Mattson, 2015). To understand the usability, learnability and acceptability of the ABD app (Armchair Gallery app), participants were asked to complete the app usability questionnaire (Appendix X) in the sixth week, immediately after the end of the ABD intervention

5.3.4 Qualitative data

Qualitative data included evidence-based mixed-method ArtsObS tool that was mentioned earlier (Section 5.3.3.1), post-intervention interviews and informal observations during my living lab experience which was recorded in the researcher's diary taking an ethnographic approach.

5.3.4.1 Living in a care home as an ethnographer

Recording field notes in a diary is a useful way of collecting data (Bashir, 2018). Living in a care home experience was reflected using an ethnographic approach. As auto ethnographers have a specific cultural identity, selectively and retrospectively write about experiences being part of a culture (Pitard, 2019). This approach was used because this ethnographic approach helps to explore the researcher's positionality and to monitor the impact of beliefs, biases and personal experiences carefully (Pitard, 2019). Though not formally audio or video recorded, I used my diary for recording informal observations and discussions with residents in the care home in my diary during my stay.

I collected evidence in a variety of ways, such as observing what was happening in the care home and listening to residents, staff and managers, talking about their experiences regarding the impact of activity such as observing the behaviour and interactions between residents, carer, staff, managers and family members. Other evidence was gained by asking someone who knew the resident well, for example, a carer or staff member. On this point, it is also necessary to mention my limitation for living in a busy care home

environment. On multiple occasions, it proved difficult to maintain a diary or log of each event or each conversation due to my tight schedule for delivering the intervention and collecting data simultaneously. Despite not being able to write detailed notes every time, wherever possible points were noted. My observations were validated from other data which were collected using ArtsObS (for its observational data).

5.3.4.2 Post-intervention feedback.

Receiving feedback about the intervention improves its reliability (Walton et al., 2020). For the post-intervention feedback, a questionnaire was created to evaluate the ABD intervention (Appendix T). The questions were divided into two parts. The first part was focused to understand if the activity was enjoyable. Some open-ended questions were also added to know participants' opinions and if they like the digital app. Individual informal/formal interviews were conducted with the care home managers, activity coordinator, lifestyle coach and staff. The interviewees were made comfortable before commencing their interviews. Participants were informed about the purpose of their interview and informed that interview was to find their views and opinion and that they were under no obligation to answer any question. To limit any bias the interview questions were used to allow the participants to tell their views and share their experience rather than leading the informant (Appendix Y). The interviews ranged from a few minutes, for those who were busy and were unable to respond to questions to 30 minutes duration. The open-ended questions provided participants with an opportunity to share their opinion about the ABD intervention and the digital app used for the trial study. However, due to the busy care home settings, distraction could not be avoided during the interview recording which made transcription difficult. Out of 11, only 2 participants did not provide answers to the interview questions due to their busy schedule and hospital appointments, yet they filled the post-intervention close-ended questions that received a 100% response rate.

5.4 Data analysis

Both, qualitative and quantitative, data were collected concurrently. However, the quantitative data were analysed first in the sequence. The observational data were recorded in a systematic and analysed to report both positive and negative events. As recommended by Assarroudi et al. (2018) and Elo et al. (2014), data analysis included preparation, organisation and reporting utilising field notes. First, the quantitative data was analysed and later qualitative data was analysed. Being a mixed methods complex research, in-depth analysis of the qualitative ethnographic observations of six weeks was

beyond the scope of this thesis. Hence, the field notes and researcher's diary of living lab experience were used for contextualising and to complement other data.

The quantitative data analysis was conducted using IBM SPSS Statistics 25. Descriptive statistics mean and standard deviation (SD) were presented for baseline and post-intervention outcomes following other studies with small sample sizes that are not adequately powered for testing hypothesis (Tickle-Degnen, 2013). However, to get efficacy signals, a comparison was made between before and after ABD intervention data. Training and experience in using the coding system helped in the application of the SPSS coding system. Data were collected at two points. For inferential statistics and to determine significant differences between the means before (pre-test) and after (post-test), a t-test was used because it is useful for small sample sizes and to conclude if the results are correct and applicable to the entire population. The one-tailed test was selected to test for the possibility of the relationship for a positive change (one direction). The probability (P) statistic detected a change in scores ranging from 0.5 to 1. The significance was kept at $p<0.05$. A threshold of P-value > 0.5 was selected as a cut-off for statistically meaningful change at an individual level as recommended by the University of Warwick (2019). Wilcoxon non-parametric tests for paired samples were applied for SWEMWBS using the data analysis template provided by the tool developers.

To analyse qualitative data, categories were made and themes were derived (Appendix Z). Thematic analysis was done because it helps to meet the trustworthiness (Nowell et al., 2017). On this point, it is necessary to mention that I recorded information in my diary but they were not included in the thematic analysis. My diary was used to find missing information and for my ethnographic story as a strategy for reflection. Hence my diary had a supportive role in this research. Direct reporting of confidential information was avoided. Vignettes were used for personal reflection and contextualisation and to increase reliability.

Both quantitative and qualitative data findings were triangulated as triangulation helps to understand the results and to increase trustworthiness (Noble & Heale, 2019; Morgan et al., 2019). Qualitative findings were compared with the quantitative data to find any similarities and/or differences in results. Hence, supporting the findings. Results were triangulated as it is a useful tool to check the credibility of descriptive claims (Hammersley, 1998).

5.4.1 Maintaining anonymity

Anonymisation was done before data analysis. To anonymise quantitative data, participants' names were replaced by alpha-numerical codes with their group numbers. A fixed format was used. For participants, YYXGY was used and for carers, CRYYX was used. Where 'Y' is the alphabet, 'X' is the number, G represents group participant and CR for carer or staff member. This made it easy to distinguish individual respondents. For reporting qualitative data, both staff and residents were given numbers and are represented by R for residents and CR for carer/staff.

5.4.2 Validity and reality of data.

This exploratory feasibility study was not aimed to draw a generalisation of the conclusion. External validity was considered and coding was examined by another researcher. Content validity was considered by using the validated evidence-based tools ensuring that it reflects the full domain of the concept being measured. Inter-rater reliability was addressed by testing the reliability of the care home staff's data sheets with the researcher's datasheets. As raw data could not be taken out of the care home for ethical reasons, anonymisation was done before data analysis. The staff who supported data collection also helped in validating data after each ABD activity session despite their busy schedules.

5.5 Researcher's positionality

Describing my positionality serves as a reminder of its potential effects on the research process, myself, as well as on participants and as a researcher because researchers impact their research (Al-Natour, 2011). As the researcher's education plays an important role (Al-Natour, 2011), my medical education and my practical involvement in the research process played an important role in this research. Hence, my position as a researcher was in my mind throughout this research. I define my position as a researcher with experience of working with older people both as a medical doctor and as a carer. My great interest in medical humanities led me to conduct and keep me motivated in this research project. The researcher's education ethnicity and language impact the research (Al-Natour, 2011). Therefore, my ethnic background may have influenced this research, particularly when reflecting on my observations or sometimes, I might have not appreciated the participants' standpoint. I made conscious efforts to disposition myself and validated my observations with staff before analysing the data. To avoid my own bias about the White upper class, I consciously tried to understand their point and keep my perception on the side by validating what I understood with the participants' point.

To get insights into care home culture and environment, I lived in the care home and took a collaborative approach and involved staff as co-researchers. To reflect on my living in care home experience, I used an ethnography approach (Section 7.5). Ethnographic vignettes are used as they enhance the representational reflexivity and richness of qualitative research (Humphreys, 2005). Reflexion is the turning back of an inquiry onto its formative possibilities (Macbeth, 2001). As a researcher should be reflexive at every stage of the research process (Dewing, 2009), I used self-reflection as a research instrument to analyse my observations and to reflect on my living in care home experience. It demonstrates the likelihood of subjectivity that may come to bear on the research and/or reporting as highlighted by Bourke (2014). Sometimes personal, emotional, and ideological dimensions impact research projects in unpredictable ways (Al-Natour, 2011; Heath, 2018). Therefore, to increase the trustworthiness of this research, I had been constantly thinking and reflecting on my own position and the influence that my own beliefs could have within my analysis to manage personal disposition. The reflection from my living lab story presents my personal and emotional aspects (Section 7.5) is aimed to help readers to relive my living experience through my eyes.

5.6 Methodological strengths and limitations

For designing and developing the ABD intervention, the multidisciplinary research team was involved including research partners (care home's management, residents and apps developers) from the beginning of this research. Though the ABD intervention was based on participants' needs, there appeared to be some differences in the understanding of this need. Although the disciplinary differences were overcome and a protocol was created as a guide for research partners, the care home staff were unfamiliar with it. As a mixed methods research the data for the ABD intervention were collected using both quantitative and qualitative methods. Given the difficulties of the care home environment and interviewing PWCI, this combination of inductive and deductive approaches proved to be valuable. The data analysis transformed my understanding and the theory of NBHAM was evolved and tested during this process. NBHAM played its role to guide this research from the beginning till the end of this research.

Convenience sampling was used in this research. However, this method can impact the validity of the research (Finch et al., 2014), but also the generalisability to a wider population (Babbie, 2012). This may be recognised as the limitation of the sampling method. However, being a feasibility study the focus was on the process rather than the generalisability. Acknowledging the little difference between Time 1 and Time 2 data collection points (5-6

weeks), it was a short-term intervention therefore, any change might be difficult to measure. However, the data was also supported with field observations which confirmed that the ABD intervention was conducted in the absence of any other health intervention in the care home. Therefore, increased the confidence in reporting the impact that is most related to the ABD intervention. The qualitative data, collected using formal tools based on observation and interview, were supported by field notes which equipped me with first-hand knowledge about the residents and care home environment.

The methodology included a reflective diary by the researcher and field notes were also used because field notes are useful to provide information (Phillippi & Lauderdale, 2018). There might be a lack of depth in interviewing because detailed interviews of both residents and the staff were not possible in a busy care home. This may have an impact on developing themes as in-depth interviews are linked with theme development as mentioned by Connelly & Peltzer (2016). However, neither a detailed interview was the aim of this study nor it was possible in the busy care home environment. The aim of living in the care home was to collect supporting evidence for the quantitative data without putting any burden on the frail older residents and disturbing staff and residents who already had a busy schedule for each day. Hence, the field notes and the collection of environmental data during the intervention periods strengthen the study and would help to design a more rigorous study design in the future.

5.7 Summary

This chapter has outlined the development of a protocol for the feasibility and the pilot trial study of ABD interventions in real-life care home settings. The study adopted a mixed methods methodology which integrated an examination of the existing literature, consultation, focus groups and trial study to explore the ABD interventions using contemporary technology (iPad) in care homes. Reflective interviews were conducted to explore the social acceptance of the intervention. In this exploratory feasibility study, the Armchair Gallery app was used in care home B. The researcher lived in the care home to deliver the intervention consisting of weekly, 45-60 minutes ABD activities sessions for 6 weeks. Through a person-centred approach, the primary focus of ABD activities was to empower, stimulate the imagination and engage residents in creative and innovative ABD activities. Several evidence-based, both subjective and objective data collection tools were used. A collaborative approach to involve care home staff in ABD interventions delivery, data collection and validation and a flexible strategy for screening, recruitment and data collection were taken to achieve research targets. The assessment and the observations

of the participants were made before, during and after the ABD activities with the help of care home staff to produce sets of findings to determine feasibility and whether ABD interventions should be recommended for future trials. Hence, after describing the methodology the next two chapters present research findings, first from the quantitative data and later from qualitative data as organised by the method used for data analysis.

CHAPTER 6: QUANTITATIVE DATA ANALYSIS

This chapter presents findings from the quantitative data analysis. Findings from the primary outcomes, QoL and well-being, determine the potential impact of ABD intervention on OPLICH. This chapter will help the researchers to understand the feasibility and pilot study of quantitative measures and questionnaires for future larger trials. While testing the efficacy of ABD interventions, it also describes the challenges of using the selected questionnaires in care homes.

6.1 Presentation of the findings

The findings presented in this thesis are based on the Tickle-Degnen (2013) recommendation for feasibility and pilot studies, which states that the findings should be presented clearly and in a fashion which is likely to generate replicability. Therefore, a conscious effort was made that the information collected in this feasibility and pilot study, including the data and findings from the outcomes' analysis is presented in a clear way that can generate comments so further refinement could be made for a larger trial. Though demographic data could have been presented in the earlier chapter, it is presented intentionally in this chapter to make it easy to compare it with the findings of the quantitative outcomes. The quantitative data findings are grouped by outcome domains relating firstly to primary outcomes followed by secondary outcomes. As mentioned in chapter 4, data from self-reported quantitative questionnaires were collected twice, once at the start (before) and again at the end (after) of the ABD intervention. The results which are presented in this chapter have combined both time data (before and after) to investigate any change and the potential impact of ABD intervention. As the Armchair Gallery app was used in this research, its usability and acceptability in care homes were not documented before this intervention, therefore, its' usability and acceptability are also discussed in this chapter. The findings of quantitative data analysis include a descriptive analysis of the outcomes and related domains using a t-test and p-value of <0.05 for statistical significance wherever applicable. The final part of this chapter provides a discussion on the findings and limitations of the study.

6.2 Demographic data of the participating residents

The demographic data of the care home, provided by the staff from the residents' record was presented in the previous chapter (Table 15). Demographic data about the participants was collected using the demographic questionnaire (Appendix P). Despite only 31% of the care home population was living with no diagnosis of dementia and 69% were temporary residents, 11 participants participated and (91%) recruitment targets were achieved. It

showed that all (100%) of the participating residents were White, British, English speaking females with no history of mental or neurological problems. The participants were between the age of 77 and 94 years (mean 90.2 years) and 91% of them were in the age group of 85-95 years while only 9% were in the age group 75-85 years. This pilot study was conducted in one care home located in West Midlands, where the residents came from relatively high socioeconomic status. Hence, questions on socioeconomic status were not included to reduce the burden on the participants. Regarding the health-related history, 50% of participants reported fair and 40% good while only 10% mentioned their health as poor (Table 22).

Table 22 Demographic characteristics of the participants of ABD intervention

Demographic characteristic of the participants		
Category	**Number (N) or Mean**	**Percentage%**
Age		
Min=77, Max=94	(Mean) 90.2	
Age group 65-75	0	0
Age group 75-85	1	9
Age group 85-95	10	91
Gender		
Female	11	100
Male	0	0
Language		
English	11	100
Other	0	0
Ethnicity		
White British	11	100
Asian, Black and other	0	0
Educational history		
Some high school	3	27
High school graduate	7	64
College (non-degree)	1	9
College graduate	0	0
Some University education	0	0
University graduate	02	0l
Some postgraduate training	0	0
Postgraduate degree	0	0
Employment history		
Professional	9	82
Non-professional	2	18

More than half the participants (64%) were high school graduates and 9% were educated to college level, while the rest (27%) had some high school education. However, no participants were educated to the university level as illustrated in the pie chart (Figure 26). Despite not having any formal university education, most participants (82%) had professional employment at the time of retirement (Table 22). Though looks strange in the current situation to be in professional employment after high school, during the golden age of economic growth after world war two, it was common to start a career after completing high school (Vonyó, 2008). Higher education was linked with less cognitive impairment in older people (Boller et al., 2017). Moreover, an association between higher educational level and mental activity was found by Lövdén et al. (2020). This explains the relationship between participants' education level with their cognition.

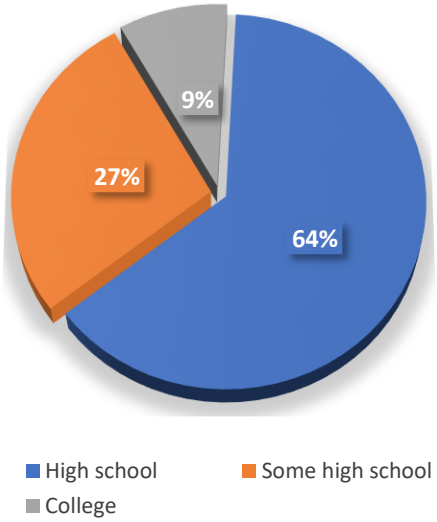


Figure 26 Education level of the participants

Regarding health-related history, for comparative health, more than half (60%) reported that their health was the same as others of their age while 10% reported not as good as others. 50% of the participants consider that their health is fair, but 40% considered it good. Only 10% reported their health was poor. Regarding doing things, only 20% reported that they have no restriction doing day to day activities, while half (50%) had slight problems with them as illustrated in Figure 27. Regarding neurological and mental health history, no participant reported any previous neurological or mental health problems or depression when demographic data were collected (Table 23).

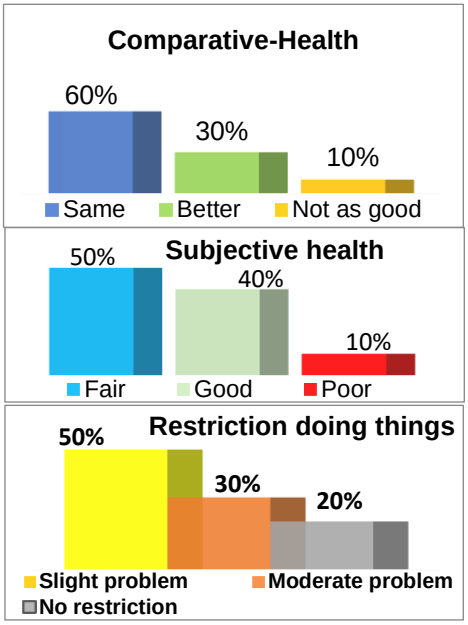


Figure 27 Health history of the participants

Table 23 Health-related history of the participants

Health-related history		
Category	Number (N)	Percentage%
Subjective health		
Fair	5	50
Good	4	40
Poor	1	10
Restriction doing things		
Slight problem	5	50
Moderate problem	3	30
No restriction	2	20
Health compared to the same age		
Same as others	6	60
Better	3	30
Not as good	1	10
Currently depressed		
No depression	10	100
Depressed	0	0
History of mental health problem		
Mental health problem	0	0
Neurological problem		
History of neurological problem	0	0

6.3 Exploring the potential impact

Though both qualitative and quantitative data were collected concurrently, data analysis was done in sequence. As mentioned in the methodology (Chapter 5) in detail, first, the quantitative data were analysed and thereafter the analysis of qualitative data helped to understand the results revealed from the quantitative data. Observational data were recorded before, during and after the activity. However, this chapter only presents findings from the qualitative data. First, the primary outcome measures (QoL and well-being including impact on cognition, depression, mood, happiness) and the secondary outcomes (computer proficiency and staff confidence) are presented in the subsequent sections.

6.4 Primary outcomes

The data relating to the process (recruitment, retention and withdrawal) was already presented in chapter 5. The data analysis for the primary outcome is presented in this chapter as they were also needed to explore the potential impact of ABD intervention. Although both subjective and objective (observational) well-being data were obtained to see the impact of the intervention, ill-being data was incomplete hence not included in data analysis. All data analyses were conducted using IBM SPSS Statistics 25. For descriptive

statistics, percentage, mean (SD) and 95% CI are presented for baseline and post-intervention to explore the outcomes as recommended for feasibility studies (Tickle-Degnen, 2013). To explore the impact of the ABD intervention, data from before (baseline or pre) are compared to after (post) intervention to see any significant positive change recorded by the participants after the intervention.

6.4.1 Potential Impact on QoL

The QoL was measured in four dimensions (i) mobility (ii) Self-care (iii) usual activities (iv) anxiety/depression (v) Pain/discomfort. The data were analysed in all dimensions to explore the impact of the ABD intervention. Participating residents rated each item in terms of the level of the problem they had with the domain in the categories 'no problem', 'slight problem', 'moderate problem', 'severe problem' and 'unable to complete the task'.

Regarding the impact of the ABD intervention on 'mobility', it is important to note that the activity was conducted in different households situated within the care home. Hence, participants had to walk to the activity place from their households. Therefore, the activity involved some physical movement as well. Data analysis revealed 20% of the participants had no problem with mobility neither before nor after the intervention. At the start of the intervention, 10% of participants reported severe mobility problems, but no one mentioned any severe problem after the intervention, similarly, 50% of participants reported moderate mobility problems at the start which decreased to 30% after the intervention, this shows a potential positive impact of the ABD intervention on general perception on an existing issue which became less relevant as the participants got involved in the ABD intervention. On the other hand, at the start of the intervention, only 20% reported a slight mobility problem which increased to 50% at the end of the intervention, this includes the shift from the severe and moderate mobility problem categories to the slight mobility problem. It can also be attributed to tiredness after 45-60 minutes long activity for OPLICH. As the mobility of older people was linked with their well-being (Nordbakke & Schwanen, 2014), improvements found in mobility may have caused a positive impact on participants well-being.

Concerning self-care, 30% of participants reported no problem both before and after the intervention. 20% reported a 'severe problem' and 10% reported a slight problem at the start of intervention which improved to 50% as none mentioned any severe problem at the end of the intervention. No change was seen in the moderate problem which remained the same at 20%. Regarding problems performing 'usual activities' such as leisure activities or doing things, 50% mentioned no problem before and after the ABD intervention. The

category of ‘slight problem’ increased 13% while ‘moderate problem’ increased 13% after the intervention. However, there was a 10% increase in the category of severe problems. It may be because 10% previously mentioned that they were unable to do things, their percentage decreased to 0%. Hence, a positive change can be inferred in usual activities. Regarding ‘anxiety/depression’, at the start of intervention half (50%) of the participants reported no anxiety/depression, 30% mentioned slight anxiety/depression and 20% had only moderate anxiety/depression. However, there was no participant with severe or extreme anxiety/depression neither before nor after the intervention. Most participants (90%) reported ‘no anxiety/depression’ and only 10% described that they have slight anxiety/depression after the intervention. This indicates a positive change among the participants after the ABD intervention.

Looking at the data, though no participant reported any severe pain, 30% of the participants reported moderate pain at the start which was decreased to 10% after the ABD intervention. Conversely, a 10% increase was found in the participants who reported no pain or discomfort after the ABD intervention. This change resulted in a slight increase (10%) from 30% to 40% in the category of slight pain seen. Hence, a shift was found from people reporting moderate or slight pain to the category of ‘no pain’. For inference, a positive change was seen in the feeling of pain after participating in the 6 weeks of ABD intervention. Table 24 presents a statistical analysis of the QoL data.

Table 24 Statistical analysis of the quality of life

The impact of the ABD intervention on the quality of life										
ED-5D-5L		**Mean**	**Median**	**Mode**	**Std. Dev**	**Min**	**Max**	**Change**	**t-test P-Value <0.05**	**Significant Change**
Health scale score	Pre	72.0	80.0	80.0	15.3	45.0	90.0	100 ↑	0.001**	Yes
	Post	82.0	87.5	90.0	12.3	60.0	95.0			
Mobility issue	Pre	2.50	3.0	3.0	0.97	1.0	1.0	-4↓	0.018*	Yes
	Post	2.10	2.0	2.0	0.74	4.0	3.0			
Self-care issue	Pre	2.30	2.0	1.0	1.16	1.0	4.0	-4↓	0.052*	Yes
	Post	1.90	2.0	2.0	0.74	1.0	3.0			
Usual activities issue	Pre	2.0	2.0	2.0	0.94	1.0	4.0	-2↓	0.172	No
	Post	1.80	2.0	1.0	0.78	1.0	3.0			
Anxiety/ Depression	Pre	1.70	1.50	1.0	0.82	1.0	3.0	-3↓	0.026*	Yes
	Post	1.10	1.0	1.0	0.31	1.0	2.0			
Pain/ Discomfort	Pre	1.90	2.0	1.0	0.87	1.0	3.0	-6↓	0.097	No
	Post	1.60	1.5	1.0	0.69	1.0	3.0			

Keys: St.Dev. Standard deviation. The upward arrow direction and a positive number shows improvement while a downward arrow and a negative value shows a decline in health-related issues
*$p < .05$, **$p < .001$

This data was also collected based on the arbitrary health scale where '0' demonstrates' the worst health one can imagine' and '100' 'the best health one can image'. Most respondents (90%) found improvement in their health scale after the intervention. The smallest score at the start of the intervention was 45, reported by only 10% of the participants, which increased to the score of 60 (20% improvement). Similarly, the majority (40%) scored 80 at the start of the intervention, had only a slight (10%) increase to the score of 90 at the end of the intervention. Similarly, the largest score of 90 at the beginning of the intervention was increased to 95 at the end of the intervention. This shows that there was only a slight change in the QoL among people whose health scale was already good.

Comparing overall health states between before (T1) and after (T2) intervention, participants' health was better in all dimensions in the QoL. However, a mixed change was found in the health score whereas no change was seen in the high scores while 20% improvement was found in low and moderate categories of QoL using ED-5D-5L as a tool for data collection (Figure 28).

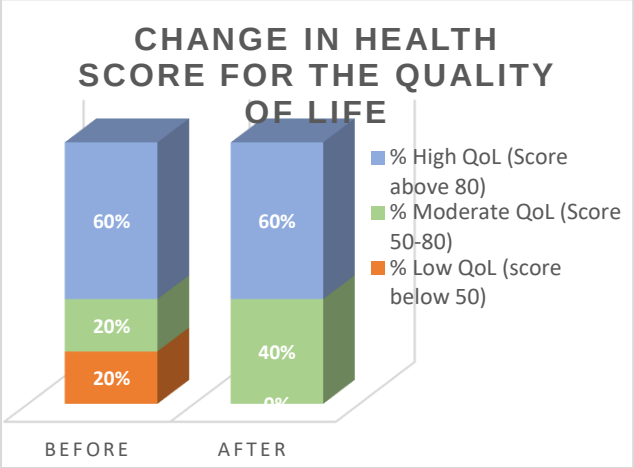
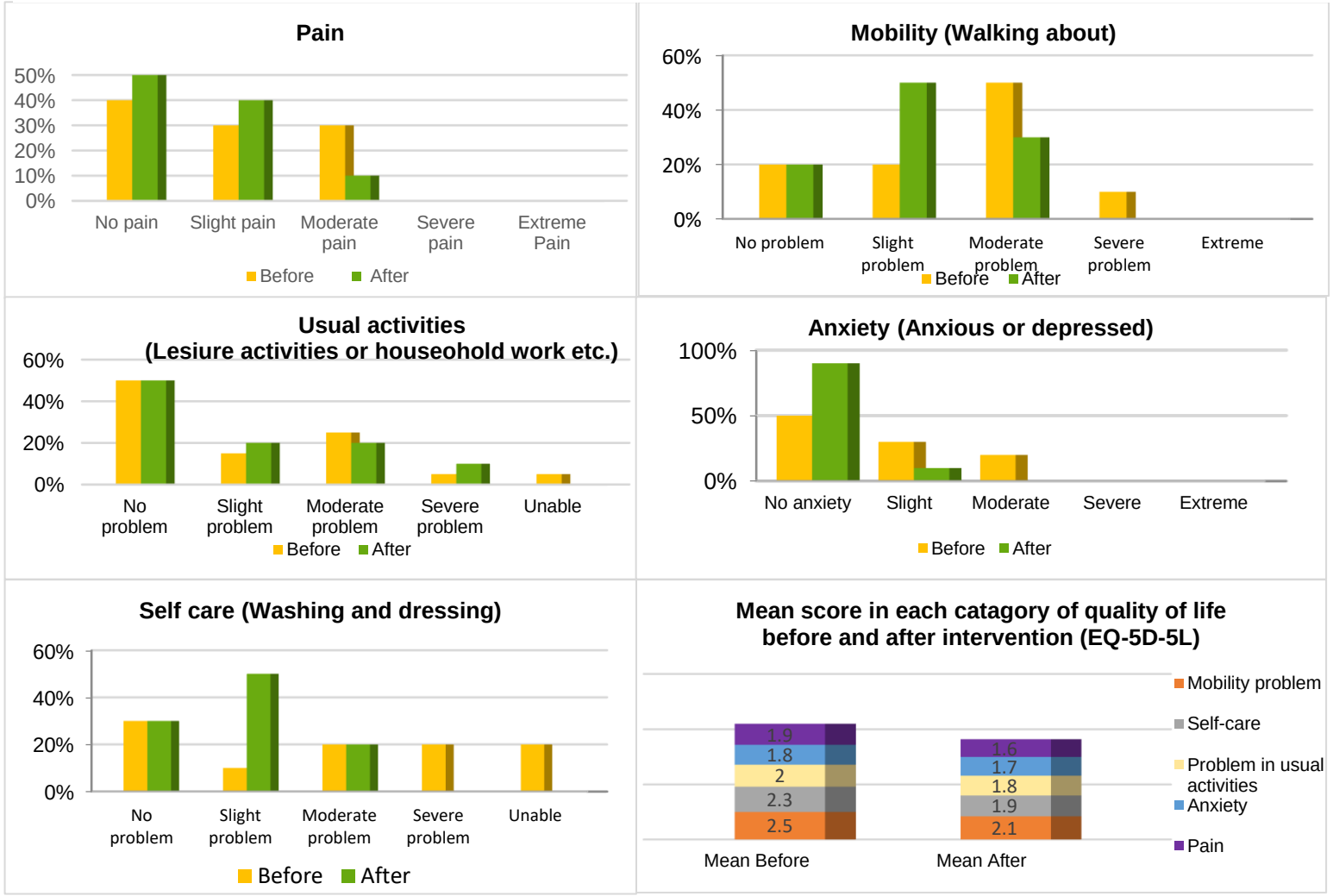


Figure 28 Change in health score of the QoL

In this feasibility and pilot study, EQ-5D-5L was found to be an appropriate tool to measure the QoL. Despite having a wide range of health conditions, the questionnaire was completed easily by most participants. On this point, it is also necessary to mention that some participants requested to read the questionnaire to them and required help in filling the questionnaire due to their functional disabilities (arthritis). For those participants, the questionnaire was answered in an interview form. Though only a small number of residents requested help, this inconsistency of obtaining data may impact the findings in this feasibility and pilot study. Therefore, consistency could be made EQ-5D-5L as overall the questionnaire was suitable for the participants. This supports Fernández-Mayoralas et al. (2015) and Griffiths et al. (2020) who also found EQ-5D-5L as a suitable tool to measure the QoL of older people in health interventions in care homes. Figure 29 illustrates the potential impact of ABD intervention on the QoL.

Figure 29 Potential impact of ABD intervention on QoL (EQ-5D-5L)



6.4.2 Potential impact on well-being

Referring back to Chapter 5, it was already discussed in detail why both subjective and observed well-being measures were included in this study. This section first presents the results of measuring, subjective mental well-being including cognitive well-being which are the different domains of well-being. The later session presents observed well-being which included both well and ill-being.

6.4.2.1 Subjective mental well-being.

For subjective well-being data for mental well-being collected using SWEMWBS, data analysis revealed a 100% response rate. Data analysis of the responses received, using the total score, revealed meaningful positive change after the ABD intervention. Table 25 shows a detailed descriptive statistics analysis using changes in scores on each SWEMWBS item to help future trials.

Table 25 Descriptive statistics of SWEMWBS

Descriptive statistics of SWEMWBS									
		I've been feeling optimistic	I've been feeling useful	I've been feeling relaxed	I've been dealing with problems	I've been thinking clearly	I've been feeling close to others	I've been able to make up my mind about things	Total SWEMWBS score
	Total no. of responses	10	10	10	10	10	10	10	10.0
Before	Mean	3.80	3.50	4.20	4.40	4.10	4.50	4.50	29.0
	Standard deviation	1.40	1.51	0.79	0.84	1.10	0.85	0.71	4.4
After	Mean	4.40	4.50	4.70	4.80	4.70	4.80	4.80	32.7
	Standard deviation	0.67	0.50	0.47	0.42	0.47	0.42	0.42	2.10
	Mean change	0.60	1.00	0.50	0.40	0.60	0.30	0.30	3.70
Total SWEMWBS score change									3.70
Positive change?									Yes
Statistically significant change?									Yes
Wilcoxon signed-rank test P-value **Wilcoxin signed-rank test** (UR: 27.5; SD: 9.18; Z:2.70)									p<0.05
Paired t-test									
Mean									4.16
SD									2.82
SE (d)									0.89
T									4.67
Df									9

Wilcoxon Significant: p<0.05

Using categorical approaches, scores were divided into high, average and low mental well-being using cut-off points. The data show that approximately 40% of the participants had high well-being, 50% had moderate well-being and 10% had low well-being at the start of the intervention. After intervention 90% of participants had high well-being, 50% had moderate well-being and no (0%) participant reported low well-being.

The change was statistically significant as P-value was less than 0.05. Therefore, the change was potentially significant as there was less than a 5% possibility that these scores occurred due to chance. The findings are contradictory to the findings of the ArtOnTheBrain app trial study that showed no change in mental well-being using the same SWEMWBS (Howard et al., 2019). The well-being results are supported by Tan's (2018a) research findings who concluded that art activities bring positive well-being outcomes (Figure 30).

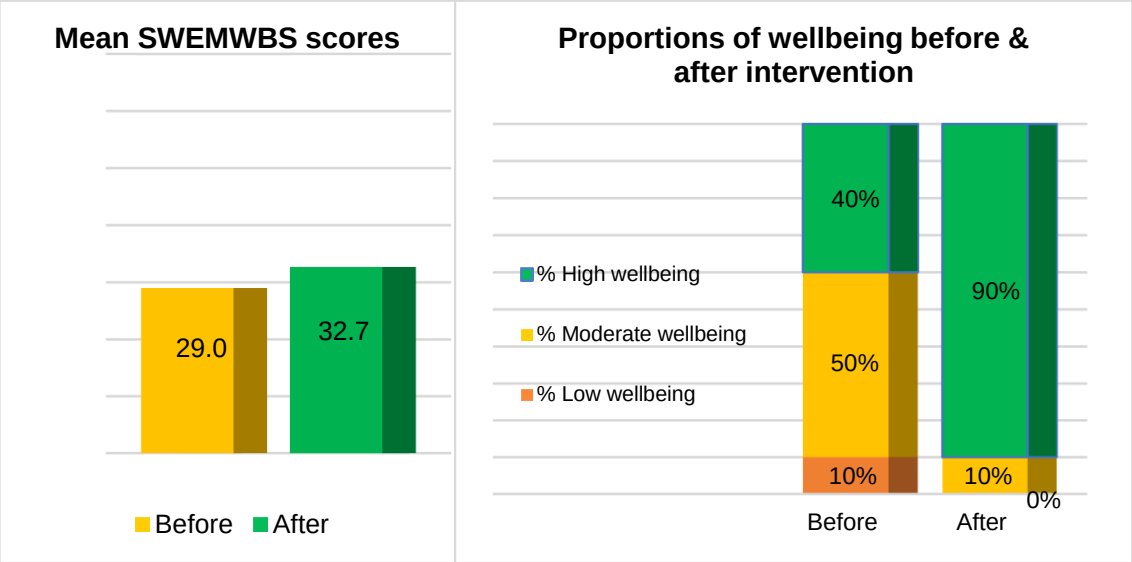


Figure 30 Impact of ABD intervention on mental well-being

The mean score of well-being was improved from 29 to 33 and 90% of the participants recorded a high level of well-being which was only 40% before the ABD intervention. Conversely, the low level of well-being was decreased to 0% which was 10% before as illustrated in Figure 30. In summary, ABD intervention revealed a potentially positive impact on the mental well-being of OPLICH and statistically, the change was significant. Arguably, this significance may dilute due to the small sample size. However, after ABD intervention, at the individual level 'minimum change' of 3 points was noted which represents 'meaningful change' in mental well-being (University of Warwick, 2019). This also indicates that even if the significant value can be diluted due to the small sample, the tool was useful to measure a meaningful change in the mental well-being of OPLICH after the ABD intervention.

6.4.2.2 Potential impact on overall well-being and ill-being.

For overall well-being and ill-being, the adapted Greater Cincinnati Chapter Well-Being Observation Tool (GCCWOT) (Appendix U) was prepared to use during group sessions to monitor participant behaviour. This scale comprised 9 items designed to assess through direct observation seven domains (interest, sustained attention, pleasure, negative affect,

sadness, self-esteem and normalcy) of well-being among older people (Kinney & Rentz, 2005).

The initial plan was to video record each session. However, it was not possible to anticipate who would participate in the activities and where the activity would take place until the last minute, hence, no prior arrangements could be made. Moreover, due to group settings and a lack of care home staff to facilitate the activity in the busy care home environment, it was not possible to capture each participant with one/two cameras. Therefore, neither there was enough time to observe and record observations nor video recording was possible for all participants using the GCCWOT. This resulted in only two incomplete GCCWOT observation forms with some missing data. Though occasional photographic evidence was taken, neither these were at a regular interval nor focused to see the expression of each participant involved in the ABD activities to complete the observation forms. Hence, data analyse was not done to explore the impact of ABD interventions on ill-being. Nevertheless, the adaptation made in the data collection tools to make it appropriate for the ABD intervention and the information collected regarding the data collection process are valuable and can be used for future trials.

6.4.2.3 Potential impact on cognition.

It is well-known that approximately 70% of the care home residents live with dementia in the UK (Griffiths et al., 2020), but it is less known that there is a significant number of older people with undiagnosed dementia (Aldus et al., 2020). Hence, the assumption, at the beginning of current research was that the population in the residential care home might have a considerable number of people with cognitive impairment. Hence, the MoCA test was used not only as a screening instrument for CI but also for a personalised approach for ABD activities. Cognitive main functions, memory, thinking, attention, visuospatial processing and language perception were tested using the MoCA test (Dautzenberg et al., 2020; MoCA test, 2018) as seen in Appendix R. A score of 27 was used as the cut-off value for normal cognition point as recommended by the test developers (MoCA, 2018).

For data reporting, a categorical approach was taken and grouped into different categories according to the level of CI., i.e., “cognitively normal” (people with normal cognition) and others PWCI which further divided into mild, moderate and severe CI. For data analysis, cut-off points were made using 7 score differences. Scores 18-25 were grouped as mild CI, 10-17 as moderate and less than 10 as severe CI. This was used to facilitate activities and to plan activities using a person-centred approach. Due to a wide variation in the cognitive

level and the busy schedule of the residents, completing the questionnaire before the start of intervention proved to be a challenge. However, the first set of questionnaires was completed during the first week of the intervention with the help of the staff.

The levels of cognition indicated in the results were neither for diagnosis nor for any prediction of dementia because MoCA was used as a screening tool (Thomann et al., 2020). However, it could also be used for evaluating the impact as used by Murphy et al. (2018). At the start of the intervention, only 10% of the participants scored 27 and passed the screening test therefore grouped as normal. 50% scored in the range of 18-25 considered as mild CI and 30% who scored 10-17 grouped as moderate and 10% who scored less than 10 were put in the group of severe CI. Like other researchers such as Murphy et al. (2019b) used a cut off MoCA score of 23 for cognitive screening, this study used it but did not aim to label anyone with dementia. Though 90% of the participants had cognitive impairment (MoCA). However, according to the care home's record they none was clinically diagnosed with dementia at the time of ABD intervention. When the data for the cognition test was analysed; before and after test values were compared to identify any change using a single

Table 26 Descriptive analysis of MoCA test

Descriptive analysis of MoCA Test				
	Before	After	Change	Significant change
Total response	10	10		P value <0.05
Normal	10%	50%	Yes↑	
Cognitively impaired	90%	50%	Yes↓	
Mean	20.3	23.6	Yes↑	
Mode	15	27	Yes↑	
Minimum	10	16	Yes↑	
Maximum	27	29	Yes↑	
St.Dev	6.04	4.88		
chi-test				0.10
T-test			0.0001	Yes

tail t-test with a p-value less than 0.05, the T-test revealed a significant change in cognition after the ABD intervention as shown in table 26.

Though older people particularly PWCI often find difficulties in performing activities of daily living (Cornelis et al., 2017). Most participants considered their memory and daily functioning like that of others their age. Hence, despite being observed for having functional impairment, the participants considered these difficulties as 'normal'. This shows that many older people view this as a normal ageing process. This can be explained that though CI causes some type of dependency of deterioration of cognitive functioning such as difficulties with memory, day to day functioning and language along with a continuum, of

‘normal’ ‘age-related’ the impairment is not severe enough to be diagnosed as dementia (Ravdin & Katzen, 2013). However, the concept of normality in cognitive function among older people is controversial. Most researchers view this as normal ‘cognitive ageing’, but normality does not mean the total absence of any diseases (Catita et al., 2020).

Despite a wide variation in the score of the cognitive test of all participants, an improvement in cognition was seen among all participants after the ABD intervention as illustrated in Figure 31. Though it looks like that the cognitive scores worsened from 30% to 40% in the moderate category, there was a 10% shift from severe to moderate as evident from individual data analysis.

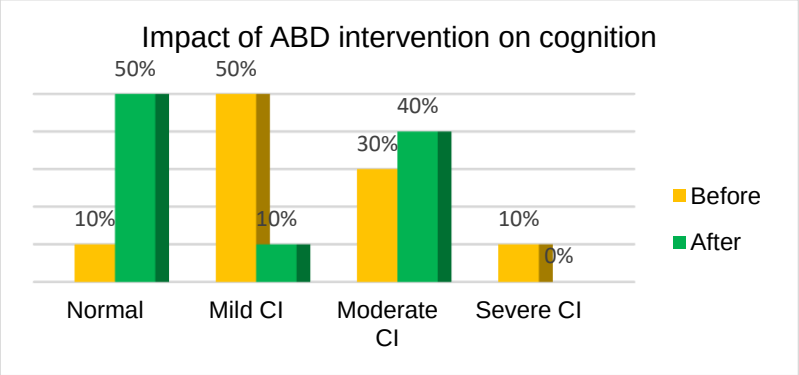


Figure 31 Impact of ABD intervention on cognition

The cognitive test not only facilitated the assessment of CI, but also the MoCA scores provided information on areas of relative strength and difficulty, providing a communication profile to inform screening as mentioned by Dautzenberg et al. (2020). The older people who could be at risk for CI showed statistically significant improvements in their cognitive function levels (Table 26). These findings serve as initial preliminary evidence for the overall feasibility and effectiveness of the ABD intervention to improve or maintain cognitive function in older people experiencing cognitive decline. Future large-scale research should be conducted so that it can provide robust evidence to understand the degree to which the improvements are attributable to the cognitive functions of older people in response to the ABD intervention.

6.5 Secondary outcomes

Secondary outcomes are also very important when exploring innovative interventions because they bring valuable information for future trials. Hence, the potential impacts on mood, computer proficiency, depression, app usability and staff’s confidence were measured.

6.5.1 Potential impact on computer proficiency

The use of digital technology was assessed using a computer proficiency questionnaire (Appendix X). The self-answered questions about basic computer use, printer,

communication, internet, calendar and using a computer for entertainment. Each category had sets of close-ended questions. The number of questions ranged from 3 to 8 depending on the information required for each category. Each answer was scored on a scale from 1 ‘never tried’ to 5 ‘very easy’. Points were summed and an average score was calculated to give an overall score in each category. The score in different categories ranged between 0-31 with higher scores indicating greater proficiency. A descriptive analysis was done using SPSS 25 for both data sets, time 1 (baseline) and time 2 (after intervention). To see any significant change, a t-test for 95% confidence was also calculated. A detailed analysis of computer proficiency is mentioned in Table 27.

Table 27 Impact of ABD intervention on computer proficiency

Descriptive statistics of computer proficiency													
	Computer basic		Printer		Communication		Internet		Calendar		Entertainment		Average change
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	
Total no. of responses	10	10	10	10	10	10	10	10	10	10	10	10	
Mean	3.0	4.0	1.5	1.5	1.9	1.9	1.5	1.6	1.2	1.2	2.7	4.1	2.4
Median	3.0	4.0	1.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	2.0	4.0	2.2
Std. Deviation	1.4	0.9	0.7	0.7	1.0	1.0	0.7	0.8	0.4	0.4	1.8	1.0	2.1
Minimum	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	7.0
Maximum	5.0	5.0	3.0	3.0	4.0	4.0	3.0	3.0	2.0	2.0	5.0	5.0	0.0
Never tried													-8.33%
Not at all													-5.00%
Not very easily													5.00%
Somewhat easily													6.67%
Very easily													1.67%
Meaningful positive change													Yes
T-test, p value <0.05													0.003
Significant Positive change													Yes

Despite that the few participants were familiar with computer technology; others never used a computer before the intervention. As the latest model of iPad was used, the equipment was new for all residents. Hence, learning how to use iPads was a new thing for most participants. Although some participants needed regular support, all participants successfully used the iPads for the desired ABD activity.

The results of the data analysis revealed a positive change in basic computer use skills and entertainment. However, no change was found in the computer proficiency in the category of the printer, using a computer for communication, internet and calendar. This shows that improvements were found only in the domain which was utilised for the ABD intervention. The change was tested for statistical significance and the t-test value of 0.002 for the computer basic and 0.004 for the entertainment category indicates a potentially significant change which could be presented with 95% confidence (P-value <0.05). Though the mean score of computer proficiency shows only a small improvement as the score was slightly increased from 12.0 to 13.1 (Figure 32), the statistical test showed that the change was significant (P-Value= 0.003).

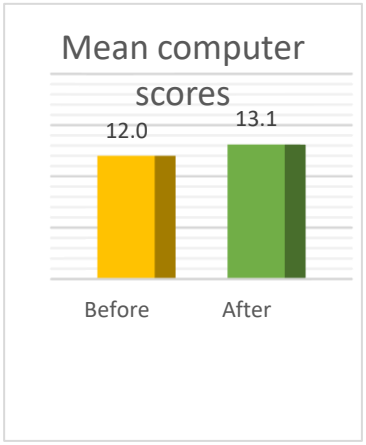


Figure 32 Mean change in computer proficiency

The findings also revealed that 52% of participants never tried any computer before the intervention which decreased to 43% after the ABD intervention. This shows that more people tried using the technology after the ABD intervention. Similarly, 27% of participants were unable to use a computer before the intervention decreased to 22%. Conversely, 8% previously not able to use a computer very easily increased to 15% and 7% of participants were able to use it very easily which was 5% before the intervention as illustrated from Figure 33.

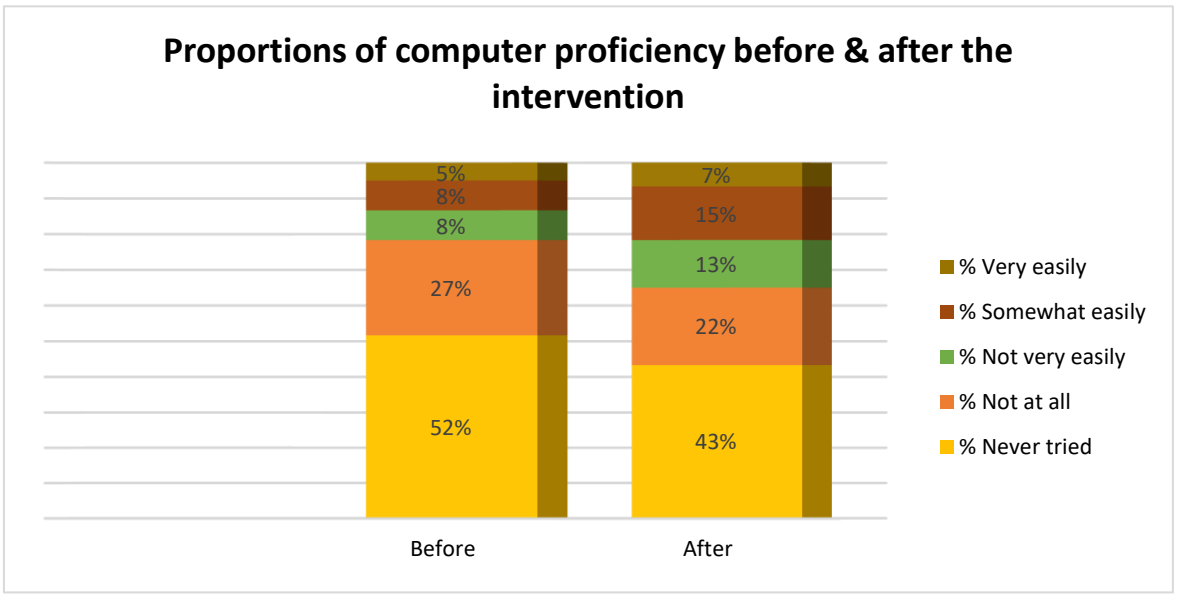


Figure 33 Proportion of computer proficiency

6.5.2 Potential impacts on mood

The mood is a temporary feeling, but not as temporary as an emotion but they influence each other (Compton & Hoffman, 2020). The potential impact on mood was measured using ArtsObS. The observation was collected before, during and after the ABD activities session using Arts observational scale (ArtsObS) to evaluate mood, happiness and staff confidence. A seven-point scale rated participants' moods before, during and after each session. The residents were observed for engagement in activities such as if they look happy, content, animated, frustrated, agitated, or withdrawn.

Two groups of a maximum of six residents in each group attended the observed sessions who were presented with a wide range of conditions including people with cognitive impairment and other physical ailments (difficulty in walking, arthritis, or/and hearing). A total of 12 observations were made (6 observations of each group). Missing observational data was due to the participating residents being away for medical reasons, hence they were absent at the point of data collection. This resulted in an unequal number of observations for the participants which may have impacted the quality of results. Frequent hospitalisation of the participants points towards the frailty of the population. However only the quantitative elements of the observation tool are presented in this chapter.

The data show that majority of the participants were happy before and after the intervention. However, a difference between the happiness levels was seen when the highest level of happiness was at the end of the final session. Session wise, the mean happiness scores were improved from session 1 (Mean= 3.90, SD= 0.32) to session 6 (Mean= 4.43, SD= 0.53). Though an overall improvement was seen, the highest attendance was on the first session which gradually decreased and the minimum attendance was on day six. However, the highest mean score of happiness was recorded in the 3rd session (Table 28).

Table 28 Descriptive Statistics for happiness

Descriptive Statistics for happiness						
	N	Minimum (Min)	Maximum (Max)	Sum (Total)	Mean (M)	Std. Deviation (SD)
1st session	10	3	4	39	3.90	0.32
2nd session	9	3	4	34	3.78	0.44
3rd session	8	4	5	39	4.88	0.35
4th session	8	3	5	32	4.00	0.93
5th session	7	1	5	27	3.86	1.34
6th session	7	4	5	31	4.43	0.53
Total score	10	3	26	202	20.20	7.81

A descriptive analysis of the observation related to mood included the impacts on relaxation, distraction, engagement and agitation. The lowest ArtsObS score recorded across sessions was the score of 1 when one participant came to the session with a mildly sad mood, but the mood was elevated to the higher score of 4 when she was observed as calm and by the end of that session, she scored 5 and became happy and entertained. The other lower scores were related to the participants who were either quiet or passive. The highest level was achieved during the 3rd session. In the 5th session, one person was sad due to some upsetting incident before the session. However, at the end of 6 weeks, 60% were happy and 40% were very happy. This shows that the ABD intervention has no record for any negative impact except that it improved the mood and happiness level of the participants (Table 29).

Table 29 ArtsObs Descriptive Statistics

ArtsObs descriptive Statistics for mood						
	Time	Minimum	Maximum	Sum	Mean	Std. Deviation
1st session	Before	4	6	49	4.91	0.64
	During	5	6	57	5.65	0.52
	After	6	7	65	6.51	0.51
2nd session	Before	3	5	44	4.39	1.59
	During	4	7	54	5.37	1.97
	After	5	7	58	5.79	2.14
3rd session	Before	4	5	41	4.08	2.15
	During	5	6	49	4.94	2.61
	After	6	7	56	5.58	2.96
4th session	Before	3	5	40	3.98	2.12
	During	5	6	44	4.38	2.35
	After	6	7	48	4.78	2.58
5th session	Before	1	6	37	3.67	2.59
	During	6	6	42	4.17	2.89
	After	6	7	50	5.00	3.45
6th session	Before	4	6	41	4.06	2.83
	During	5	6	43	4.27	2.95
	After	6	7	50	4.97	3.43

Before each session, most participants were either neutral or mildly happy. Over time, more participants became moderately happy. By the 6th week, at the start of the final session, the mood of the participants elevated and all were either mildly happy or moderately happy during the session. The level of happiness increased by the end of 6 weeks' intervention when all the participants were observed as 'very happy'. On average, most participants

were moderately happy after the intervention. This shows that the participants' mood was improved during and after the session and the happiness level also improved (Figure 34).

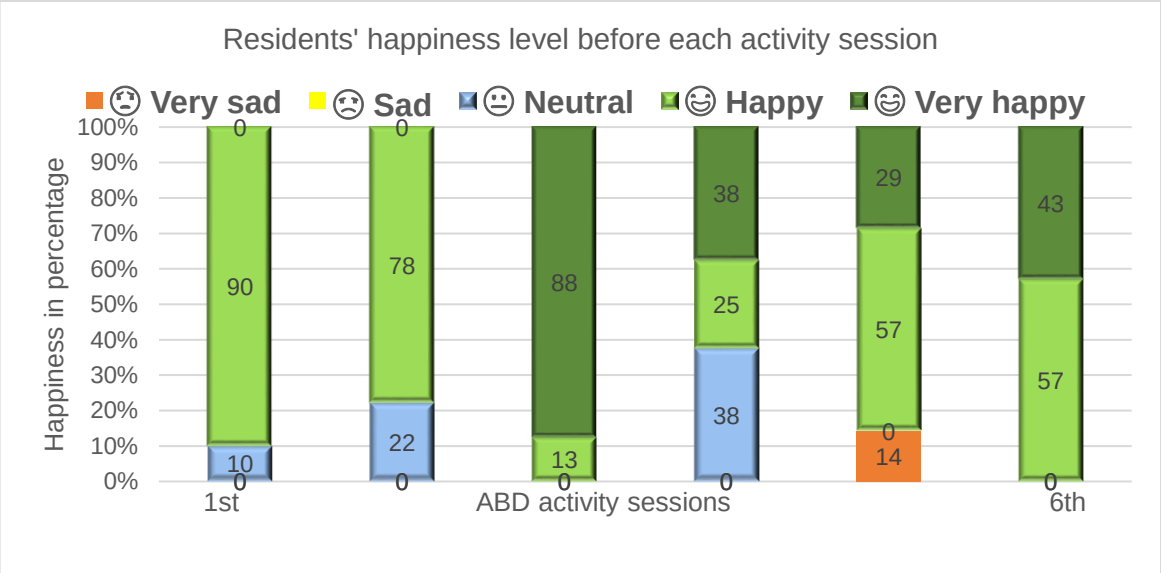


Figure 34 Happiness of the participants during sessions

Looking at the attendance, more participants were absent during the last two sessions compared to the first four sessions. Analysing data at an individual level, all the participants had improvement in mood from the baseline after the ABD intervention except one resident (R3). Though further data analysis at an individual level was not done, qualitative data revealed that it was linked to her illness and hospital appointments. The participants who attended maximum sessions sustained a high level of engagement (26 and 27) across the last three sessions. In terms of mood, 9 out of 10 participants showed positive changes in their mood across the observed sessions. In conclusion, the mood of the participant was changed after each session to satisfied, happy or excited, or satisfied (Table 30 & Figure 35).

Table 30 Descriptive analysis ArtsObs

Descriptive statistic of ArtsObs																			
Category	Sub categories	1st session			2nd session			3rd session			4th session			5th session			6th session		
		B %	D %	A %	B %	D %	A %	B %	D %	A %	B %	D %	A %	B %	D %	A %	B %	D %	A %
😐 Neutral	Calm	30	-	-	20	-	-	-	-	-	10	-	-	10	-	-	-	-	-
Mild happy 🙂	Happy	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-
	Focused	10	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Alert	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Satisfied	50	30	-	70	10	10	80	-	-	70	50	20	40	10	-	20	-	-
😀 Moderate happy	Respective	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Happy	10	40	50	-	60	40	-	60	10	0	30	50	20	60	-	50	70	-
	Interested	-	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-
	Entertained	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
😁 Very happy (visible)	Excited	-		40	-	-	40	-	-	70	-	-	10	-	-	50	-	-	70
	Delighted	-	-	-	-	10	-	-	-	-	-	-	-		-	10	-	-	0
	Appreciative	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	0
Absent		0	0	0	10	10	10	20	20	20	20	20	20	30	30	30	30	30	30

Keys: A=After session; B= Before session; D= During session

Figure 35 Mood observations in ABD intervention sessions

6.5.3 Potential impact on depression

Although it was mentioned that arts carry no side effects (Taylor (2017), it was necessary to measure any negative impact of ABD intervention. The demographic data showed that none of the participants reported any depression, the participants were tested to confirm the results obtained from demographic data at the start of the intervention. To see any negative impact of ABD intervention, participants were again tested at the end of ABD intervention. All participants scored between 0-5 which is an indicator for no depression (Greenberg, 2007). Hence, results showed that no participant had any depressive symptoms both before and after the intervention.

No participant was concerned about memory problems and they all were hopeful even before the intervention. However, a slightly positive (10%) change in response was seen after the intervention (from 70% to 60%) when asked if the participants have dropped activities and interest or if they are afraid something bad will happen (from 10% to 0%). After the intervention, 20% fewer (from 30% to 10%) participants reported that they get bored. To explore any potential significance, a t-test was used in the analysis to make it easier to compare the change before and after the intervention which shows a significant change (P-value= 0.05). The mean depression score decreased after the intervention from 0.11 to 0.09 as illustrated in figure 36.

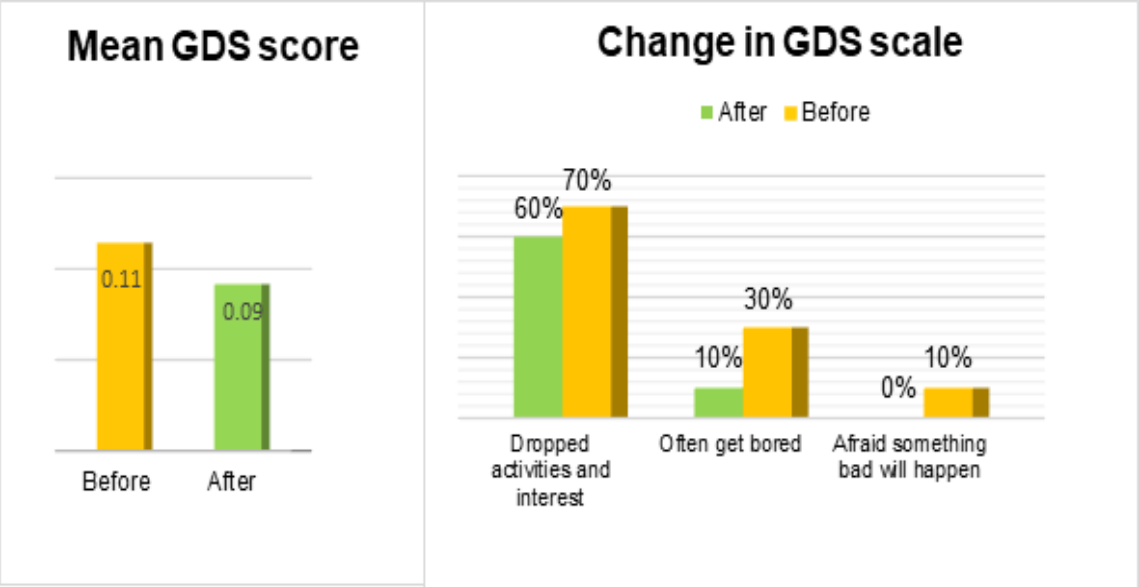


Figure 36 Impact of ABD intervention on depression

The results show that all participants were satisfied with life, kept activities and interests and felt that their life was not empty. They all were in good spirits most of the time before and after the ABD intervention. Only 10% who were concerned that something bad was

going to happen at the start of intervention reduced to 0% after the intervention. The participating residents felt happy most of the time and did not often feel helpless. 60% of participants preferred to go out and do new things rather than to stay at home (care home) whereas only 30% preferred to stay at home both before and after the intervention. According to the results, the participants did not feel worthless and thought that it is wonderful to be alive. 60% felt they were not full of energy both before and after the intervention. A complete data analysis for depression is summarized in table 31.

Table 31 Impact of ABD intervention on depression

Impact of ABD intervention on depression (GDS)										
Elements in GDS test	**Before intervention**			**After intervention**			**Total**			
	%	**Mean**	**St. Dev**	**%**	**Mean**	**St. Dev**	**Change**	**Positive change**	**Mean**	**St. Dev**
Not satisfied with life	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Dropped activities and interest	70.0	0.70	0.46	60.0	0.60	0.49	-10%↓	Yes	0.65	0.49
Feel like life is empty	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Often get bored	30.0	0.30	0.46	10.0	0.10	0.30	-20%↓	Yes	0.20	0.41
Not in good sprit	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Afraid something bad will happen	10.0	0.10	0.30	0.0	0.00	0.00	-10%↓	Yes	0.05	0.22
Mostly unhappy	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Fell helpless	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Prefer to stay at home	30.0	0.30	0.46	10.0	0.10	0.30	-20%↓	Yes	0.47	0.30
Memory problem	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Not wonderful to be alive	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Feel worthless	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Full of energy	60.0	0.60	0.49	60.0	0.60	0.49	0%	No	0.60	0.50
Situation hopeless	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Most people better off than you	0.0	0.00	0.00	0.0	0.00	0.00	0%	No	0.00	0.00
Total mean	1.26 (11%)	-0.11	0.08	1.01 (9)	1.07	0.09	-2%↓	Yes	0.02	0.04
T-test (*p* value for t-test **<0.05)**							Yes 0.052	Significant change		

6.5.4 Usability and acceptability of the ABD app

To understand the usability of the ABD app, participants completed the app usability questionnaire (Appendix X) which helped to explore the learnability and acceptability of the Armchair Gallery app at the end of the ABD intervention. Learnability was assessed by asking “most people would learn to use this app very quickly” of which 10% strongly agreed and 20% agreed while half (50%) were undecided and 20% have disagreed. Participants were asked if they need to learn a lot to use the app, of which 80% disagreed and only 20% agreed. The difficulty level was revealed by asking if the app was easy to use, for which 60% agreed and 40% were undecided. Similarly, 70% reported that they needed a technical person to use the app while 30% were undecided. Efficiency was calculated by asking questions about the app such as if the app’s function were well-integrated and 70% agreed and 10% strongly agreed while 20% were undecided. Similarly, for effectiveness, participants were asked if they feel more confident after using the app. 40% of the participants strongly agreed and a half (50 %) of the participants agreed that they would recommend the app to others while 10% were undecided. A detailed descriptive analysis is given in Table 32.

Table 32 Armchair Gallery app usability

Description of Armchair Gallery app usability										
	Like to use the app frequently	Need to learn a lot to use the app	The app was easy to use	Need a technical person to use this app	App's function is well integrated	Too much inconsistency in the app	App difficult to use	Feeling more confident after using the app	Most people would learn to use this app very quickly	Would recommend the app to others
Response no.	10	10	10	10	10	10	10	10	10	10
Mean	4.5	2.4	3.6	3.7	3.9	2.1	2.2	3.7	3.2	4.3
Median	5.0	2.0	4.0	4.0	4.0	2.0	2.0	4.0	3.0	4.0
Mode	5.0	2.0	4.0	4.0	4.0	2.0	2.0	4.0	3.0	4.0
Std. Deviation	0.7	0.8	0.5	0.5	0.6	0.3	0.4	1.1	0.9	0.7
Minimum	3.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	3.0
Maximum	5.0	4.0	4.0	4.0	5.0	3.0	3.0	5.0	5.0	5.0

Regarding confidence level, it was asked if they feel more confident after using the app, for which half (50%) agree and 20% strongly agreed while 20% disagreed and 10% were undecided as illustrated in Figure 37.

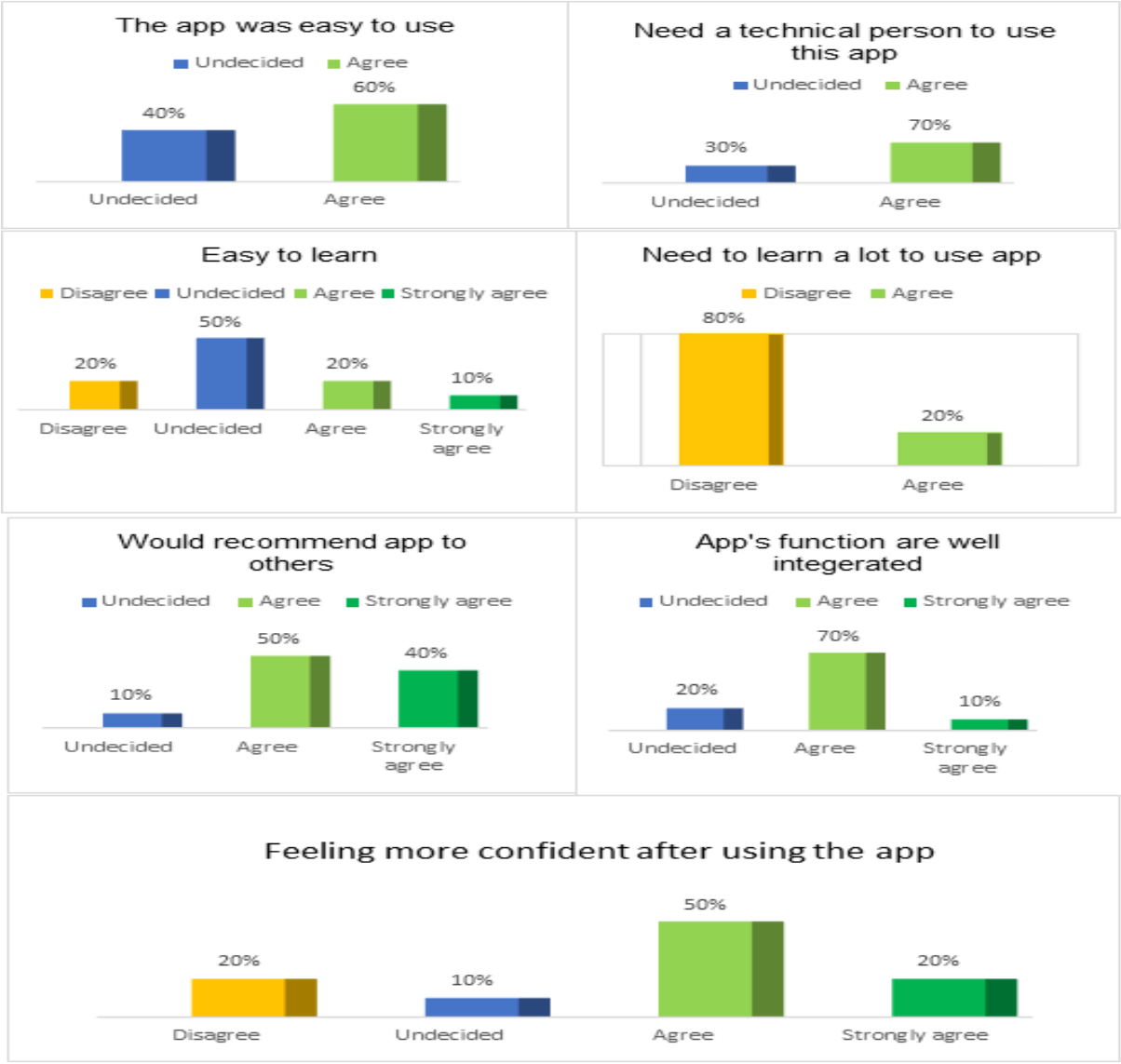


Figure 37 Illustration for app usability

6.5.5 Potential impact on staff's confidence

The impact of the ABD intervention on participants and the impact on staff in delivering the intervention was calculated. As part of the ArtsObS tool, staff confidence was recorded in all sessions by the researcher. Two staff members facilitated two separate groups of the weekly ABD activities, therefore, overall, 12 observations were made within 6 weeks. Both facilitators were asked about how confident they feel in supporting to take part in the ABD activities on a scale of 5 where 1 stood for 'not confident at all' and 5 for 'highly confident'. Initially, both felt somewhat confident in facilitating the group activities, but just after two sessions their confidence level was increased to the highest level and they remained highly confident throughout the ABD intervention. This shows that any initial apprehensions they

have at the start were resolved quickly and within a week they become highly confident in facilitating innovative ABD activities. Hence, we can say the activity had a positive impact on the staff's confidence as illustrated by Figure 38.

Figure 38 Armchair Gallery app usability

6.6 Follow-up data

Studies with follow-up data can be highly informative as they help to determine whether short-term changes persist (Craig et al., 2008). Therefore, periodic follow-up visits up to six months to the care home were planned. Despite all possible efforts were made to arrange subsequent visits to the care home after one month, follow-up data could not be collected due to the lack of response from the care home management that may be due to their busy schedule and the limited resources at the care home, later due to the outbreak of COVID-19, it became impossible to gain access to care home where vulnerable old age people were residing.

6.7 Discussion

For this small-scale feasibility and pilot study response rate[3] was important but getting a 100% response rate was an ideal situation. Although the ideal situation of 100% response rate was achieved it was challenging. The challenge was not only to approach the participants in the busy care home environment but also to get the response from less responsive participants. Otherwise, the differences in response rates due to more

[3] The percentage of people who respond to the questionnaire

responsive participants could have caused a larger impact on the conclusions of this small sample size study. If the researcher has not been living in the care home during the intervention period, then, it might have not been possible to achieve the 100% response rate. However, the researcher's dedication and support from the care home staff have played an important role and made the target achievable. As a template for the larger-scale future trials, statistical analysis for the relatively smaller size data analysis was done, it needs to be seen with caution and can be evaluated by large sample size trials.

Looking at demographic data, participants were all white women. However, the homogeneity of the group is not surprising considering the data from the 2011 Census inform that 85.5% of the population of England is White (ONS, 2014a). The care home was mainly populated by women which can be explained that women live longer than men hence women increasingly outnumber men at older ages among those aged over 65, 55% are women (ONS, 2018). This can also be explained by the statistic that women live on average 3.6 years longer than men, but women live a smaller proportion of their lives in good health (The Kings Fund, 2018). This may be the reason to move into a care home. However, in the absence of male participants in this research, the possibility of gender bias may not be eliminated.

The literature review led to an assumption that most PWCI were likely to have some degree of physical or CI or complex care needs. However, the demographic data indicated that only half (50%) of the participants had a moderate restriction doing things. No mental health issues were reported, while the other 20% reported that they had no restriction doing things. Hence, in the absence of any serious mental health, their admission in the care home could be linked to either physical disabilities or general frailties. This can be explained by national statistics that 75% of older people over the age of 75 years have more than one chronic condition which rises to 82% for 85-year-olds (NHS England, 2019).

The concept of healthy ageing presented in this thesis is not an absence of disease, but the emphasis was given on functional abilities as healthy ageing is concerned with the functional ability of older people. In this sense, ABD activities have the potential to improve functional abilities because a positive change was found in mobility, self-care and usual activities during this intervention. Mobility is important for care home residents for practical reasons (Oishi, 2010). Therefore, improving residents' ability to meet their basic needs can be made by making them more mobile (Beard et al., 2016; Rudnicka et al., 2020). In this ABD intervention, the results from demographic data showed that more than half (60%)

residents reported that their health was the same compared to others of their age and 30% considered their health even better than others and only a small portion (10%) considered that their health not good compared to other people of their age.

Though the demographic data showed that the participants had no serious health condition to limit their everyday life, EQ-5D-5L revealed 50% had mobility problems and restrictions on doing things while 20% reported severe problems in self-care. However, people (30%) reported a slight problem in self-care at the beginning of intervention increased (50%), but no one reported a severe problem at the end of the intervention. The improvement in different domains of QoL as seen from the results indicates that ABD activities have the potential to improve functional ability. This can be supported by Ho et al. (2019) research who also found that engaging older people in arts and culture-related activities result in a higher QoL.

The results revealed from EQ-5D-5L that only a small portion of the participants had poor QoL, even before the start of the intervention and the common negative perception of the QoL in care homes seemed not to be the case in this care home. This can be explained by O'Neill et al.'s (2020) research who highlighted that the care home residents were significantly more limited in their physical functioning, but they reported better mental health and social functioning than older people in the community (O'Neill et al., 2020). Pain' could impact the QoL and well-being includes bodily pains (Boggatz, 2020). Therefore, it is an important domain when discussing QoL. Similarly, it was important when evaluating participants' attendance in the ABD activity sessions. Strawbridge et al. (2002) mentioned that many older people despite their functional difficulties and chronic conditions reported good well-being and rated themselves as ageing successfully. On the other side, it can be argued that there could be a bias in selection and that only people with good functional and mental health were recruited as the researcher had limited access to the residents at the time of recruitment.

As well-being is a domain of Maslow's model (Power, 2015), using the NBHAM theoretical framework, subjective mental well-being became a necessary part of overall personal well-being. A meaningful positive change was revealed and participants did not report any decline in their mood or well-being. The positive change was statistically significant. High scores achieved in self-reported well-being indicate that the participants were benefitted from the ABD intervention and it has the potential to fulfil residents' personal needs. However, the positive change in subjective well-being is not uncommon in art interventions.

For example, Crossick & Kaszynska (2016) also linked their arts and cultural activities with subjective well-being.

Holistic wellness is the best predictor of self-rated physical health (Fullen et al., 2018). Hence, GCCWOT was adapted to collect both ill and wellbeing for a complete picture of wellness. However, it was not feasible to use video data recording and due to the data protection, videos could not be taken out of the care home. Hence no data analysis was possible due to a lack of photo/video records necessary to analyse data for GCCWOT. Even if the data were available, no data validation was possible due to the staff's busy schedules. Hence, the tool could not be used to measure overall well-being in this research. However, trying to use this well-being tool has provided useful practical and feasibility information such as challenges for video recording in a busy care home setting. This information will help other researchers to consider the challenges of audio/video recording in care homes. In the future, where possible, the same measure can be used for future trials as it can provide information about both well-being and ill-being (details in chapter 4).

Demographic data showed that no participant had a diagnosis of dementia and no one mentioned the history of any mental or neurological health condition/problem. However, the cognitive assessment test (MoCA) revealed 90% of the participants had a cognitive decline and considered it a normal age-related decline. The findings can be explained by other research which mentioned that MCI and early stages of dementia in older people are often normalised, hence remained undiagnosed (Alders et al., 2020; Chertkow et al., 2008; De Roeck et al, 2020; Mokhber, 2019; Scharre, 2019). Frail PWCI represents a growing population in England and Wales (Hinsliff-Smith et al., 2017). This is particularly true for the care home population as the Alzheimer's Society (2019b & 2020) reported that 70% of the people in care homes live with cognitive impairment or severe memory problems.

Improved cognitive scores after ABD intervention shows that ABD intervention which included cognitive activities helped PWCI to regain some of the lost cognitive skills. Likewise, Stern & Seifert (2016) found a significant reduction in the risk of cognitive decline after culture and arts-based activities. Butler et al. (2018) concluded that cognitive activities improve cognitive performance in older people with normal cognition and Im & Lee found improvement in cognition in older people with CI (2014). If cognitive activities can reduce the risk of MCI as Verghese et al. (2006) mentioned, then ABD intervention has the potential to prevent cognitive decline. However, according to Butler et al. (2018), the evidence for preventing or delaying cognitive decline or dementia is insufficient. Yet, WHO (2020)

supports the role of cognitive activities in increasing cognitive reserve. Hence, the inference can be made that the ABD activities have a buffering effect against rapid cognitive decline. Improvement was found in cognition in this research. As cognition was linked with frailty (Malmstrom & Morley, 2013) and if frailty is reversible (Gobbens et al., 2010), then ABD intervention may potentially decrease frailty.

Improvements in using the MoCA test was seen, but there could be many elements that could have given an impression of improvement in the cognitive score as the same test was used at the start and the end of the intervention. However, the second time, participants already knew what they would be asked to draw (a Clock) and answer the same questions. It is important to understand that education and age could impact the test results, therefore, collecting information and relating it to education and age-related norms became important for the MoCA test to avoid misinterpreting of CI as mentioned by Elkana et al. (2020). They also mentioned that the cut-off point of MoCA is too high even for highly educated, cognitively normal older people. Hence, after intervention re-testing on a different version or re-considering the cut-off point are some options. Cut off at 23/24 points instead of 26/27 points was recommended by Thomann et al. (2020) who found 23/24 more sensitive.

Cognitive decline cause functional disability, depression and change in mood impacting well-being and the QoL of older people (Kingston et al., 2012; Strawbridge et al., 2002). Depression is the most common mental health problem among older people particularly for the people in care homes (Cummings & Cockerham, 2004). All the participants were females living in the care home. It was known that depression affects more women aged 65+ than men (Royal College of Psychiatrists, 2018). Hence, the depression scale was not only used as a screening tool but also to explore any negative change in the emotions of the participants after the intervention. However, results showed that participants had no depression both before and after the ABD intervention. The GDS scores less than 5 on the GDS scale validated the results obtained from the demographic data which showed that participants did not consider themselves as depressed at the beginning of the study. Similarly, data analysis has also suggested that the ABD intervention did not bring any major negative impact on the participants' mental health.

Most participants experienced changes in their memory and cognition, they still considered their memory and daily functioning similar to other people of their age. Most residents viewed this as normal ageing. As normality does not mean the total absence of any diseases (Catita et al., 2020). Therefore, normality should be determined. To maximise the benefit and investment in larger studies in a care home, well-measured cognition will be

required as several residents live even without a clinical diagnosis of dementia. Cognitive benefits such as improvements in memory function can be explained in terms of playful mental games in the Armchair Gallery app. Digital games or playful mental exercises and problem-solving games for older people are reported as fun and have cognitive benefits (Schell & Kaufman, 2016; Tan, 2018a).

Despite the physical functioning limitation among the participants, better cognitive health was revealed after the ABD intervention. This research indicates the potential of ABD activities to allow primary prevention of cognitive decline which is linked to frailty. As cognitive impairment increased the risk of dementia (Lopez, 2013), improving cognition can help in the prevention of dementia (McDermott, 2020) and prevention of dementia is a public health priority (Frankish & Horton, 2017). As the results show improvement in cognitive functions inference can be made that ABD intervention has the potential to reduce the risk of dementia. These results support other research which found that health interventions using arts can improve cognitive functioning in older people and those with memory problems (MacPherson et al., 2010; Tyack et al., 2015; Young et al., 2016).

Being a digital intervention, computer proficiency was an important domain to measure the impact of ABD intervention. Even though older people experience more barriers when developing and retaining digital and technological skills (Gov UK, 2018), computer proficiency data showed an improvement after ABD intervention. More people tried to use the computer after the intervention and 3% more people were able to use the computer very easily. This finding supports that older people appreciated games, activities that offer cognitive exercise and they value the learning experience for its own sake (Chang et al., 2015). Learning new skills such as learning how to use an iPad is not only entertaining for older people, but learning is an important way for many older people to enhance their QoL (Kaufman et al., 2020). However, older people are motivated to use the technology when its benefits outweigh the time and effort needed to learn and use it (Chang et al., 2015).

Learning is mentioned as an important pillar both for active and healthy ageing (Age UK, 2011; Faber, 2015). This can be explained by previous research which showed that older people, particularly those with more education, often become lifelong learners for both mental stimulation and entertainment (Chang et al., 2015). The demographic data in this study showed that most participants were educated to high school or above, therefore they were able to easily learn new computer skills. It should also be noted that future care homes population will be more educated (Maenhout et al., 2020) and more digital-friendly, therefore, future interventions should consider their learning needs based on the theoretical

model (chapter 3). Though education contributes significantly to the wellbeing and better health throughout the life course, lifelong learning is not limited to formal education (Faber, 2015). Therefore, learning new skills (such as computer proficiency) can be useful to empower older people. The improvement in computer proficiency shows that ABD intervention built on the model of healthy ageing and utilised the concept of empowering older people as empowering is important in health promotion in the context of active and healthy ageing (Kayser et al., 2019).

The usability or utility of the ABD well-being apps in ABD intervention for older people depends on staff and residents seeing it worthwhile. Like any other digital intervention, it depends on the energy and time they invest as opposed to the benefits that they experience (Kaufman et al., 2020). In ABDI intervention, participants were of various levels of cognitive levels, few participants regularly needed support from a facilitator. App usability questionnaire revealed that though 70% needed technical support to use the app, 60% informed that the app was easy to use. Regarding the learnability of the app, 80% disagreed that the app needs a lot to learn to use the app while 50% of the participant mentioned that it was the ease of use. Regarding the utility of the Armchair Gallery app, 70% felt more confident after using the app. Older people's difficulties with digital technology are often due to its' poor user-friendliness and an app is user-friendly for older people when it is accessible to use, intuitive and adaptable to their characteristics (Kaufman et al., 2020).

The participants were able to learn how to use the Armchair Gallery app and were mostly perceived as easy to use and beneficial for health. The 'mood' data recorded using ArtsObS (Appendix T) showed that that the overall mean value for 'mood' was increased after each session when compared to before for each resident. Similarly, the observational findings showed an increase in happiness, relaxation and engagement across sessions. However, there was no trend of increase in the mean value at the start of the session between the weeks indicating the effect could be a short-term benefit.

As a feasibility and pilot study, the focus was to explore and test different questionnaires. Hence, this research also collected information about the suitability and administration method of questionnaires. The ArtsObS was easy to administer and considered participants' needs and sensitive characteristics as mentioned by (Daykin & Josh, 2016). Additionally, it allowed observers to focus on the direct effect that the ABD activities were having on mood scores (angry, sad, frustrated, calm, satisfied, happy and excited) and on specific criteria relevant to the organisation (i.e., care home) delivering the intervention as indicated by Fancourt and Poon (2015).

Like Griffiths et al. (2020) this research used evidence-based tools for face to face interviews. However, inconsistency in the use of questioners could have an impact on the reliability of the data. At this point it is important to note that though baseline and post-intervention assessment included self-administered questionnaires; QoL, well-being, computer proficiency and cognition measures, the questionnaires were either administered by the carer or researcher for some residents who required assistance due to their physical disabilities. Therefore, consistency in the method of administrating the tool even in self-administered outcome tools should be considered in future trials.

Though for most participants the assessment questionnaires were self-administered, for participants with high levels of CI assistance was needed in self-completing the questionnaires. However, this could raise questions on the reliability of the data. Nevertheless, there was no agreement on the threshold for cognition if an individual is unable to reliably self-report their own health-related QoL (Easton et. al., 2018). Self-rated measures can raise issues concerning accuracy among people with CI (Griffiths et al., 2020). This research also supports Griffiths et al. (2020) that older residents with CI can find difficulties in recall or accuracy and reasoning. Therefore, in this research, cross-checking of the data with the participant was done. Moreover, the issues of proxy measures were also not neglected. To avoid proxy informant multiple outcomes measures were used which helped in increasing the validity of the trial study. Therefore, consistency in the method of administrating the tool, even in the self-administered outcome tools, should be considered in future.

Due to the lack of a control group, the improvement in the scores on some measures might be a result of attention received from the researcher and staff to the participants rather than the intervention itself. This study contributes to the knowledge around using ABD activities for healthy ageing and promoting the health of older people in care homes. As a feasibility study, the findings are presented tentatively, despite a statistically significant positive change in the outcome measures for PWCI after the ABD intervention. There are some promising findings from the trial of intervention on QoL, mental well-being, cognition, mood, happiness and computer proficiency and staff confidence. Though the results show that the Armchair Gallery app is a promising intervention, further research could evaluate the impact on health using larger sample sizes, a longer duration of intervention and obtaining follow-up data. There is a need to conduct robust randomised control trials addressing the gap of evidence-based research to evaluate the impact of ABD intervention among OPLICH.

The feasibility data add to the literature on the value of ABD activities as enjoyable recreation, a mean of promoting wellness in older people. However, from a public health perspective, generalisability is crucially vital, but it is also necessary that the research findings are not translated beyond the populations in which the evidence was generated. In this sense, the care home was unique in the level of care and also the population of residents living there. For this reason, the focus of this thesis was on replicability and the process instead of generalisability. The findings also demonstrate the importance of further investigation into the potential for primary and secondary health outcomes and health benefits.

Acknowledging the missing follow-up data this feasibility study presents the challenges of accessing the care home and the participants to collect follow-up data. However, though not without challenges, data were collected successfully at two different time points i.e. before and after the intervention with a 100% response rate. Despite the data outcome is not commonly analysed in practice for feasibility studies, data analysis provides valuable additional information about the potential efficacy of ABD activities. It is worth noting that though a significant impact of the ABD intervention is revealed, the possibility of the potential reverse impact may not be ruled out due to the absence of the follow-up data. Yet, the simple data analysis provides a very clear summary of what could be the potential impact on health as a result of engaging in ABD activities without relying on value sets. In other words, this research only highlights the potential benefits of ABD intervention to improve well-being and QoL.

6.8 Summary

This chapter presents findings from the quantitative data collected from a small sample of 10 White, English, British females aged between 77-94, living in a care home located in West-Midlands in the UK. The ABD intervention was 6 weeks long in which a group of 6 people participated in ABD activities in 45-60 minutes long weekly sessions using the Armchair Gallery app on a tablet. The participants were aged 72-94 (Mean 91). In this trial, several questionnaires were adapted and tested to evaluate their suitability for the ABD intervention trial particularly in the care home population before and after the 6 ABD interventions. Appropriateness of questionnaires was explored to help other researchers to pave the way for larger ABD intervention trials. The quantitative data analysis showed a positive change in the QoL and well-being cognitive functions, depression, mode scale and improvement in the computer proficiency and using technology for entertainment in participants with age normal cognition and with CI after ABD intervention. Testing revealed

a significant difference in most quantitative outcomes. However, due to the low sample size, the effect of dilution was high. Therefore, the exploration of impact is presented tentatively with no intention to generalise its findings and only aimed to develop a framework for future larger trials. To further explore and understand the impact of ABD intervention, findings from qualitative data analysis and reflection from field observation are presented in the next chapter.

CHAPTER 7: QUALITATIVE DATA ANALYSIS

This chapter provides the findings from the qualitative data to complement quantitative data and provide missing information related to the care home environment. The qualitative study findings include my reflection from the field notes to help understand certain attitudes toward the ABD intervention and the participants and staff's thoughts and feelings. It also describes how the activity was perceived in the care home. The later part of this chapter provides a discussion around qualitative findings to validate data from published literature.

7.1 Presentation of the qualitative findings

The details of how data were collected and analysed have already been discussed in chapter 5. The quotes presented in this chapter used "CR" and a number to indicate carer and 'R' with a number to represent residents for anonymisation. Three main approaches have been utilised to collect qualitative data (i) Observation by staff and researcher (ii) Semi-structured interviews of participants and staff to receive feedback (iii) Researcher's field observations as a living experience. However, the findings were combined and presented under three major categories. The first set of themes were relevant to the residents, the second set of themes were relevant to the staff and the set of third themes were both relevant to residents and staff.

7.2 Themes relevant to residents

Both observational and the semi-structured interview data analysis revealed five themes that were only relevant to the residents, namely (i) Reminiscence (ii) QoL and well-being (iii) Social interaction (iv) Empowerment and (v) Environment.

7.2.1 Reminiscence

'Reminiscence' that refers to being nostalgic or revisiting past experiences or casting of one's mind back to past times, was the core theme in all sessions that emerged from the qualitative data analysis. This research explored group discussion which included reminiscence using digital technology such as iPads and apps which are developed for older people and PWCI. Armchair Gallery app, with its museum elements, was chosen for themed talks, which triggered memories or reminiscences during the intervention. The app was found to be useful in stimulating discussion, recalling past activities and experiences as previously found by Ryan et al.'s (2020) when they used tablet devices with older people. Carers also reported that the reminiscence was linked with participants' own past life. For example, one carer (CR1) said,

"R11 wanted to look into the app, found the recipe book and started making a pie. She even recognised the ration book and spoke about the time it was used."

This research shows that reminiscing is a brilliant way to feel happy and bring a sense of purpose for older people including PWCI. As an example, one participant (R9) who scored less than 20 in the pre-intervention MoCA test (Normal above 27) mentioned:

"This made me so happy… I wait for it."

At this point, it is important to mention that my field notes and diary revealed some interesting information that the reminiscence was different when the staff was involved. It was interesting to know that stories generated by residents, using apps, were beneficial in supporting a greater understanding of the biographical and cultural narratives of the residents. Participants made personal links with the artworks and related them to memories or important events in their lilies. Discussion between the carer and the resident was more relationship-focused, whereas residents were more focused on their personal life and events from the past. As an example, one carer (CR1) shared the observation in these words:

"The app helped the group to reminisce and it brings back memories. Residents shared so many memories and only now I came to know her."

This indicates that the reminiscence can help to improve relationships between carer and residents, which is an important factor to promote health among older people and supports the Model of healthy ageing (WHO, 2020b).

The observational findings show that virtual visits to museums and reminiscence activities were enjoyed by the participants. However, the reminiscence, part of the activity was not without its challenges, particularly, when memories were linked to a distressing event such as loss. For example, there were some poignant instances when participants reminisced about the years, they were young and energetic, which brought a sense of loss. On another occasion, participants started discussing their lost functional abilities and missing their lovely home/garden. However, the situations were handled sensitively by facilitators such as by asking participants to use the Armchair Gallery app to virtually grow flowers in the app to create their gardens on iPads. The new activity immediately changed the environment and converted the feelings of sadness or loss into feelings of happiness or achievement. Moreover, using the Armchair Gallery helped residents to recall memories, facilitated the development of new insights about gains and abilities rather than disabilities and losses. Recalling the past and old memories related to the museum were important for the participants. Such as one participant (R1) said, "Memories are important to me." While

the other participant (R6) added, “I remember going to the Lowry and have lots of good memories.”

Each resident had a particular perspective when viewing the museum art from previous experiences, such as family memories. It was observed that the ABD intervention provided a safe expression of emotions and a chance to explore and practice new ways of communicating. It provided an opportunity to learn new technologies and experiment with new expressions of self as well as an opportunity to make choices about activities. A new relationship with the staff or carer was developed through sharing their past and creative work, an opportunity for fun and enjoyable involvement without putting any burden on participants to improve their cognitive abilities and well-being.

The observational and interview data analysis revealed that both the museum and reminiscence were the most enjoyed part of the activity because they brought back mostly good memories. Involvement in the ABD activity had a significant impact on participants’ self and their relationship with their carer. Residents felt more confident in their ability to learn new skills. Edmeads & Metatla (2019) and Ryan et al. (2020) who studied the impact of reminiscence using digital technology also found it beneficial for older people with cognitive impairment. Furthermore, reminiscing was found as a wonderful way to feel develop relationships. Hence, the ABD activity was found to have a positive impact on older people including those with CI and their carers at both individual and relationship levels.

7.2.2 QoL and well-being

A wide range of factors contributes to the QoL in older people (Van Woerden et al., 2020). Therefore, the subthemes i.e., happiness, emotions, cognition, well-being, self-esteem, and resilience are discussed under the core theme of QoL. Similarly, subjective well-being contributes to both health and mental health (Linder et al., 2015). Though the concepts of well-being and QoL are sometimes used independently, they are also used interchangeably. Hence, there remains a lack of consensus for the appropriate definition for both concepts. However, based on the NBHAM, QoL is a broader concept that includes well-being.

Happiness was a common sub-theme among residents and theoretically, happiness and joy lie at the top of the pyramid of human needs or the theory of QoL (Power, 2015). Happiness and sadness both are mentioned as a mood (Compton & Hoffman, 2020). The observational data results confirm that even if a participant was ‘sad’ at the start of the

sessions or was not fully able to participate or enjoy the session due to any negative emotions, after participating in the ABD session, they were observed to be happier. Though happiness is the fulfilment of personal goals such as belongings and self-expression, happiness is not a goal of life rather a probable consequence of full involvement in life activities (Compton & Hoffman, 2020). However, happiness itself is multidimensional, therefore one can argue that it does not cover all dimensions. This argument can be ignored as the intervention was conducted in a real-life within a care home setting and the complexities of a full and rich life in care homes are already mentioned by other researchers (Compton & Hoffman, 2020) and should be considered before making conclusions.

Happiness and sadness are important indicators of emotion (Compton & Hoffman, 2020). Hence, had a relatively longer impact than mood because it is not temporary. In ABD intervention, participants reported positive emotions were triggered by the ABD activities. One participant (R10) who attended 4/6 sessions shared how the activity helped her feel happier when she used a computer again as she was a telephone operator and had to use computers every day until she retired. She expressed her feeling as,

"This made me so happy… I wait for it." (R10)

The happiness for the sessions continued once the participants went back to their rooms. The carryover of emotions was reported by carers as they observed elevated moods after the activity sessions. This indicates that the effects were not only just after the activity, but also in the days following the ABD activity sessions. Well-being can be achieved through a willingness and eagerness to experience and expand one's sense of self-awareness (Compton & Hoffman, 2020). Care home staff reported that the ABD activities sessions were effective in increasing self-worth and improvements in well-being among participating residents. The creative element of the intervention allowed participants to express themselves, make a meaningful contribution and self-expression because arts spark inner mind and life (Kandinsky, 2012). Interesting reflections were made by participants indicating a positive impact on their well-being which is an important element in the QoL model (Power, 2015). As an example one carer said,

"She (R10) had been feeling unwell earlier this week but this activity really cheered her up" (CR7)

The spiritual needs were considered important by both staff and residents. The staff understood residents' spiritual needs as the facilitator mentioned them during her conversation and planned the activities. CR1 said,

"I know the residents; the first activity should be related to Noah's Ark as residents like religious activities and you will see how much they will enjoy."

Pairing animal activity related to Noah's Ark received positive feedback from participants as they were linked to their spiritual needs. Reflecting on it, ABD activities can be planned according to the resident's needs, including their spiritual needs as their fulfilment is linked to happiness and well-being in the QoL model (Desmet & Fokkinga, 2020). The staff played an essential role in facilitating the ABD intervention project as well as the researcher.

Most participants reported that they enjoyed the ABD intervention and were happy after participating in the ABD activities. For example, one resident (R8) said, "It made me happy." and another participant (R7) said, "I feel happy." Story making, using artwork for imagination helped in engaging the participants. For example, when participants were viewing the portrait of a dog, the facilitator asked, 'What name would you like to keep for your pet?' Everyone engaged and got into it and the picture changed into a real pet for the participants. R3, living with cognitive and functional impairments, enjoyed participating in the imaginary activity. This shows that regardless of the participants' cognitive abilities, the imaginary activity can be enjoyed because the capacity for imagination remained despite other losses (Christie, 2020). To engage residents in non-pharmacological interventions aimed to improve QoL, it is vital to understand residents' needs which can help researchers receive expected responses as the QoL is focused on the fulfilment of needs (Power, 2015).

Older people are at a higher risk due to CI as mentioned by Wuthrich et al. (2019). Demographic data of the care home showed that most residents had dementia. However, all residents who participated in the ABD intervention reported their memory and daily functioning similar to that of others of their age. This was also evident from the demographic data. In contrast to demographic data, not only the cognitive test but also the qualitative data support that some participants had memory problems. For example, one resident expressed her memory problems in these words:

"I am not young anymore! You know, one becomes forgetful too." (R1)

R6 wanted to involve in digital activity, but she had never used a computer. After participating in the ABD intervention, she was not only able to use a computer but loved the new activity and said,

"I've never used a computer before in my life, but I thought now was as good a time as any to give it a go and I loved it."(R6)

Though the groups were made by staff using their prior knowledge and residents' cognitive abilities, yet the group members were of mixed cognitive abilities. On one occasion, the mixture of people of different cognitive and functional abilities made it difficult to engage all participants at the same time. For example, on one occasion participant (R4), who was comparatively younger than the other participants and had no CI, was observed as 'passive' and 'bored'. While the other participants were still struggling to follow the instructions, she (R4) finished the tasks earlier than others. Upon noticing, the situation was handled carefully and sensitively by the facilitator. The facilitator gave her another relatively challenging task which made her actively engaged and happy again. This not only shows the importance of a needs-based personalised approach to engage participants but also indicates that the facilitator has a key role in the ABD intervention. Hence, noticing and responding to the participant's needs promptly, focusing on the person's perspective with understanding and respect are important factors in a person-centre approach and help in facilitating the activities and successful delivery of the ABD intervention. The findings support McCormack et al. (2017) who recommended using a person-centred approach.

Many participants reported that they enjoy the activity and an uplifting in their mood was observed by the carers during and after the activity. For example, one participant (R9) expressed her feeling and said: "It lifts your mood." Though mood can influence emotions, the mood could be a temporary feeling and can change quickly (Compton & Hoffman, 2020). Emotions were presented with expressions like joy, surprise, anger and distress. ABD activities allowed participants to express their emotions and perceive the activity as joyful as expressed by R6, "It is joyful." Another participant (R3) expressed her feeling in these words, "I am no more sad… and delighted to play games." This statement supports Minoi et al. (2019) that play is highly universal and can be used for engagement purposes.

The multi-sensory experiences through touch, smell, look and taste were enjoyed by the participants. Though they were found to improve anxiety/depression in older people by other researchers (Carlton, 2014; Moghaddasifar et al., 2019), no change was recorded in the anxiety/depression of the participants as no one reported any of these issues neither before nor after the ABD intervention. However, the multisensory stimulation, through group ABD activities, served as social events and activities to use the remaining physical and cognitive capacities in the participants. It was surprising how participants not only enjoyed and used multiple senses, but also it became an effective cue to emotions, such as happiness, enjoyment and achievement especially for the residents with cognitive impairment. One participant (R1) described the likeness of multisensory activity as:

“I was waiting to play ‘guess game’ because I like to use my senses when you give something in my hand and my eyes are closed.”

The group ABD activities were found to have a positive effect on participants by allowing residents with functional disabilities to interact with residents without physical or CI. There was a mixture of residents with various levels of functional and cognitive abilities in the ABD activities sessions. In general, the social, learning, cognitive and reminiscence aspects seemed to be more prominent than the other aspects and reflected the needs of the older people in care homes. The activity created a supportive environment and participants were seen helping each other. On this point, it is also important to mention that the experience could be different for cognitively and physically normal participants. Some participants never used a computer before. Even if some participants previously used desktop computers in their professional life, the majority were unfamiliar with the new technology and never used an iPad before the intervention in this research. Still, they enjoyed the ABD activities. This finding contradicts other research like Rantakokko et al. (2016) who stated that older people face difficulty adapting to constantly changing digital technology change. Hence, the qualitative data supported cognitive tests mentioned in Chapter 6.

Learning was not only happening during the activity but also after the intervention. Such as one carer mentioned,

“Like today, this morning I went to see her and she asked me if I can help her to download the app on her iPad/tablet. She enjoys arts and craft activities.”

They appreciate digital games that offer to learn new skills and cognitive exercise and they value the learning experience for its own sake as found by Kaufman et al. (2020) in their digital game activity. The improvement seen in the cognitive function can help in reducing frailty as improving the mental reserve of people with mild CI can reduce the risk of frailty (Lindsay et al., 2019).

Despite being aware of cognitive and functional impairment, no assumptions were made about the ability to participate as expressed by the facilitator (CR2) in these words:

“The sessions allowed people to achieve their full potential as there were no assumptions that they may not be able to do things.”

Participants with even a CI used iPads and the Armchair Gallery app made themselves surprised at their own abilities. The facilitator (CR1) noticed the improvement in cognitive functions among the participants as she reported:

"R1 was very happy to start the activity today. She remembered 85 to 90% of how to access the Armchair Gallery app"

As 'staff know their residents well', they helped in a personalised approach to make them happy. The ABD activities included cognitive activities that were helpful to regain some of the lost cognitive skills as seen by an improvement in the MoCA scores (Chapter 6) and the qualitative data supports those findings. Hence, despite that most participants were cognitively impaired, they actively participated, expressed their feelings and shared their stories. The results are a recurrence of Tan's (2018a) findings in the arts and health research that the participants compete with others and/or themselves to make higher scores. Although competition keeps participants engaged, a balance between pressure and motivation was maintained during the ABD activities sessions as advised by Tan (2018a).

In general, expressing feelings, opinions and attitudes through the ABD activity is not only possible for people with normal cognition, but also for PWCI as art is a stimulus for cognition (Demarin et al., 2016). Overall, the activity was perceived as positive and staff reported positive changes in the mood, emotions, cognition, resilience, well-being, indicating that the ABD activity has the potential to improve QoL as these are important elements in the theoretical model of QoL (Power, 2015).

Despite participants' functional disability that caused challenges to continue or to participate in the ABD activities, most participants continued attending the ABD activities sessions. For example, R6 described the pleasure and experience of playing the piano, which she had to give up due to arthritis in her fingers. Through the Armchair Gallery app, she was virtually playing the piano, therefore, her participation in the ABD intervention was a joyful and uplifting experience. She said, "I have been waiting for this activity since last week… my fingers are not working like before, but I really enjoyed it, I felt that I was playing it in front of a large crowd."

As most participants were over 90 and older age increases frailty (Young, 2014). Though frailty was not the recruitment criteria, the majority of participants were frail due to their co-morbidities and/or functional and/or cognitive impairments. The care home residents were involved in a series of challenges as they felt that they were unable to exert any control over their situation such as feelings of isolation, alienation, confinement as mentioned by Claire et al. (2008). Residents enjoyed the group activity demonstrating self-esteem and resilience. For example, one participant (R3) said, "Despite the repeated infections, I don't want to miss this activity and feel strong."

The research showed that resilience was potentially achievable by residents regardless of their situation, including those with cognitive decline. In this way, the findings support Fredriksen-Goldsen et al. (2015), McFadden & Basting (2010) and Manning et al. (2016) who mentioned that resilience and wellness are useful in promoting healthy ageing. Resilience was not one of the original objectives of the research. However, it became evident during the observation process and the data analysis that the ABD intervention supports resilience which plays a key role in old age (Di Ciaula & Portincasa, 2020). Resilience helps to effectively negotiate, adapt, or manage significant sources of stress or trauma (Newman et al., 2019) and is connected to QoL (Fullen et al., 2018).

A positive attitude was seen towards the ABD intervention. For emotional and mental well-being, a positive attitude was seen which acted as a motivational source. It allows people to cope with challenging situations and enhance capability levels (Johnson et al., 2010). Despite that no participant had any diagnosis of dementia, the majority (90%) of the participating residents were frail due to their functional difficulties as revealed in the QoL data analysis. This included both physical and cognitive impairments as revealed in their cognitive test (MoCA test). Most participants were with CI, some had normal cognition. Hence, the diversity of cognitive functions was found in this research. Incredible resilience and positivity were observed during the ABD intervention. This may change the perception of the cognitive capabilities of OPLICH. As an example, one participant (R8) who was cognitively impaired, in everyday life was hardly seen smiling, but she was observed smiling and laughing during the sessions. This was also noticed by the staff (CR2) who said, “R8 was laughing and I was surprised to see the change in her.” This indicates that ABD activities can help older people have a positive attitude towards life and they can be expected to have higher resilience. Hence the findings from the qualitative data support the results obtained from the quantitative data which shows that ABD intervention brought a positive change in participants’ well-being.

Self-esteem is another factor for QoL (Power, 2015). The qualitative data indicate that self-esteem and the ability to adapt can be supported by ABD activity. Participants were supported to increase self-esteem and the impact was being seen. For example, participant R6, who was a 92-years old female with functional disability (wheelchair-bound) and CI (MoCA cognitive score of 10). When she first started participating in the ABD activities session, she was unable to use the iPad due to her functional disability. Hence, she was observed as a quiet and passive person at the start of the session. CR1 identified that she was finding it difficult to press the icon and navigating the app was difficult due to her arthritis and deformity in her fingers. Based on her needs, she was given a stylus which made her

comfortable using her iPad and she actively participated in the rest of the sessions. Moreover, she was consistent in attending every week and most benefited. The positive change in her behaviour was not only found when data were analysed but also it was reported by her carer. In this case, R6 demonstrated that well-being can be regained with adaptability to help the participant in attending the ABD activities. One day, during the ABD intervention session, her son came to visit and did not find her in her room so asked the carer who directed him to the activity room. Through the glass door, he watched his mum actively participating in the activity, laughing and talking to other participants. Later carer (CR1) mentioned that her family response was very positive about the activity. In the interview, her carer mentioned:

"I was surprised at how R6 participated in the activity. Even the family member noticed the change in her behaviour and asked us what change has been made in the care plan."

The family noticed a positive change in her behaviour and was thankful as mentioned by staff (CR 12):

'Her son was very thankful for arranging this activity for giving her a chance to her mum to participate in this activity"

7.2.3 Social interaction

The benefits of group intervention in care homes were previously mentioned by Haslam et al. (2010). In this research, ABD intervention as a group intervention, revealed 'social interaction' of the participants with other residents and staff emerged as a major theme. Social interaction could be discussed under the umbrella of QoL because social well-being is an important domain in the QoL and NBHAM. However, as a group activity, ABD was a social intervention and the data analysis has shown it as a separate theme, therefore it is discussed separately.

Though the predictors of isolation and loneliness are diverse, my field observations indicate that the emotional and social support from others is likely to be protective as found by Band et al. (2019) in their trial focused on the social isolation study. This research has found that care home residents often feel isolated particularly. Poor social interaction increases the vulnerability of older people (Di Ciaula & Portincasa, 2020). Social connectedness and maintenance are important throughout the lifespan to promote well-being for successful ageing (DOH, 2016). Therefore, shared interests and goals were boosted in all ABD activities sessions as social isolation can be reduced by increasing the amount of social contact older people already have (Age UK, 2018d). As a result of this ABD intervention, an increase in social interaction was observed not only during the group activities but also

outside the intervention. As an example, one participant (R10), who was cognitively impaired, was mostly seen in her room not interacting with other residents at the start of the intervention. During the ABD intervention, she was interacting with other participants. After noticing the change, the facilitator (CR1) said, “She (R10) was connecting with other people as well as in the group.” This shows the relative value and importance of the social components of QoL and being a part of the care home community. Due to the association of social interaction with loneliness reduction in older people, it was promoted during ABD intervention. Staff reported better communication with their residents after the ABD intervention. They came to know about their past and like and dislike through the ABD activities. Hence, an increase in social interaction was found during the ABD intervention. As an example, one carer (CR3) described the challenge in these words:

‘Um, sometimes I know what's wrong, but sometimes you have to guess.”

Another carer (CR7) said,

“Yeah, sometimes it is difficult to know if they (residents) don’t express, like some people who cannot tell you properly, you never know if they don't tell you.”

The results are supported by Han et al. (2016) who found individualised leisure and social interventions beneficial for older people in their systematic review and Haslam et al. (2010) who also found group intervention beneficial for OPLICH.

Care home residents who were isolated in their rooms, volunteered out to the activity sessions, giving them space and opportunity to interact with others through arts and technology. The ABD intervention showed that it was successful in bridging gaps within the care home community. Participants met other residents and staff inside and outside their known comfort zones. Both residents and staff mentioned that they looked forward to seeing each other every week. Hence, the inference was taken that the ABD intervention was effective in connecting people.

The social environment or friendship networks can influence residents’ willingness to participate and engage if they have support from others through their encouragement or joining them in an activity as mentioned by Charlton et al. (2010). For example, R2 joined the activity as her friend R1 asked her to participate and she attended all sessions with her friend despite feeling sleepy in the afternoon. They both went along and supported each other. For example, once she said to her friend:

“Oh, I’ll do it if you do it.”

This resonated with R10 and R11 who came together and supported each other in all sessions. R10 said, “We both are good friends and go together ... now we met new people”

One carer (CR9) mentioned the role of friendship as:

"You know you need to have a friend to take you and enjoy."

Communication is important for emotional and social well-being (Sundling et al., 2020). Participants discussed their plans for the day and shared their stories. Viewing museum arts enabled communication by supporting and providing alternative paths for communication among older people and PWCI. Similar results were observed by Newman et al. (2019) who mentioned arts as an alternate medium for communication. The results show that participation in the ABD activity provided a medium to express feelings and emotions, to re-construct one's thoughts and re-imagine the world as done in this research. The carers mentioned that by participating in the ABD intervention, residents and staff developed a close relationship with residents who had never shared their stories with them before. For example, one carer said in his interview:

"The activity was quite different to me because it brought us together, I had a greater interaction with the residents that I didn't know before" (CR2).

Increased communication was seen in the ABD activities session. An example of how ABD activity enabled communication between residents is R6. She was a 92-years old female resident, with no depression (GDS score 1), but mild CI (MoCA scores 24). In the first session, she (R6) was not interacting much with other residents and staff. She was also less verbal compared to other participants. However, from the 2nd session till the end of the intervention, she was dressed nicely as if she was about to go out, wearing nail polish and asking questions and sharing her past with the care home staff. She gained confidence and became socially connected with other residents during the ABD intervention.

Well-being is a dynamic state that refers to a person's ability to develop their potential, work creatively and productively and build strong and positive relationships with others to contribute to their community (Herrman et al., 2011). Among the two groups, some participants already knew each other by sight, but the majority lack pre-existing relationships that were developed during the intervention. Both groups met on the celebration day and developed a new relationship. Group belonging is perceived as safe and appreciated. The ABD group activities served as meeting opportunities for residents and staff and provided means to reach the goal of enabling and maintaining their remaining skills.

For the carers, this study created an opportunity to find a new way of caring for their residents, which is person-centred as recommended by Ryan et al. (2020). An equally close

relationship between residents and carers were apparent throughout the intervention and supported the personhood. This can improve staff knowledge of their residents and their skills and confidence to interact with them. Hence, a task-oriented care approach may be shifted to a person-centred resident-oriented approach. This intervention showed that ABD intervention can be used as a medium for a communication tool for staff and residents and can be a part of a care plan.

The ABD intervention has the potential to improve the relationship between carers and residents. By mutual engagement with arts, an improvement in the relationship was also found by Camic et al. (2014). The ABD intervention can decrease feelings of loneliness as can be done by other digital game activities as they provide an ideal mental condition during which seriousness and play go in harmony to elevate mental health (Kaufman et al., 2020). In this way ABD interventions have the potential to develop new skills, build a sense of achievement meet and connect with other residents and carers.

7.2.4 Empowerment

Empowerment was another theme that was revealed from the data analysis. The process of empowerment begins with the participation of residents to choose their activity and learn new skills and by engaging and creating an enabling environment. Engagement in activities generates meaning in life and feelings of fulfilment (Westerhof et al., 2010). Hence, engagement in life encompasses empowerment. For example, the facilitator (R2) said, “It was a different activity; therefore, they were fully engaged and you can see they had enjoyed it.” In this research, participants shared their stories as they felt they had something valuable to share. This contributed to participants’ personal and social well-being increasing their self-worth and confidence. Henceforth, ABD interventions can increase confidence as explained by a carer as: “While having the opportunity to socialise, build confidence and increase stimulation.”

During the activity sessions, most participants were focused on learning new skills. They were interacting with each other and staff effectively. For example, sharing their stories, asking questions, making eye contact with others in the group and showing their creative work to each other. However, once a participant looked less engaged, the facilitator involved her tactfully in viewing the video and offered craft activity based on her interest which made her happy. This not only supports the theme, ‘staff knows residents well”, but it also indicates that the facilitators should show their knowledge, skills, ability to respond sensitively at the moment. Regard and awareness for others were the few qualities observed among all residents and staff during my stay in the care home, particularly during

the group interactions. For example, staff considering residents' preferred individual activities to address participants' personal needs; creating a friendly and warm welcoming environment and sensitivity towards the groups' requirements, facilitating and remaining calm and gentle communication style with others etc.

The empowerment brought self-esteem, self-confidence and a sense of achievement which all can be linked to well-being. Although most participants were cognitively impaired, they all had self-awareness and they were more empowered after the ABD activities. The observations were supported by the staff's comments as one carer said (CR6), "Maybe cognitively impaired, but empowered." Considering the positive change observed among the participants, it will not be wrong to say that the ABD intervention has the potential to empower care home residents.

Often staff's support is required by older people in care homes to sustain their part in the social world. Therefore, staff who understand residents and their ability to communicate effectively can help their residents to make decisions which increases residents' personhood. One carer (R6) expressed this in these words:

"I think sometimes people underestimated how capable they are and just assume that they will find this activity difficult."

An example is the case of R6 whose capability was undermined by her carer and family members. After participating in the intervention, they were surprised to see her comfortably using iPads. Hence, through ABD intervention, both her family and carer realised her abilities and what she can achieve on her own. The participants played games and felt happy. They shared their feelings with others and felt proud of their achievement. As an example, one participant (R3) who virtually baked an apple pie excitedly showed her screen to others and said,

"See, I can bake my own perfect pie"

Often corresponding expectations and performances are required if people with CI are to sustain their part in the social world. However, the staff encouraged residents to get involved in activities they might not otherwise be interested to participate in. Many residents found that the activity improved their self-confidence.

Not only during the activity session when participants were playing games and competing with each other and mentioning their achievements but also after each session participants showed their creative work to others to demonstrate their creativity. The results show that learning new technologies such as iPad and engaging residents in playful ABD activities can have a positive effect on empowering residents. Therefore, ABD activities may be

useful for older people or people with cognitive impairment in care homes to improve their confidence, computer skills and empower them.

7.2.5 Environment

'Environment' was an important theme that was emerged from the data analysis. A suitable environment is important to conduct activities (Astell et al., 2016) environmental comfort and social safety are basic human needs (Power, 2015). Therefore, for the delivery of the intervention, the environment in a care home, the security and safety needs and rights of the older people particularly those requiring support become particularly important. The care home environment was found safe and protective for the residents. Moving to a care home was a major event in residents' life and environment' played an important role in the health of residents as CR1 mentioned about one participant whose health deteriorated after moving to the care home as:

"I have seen how R9 move to the care home changed her life. I visited her home multiple times before moving to this care home. She had a beautiful fully maintained garden and she was always busy gardening and cooking. She has been deteriorating since she is moved here"

Though virtual, the Armchair Gallery app provided an opportunity to grow a garden or to bake a pie. Hence, R9 enjoyed growing flowers on her iPad during the ADA sessions. Staff repeatedly used 'busy care home environment' and 'real-life situation' in their conversation and feedback. The environment played a key role in engaging participants in ABD activities and the success of ABD intervention. For example, in the first session, the cinema room was selected to use a bigger screen for the group ABD activities. However, the room was not only small and dark, but it was a hot day in July therefore the environment was not comfortable and residents felt hot and dark, hence uncomfortable. One resident (R5) left the room in the middle of the activity after staying for 20 minutes and later decided to withdraw from the intervention. Similarly, the other participant (R6) shared her feelings about the room and space in the following words:

"It was very hot inside (cinema room) and should have some open space for this activity."

This shows the importance of the environment in engagement and retention in the ABD intervention. Residents became more aware of their environment after participating in ABD activities. One participant (R9) expressed her feeling as:

"I had never noticed the beautiful picture on the wall. I like it, I hadn't noticed it before. We don't often notice things around us as we live here. The picture had blended into the wall very well."

In this respect, ABD activities bring strengths in participants' existing abilities to notice their environment. The research findings indicate that creating a friendly and stimulating care home environment was beneficial for OPLICH because it provides cognitive and emotional resources. The environment is a determinant of frailty and plays a key role in successful ageing (Di Ciaula & Portincasa (2020). Hence, fostering older people's care environment by using innovative activities like ABD activities can maximise residents' well-being because improving environments allow primary prevention and reduced frailty (Di Ciaula & Portincasa, 2020; Kabadayi et al., 2020).

7.3 Theme relevant to staff

Staff's interviews were analysed which revealed an important theme emerged that was only relevant to the care home staff "Staff knows residents well." Hence, it is discussed separately to help other researchers to understand the staff's perspective about their residents.

7.3.1 Staff know residents well

Though an unexpected theme, ABD intervention field notes were supported by the themes that emerged from the staff and residents quotes. It was clear from observational notes and the interview data that the staff knew their residents well, for example, one carer (CR3) said:

"I mean, the staff know them well, obviously, you know, I know what they like or dislike. You just know because you spend time with them."

The staff mentioned that they had experience in managing residents. For the observational data, knowing what is 'usual' and what makes participants happy as the staff knew residents well, was found a useful strategy and helped in validating data. The staff were trained to observe and notice any change in residents' behaviour. For example, once the facilitator (CR1) said:

"You just know when something is wrong."

During an interview one carer (CR4) said,

"Some participants here are from the same household where I work and I know, how to deal with them. I know how to make them laugh and keep them happy. I learned it from my experience. I understand exactly what they want to do."

The other carer (CR8) who was indirectly involved in residents' care, such as cooking, mentioned her knowledge about residents in the following words:

"I know exactly what she wants"

With the knowledge of the residents' previous work or profession, as in the case of R10, the staff were able to know her better, therefore, her needs were fulfilled which made her happy. This supports Desmet, & Fokkinga, (2020) who indicated that happy people would have their needs fulfilled. As the strategy of involving staff were proved useful for this research, staff can be involved in future trials from the planning stage because staff can use their experience to guide researchers when working in care homes. The feasibility study indicates that staff involved in the ABD intervention can help to achieve the desired goals.

7.4 Themes, common for both residents and staff

Some themes were common among both residents and staff. The results below are presented under four common themes: (i) Learning (ii) Acceptability and usability (iii) Engagement (iv) Challenges.

7.4.1 Learning

Learning was one main theme that was found among both participants and staff observations and interviews. Though learning could be related to cognitive health, social learning in ABD activity sessions was observed. Residents learned how to use an iPad and navigated through the Armchair Gallery app. Using new technology, such as iPads and the Armchair Gallery app, not only helped participants to learn new skills playfully but also increased their confidence. One participant shared her thoughts in these words: "I was thinking, I might not be able to use it, but now I can, my confidence is improved." Based on participants' interests facilitators helped them to learn other functions such as taking selfies during the activity sessions. The results show that participants learned new skills and their knowledge was increased as one participant (R6) said: "Now I know more than I knew before." The findings show activity based on the individual's level of learning and playful learning using tailored methods can help residents enjoy and playfully learn new skills.

Staff used skills to facilitate activities, e.g., asking and prompting questions, assisting participants in navigating through different apps and problem-solving. Staff commented that this study gave them insights into ABD interventions. Participants playfully learned new skills by playing games not only in groups but also individually on their iPads using the Armchair Gallery app. Günther et al. (2003) highlighted that digital games or tasks can increase attention and learning that can improve verbal performance, reaction time, attentiveness, memory and general knowledge and the same was observed during the arts-based activity sessions. The results from this study support that playing digital games in groups can positively affect their sense of well-being as mentioned by different researchers

such as Kaufman et al. (2020) and Dupláa et al. (2017). The significance of learning new skills and the joy of learning new skills was expressed by the participants as one resident (R2) joyfully said,

"I know how to open and start the game (app).

The other (R1) said:

"I never touched a computer before, but now I learned how to use it"

ABD activities utilise the functional and cognitive function, therefore, support not only the maintenance of previously learned abilities but also learning new skills. The activity strengthens existing abilities with a personal approach to support the success of older people. One resident R2 said,

"Something new to learn… I look forward to."

In contrast to other passive art-viewing activities, ABD intervention offers interactive activities, provides an opportunity to be active and engaged in art-making and as a process of learning new skills which is an important part of healthy ageing (Beard et al., 2016; Rudnicka et al., 2020).

Participants who were willing to participate were also ready to learn about new things such as new technology. A positive attitude towards healthy ageing acts as a motivation to be active and directly influences the likelihood that the individual will be willing to learn about new things and accept new advances in technology (Werner et al., 2011).

Consistent with the person-centred approach to healthy ageing, it appeared that the ABD intervention enabled carers to better know the person they cared for from inside. The staff (CR11) said: "Some of the residents who took part in the project hadn't used an iPad before or a computer for many years, so it provided an opportunity for people to learn new skills – or re-ignite existing ones."

The staff described how the intervention helped them to learn new things about their residents. The activities provided learning for the staff to use innovative and creative ways of caring. The staff involved in the ABD activities were encouraged to apply their own ideas and what they had learned into their daily practice. Learning supports all the other pillars of healthy ageing (Rudnicka et al., 2020). As participants learned new skills of using digital technology, the ABD activities can promote healthy ageing by providing innovative learning opportunities. Overall, it can be concluded that the ABD interventions can provide flexible, accessible computer literacy, training opportunities and can help in retraining abilities in older age.

7.4.2 Acceptability and usability

Another theme that emerged strongly regarding the ABD intervention, was acceptability and usability. All participants used the latest iPads. Regarding using technology, older people use technology only if they see it as worthwhile in terms of the time and energy that they invest versus the benefits that they experience (Kaufman et al., 2020). Hence, the residents used Armchair Gallery and played games because they found it useful. Residents who owned iPads downloaded the Armchair Gallery app and other colouring apps onto their tablets and used them in their own time. An increase or change in the amount of use of tablets and informal art viewing was seen in the care home. One staff member (CR2) said,

"I am new to digital activities, but I am loving it. This is so much fun and well worth the time and effort involved. Talking, sharing old stories, working together in groups, crafting, entertaining and being valued is priceless."

Participant R6 liked using advanced technology and said,

'I just open it (iPad) and things start happening and I find it great.'

The Armchair Gallery app was tailored to encapsulate the individual qualities of the venues. The activities in the app considered different needs of older people such as multi-sensory elements, ease of use and accessibility in response to people's health and cognitive needs. Participants liked the app and enjoyed using it as a facilitator mentioned:

"R3 kept asking throughout the week when the Armchair Gallery was (will be). She expressed how amazing the app (is). She was happy and involved in the activity.

Conversely, cognitively normal participants found the activity easier compared to the cognitively impaired participants as the facilitator recorded in the observation tool as:

"R4 found the activity easy. She wanted more activities on the app."

The other participant (R7) said,

"I want to get on to it (iPad), a lot to learn on it. It keeps my head thinking."

The links for other apps given in the Armchair Gallery app were used to engage participants. The facilitator downloaded relevant apps for the participant according to their ability level. This approach made participants fully engaged and they remained happy until the end of the intervention as their needs were fulfilled. This shows that the app can be used according to the person's need to engage them. This also indicates that a personalised approach is necessary to fulfil the needs of each participant in the ABD activities. Staff (CR1) mentioned her personalised approach during the activity session in these words:

"You see me, I play with them, give them a cup of tea just to make them happy and frequently ask participants if they're fine."

However, I acknowledge that it is not always easy to fulfil the requirement of all participants in group settings. As an example, one participant asked, "I would prefer a bigger screen." It was not possible to provide a bigger screen in this study due to limited resources. However, this can be considered when planning a larger trial and resources can be arranged according to the residents' needs in future trials. There were issues of screen glare which were resolved by appropriate settings for screen display, navigation and readability based on participants' needs.

Regarding the length and duration of intervention, the care home staff and residents reported that the length of the intervention, sessions' contents and the activities were neither long nor too short or technicality complicated. Therefore, can be used within residents' abilities. Additionally, they reported that older people enjoyed the activities and learning technology as these activities were not available to residents regularly. However, they mentioned that fewer outcome measures would be useful. Hence, the intervention can be modified to focus on evaluating only one area such as just the QoL. Overall, the majority of participants liked and mentioned they would use the app in the future, and some recommend it to others.

7.4.3 Engagement

Engagement is another theme revealed from the data analysis. Similar to participants, the staff were also actively engaged with the intervention, including carers who brought participants to and from their rooms. The engagement is the attendance at the sessions and participating in the celebration. One carer (CR10) said,

"When I took her to her room after the activity, she asked me if I could be on the next shift, so to help her using her iPad and they talk about it at dinner time, even they discussed it the next day."

Engaging residents in meaningful ABD activities has been found feasible in care homes which may also help in achieving healthy ageing. Care homes were able to accommodate the ABD intervention without finding it intrusive. The results revealed that tailored ABD activities can be used as leisure group activities for older people including PWCI as they promote social engagement and improve well-being. For example, one facilitator (CR1) reported:

"R8 has said she has been feeling very unsettled when she came and really enjoyed getting away from everything. She was really engaged in revealing writing."

On occasions where they were less engaged, the facilitator responded by playing their videos and showing photos from the past sessions. In response, participants enjoyed, smiled and started sharing their happy memories. Not only the participating residents, but the staff members were also fully engaged with the ABD activities. The observation revealed that most participants were both actively and passively engaged in ABD activities in all sessions and not disengaged in any session.

The participating staff had never taken any part in a feasibility study or trial before. Therefore, it is not surprising that they found the research process a little intimidating. However, once they started to participate in the activity, they found it more interesting and they were fully engaged throughout the intervention period. Participants were generally attentive and engaged during the ABD intervention, triggering happy emotions. Participants' responses may be affected by their health conditions. However, ABD activities were helpful distractions from those concerns. Most participants understood the purpose of ABD activities and most were fully engaged yet able to interact effectively with each other. Participants with more formal education were more capable of adapting to new ABD activities. The professional backgrounds tended to interpret the artwork from their personal histories to appreciate the artwork from museum galleries.

During the session, the observed engagement was divided into three categories, i.e. active, passive, self-engagement and others, as detailed in Table 21. The observation revealed that most participants were both actively and passively engaged in ABD activities in all sessions and not disengaged in any session. The results showed that staff awareness of adapting activities for each participant and how to facilitate activities to engage participants to promote social connectedness are necessary as previously found by Holthe et al. (2007). It was during an afternoon session when some participants were seen a bit tired, still, they were fully engaged in the activity. This is in contrast to Holthe et al. (2007) research who found that only a few participants actively participated and engaged, this feasibility study found that most participants wanted to participate in the ABD intervention. This leads to the conclusion that despite the tiredness, ABD intervention was able to fully engage residents in the activities.

The researcher's observations were validated by the staff's observation which revealed that most participants were both actively and passively engaged in ABD activities in all sessions and not disengaged in any session. Facilitators can play an important role in engaging

passive participants. For example, in the first session, at the start, one participant (R6) was passive and quiet and did not converse in the group or with another participant neither shared her story, but after half an hour she became more comfortable and started sharing her memories and was observed being happier and taking an interest in life. This indicates that participants need some settling time. Residents who more actively participated in the activity benefited more from the intervention as observed during the ABD intervention. Moreover, the observations were recorded by staff for each participant during the ArtsObS. These findings are also supported by Bourassa et al. (2017) who stated that activity level can predict the cognitive status. The qualitative findings support quantitative findings, which revealed more improvements among participants who attended more sessions and were more actively engaged compared to the other participants who missed some activity sessions.

Residents enjoyed the activity and some of them continued using the app. This finding was supported by one participant's (R9) quote:

> "When I first started, I didn't like this activity that much, but now I like it so much that I want to continue telling my friends to use the app."

This also shows social acceptance of ABD intervention in the care home. Although to some extent active participation in the group activities was affected by underlying health conditions such as hearing or functional and cognitive impairments. Overall, the participants were in high spirits in most sessions, often smiling and laughing. Participants commented that they enjoyed the activity as well as the digital and social elements of the project. They also liked to use multiple senses in the game activity. When it comes to determining the use of the ABD app for healthy ageing in care homes, ABD activities look relevant.

7.4.4 Challenges

'Challenge' was another common theme found both in interviews and observations. Though 'challenge' emerged as a theme, strategies for overcoming each type of challenge are also identified and mentioned wherever appropriate. Not only residents and staff, but the researcher can also face challenges. Hence, the challenges are divided into three categories. i) Challenges faced by the participating residents ii) Challenges faced by care home staff and facilitators iii) Challenges faced by the researcher during the delivery of the intervention and living in a care home.

Regarding challenges in participating in ABD activities, internal factors or situational barriers such as personal circumstances like a resident's health situation can impact the participation in ABD activities. For example, incontinence, infection or arthritis was found to

be a challenge to participate in the activities. One carer (CR8) mentioned the challenge in the following words:

> "When residents get infections like water infection, you know they can get quiet or lethargic and tired. Obviously, it makes it difficult to participate in any activity"

Another carer (CR7) described the participant's health condition as a challenge to attend the activity as:

> "You see, she is somebody who likes to participate in all activities, but since she is not feeling well due to her arthritis, she does not want to talk and wants to leave her alone."

Participants mentioned that not only the cognitive test but also answering several self-answered questionnaires was a challenge for them due to their busy schedules and doctor/hospital appointments. Situational barriers or challenges which were linked with participating in the activity session included busy schedules like hospital appointments, hospitalisation, losing dentures causing difficulty in speaking and communication, losing spectacles or hearing difficulties despite using hearing aids. This hearing loss was an important barrier to participate in ABD activities. Hearing impairment can increase social isolation and loneliness reduces overall health, QoL and well-being (Action on Hearing Loss, 2019). Ageing associated with physical impairment can lead to functional disability which causes adverse effects on the well-being of older people. The findings can further be explained by Age UK's (2018a) who identified situational barriers in taking part in cultural and creative activities such as lack of time. Though help and assistance were provided to staff in setting things and bringing participants from their rooms, the staff faced challenges in facilitating the activity. For example, on one occasion a carer (CR1) said, "I've made arrangements to stay, but you know it is a real-life situation and an emergency can come at any time."

In addition to internal factors, external factors can create challenges for participation which are often beyond the individual's control (Charlton et al., 2010). For example, attitudes, beliefs, opinions held, an environment in a care home and usability of the app can affect the lives of OPLICH, but the barriers can be removed by improving the physical environment, quality of provision, ease of app use, promotion of activities and a personalised approach. Participating in research was demanding because the staff were actively seen involved in the attainment of health and the caring of residents' well-being. As an example, regarding the external barrier, the facilitator (CR1) said:

"She (R2) really likes to participate in the activity, but she has a hospital appointment and we can't change the activity days, you know it was planned and other residents would be waiting for the activity day."

However, these situations can be controlled by care home management, such as by offering her a one-to-one session for a personalised approach as the app can be used for one-to-one support. Another example of external challenges is the time of activity as described by one participant in these words:

"I like to come for the activity, but I feel sleepy after lunch. It is a challenge for me… I take medicines after lunch and want to take a nap"

To overcome this challenge, selecting a time suitable for all participants may change the environmental situation. Hence, for future trials, the timings of the group activity can be modified based on the residents' need to increase attendance and engagement in the ABD intervention.

Care homes are often dominated by hierarchical decision making (Brownie & Nancarrow, 2013). This research also reports the hierarchy system as it was a challenge for both staff and researcher. For example, the facilitator (CR1) said,

"I will prepare a report for the top management as it is important to make this activity a regular activity.

The other staff member who wanted to be involved in the activity said,

"I wanted to be involved in this activity, but I was not invited, I don't know why."

Though there was no waiting list, many other staff and residents, who were not recruited in this trial, wanted to participate in the trial. However, for residents and staff, who were already involved in the intervention, even for them, participating in the 6-week intervention was not less than a challenge. However, participants were happy to take this challenge and felt privileged and proud of themselves for taking the 'university challenge' as they called it. For example, one participant (R6) said:

"I like challenges and I told my son that I am participating in the 'university challenge'."

Moreover, a high (91%) retention rate as mentioned in chapter 7 is another evidence to support the statement that participants were happy to take the challenge of participating in the ABD intervention. However, this research highlighted the challenges of the uptake of technology in a care home. For example, despite positive feedback from residents in favour of using technology (such as iPad), introducing new technologies into the care home seemed unlikely to be effective due to the funding, financial, and staffing challenges.

7.5 Field observations and living lab experience

“Believing something is never enough to make it true” (Law, 2004, p17). Therefore, to experience a real-life care home culture, I lived as a guest for the intervention period (6 weeks) in the same care home where I delivered the ABD intervention. and spent my days and nights with staff and residents. A detailed methodology for this approach is described in Chapter 5 (Section 5.1.3).

As ethnographers should at least provide some autobiographical information for their stories (Chang, 2008). Therefore, before sharing my experience of living in a care home, it is necessary to understand my background. After the death of my mother in my teenage, I became very close to my grandparents as they looked after me and gave me physical and emotional support. Therefore, I always feel emotionally attached to all older people. This is important to know because this emotional factor had played an important role in taking this research as well as in keeping me motivated throughout this research. I also acknowledged my limitations as a researcher from an ethnic minority as I selected a care home that was dominated by the white population including the staff. This might have influenced the research such as when reflecting on my observations or occasions when I might have not appreciated their standpoint. Regarding managing my dispositions in this research, the qualitative part of this research was more challenging with regards to maintaining objectivity. Knowing my positionality is important to understand my reflections. Being aware of my own limitation. I interpreted and presented my findings with caution as researchers should be aware of their limitations (Craig et al., 2008). The reflections from my diary are presented as an ethnographer story (Vignettes) because it is useful for mentioning practices and interactions of research participants within the research environment (Mihailidis et al., 2010). The section below presents vignettes from my diary and field notes that were collected during my stay in the care home.

My living lab ethnographic story started from obtaining ethical approval. Gaining entry into the care home involved several challenges in both receiving official authorisation and completing required modules and training to facilitate ABD activities. However, achieving psychological entry was another challenge after gaining physical entry for collecting pre-intervention data. This challenge is not uncommon as the challenges are mentioned by other researchers (Streiner & Sidani, 2011). Starting as a stranger in the care home meant that residents did not immediately trust me or see the benefits of participating in ABD activities or it may be that they did not understand my motivations for conducting this research. This indicates the importance of pre-intervention planning and the need to better

understand the factors which may prevent a researcher from collecting data. Therefore, researchers coming to care homes should find strategies for overcoming these barriers such as extended time-frames that may allow them to develop good relationships both with residents and staff to build mutual trust.

When I participated in the teacher training programme, my focus was to teach university students. However, the acquired teaching skills were found useful for the tailored ABD intervention and helped me in training staff and facilitating the activity. During the ABD activities sessions, the participants considered me as a teacher which could be due to my visible university identity card. As a teacher, my teaching philosophy of social constructive learning played an important role during the staff's training and when facilitating the ABD activities sessions for residents. Providing verbal constructive feedback helped participants in their imagination process. My field notes supported the positive impact of ABD as revealed from analysing quantitative and qualitative data. I mentioned in my notes:

"Overall, I observed that the activities based on the individual's level of learning or playful learning were more engaging compared to craft activities as residents were taking with each other that they enjoyed and learn new computer skills in the session."

A limitation of living in a care home was that observations could not be audio or video recorded for all six weeks. Some observations were written in bullet points, some were recorded later in the day due to my busy schedules in the care home. Additionally, I avoided intrusive observations, such as activities taking place within private spaces etc. On multiple occasions, I had to stop my observations responding to residents' questions or to help staff or to participate in other activities happening around me. Though these observations were useful, it was not the focus of this thesis and had a supportive role in this research. My observations during the intervention period have provided additional information which was not collected using other methods like observation tools (ArtsObS) or interviews. For example, no major negative impact was found on mental well-being using the quantitative measurement tools. Similarly, residents did not report any negative impact during post-intervention interviews, yet, my field notes revealed some minor issues like screen glare and difficulty reading in bright light were a few difficulties that participants were facing during the activity sessions. Living in a care home helped me to remind residents about the activity day and time. It became easier to manage and facilitate activity sessions, collecting evidence and preparing field notes. Overall, researching, while living in the same care home, helped me to understand the real-life situations and practicalities of delivering interventions in care homes. Additionally, the differences in the environment, besides the intervention, were easy to identify with the general integration of ethnographic perspectives.

Hence, improved the trustworthiness and to infer that the differences identified between the two time periods in quantitative data were due to the ABD intervention and not due to other confounding variables.

7.5.1 Reflection from the researcher's diary

It was clear from the initial fieldwork that the two care homes included in the focus group study had two entirely different environments and cultures. The staff and residents in the independent living environment had fewer interactions compared to the other care home where most residents were dependent on staff. The field notes revealed that older people could have different reasons leading to their admission into the care home. My informal discussion with residents was supported by my field observation and showed that there was a wide variation in the reasons for moving into the care homes. Some mentioned that they considered it long before moving into the care home, for others, it happened relatively quickly following an accident or illness. To some residents moving to a care home was not only a major upheaval but also a bereavement involving loss of functional abilities, loss of independence, autonomy, loss of a partner and friends. This resulted in disruptions to social support networks. Some shared their stories about major alterations in their social life and some mentioned the loss of privacy, dignity and independence. However, the loss of a social network was common among older people as previously mentioned by Boggatz (2020).

My diary revealed that most residents were frail due to their functional and/or cognitive disabilities making them even more vulnerable. The care homes population had more functional disabilities compared to the community or independent living settings. This observation supports O'Neill et al. (2020) who mentioned that care home residents are functionally more dependent. To reflect upon my observation, though functional and cognitive declines can occur with age, not all abilities are lost simultaneously. The diversity was observed among care home residents as some residents were more active, happier and friendly than others. I saw them involved in other activities such as playing board games and going shopping, etc. My informal discussion with residents during dinner or lunchtime revealed that most participants were from good socio-economic backgrounds and some of them had travelled around the world. I often found their perspective a little unfamiliar as I had not travelled to those countries.

While living in the care home, I listened to several stories from residents and their carers about how the environment adversely impacts the health of older people who previously

were in good health. Some needed to move to the care home to accommodate their physical or mental limitations. Alternatively, for some residents, the safety and peace of mind or not being alone and receiving comfort were appealing to them when moved to a care home. This finding supports Faber (2015) that care homes provide a suitable choice for older people who lack adequate support at home or live with heavy dependency. Despite all the differences in the circumstance or the reasons to move into a care home, one thing was common that they all were frail as found in research by Maenhout et al. (2020). However, I observed that often staff disseminate the cycle of functional decline and fail to support continued abilities. Except on a few occasions, residents were mostly observed sitting in the lounge and either closing their eyes or sleeping during the day. Often they were not interacting with anyone and sometimes complained about feeling tired. This has been seen as a possibility of recruitment bias if staff offered ABD activities to more active participants as the same residents, who participated in this research, were observed participating in other activities. This deprivation was particularly evident in the provision of digital technology. Despite staff's well-intentions, overprotection may indicate a lack of respect for the intact skills and abilities of residents and a general lack of recognition for residents' personhood as highlighted by Miller et al. (2008). Hence, it is necessary to ensure that residents maintain their quality of life.

Describing my living lab experience and observations as an ethnographic story, the residents had been playing the role of guests living in the care home and carers and staff had been actively working as hosts during the activity sessions. Residents invited to the ABD activities perceived it as an advantage. Reflecting upon my observations mostly the pressure of engaging residents relied upon the facilitators while the residents took a more passive role. However, once the participants were engaged, the facilitator only had to keep them engaged and took a passive role. In every session, the facilitator encouraged participants to create their own stories. There was a sense of empowerment among participants. ABD activities incorporated multidimensional activities. I observed that the music element in the ABD activity positively affected the participants' mood. The following vignette will help to understand the social environment during the ABD activity session:

"In today's session, when residents were virtually playing musical instruments, one participant told others that she was a professional musician. She said that she knew how to use musical instruments, but it was very different for her to play musical instruments digitally. I was surprised to see that she was trying to play on digital equipment, she started learning new skills as she was moving her fingers to create even more interesting

sounds and music. While others were enjoying her newly created music they were also learning and asking questions to create their own music."

Information, that was not collected using the observational tool (ArtsObS), were gathered in my diary/field notes. For example, the missing information about participants' background, reasons for not attending any session etc. My diary revealed that among the 11 recruited participants, 9 had mobility difficulties, 3 were using walking frames with wheels and brakes, 1 was using a stick to assist balance and prevent falls while five were in wheelchairs and one had difficulty expressing herself. 2 out of 10 participants had difficulty in hearing. This resonates with the previous survey which showed 75% of people having hearing loss in care homes (Action on Hearing Loss, 2019). Similarly, I noted that participants were tired during afternoon sessions and looked less energetic. This indicates that an appropriate time is important for creative/learning activities.

28th June 2019 was celebrated as the 'National Care Home Open Day'. Every year, on the open day, care homes across the UK open their doors to the public. The theme for 2019 was 'Celebrating Arts in Care' (Care UK, 2019). The following vignette helps to understand the social and cultural aspects (Barter & Renold, 1999), the following sections present the vignette from my diary which I wrote on the open day:

"Today, the local community was welcomed in the care home. The care home was celebrating the 'National Care Home Open Day'. It was a fun and relaxing event to showcase what is going on in the care home. Staff had been preparing for this day for the last few days. A separate stall was set up at the entrance of the care home to showcase the Armchair Gallery app. Pictures of residents were on display to show that the creative arts play a key role to encourage sharing emotions and also to showcase that residents have talents and the care home provides the right environment to flourish their talents. People from the local community saw residents' art and craftwork. Residents proudly presented their work and shared stories behind it."

Reflecting upon the above observations, staff and residents' selected ABD activities as they found them worthy of sharing and felt confident to present their work. It also shows the popularity of ABD intervention and success in a care home. Moreover, it indicates the potential of ABD, its acceptability and possibilities of future implications.

My field notes were useful to give some background information about the sessions which might otherwise be not possible. For example, observations about intergenerational interaction. For example, below are vignettes from my diary:

"Today when I was busy facilitating the ABD activities, five teenagers arrived to meet residents and saw residents busy with arts-based digital activities. One resident informed me that these young volunteers come from the local community and they also came last week and spend time with them. Residents and staff were busy with ABD activities but they invited young volunteers to join them. Residents happily showed volunteers the Armchair Gallery app and helped each other in navigating the app. I observed the participants learning from each other, solving problems together, laughing over difficulties, enjoying each other's company. While facilitators were encouraging and boosting morale and mutual learning."

The reflection from the above observation indicates a positive relationship between residents, staff and young adults. This shows the possibilities of involving young volunteers in ABD intervention for future intergenerational research. Older people engaged young volunteers with the ABD activity and social learning took place. These observations can be supported by Kaufman et al. (2020) who mentioned that intergenerational activities can help older people to feel happier and encourage shared social learning. Hence, in future trials, researchers can possibly use young volunteers for ABD intervention to facilitate the activities. This can encourage intergenerational interaction to build relationships between old and young people as found by Kaufman et al. (2020).

It is not uncommon to observe the impact of arts-based interventions after the session as used by Newman et al. (2013). Similarly, in the ABD intervention, the impact was observed not only within the sessions but also immediately on return to their room after the activity. Moreover, the positive impact remained and was observed until the next session. My field notes stated:

'R4 was passionate and was able to interact with others more than she normally did when observed in the care home. In this context, staff also mentioned that the activity supported her confidence and selfhood."

On the celebration day, residents met my supervisors (the research team from Coventry University), the top management of the care home, staff and participants from other groups. I wrote in my diary,

"Both staff and residents were appreciated for their achievements by the senior management of the care home and professors involved in the research from Coventry University. They were impressed by residents' creative work. The certificates of achievement were distributed not only to the participating residents but also to the staff to recognise their contribution. Residents shared laughter and enjoyed each other's

company. No distinction was made between those participants who only attended one session due to either hospitalisation or sickness or those who attended all six sessions. Participants who attended all sessions were appreciated in person for their 100% attendance, which made them feel empowered without hurting the feeling of others who were unable to attend all sessions."

Residents who participated in most sessions were found to be more confident in presenting their creative work. I observed during this study that self-confidence has a link with engagement and achievements. The peak of sense of belonging, connectedness and achievement was seen among staff and residents on that day. One carer (CR2) shared feeling in these words,

"The celebration was great – we all enjoyed it. It just felt like a big party or like a Christmas."

Living in an unfamiliar care home environment was challenging for me. As an academic, it was also a challenge to take a neutral and impartial role, yet I tried to remain as honest as possible when reporting. However, there were several benefits of the living lab. To name a few; achieving the recruitment target, being able to conduct a 6-weeks' ABD intervention, collecting qualitative, quantitative and field observational data. However, during the conversations with staff, it was clear that lack of communication was a norm in the care home. Hence, despite developing good relationships with staff, gaining entry and collecting follow-up data proved difficult. Though several emails were sent to the manager to gain access, no response was received. A lack of response to access to care homes was the major impediment in collecting follow-up data. One of the reasons that I can understand could be the work burden on the care home staff. Soon after the ABD intervention study, the COVID-19 pandemic started and care homes shut their doors to outsiders. This could also be another reason for not getting any response from care home management. I witnessed both sad and happy moments. Despite numerous challenges that were experienced during my stay in the care home, they were not insurmountable. Living in the care home helped me both in the delivery and the data collection of the ABD intervention.

7.5.2 A change of positionality from an outsider to an insider researcher

Living alone for 6 weeks in a care home without my family helped me to feel how it feels to be lonely. Therefore, aided my understanding of the challenges residents may face when they move to a care home and have to follow the strict care home routines. For example, I felt sympathetic to the residents living with dementia even when I was not able to sleep well due to wandering and sleepless residents walking in the corridors.

When I started living in the care home, I felt that the residents were inquisitive about my presence in their care home and wanted to know about my role in their care home. I introduced myself, explained my research to build trust and better relationships with them/ these steps are required to elicit their cooperation and support (Tabatabaei, 2016). My flexibility as a researcher was seen to foster a relationship to develop and trust. I developed a good relationship with the care home staff and management. Hence, they were more willing to engage in the research. Staff assisted frail participants and brought them to the activity place. They also helped participants to follow the instructions on cognitive games or learn computer skills. However, on occasion staff felt that with care responsibilities, supporting a research project could be a potential burden. This is important and should be considered carefully in future trials. On several occasions, staff supported in collecting data and I helped staff in fulfilling their duties such as helping in peeling vegetables, washing dishes, taking wandering residents back to their rooms, or making tea or coffee for the residents, etc. Though I started living in the care home as a guest, within a few days I developed new relationships and close emotional bonds with the residents, staff, residents and researcher. A level of trust and acceptance was developed. Working with staff, allowed them to own the research and the researcher was facilitating both staff and residents to work together to own the research. The unfamiliar environment of care home became familiar to me. This research has provided me with a greater understanding of the challenges for care home staff when managing the healthcare needs of their residents, particularly those with dementia. By the end of the intervention, the researcher's position was changed to that of an insider. I felt that I better knew the care home culture. Residents took the opportunity to talk and trust me to disclose their personal experiences. Therefore reflexivity in conducting the study was aimed to prevent objectivity during data collection or/and analysis.

7.5.3 Issues for leaving the field

The researcher's relationships with staff and residents are reported as good in this research. However, building these relationships was not straightforward and took lots of effort and sacrifices. Yet, once developed, residents started to talk to me as they felt that I was listening to them carefully. I was careful and ensured that staff and residents benefit from their participation. I trained staff to facilitate ABD activities so they can continue using them independently and encouraged them to continue using ABD activities in their care plans to engage their residents. After my six weeks' stay in the care home, I became emotionally attached to both staff and residents. It became difficult to leave the field. Before

leaving, I thought ethically about any potential emotional harm. I prepared myself and the research participants for leaving the care home. Before leaving, I gave thank you cards to all research participants including staff. I also gave participants their printed photos that I collected during the activity sessions. Residents were happy to keep their folders in their rooms as they mentioned ‘happy memories’.

7.6 Discussion

Qualitative data analysis showed that the wider impact of ABD intervention on residents and staff. The qualitative analysis allowed me to understand various elements of the ABD intervention and which element was more impactful and their relevance to quantitative findings. The qualitative findings support four major pillars of healthy ageing which are mentioned in the literature i.e., engagement in the activity, learning, social relationship and environment (Fuchs, 2013; WHO, 2020b; Wong, R., 2018). Although a wide range of factors contributes to the QoL of older people which include long term conditions, social isolation, disability as mentioned by Van Woerden et al. (2020) the improvement seen in the QoL of older people included multidimensional well-being and satisfaction of needs as highlighted by Boggatz (2020). Though, measuring the QoL as an outcome was complex, this research shows that assumptions that any disability or chronic condition do not inevitably lead to poor QoL as mentioned by Van Woerden et al.’s (2020). A sense of being valued as incorporated in the ABD intervention may have resulted in the self-reported improvement in confidence that can also be linked with QoL and healthy ageing. ABD intervention was an engaging activity that could be linked with the sense of meaning and purpose as they are important in buffering the negative effect of loneliness. QoL and well-being can only be achieved when looking at a person as a whole especially if aiming at older people, rather than just looking at their condition. This shows improved well-being even in the presence of chronic conditions or disabilities which are influencing factors for the QoL (Van Woerden et al., 2020). This can also support McFadden & Basting (2010) who found that resilience can be achieved by engaging in creative activities using social support regardless of their cognitive abilities. The ABD activity supported QoL and well-being both from quantitative data (EQ-5D-5L and SWEMWBS).

The field notes showed that the care home was located in a high socio-economic area. However, the majority of residents were deprived of their personal digital equipment which could be used for ABD activities. As inequality in life expectancy was highlighted in different socio-economic groups in the literature (The King’s fund, 2018a). In this sense, as expected oldest older people (majority over 90 years old) were found in the care home. The youngest

participant who was 72 years old was a temporary resident and only moved to the care home after repeated fall injuries. This shows that instead of age, frailty increases the likelihood to require care and care home admission as also found by Chen et al. (2018). Therefore the person-centred approach for the ABD intervention was useful. Though disabilities or physical limitations such as arthritis and hearing impairments affect independent use of technology (Kerssens et al., 2015), activities like ABD activities can strengthen existing abilities with environmental adaptations to support the success of residents in the activity.

Residents enjoyed the ABD activities which were tailored to fulfil their needs. Though virtual, on the Armchair Gallery app, participants liked activities such as making a pie and growing flowers in the garden as cooking and gardening naturally sit more accurately into people's everyday lives. During interviews, staff caring for the participants reported observations of group friendship, social interaction and communication, including reminiscence. Museum arts acted as stimuli and participants linked it to some important moment in their lives. The artwork and memories related to the galleries acted as stimuli and became a point of discussion as previously found by Mittelman and Epstein (2009).

Whilst subjective experiences were presented by most of the themes revealed in the qualitative data analysis, yet it was difficult to understand the care home or social environment using the observational tool (ArtsObS) or interviews. In this regard, ethnographic field notes helped to describe the social aspects, learning environment. My field notes confirm that there was a general feeling of achievement and a sense of community amongst the group members. During the activity sessions, most participants were focused on learning new skills. They were interacting with each other and staff effectively. For example, sharing their stories, asking questions, making eye contact with others in the group and showing their creative work to each other. However, once a participant looked less engaged, the facilitator involved her tactfully in viewing the video and offered craft activity based on her interest which made her happy. This not only supports the theme, 'staff knows residents well", but it also indicates that the facilitators should show their knowledge, skills, ability to respond sensitively at the moment. Regard and awareness for others were the few qualities observed among all residents and staff during my stay in the care home. For example, staff considering residents' preferred individual activities to address participants' personal needs; creating a friendly and warm welcoming environment and sensitivity towards the requirements of the group settings, facilitating and remaining calm, gentle communication style with others were observed during the group interactions.

The spiritual need was considered important by both staff and residents. The staff understood residents' spiritual needs as the facilitators mentioned them during their conversation and helped in planning the activities accordingly. One facilitator CR1 said,

"I know the residents; the first activity should be related to Noah's Ark as residents like religious activities and you will see how much they will enjoy."

Pairing animal activity related to Noah's Ark received positive feedback from participants as they were linked to their spiritual needs. Reflecting on it, ABD activities can be planned according to the resident's needs, including their spiritual needs as their fulfilment is linked to happiness and well-being in the QoL model (Desmet & Fokkinga, 2020). The staff played an essential role in facilitating the ABD intervention project as well as the researcher.

During interviews, staff caring for the participants reported observations of group friendship, social interaction and communication, including reminiscence. Museum arts acted as stimuli and participants linked it to some important moment in their lives. The artwork and memories related to the galleries acted as stimuli and became a point of discussion. For external validation, the research is supported by the research findings of McCormack et al. (2017) who conclude that a person-centred approach can bring a change in the care home environment. When the environment is modified to increase engagement, success in the activity is seen with enhancements in the overall QoL. However, how the QoL and well-being can perceive by one resident may be different compared to another resident with different functional and cognitive abilities. It may be because QoL and well-being can influence by the context with different issues arising in that time may be different for one person compared to another as mentioned by Lincoln et al. (2018). Thus, the complex health needs of the older people in care homes are multi-faceted and involve many different physiological, psychological, spiritual and social elements.

Despite that ageing can negatively impact mental health, well-being and QoL in the older population (Greenawalt et al., 2019), other key domains of overall QoL like living place, values, culture and spirituality can add complexity in its measurement. The observational findings from the qualitative data fill this gap and link QoL with well-being, culture and spirituality. The ABD activities were found to have positive changes in mental and social well-being and stimulate multiple senses by encouraging playful learning and empowerment. The positive change in well-being can be linked with the creative and cultural elements as previous research are also show that the cultural activities found to have the highest overall contribution to well-being in old age (Age UK, 2017a). Except on one occasion, mentioned earlier in this chapter, the participants enjoyed the ABD, particularly Armchair Gallery app activities which brought back good memories. To

externally validate, Fruhauf et al. (2020) also evaluated the impact of visiting a museum with older people and reported that older people appreciate the activities they use to do in their past and enjoy the artwork or museum they have previously visited. The qualitative findings from this research indicate that the ABD app has the potential to provide dynamic reminiscence activities. These findings are also supported by Lazar (2015) and Edmeads & Metatla (2019) who reported ABD technology having the potential to engage older people in creative activities.

Some residents were seen having relational deprivation and sitting alone as previously found by Claire et al. (2008). Some participants met for the first time with each other. The social isolation of older people was also evident from the literature review as social conditions play a crucial role among the older population and poor social interaction increases the vulnerability of older people (Di Ciaula & Portincasa, 2020). This research has shown that social isolation also happens within a care home between households that often do not interact with each other. Social isolation is both the deprivation of social connectedness and an inadequate quality and quantity of social relations as found by Zavaleta & Samuel (2014). On one hand, the number and frequency of interactions with others increase the social relations and on the other hand, the quality of social relations and the meaningful relations such as making new friends and regular interaction is mediated by cultural norms as recommended by Zavaleta & Samuel (2014). The research findings support Mittelman and Epstein (2009) who used art appreciation activities for PWCI for verbalisation and provided evidence about the power of visual arts for increasing communication. In this reference, the staff also mentioned the communication challenges they faced in the care home when dealing with people with CI.

As mentioned by NIHR (2013) meaningful activity builds meaningful relationships with residents, improved social connections were seen in ABD intervention. This can further positively impact health as they are linked with a person's well-being (Zavaleta & Samuel, 2014). The findings can also be supported by the results presented by Tan (2018a) who mentioned that arts activities brought positive well-being outcomes as arts foster space for self-discovery, growth and socialising for multi-sensory engagement and stimulation by boosting morale. Similarly, the research findings can be validated by MacPherson et al. (2010) who also found after the museum art-viewing once a week for 6 weeks group intervention resulted in gaining confidence, interaction with the artworks and social interaction.

The staff were very positive about the ABD activities and were keen to support them. The ABD intervention could not have been delivered without the staff's support and facilitation. After living in a care home, I agree with Nyström et al. (2018) who mentioned that care homes are complex. The field notes showed that care home staff face many pressures in delivering care and their activities are mostly task focussed as previously highlighted by Davies et al. (2010) and Edmeads & Metatla (2019). Due to several challenges and pressures, care home staff had to take a flexible approach based on the need of the day, it is not surprising if arts activities are not featured as a high priority. This research shows that delivering an intervention in care homes is complex and challenging (e.g., access issues, recruitment and retention etc.) as mentioned by Ellwood et al. (2018). Research in care homes requires staffs support as highlighted by Goodman et al., 2011). This research has included comments on the research suitability in a care home environment to inform care providers that the ABD activities can be seen more as an asset rather than an unrealistic duty and additional burden.

Though the observational data was validated by staff, staff interviews were not reviewed by another reviewer. As interviews were not audio-recorded, they were written in front of the interviewees. Therefore, the data were validated by showing the transcript data to the interviewees. However, the absence of another reviewer for interviews was acknowledged as a limitation of the study. The results from this analysis show some interesting information, especially given that the researcher was from an ethnic background and 100% of participants were White British. Though there was a plan to present research findings after data analysis in front of the staff and residents who participated in the research, it was not possible to access the care home and present the findings to participants due to the social isolation of the older residents during the pandemic of coronavirus. This suggests that the researcher should not wait for a separate time to involve participants and present research findings instead should avail every opportunity to involve participants after the intervention.

7.7 Summary

In short, though the findings from quantitative data have provided useful information about the impact of the ABD intervention on well-being, QoL, cognition, depression and computer proficiency, the voice of the participant and the researcher's observation was missing in the quantitative findings. Hence, this chapter provides information from field notes, findings from the observational data and interviews which are complementary to the quantitative findings and presents staff and residents' perspectives and reflections from the researcher's field notes about the social impact and acceptance of ABD interventions in care homes.

The present study suggests that older people in care homes are often considered as an at-risk group for social, cultural isolation and loneliness, yet can take the challenge of participating in the ABD weekly group intervention. The staff was keen to share their knowledge and experiences of the intervention. Interrelated and interdependent themes emerged from the qualitative part of the evaluation to provide evidence of the potential impact that the intervention helped in reducing isolation, increasing well-being, happiness, enjoyment, benefiting care home staff and strengthening community in care homes. Engagement in playful group ABD intervention improved staff's confidence and connected staff with residents. Hence, ABD intervention is a promising intervention for the growing numbers of older people in care homes lacking social and cultural connectedness. The ABD intervention offers sufficient ground for transforming arts activities into digital activities in residential care which can be included in the routinely offered activities as they received positive feedback.

CHAPTER 8 EVALUATION AND REFLECTION

During the fourth phase of this research, the focus of this research shifted towards evaluation and reflection which was necessary to take a holistic view of this research. It also informs whether the research was effective in achieving its aims and objectives. The triangulation of the outcomes mentioned in this chapter validates and helps to understand the potential impacts on participants. This research not only recognises and reports challenges but also presents strategies to overcome these challenges. Therefore, learning points are presented to help the delivery of future larger trials. The chapter ends with a conclusion of the discussion.

8.1 A realistic formative evaluation of the feasibility of the ABD intervention

Accountability and transparency are key elements in any research report (Carlsen & Glenton, 2011). Without evaluation, it would be difficult to determine that the ABD intervention has achieved its aims and objective and mentioned what needs to be improved in a future larger trial. Evaluation of complex health interventions increases reliability (Walton et al., 2020). Hence, to increase reliability, the evaluation of the ABD intervention can determine whether the intervention has been worthwhile in terms of delivering what was intended and expected from it. The method used for evaluation was strongly influenced by the notions of evidence-based research because it is important in health research (NICE, 2012). Moreover, the process and quality of the intervention are just as important as the outcomes it achieves (Moniz-Cook et al., 2011). Therefore, for evaluating, both process and findings were validated internally by triangulation and externally by published research. The formative evaluation included a systematic evaluation to gain an understanding of what worked and what did not work to provide a complete picture. Recognising the complexity of ABD intervention, a less linear integrated evaluation of both process and outcomes for future trials was used as recommended for evaluating a complex intervention (Craig et al., 2008). To strategically approach evaluation, it started from the first stage of the research as a good evaluation starts from the beginning and includes planning and reporting (Daykin et al., 2013; Wilkinson, 2019). For a complete picture, the discussion starts with project planning, followed by methodology, delivery, reporting of the impact of ABD intervention and lessons learned from this research.

8.2 Project planning

Sometimes even well-designed trials do not work despite the evidence for the intervention being robust and the competence of researchers due to the problem with the process (NIHR, 2015b). Time given for planning and field visits have important roles to understand

the challenge and steps required to overcome identified challenges of researching in care homes. It has already been discussed how the focus group study helped to assess staff and residents' needs (Section 4.8). It was also clear that the stakeholders' involvement and their advice were vital in designing and tailoring the ABD intervention to suit the research population. In preparation to conduct an effective trial, staff's and researcher's training played an important role in overcoming research challenges.

Using the need-based approach, the evaluation for ABD intervention started from the initial planning phase which carried the feasibility trial. The evaluation research took an iterative approach as it helps to improve the research process (Wilkinson, 2019). It enabled me to continuously improve the project at each stage using the 'Needs-based Healthy Ageing' theoretical framework. The evaluation at the planning stage involved consultation for the concept, testing apps to check their appropriateness for the care home residents based on their needs even before planning a protocol. The evaluation of planning involved rationale, theoretical framework, ethics, design and methods and measurement tools.

8.2.1 Evaluating the rationale

As a relatively new area of research, a realistic approach was undertaken. Due to the complex nature of ABD research, pre-determined exclusion and inclusion criteria were applied across multiple electronic databases. A manual search of grey literature was combined with expert consultation (Chapter 3). The review involved several formal searches with an analysis of the results. It provided comprehensive information about meaningful ABD activities. The literature review provided insights from health, arts, technology and social care literature and revealed several benefits of arts, culture and digital activities for older people to promote healthy ageing. Despite that the review showed that ABD activities have potential positive outcomes among older people, limited information was available on ABD interventions in the UK. Hence, the knowledge gap had provided the rationale of ABD intervention, yet the questions arise whether there was a need for ABD intervention or whether further full-scale research would be required.

The literature highlighted the need for new innovative research to improve QoL and cognition for healthy ageing and dementia prevention intervention in care homes (Cagney, & Cornwell, 2018; NIHR, 2020; Pekkala, et al., 2017). Literature also showed that little or no ABD activities were being undertaken in care homes and there were also limited opportunities for social interaction and self-expression which are threats to selfhood (Newman et al., 2019). In this sense, this research fulfils the criteria due to its target

pupation being people in care homes and it provided creative opportunities for self-expression and cognition stimulation.

Indeed, technology is increasingly becoming accessible and functional (Caprani et al., 2012). However, it is important to use the right technologies at the right times in care homes (Pitts et al., 2015). In the exploration of the health impact of the ABD intervention in care homes particularly when taking an interdisciplinary collaborative research approach, there were limitations such as when and how to consult or when to deliver the intervention. Thus, limiting the scope of intervention in determining allocation and recruitment. However, the consultation process and focus groups indicated the most feasible time for ABD intervention to meet the needs of care home staff and their residents, The current situation of social isolation further stresses the need for more convenient and more effective innovative interventions in care homes to empower older people and improve their health and quality of care (WHO, 2020a) and indicates the importance of the ABD intervention. Moving into the future, the growing population of older people with age-related physical, cognitive and social challenges will need support hence moving to a care home causing a burden on the health and care system. Considering the global crisis of ageism, more ABD interventions should be developed based on the target population's needs and should be adapted in contexts to the national and cultural differences for improving the health and well-being of older people in care homes that in turn lead to substantial healthy ageing. Most participants were found to have CI, which was undiagnosed. As CI can be a precursor to severe CI or eventually dementia (Olivari et al., 2020), preventive intervention becomes even more important in preventing cognitive decline and dementia This indicates that there was a need for this innovative research to promote cognition and healthy ageing in care homes. In this sense, this research fulfils its goal to meet a clear unmet need of older people and new ABD activities. ABD intervention gained popularity among both residents and staff as it was found to be fulfilling the needs of innovative activities.

An array of health is associated with loneliness and social isolation, including general health, depression, QoL and cognitive function (Gardiner et al., 2018). The 'Coronavirus' (COVID-19) and forced social isolation during the pandemic not only provided evidence that older people in care homes are particularly vulnerable, but it further increased their vulnerability (Comas-Herrera et al., 2020; WHO, 2020a). Therefore, due consideration is required for their unique needs (Comas-Herrera, 2020). This also shows that ABD intervention remained important for further trials of ABD interventions for older people.

8.3 Evaluation of the methodology

This discussion starts with the evaluation of the theoretical framework and ethical considerations following by the design and methods and measurement tools.

8.3.1 Evaluation of Need-based Healthy Ageing theoretical framework

Indeed, a conceptual and theoretical framework forms an important part of research and provides life to research (Adom et al., 2018; Wong, R., 2018). However, before establishing a theoretical model for this research, a detailed literature review was undertaken to analyse ABD intervention models. In the absence of consensus on a single theory that can encompass the ABD intervention, exploring relevant theories became an important objective. Before constructing a tentative framework for this research to answer the research questions, I explored and outlined the most relevant theoretical propositions, which arose from the literature review (Chapter 2 and 3). This has fulfilled the objective of exploring relevant theories. Additionally, it provides a better understanding and will help other researchers to make a base of future ABD interventions. The discussion in this section is framed by considering to what extent the intended combined model has been accepted by the ABD intervention process and findings and what should be considered in future trials.

As outlined in Chapter 5, the conceptual and theoretical framework of NBHAM was initially tentatively used by combining the essential Human Needs model and the 'Healthy Ageing model. However, as research progressed, as an iterative process, the concept was evolved during the study and the NBHAM guided each aspect of this thesis. NBHAM was used as an innovative approach for developing the ABD intervention, to achieve the required outcomes and to interpret the impact of the ABD intervention as a lens to evaluate the intervention. However, complex interventions are not merely a sum of their parts, therefore, it should be better theorised to reflect this (Brand et al., 2019). The theoretical approach was carried out at every stage of the ABD intervention and played a critical role in the development, from planning to feasibility trial and from assessing residents and staff's satisfaction, acceptability and usability. Insights from evaluating NBHAM can help researchers in the process of producing, evaluating and recommending ABD interventions for older people in care homes.

The healthy ageing in the NBHM has recognised the diversity in ageing which is often neglected in ageing research focused on successful ageing. It took an account of diversity in ageing and circumstances. As there is no typical older person, older people can have various levels of physical and mental capacity that can be the cumulative impact of

advantages and disadvantages across people's lives (WHO, 2020e). Environments, sex, ethnicity, and level of education are some of the elements that can impact older peoples' lives. Therefore, successful ageing does not acknowledge environmental determinants of health, social relations and health inequalities (Katz & Calasanti, 2015). On the other side, Healthy ageing, relatively, is a more inclusive concept that more accurately describes individuals as the population ages (Wong, R., 2018). Healthy ageing in the NBHAM considers both opportunities and social inequality in accessing cultural and digital activities based on human needs. However, one can argue that there is tension within this thesis between the two different concepts of ageing. First, the 'positive' concept of ageing, in which older people decide their own lifestyle as mentioned in successful ageing (Rowe & Kahn, 2015). Second, the health decline model of ageing, in which the decline in physical and cognitive functional health can be a normal ageing process (WHO, 2020b) as discussed in Chapter 1. However, both concepts are overlapping as both are focused on the possibilities of promoting health in older people (Wong, R., 2018). The aim was to present a broader picture of ageing for promoting health among older people in care homes.

Creativity is an important component of healthy ageing (O'Neill, 2019). This research was also focused on creativity and included culture as an important dimension. The playful digital activities were experienced as positive and engaging as digital playfulness encourages creativity, exploration and stimulates social interaction that helps to age well (Tsekleves & Darby, 2020). In this way, it reflects the notion of healthy ageing. This research acknowledges the narrative of decline and burdens and highlights the positive aspect of ageing by providing an enriching environment and meaningful ABD activities. Therefore, it has neither neglected decline in health in older people nor does it deny individuals' ability to learn new skills to improve cognitive and physical health which is a critique on successful ageing (Katz & Calasanti, 2015; Calasanti, 2016). This research supports a model of long-term care to promote healthy ageing in care homes by focusing on a safe care home environment comfortably and independently regardless of their ability levels.

Needs assessment is important in research (NHS, 2018b). Moreover, as the care home population was unique in their needs, the assessment of each person became fundamental for the ABD intervention delivery. In this way, the NBHAM helped to tailor ABD activities based on the needs of each participant. Considering each person's needs and their cognitive differences when planning sessions and delivering the process, the NBHAM supported those. Inclusion was promoted through the differentiation of approaches from resident to resident in the NBHAM framework. The ABD activities included cognitively

stimulating activities, increasing cognitive abilities and mental well-being. With better memory appraisal and well-being, ABD activities increased QoL because an improvement in cognition is linked to an increase in self-efficacy and QoL (Boller & Belleville, 2018). The results can be validated by Vidovich et al. (2015) who also concluded that cognitively stimulating activities increased cognition in cognitively impaired people and had a positive impact on subjective measures of memory and well-being. Participants learned new digital skills playfully. Therefore, this research supports Tsekleves & Darby (2020), that playfulness and sensory experiences can be used for healthy ageing as play is a driver in human cultural development. However, healthy ageing greatly varies according to the values and cultural contexts of a person, society or nation (Wong, R., 2018). Therefore, the conceptual framework of NBHAM took a person-centred approach to promote creativity, self-esteem, social connections, confidence, environment and culture in older people in care homes. The model considered the creative needs of older people as they were motivated in this research. This supports Maslow (1987) that creative people may be relatively motivated. Taking Power's (2015) vision, security in the NBHAM referred to both physical safety and emotional security that arises from respect, trust and a sense of belonging. This also includes mental health app security as the mental health apps' security could be a major issue (Luxton et al., 2011).

Using the extended human needs model (Maslow, 1987) and a person-centred approach, essential needs were kept flexile. As Maslow noted (1987) for some people, the self-esteem need can be more important than the love need. Similarly, in this research, the need for creativity sometimes superseded even the most basic needs. In this sense, the human needs model supports all human needs including safety, cultural, creativity, and spiritual needs to improve the quality of life of older people. As self-transcendence is also an essential human need (Maslow, 1970; Koltko-Rivera, 2006; Sosteric & Raktovic, 2020), the model supported the spiritual elements in ABD activities. Thus, covered both internal/personal and external/environmental needs and allowed an easier transferability across cultures. Self-transcendence linked participants with other residents and staff as well as their culture and technologies. Critically, there may be a conflict between the natural and artificial world in the ABD intervention. However, the NBHAM theory has provided opportunities for technological path and the self-transcendence element in the theoretical framework helped to overcome the physical limitations in which human biology combines with computers and spiritual needs were fulfilled.

Evaluating different domains of ABD interventions, the theoretical framework of NBHAM supports creativity and problem-solving was based on the individual's needs. It focused on empowering older people and gave them the freedom to express and choose their activity while the focus remained on promoting healthy ageing. ABD activity sessions provided the opportunity to enjoy, create, learn and communicate with other residents and staff. Considering the outcomes using the lens of NBHAM, the activity brought a greater sense of well-being, a state of immense concentration, enjoyment and satisfaction that was experienced when residents were engaged as they found it an intrinsically rewarding activity. This study indicates that facilitating access to arts and museums for older people in care homes through digital technology can contribute to fulfilling their need in participating in creative, cultural and ABD activities. Utilising the NBHAM framework, ABD intervention was found to have the potential to improve both the QoL with the quality of care as the essential needs of older people in care homes.

Following the NBHAM theoretical framework, although the activities were structured, they were kept flexible to address individual needs. The activities were adapted to the motivations, needs and dynamics of each resident in the group. They supported the group participants to increase their confidence and helped them to learn new things, improving their self-esteem and sense of achievement which were essential human needs in NBHAM. With mental well-being and QoL outcomes, enjoyment, a sense of achievement and increased confidence were achieved among several other secondary outcomes that are not widely reported in health research. The theoretical framework of NBHAM under the strategic needs-based personalised approach, encompassed physical, mental, cognitive, emotional, social and spiritual health and well-being while the environment facilitated it. Hence, found fulfilling residents' needs. This included interpersonal relations (e.g., friendship) and emotional attachments (e.g., love and care for others and the sense of belonging), actualisation (e.g., cognitive and functional capabilities) and the care home provided a safe and secure environment to facilitate ABD activities. The NBHAM supports the group approach by recognising that residents do not exist and operate in isolation. Thus, the satisfaction of a resident's needs creativity, learning and, achievement occur within the social context, acknowledging the importance of interaction and relationships with others. By satisfying residents' needs, ABD activities brought a positive change in the mental well-being and quality of life of older people in care homes which are basic human needs. Hence, the NBHAM was found to be suitable for the group ABD activities which were focused on creativity, culture, participants' memories and present happiness. As cognitive needs and transcendence are essential human needs (Sosteric & Raktovic, 2020), the NBHAM

framework allowed facilitators/carers to look at the existence of critical cognitive needs and helped to avoid any ethical discomfort.

The NBHAM has provided a theoretical base that recognises essential needs of older people in care homes particularly related to self-actualisation, creativity, cognitive and learning new skills such as using digital technology to promote healthy ageing. The theoretical framework helped in retaining focus on the participants' basic needs such as safety and creativity as well as on their vulnerability during activities upon issues relevant to sad memories and data collection (discussed in Chapters 7). Technology should be appropriate to support its' safe and secure use (Goorha, 2017) which are also basic human needs (Maslow, 1987). Considering the importance of safety and security of the technology and app used for ABD activities (Armchair Gallery app and iPads) they were found safe to be used by older people. Moreover, the ABD activities also helped to fulfil other human needs such as creativity, learning, cognition and transcendence etc. The NBHAM gives freedom and confidence to residents to make choices to use activity and to learn new skills and using healthy ageing model, functional, mental, social and spiritual health and well-being are recognised. As interventions should aim to develop and maintain the functional ability to promote health and well-being in old age (Sadana & Michel, 2019; WHO, 2020b), the multisensory and functional activities in ABD intervention are found to be particularly stimulating and bring positive change in well-being. It allowed building a deeper understanding of the needs of older people in care homes and their views about the intervention. This shows that it has the potential to lay a solid foundation for ABD interventions. To summarise, the NBHAM theory boosted the rigour and empiricism of research.

Considering the limitation of NBHAM, this research revealed that it might not always be possible to incorporate a person-centred approach in the NBHAM. This is because, within the hierarchy of needs, physiological and safety needs are met before moving onto higher-level needs. As Louca et al. (2021) highlighted, humans are complex and their needs do not fit in a linear framework. Therefore, the needs of each person, group and culture can be different. As cultural and spiritual needs appeared to be very important for the participants, one can argue that the 'self-actualisation comes before other personal needs. This refers to the original Blackfoot Nation theory (Blackstock, 2011; Brown, 2014) in which actualisation was the foundation for individual and community health. It may seem appropriate given the care home population of the current research in which participants were connected with others and helped each other during the ABD session. In this respect,

community actualisation, self-actualisation and transcendence needs were fulfilled. However, the human needs model and person-centred approach taken for this research may look to better fit with the Western individualistic society rather than the Eastern collectivistic society. Considering the White upper-class participants in this research, the research may lack diversity. Moreover, due to the wide diversity in the care system and population in the UK and other parts of the world (Chapter 1, section 1.4) may impact the transferability of NBHAM to other populations or cultures. Similarly, due to the methodological challenges, i.e., a small sample size of the white upper class, the generalisability of this model may not be possible. Hence, NBHAM needs to be interpreted cautiously due to the methodological limitations for being tested in single care home setting with a small group. This may increase the potential for confounding bias. Hence, further research with proper cross-cultural evaluation of NBHAM using large groups in multiple care homes would be useful to establish its effectiveness and to enhance its transferability across different contexts and other cultural groups.

Even though the research was conducted in a challenging care home environment, combining the needs-based model with the healthy ageing model helped to understand the needs of residents and staff, while the focus remained to promote healthy ageing (Chapter 4, Figure 10). In this sense, it agrees with Power (2015) who suggested that Maslow's model has the potential to be combined well with other theories. In particular, considering the cultural implications of the expanded human needs' i.e. Cognition and transcendence in Maslow's model have provided complementary insights into the socio-cultural context of the ABD intervention. However, healthy ageing greatly varies according to the values and cultural contexts of a person, society, or nation (Wong, R., 2018). Based on a positive change that was seen in all four domains of healthy ageing (physical or functional, emotional, cognitive, mental and social health) after the ABD intervention. Hence, the theoretical framework has the potential to fulfil the main characteristic of promoting healthy ageing. This also provides evidence that the concept of NBHAM was a practical idea for ABD interventions as tested in this research may be useful for future research. This research has shown that theories can be combined and used as they appeared to be influential in the success of this research. However, future implementation research can also test the combination of other theories such as 'Diffusion Technology' or 'Unified Theory of Acceptance' theories with Maslow's model as they are among the most popular theories in implementation studies (Chapter 2, Table 5).

8.3.2 Ethical considerations

This research followed principles of procedural ethics (seeking approval from the ethics committee) and practical ethics (issues that arose in this research). Achieving ethical approval was a challenge for using new digital software as negative impacts of the well-being apps and the arts were not found in the literature review. However, it is not uncommon and other researchers also mentioned that negative impacts in research are not commonly mentioned (Jensen, 2014; Reed, 2019). The process of obtaining consent was tiring and time-consuming as consent taking is not only an administrative requirement but also an ethical and moral responsibility. Similarly, as interdisciplinary research, gaining organisational approval became a challenge due to the lack of experts to understand the complex project. Although it can vary from one faculty or one organisation to another, ethical approval was time-consuming, especially if the population for research includes people with cognitive impairment. However, the researcher was prepared to answer complex ethical and legal questions that may be raised by the gatekeepers or ethics committees in future studies. As advised by Guillemin & Gillam (2004), this involves using simple language, free of jargon, a language that the committee can understand.

According to some researchers, arts-based interventions can only be delivered by art therapists (Alders et al., 2011; Magniant, 2004). However, arts do not solely belong to art therapists (Kalmanowitz & Potash, 2010). Despite that, knowledge of art structure, materials, application and interpretation is useful. Hence, I received training from an art therapist to deliver ABD intervention and trained facilitators before commencing the trial. Claims have been made that the arts do not carry side effects or contraindications (Taylor, 2017). The sessions followed the principle of 'first do no harm' (Jensen (2014) because sad memories can negatively affect old people (discussed in Chapter 7). However, it was difficult to predict the impact of ABD apps on residents or staff as there was no previous similar intervention in the care home.

This research received ethical approval to include people with cognitive impairment in line with the Mental Capacity Act Code of Practice (2005) that describes that a person must be assumed to have capacity unless it is established otherwise. However, the participants were assessed for their capacity by the care home staff as this act is part of day-to-day practice in care homes (Manthorpe & Samsi, 2016). Informed consent was taken following the ethical guidelines. However, the participants with a diagnosis of dementia were excluded due to time limitations and challenges of establishing the ability to give consent. Despite not including the people with the diagnosis of dementia, many participants were

found cognitively impaired when tested on the MoCA test. However, they all were established as being able to give consent themselves and not identified as cognitively impaired by their record as checked by the care home staff.

Despite receiving permission from the ethics committee and gaining informed consent from participants for audio and video recording, no full session was video recorded due to the uncertainties and last-minute changes in the plans by the staff which was not only inconvenient for the researcher, but also for the participants who wanted to attend the session. Challenges of care home research were also highlighted by Bourbonnais et al. (2020). However, improvements in communication, better plans to overcome the challenges of working in a busy care home environment can be helpful to overcome these challenges. Similarly, preparations like getting ready to answer complex ethical legal questions which may be raised by the care homes or ethics committee and agreeing on a suitable place with care home staff during the consultation phase can increase the possibility to use different methods of obtaining data (like 360 video recording, etc.).

The traditional style of obtaining consent appears to be un-realist because it does not appear to fully respect the care home settings. Although well-intended, this approach appeared to contain some assumptions about the perceived importance of research in the lives of care home residents and staff. For example, I emailed flyers, information sheets and consent forms to the care home managers to distribute to their staff and residents, except for the extra care home, neither the flyers were displayed on the notice board nor the information sheets were distributed. This might be either due to their busy schedule and time limitation or their inability to understand the value of flyers and information sheets for research. I was imbued with the false assumption that staff would be able to stop what they are doing and devote their full attention to my research. Though they help in the consent process at the outset of the study, they gave only a limited time to the potential participants to decide.

Similarly, there was limited recognition and understanding of the ethical challenges for using ABD technologies such as requiring mental and/or physical efforts to learn how to use technology and facing any difficulty to manipulate iPads such as turning it on, the impact on eyes (dryness) for using the shiny surfaces of iPads for a long time or any physical discomfort caused by holding mobile devices as the inclination of the screen can be uncomfortable. Difficulty in reading small print instructions can also be an ethical challenge as indicated by Barnard et al. (2013). To be more ethnically inclusive regarding the

involvement of staff who may not be deemed willing to participate but forced by the management. Other ethical challenges that arose from the use of the ABD intervention included time commitment from staff and residents, the burden of filling several questionnaires both before and after the intervention. Concerns about the security of data, such as sharing personal stories or the negative health impact, which were not reported by any residents or staff could be health risks related to technology.

I am satisfied that I acted ethically throughout my study and protected the participants. Despite that I was a learner researcher, I was able to handle challenging situations using my previous experience of working in care homes. Alders et al. (2011) mentioned that digital arts present opportunities as well as an ethical dilemma. In the consent form, consent about artwork was not separately mentioned. Hence, during the recruitment and ongoing involvement of staff and participants, the process model of consent was followed which was recommended to protect people with cognitive impairment and dementia (Dewing, 2007). Despite knowing that participants had no dementia, I took regular consent and felt confident and followed the rules to protect participants with even MCI. However, I came across some unanticipated ethical challenges. Such as lack of access to the care homes, potential participants' concerns related to the paperwork. Some refused to sign the form upon receiving the consent form saying that they wanted to think but did not take the information sheet with them. This reflects that though the consent process fulfilled its role, the length of the information sheet and signing a document may have prevented the potential participants from taking part in this research. Information sheets (Appendix L), which included sections of possible side effects that might be exaggerated or commitment information might be presented in a way that did not attract the residents. Thus, the consent process seemed stressful for frail older people to dissuade from taking part in the research to which they had initially been happy to contribute. This also shows that the consent taking process might have not offered the necessary flexibility in this research.

Regarding ethical considerations using innovative technologies, acceptance or rejection, could likely come from a lack of awareness or objection about the intended use of technology or priorities of residents and staff. Similarly, challenges to deliver the intervention, report writing, managing research partners and changing the protocol on their requirements and the emotional aspects of researching care homes should also be considered when planning a future intervention in care homes. Considering confidentiality, some conversations seemed related to residents' personal experience of living in the care home, which may not previously have been openly discussed with the staff. This also shows

that the researcher develop a new relationship with the residents and participants trusted the researcher to share their confidential information. However, it created an ethical dilemma. Following the ethics in practice (Guillemin & Gillam (2004), I avoided reporting any confidential information. Arguably, this new relationship might influence participants' feedback or responses that were received by the researcher at the end of the intervention. This also points towards the practical ethical challenges of researching in care homes.

8.3.3 Evaluating the design and methods

According to the NIHR (2018c) recommendation, research should be done in a real-life. This research used a realistic approach and started with a realistic review of ABD apps. An intensive systematic search involved an online exploration but also experts' consultation and attendance in several arts and technology-based health conferences. Details of research philosophy, design, methods, theoretical framework development are presented in chapters 4 and 5. Although much has already been mentioned in previous chapters, evaluation of the design and methods was still needed because the evaluation of research design is important (Craig et al., 2008 & 2013).

A mixed methods approach was justified according to the recommendation given for arts-based health research (Fancourt & Poon, 2016). For quantitative research, the sample size may be too small to analyse or test efficacy. However, considering recruitment difficulties in care homes that were faced by other researchers like Ellwood et al. (2018), the sample size was practical as used by Tyack et al. (2015). This may also be acceptable as it was a pilot project and focused on testing feasibility. This also provides the rationale for using mixed methods rather than using a single data collection method for this research.

Often in interdisciplinary health research, researchers take positions and views, reflective of a quantitative ethos (Vasileiou et al., 2018). However, evaluation of design showed that the qualitative data was not merely complementary to the quantitative data but itself was required to explore the social and environmental factors. The qualitative element in this mixed methods research also included integration of ethnographic perspective to provide possible explanations for the results by investigating intermediary factors, such as care home staff culture and the social and spiritual aspects which could not be captured by quantitative data alone. After the living in a care home experience, I concluded that taking field notes and writing down experiences of researching in a care home is both embodied and reflexive and holds several advantages (discussed in section 7.5). It can give an insight into the life of older people in care homes, contextualise the ABD intervention and enhance

the quality of research. However, using the field notes for ethnographic reporting alone could increase the potential of bias reporting as ethnographic studies are mainly determined by personal experiences and the researcher's positionality and views (Karwan, 2016).

The combination of qualitative and quantitative data led to conclusions that findings may not be as rich or exploratory if relying on one method alone. While outcome measuring questionnaires look dominated by quantitative research, this mixed methods study has used observations, interviews and field notes to produce reliable results in addition to providing a holistic perspective of the complexities of real-life care home environment. Therefore, qualitative data have more than a supporting role in research. Hence, the adopted model relied on the principle of complementing each other by using the strengths of one method to enhance the other. Moreover, the qualitative approach was mixed both subjectively and objectively. This approach helped to understand the importance of an ABD intervention and the value of evidence that was aimed to gather. This research showed that an appropriate design is important. Communication with staff was an important factor for developing an ABD intervention which enhanced the use of theory and evidence-based approaches.

Despite the methods employed in this research being complex and multi-domain, the quantitative method was supplemented with the qualitative method as mixed methods can address the complexity of health interventions (O'Sullivan, 2019). Combining qualitative findings with the qualitative findings and conducting a mixed study not only helped in fulfilling the gap in obtaining quantitative information but also to validate quantitative data by comparing and contrasting both data. Using mixed methods helped in generating a more complete picture of the potential impact of ABD activities on older people and allowed me to gain a more comprehensive perspective of the complex ABD interventions in care homes. The knowledge being sought was both subjective and objective which reflected my ontological positioning. Missing social, emotional and environmental information was sought from the qualitative part. This complements Creswell's (2017) statement that a mixed methods design strengthens and complements the weaknesses of each approach. This indicates that the mixed methods approach was appropriate and feasible allowing to utilise strengths of both qualitative and quantitative methods. However, a major threat to the validity of mixed methods is the insufficient convergence of data and/or failure to identify all findings (Creswell, 2017). Therefore, findings from the quantitative and qualitative components were discussed separately in chapters 6 and 7 and convergent at the end for revealing any divergent findings and developing additional explanatory understandings

(Chapter 8). To conclude, the mixed methods were evaluated for their effectiveness in this research and found to produce better outcomes than single method research as both the context and the population were challenging in a care home setting. The components and methods were interconnecting and interactive as summarised in Table 33

Table 33 Summary of studies, methods and conclusions used in this thesis

Summary of the studies used in this thesis		
Literature review/ Systematic		
Aim	Method	Conclusion
To explore existing evidence about the health and social impact of the ABD on older people in care homes	**Mixed method**: A systematic literature review of the ABD interventions for older people using database used in Arts, health and technology.	- No consensus on a single theoretical framework for ABD activities. - ABD activities can be used for reminiscence and cognitive games activities. - The activities have the potential to improve quality of life well-being, social connections mood, of older people & people with cognitive impairment.
Consultation and focus groups study		
Aim	Method	Conclusions
To identify the most suitable location and the arts-based app and developing and refining a protocol for the ABD intervention.	**Qualitative method** Consultation, interviews, field observations, focus groups	- Though initially, both research partners (care homes) were interested in participating in this research, only one was ready. - Among the two selecting apps (freely downloadable Armchair Gallery app and the web-based subscription-only ArtOnTheBrain app) Armchair Gallery app was more suitable for the selected care home setting.
A feasibility study of ABD intervention		
Aim	Method	Conclusions
To explore the feasibility of the ABD intervention in care home settings and it's social and health impacts on older people living in care home settings.	Mixed methods **Quantitative method**: well-being, quality of life. cognition, depression, computer proficiency, mood, usability and acceptability of the ABD app **Qualitative method**: Social connections, engagement and acceptability of art-based digital app	- The ABD intervention has the potential to bring positive change in the well-being, quality of life. As a secondary outcome, it has the potential to improve computer proficiency, cognition, depression and mood. - ABD activity not only socially connected older people but also brought happiness and sense of achievement among participants. - The activity was enjoyed and socially accepted both by the care home staff and their residents.

The robustness of the mixed methods design is that the same participants were used to consistently ask questions in further detail. Additionally, the voice of staff and their perspective about the ABD intervention was added for objectivity. However, complete objectivity and pure subjectivity were impossible which may undermine the credibility of my efforts in reflecting a balance between understanding and describing the participants'

authentically. Despite all the complexities, I consciously try for being self-analytical and being aware and reflexive in this complex research process. However, the robustness of this design can be improved by adding another observer who can critically analyse the findings to reflect and validate the balance between subjectivity and objectivity. The exploration of using combined methods revealed that arts using digital technology can also be a feasible idea that can potentially play a role in bringing health benefits to frail older people who are unable to participate in arts and cultural activities that are available to other people.

8.3.4 Evaluation of the measurement tools

A process evaluation identifies related factors associated with outcomes to develop adaptable complex interventions (Brand et al., 2019; Moore et al. 2015; Oakley et al., 2006). Not merely the process, the quality of the intervention and outcomes are equally important in research (Moniz-Cook et al., 2011). Therefore, Chapters 4 and 5 have presented a detail of outcome measurement which not only increases the credibility but also make this research replicable. Transparent information about the quantitative and qualitative data collection methods (Chapters 5) and data analysis (Chapters 6 & 7) have been presented. Being a feasibility study, it can be argued that the data was overly tested and analysed using p-values to check significance with such a small sample size. However, neither it was aimed to generalise the findings nor significant results were presented to claim impact. Instead, the outcome data analysis and significance tests were used to get potential efficacy signals. Moreover, using outcome tools provided useful information to develop a framework for larger trials.

Throughout this thesis, the associated contextual factors of ABD intervention were mentioned. However, it does not substitute the evaluation of outcomes. Being a small-scale feasibility/pilot study, it was not focused on outcome evaluation. Yet, finding appropriate well-defined measures as outcomes tools were important parts of this feasibility study. This was because evaluating the outcome measures can inform future definite trials as the outcome indicator reflects the aims and objectives of the intervention (Public health England, 2016). Feasibility studies usually avoid testing the effectiveness of an intervention (Eldridge et al., 2016b). In this research, efficacy was tested and statistical tests were also done to help researchers to make safe assumptions before recommending the ABD intervention for a larger trial. The usefulness of testing was reported in the literature (West & Michie, 2016). A wide range of questionnaires included both subjective and objective and was found useful to gather rich data. However, in terms of measures for ABD intervention

in literature, there has been little information to date for standardised, reliable, and validated tools as revealed in the realistic review (Chapter 3). The rationale for the outcome measures selection was mostly evidence-based i.e., established use in the literature among older people demonstrating internal validity and test-retest reliability. Also, on criteria, the most used questions in arts and/or digital interventions and found appropriate questions with little modification. Hence, mostly based on previous research demonstrating usefulness in older people and/or people with cognitive impairment. Using the selected evidence-based tool helped in testing against the baseline after the ABD intervention and to check the feasibility and appropriateness of the intervention. Most tools used in this research were found useful as this study mostly used evidence-based outcome measures. The information gathered from qualitative, subjective and interpretive data supplement quantitative results and provide practical information. Challenges in using these would be more important for future trials because feasibility studies also point to any potential problems (Tickle-Degnen, 2013). As the focus of this study was on QoL EQ-5D-5L was found appropriate for collecting data about the quality of life of older people living in care homes. However, EQ-5D-5L did not include social well-being. Aspde et al. (2015) also criticised this tool for not including well-being in their systematic review.

While interviews were carried out, it required an open and flexible approach, the respondent took control of the interaction as they took this an opportunity to share their views. This resulted in several interviews being not recorded properly, yet they helped in revealing fascinating insights into the impact of the ABD intervention. It enabled participants to discuss things that were important to them. Hence, I learned that researchers should put aside any pre-assumptions and should be open to new ways of thinking to get feedback. However, it can involve the risk of not being able to get the answer or address the aims and objectives that a researcher set for a traditional style of interview.

The adapted version of ArtsObS was found appropriate as the observations were recorded to minimise interference with the activity and for some sensitive situations without interrupting the participants as recommended by Fancourt & Poon (2015). However, participants being observed carries their own risk if the participants feel like they are the contributor to or/and a recipient of an innovative ABD experience as mentioned for other arts-based activities by Brotherhood et al. (2017). This could impact the responses. Hence, the response could considerably differ. Fundamentally, it can alter the situation, particularly if the same observer (in this case researcher) interviews the observed participants. Thus, it

not only carries the risk of introducing observers' bias but also elements related to participants for being observed and evaluated.

Computer literacy or digital skills outcome measure (Computer Proficiency Test) brought useful information about learning new skills to fulfil their learning needs. Thus a useful tool for measuring residents' computer proficiency. However, the current research shows that learning is an overlapping concept because art itself is a powerful way of learning. Likewise, cognitive games could be a method of playful learning in addition to digital technology which is also another way of learning. Regarding usability, the questionnaire was a useful tool in gauging participants' more general feelings towards technologies. The tool can be adapted according to the technology used in the future rather than using its original form to capture more relevant data. The interview questions appeared to support the quantitative data by revealing the participants' preferences for the app and activity. It may have been useful to use the same questions in quantitative methods to validate and establish the level of robustness.

Humphrey et al. (2017) after their arts-based intervention concluded that the successful engagement with these activities is credited to well-planned and supportive activities in which communication happens in a friendly environment. Hence, utilising iPads and the Armchair Gallery app participants could view arts (visual arts) from different museums and sculpture parks. They were encouraged to discuss their past events in a friendly environment. The level of cognition is relevant to the ability to do things (Giebel et al., 2015). Despite that the functional or/and cognitive impairment affects a person's ability to engage, the results indicate that the ABD intervention was successful in engaging residents in these activities as they were well planned and supported by staff**.** Although a sustained engagement is not a requirement for each intervention, the difference between 'effective' or 'sufficient' engagement can be established. Hence, a proper tool to measure engagement can be included in future trials. Overall, the ABD intervention was well-planned and utilised a suitable research method. In the future, researchers can consider using other apps according to the cognition level of the participants and can set the difficulty level for each participant to make it suitable for them.

The ABD intervention was successful in providing opportunities and space for older people in care homes to become more creative, active and healthy. However, the impact like aesthetic outcomes was not included in the questionnaires despite that the qualitative data showed that the activity was important in terms of allowing the resident a way to express

themselves meaningfully. Hence, in future trials, other artistic (e.g., creative) and health outcomes (e.g., the impact on ADL and medicine or hospital admission etc.) can be included. Most of the selected measurement tools and questionnaires were reliable and evidence-based and used successfully. However, observational questionnaires required adaptation to make them suitable. The tools captured what they were supposed to understand the impact of the ABD intervention on health and measured the changes after the ABD intervention, except the adapted version of the GCCWOT. Although GCCWOT could have added valuable information, this research could not make full use of the tool due to the limited time and resources to record video in the busy care home environment. However, the adapted GCCWOT (Appendix U) found it useful to collect useful information about overall well-being and ill-being and can be evaluated in future trials. Indeed, adaptation and the process of using it has provided useful information both about the suitability of adapted GCCWOT and the challenges of video recording in real-life settings. This will help other researchers when planning to use video recording to capture and analyse data in a busy care home setting. To share my experience, getting photo evidence at regular intervals in a care home setting could only be possible if the observer has no other responsibility (such as facilitating the session) except recording and not. To ensure that all participants receive the help they required during the ABD intervention sessions, a minimum of two staff members (one facilitator and a carer) might be required in group settings. However, this will be dependent on group size and cognitive or functional capabilities.

Despite a rising need for a cognitive test for screening and evaluating change, a cognitive test was commonly missing in arts-based interventions. Considering the importance of assessing cognitive capability and evaluating any change in cognition among participants, the MoCA test provided useful information about cognition. It also helped in comparing the change after the ABD intervention. However, due to the time limitation, despite performing an individual cognitive test, the intra-personal comparison was not made in this research which could have provided additional information. Therefore, if time permits, further analysis would be useful in future research. Self-administered quantitative questionnaires were more efficient in receiving less biased responses and participants freely answered even sitting in the coffee area or taken to their room so whenever and wherever they felt comfortable. However, some residents needed support in filling the questionnaires. Hence, inconsistencies were found in obtaining the answers for self-reporting questionnaires, i.e., some residents used the method of interviewing rather than writing answers themselves and others filled the questionnaires themselves. Collecting data, such as the need to be

considered when selecting measures. The typical time spent filling in the questionnaire by the respondents has been 30 minutes approximately, a little more than expected. Most outcome measures tested in this research were found to be suitable for use for an ABD intervention therefore can be used in future research with maintaining consistency. The tool which was not included in this research, such as for receiving information about other factors that may have affected participants' concentration and mood, such as medication or activities of daily living can be added in future research.

Though basic information related to the demography was collected, information about chronic conditions or comorbidities was missing which can be included in future trials to understand these variables. Participating residents completed validated self-reported health questionnaires including the primary outcome measure on the QoL and well-being. The secondary outcome observational measures on happiness, mood, depression and confidence as well as usability and acceptance data, were also collected. Despite collecting valuable information using a computer proficiency questionnaire, some improvement could be made by selecting only relevant questions in the questionnaires. For example, asking questions about using a computer for printing or using for the calendar was irrelevant as most residents did not have their own computer. Using only relevant questions will not only decrease the completion time but also will reduce the unnecessary burden on respondents.

Considering public health focus on effectiveness and cost-effectiveness (Vermeulen & Krabbe, 2018), neither impacts on activities of daily living nor financial benefits and cost-effectiveness were the aspects of the ABD intervention. Hence, they demand an additional investigation in future studies. In short, this study has presented several practical ideas to design targeted interventions for older people in care homes. Other outcomes that can be included in future research can be personal, such as the ability to communicate and express and physiological (behaviour change) and social impacts (social contacts) and impacts (such as influencing care home policy).

8.4 Delivery of the ABD intervention

Evaluating the delivery was challenging because ABD health is a relatively new area of research and there is only a small number of published articles. Additionally, being interdisciplinary research, multiple approaches were used which varies in arts, health and digital technology hence the results obtained may not be comparable. More importantly, as there was no similar intervention that can be used to externally validate data, inferences can be made from arts and digital interventions and to evaluate this research. Internal

validation was challenging for evaluating the approach used for sampling, recruitment, attendance, getting sufficient numbers of respondents and obtaining valid data. In terms of delivery, evaluating fidelity and varying levels of engagement with the intervention were also difficult. To reflect, evaluation is discussed for sampling, recruitment, attendance and retention as these can provide useful information for future trials.

8.4.1 Evaluating the sampling process

Both the literature review and fieldwork revealed that care home staff can potentially provide quality data that may not be available through random sampling. Therefore, despite using convenience sampling for the quantitative data collection, the selection was purposeful for the consultation, the focus groups and post-intervention interviews. In this research, convenience sampling was used for residents' recruitment. While purposeful sampling was used for staff interviews as only people involved in caring the participants were recruited which helped in obtaining views of staff involved in activities with their residents. During the focus groups discussion, staff drew strength from their practical knowledge gained through working with their resident in real-life settings. As sampling was convenience sampling and most participants were selected by staff, several residents with diagnosed dementia were excluded from this research. Therefore, strict eligibility criteria for not including people with dementia, a lack of variation in the care homes (selection of a single care home in an urban location, demographically predominant with White British residents) limited the number of recruitments. Thus, resulted in the recruitment of single-gender (females) and single ethnicity (100% White). Women seemed to be more interested in the ABD activities as only females participated in the ABD activities. The recruitment of only female participants can be explained in terms of the care home population, which had an overall high proportion of females. As the aim was to maintain and improve the QoL, the perceived impact can be expected for all residents regardless of their gender as health is a shared concern. The sample included participants of mixed mental and physical functioning including cognitively impaired residents, thus the sample may be a fair representation of care homes.

Similarly, for the post-intervention interviews, a type of non-probability sampling purposive sampling method was utilised. As a subjective method, the main objective of a purposive sample is to select a representative of the population sample (Lavrakas, 2008). I decided who would be included in the sample for interviews. Justifying the acceptability of sample size is an indication of the quality of research (Vasileiou et al., 2018). Commonly, the determination of the sample size is based on pragmatic reasons (Vasileiou et al., 2018). No previous information was available about the variability of the care home population and

the potential response rate for ABD interventions. Hence, the sample size justification for this research was referred to practical aspects of the feasibility experimental trial. Such as time constraints, project management, difficulty to access study populations and limited availability of the staff and residents. For a feasibility study, a practical approach is not uncommon. However, future trials can select more than one care home to increase the chances of recruiting diversity in gender, socioeconomic and cognitive and functional participants. Consequently, it will make use of the full potential of ABD intervention by selecting a true representation of the care home population.

8.4.2 Evaluating the recruitment process

Though Davies et al. (2010) achieved recruitment targets in their longitudinal study of the oldest old in the UK including older people in care homes, they recognised the recruitment of older people in research as difficult. Most researchers highlighted the recruitment of OPLICH as challenging (Harris & Dyson, 2001; MacFarlane et al., 2016). Knowing the recruitment difficulties, the time required for recruitment particularly in care homes was an important part of planning. This research showed that the time and difficulties in the recruitment process and engaging the care home population in research should not be underestimated. Little available information about the care home residents and a lack of the researchers' access to the care home residents (Chapter 6) were major impediments to this during recruitment and data may have increased the chances of selection bias. Hence, like Stewart et al. (2017), this research also received help from research partners in recruitment. However, to increase the number of participants, taster sessions could have also been offered. As recommended by Age UK (2018a), these sessions enable older residents to try out new creative activities to promote well-being. However, due to the limited time and limited access to the care home, it was not feasible in this research.

The residents were recruited using staff knowledge. Unlike Teh and Tey's (2019) research that found older males participating in leisure activities compared to females, this research found females more interested in the ABD activities. After the first phase of recruitment, as my knowledge of the care homes and my relationships with staff developed during the intervention, I was able to judge and develop an intuitive sense for how and when it might be best to approach among these staff members. I invited relevant staff who were more interested and receptive to my invitation to participate in the study and happy to give time for an interview. This shows that mutual trust is required when recruiting staff. I approached the staff myself to reduce the risk of feeling pressured in any way by management to participate. I found that a suitable approach was required to raise the idea of participation

with staff members individually, ideally at times when they did not seem to be too busy. Yet, achieving a recruitment target in a single care home seemed to be a highly ambitious figure and achieving the 100% target could even be more challenging. Most residents were not eligible for participation due to lacking the capacity to provide written consent independently due to a diagnosis of dementia. However, the sample included people from various ranges of cognitive and functional impairments. Without a collaborative approach and staff involvement and their support, achieving the recruitment target may not be achieved. Though ABD intervention is a complex intervention and fulfilling the technical demand is difficult, especially for participants with cognitive impairment, discrimination could be avoided in favour of older people with higher computer proficiency. There could be variation in the consent, recruitment and retention rates in another setting or when a researcher works as an outsider. At the planning stage, this should be considered and not be overly optimistic about the recruitment projections. Overall, the successful recruitment and delivery of ABD intervention relied on staff.

8.4.3 Evaluating the ABD activities sessions

To check the effectiveness of a complex health intervention, one needs to know whether the intervention was delivered as planned. In this context, field notes and the researcher's diary provided information that ABD intervention was delivered as planned and mostly adhered to the protocol. Though this was a small-scale feasibility study, it may not be a scale model for the future full-scale trial. However, the intervention has examined the key uncertainties and identified development and delivery challenges of the ABD intervention which will be useful for a future larger trial.

The complex ABD activities included creative, craft, games, literacy, learning, storytelling, visual, music, cultural and heritage (like virtual visits to museums) and digital (using digital equipment i.e., iPads) multisensory stimuli activities. Though the impact of each component could be different which was not determined in this research, it could be a good approach to engage residents according to their personal needs and likes/dislikes. Although reminders were given to the participants before the start of the activity, no location was fixed until the last minute. Hence, scheduling one dedicated location can help residents to reach the activity place on time and will prevent participants' time and energy in finding the activity place. Moreover, this can avoid delays in starting the activity and overrunning the session.

Regarding attendance and retention, researchers should understand that older people in care homes are more vulnerable to infections. This should be considered when planning recruitment and retention in care homes. Participation, engagement and attendance in the ABD activities sessions can be affected by participants' health conditions such as mobility, hearing, impairments and infections which may also be linked with the intervention impact. Though the basic information about the reason for absence or withdrawal from the ABD activities session was mentioned by the staff (i.e. fall, infection, or hospitalisation), without more specific data on it and the evidence, it is not possible to know the actual reason for absence from activity sessions. Therefore, routinely collected care home data could be used to collect further information.

This research has demonstrated that a flexible approach and recognising care home staff and residents' needs are the core both in recruitment and delivering the ABD intervention in a care home. This initial feasibility study has identified some challenges that may also arise in future trials; therefore, researchers will have to work out how frequently these practical issues are likely to arise and influence schedules in a full study. Research in care homes needs working within the staff and residents' schedule, avoiding the busy time to increase attendance in the sessions. Busier times for administrative tasks or for analysing videos, which do not involve the residents or staff could be an efficient use of time. Quieter times in the care plan or schedule was used for recruitment and delivering the intervention. Sessions' timings were important as participants can fall asleep or do not engage due to tiredness or reduced capacity to concentrate. Some participants found difficulties in attending the afternoon session because after lunch residents often feel tired and sleepy, hence it was difficult to engage participants in a large group. Therefore, morning sessions such as after breakfast when residents are found to have more energy to participate in the creative activities may be more suitable for future trials. Similarly, avoiding time after lunch when residents are tired and feel sleepy should be considered in future trials. This research also shows that the willingness of residents and care home staff to retain or participate can decrease or increase over time depending upon the popularity of the intervention. ABD activities sessions were inclusive and participants' dignity, personal growth, positive social relationships and autonomy were promoted during the ABD intervention sessions which are important domains of well-being (Perkins et al., 2012; Ryff & Keyes, 1995) and successful cognitive ageing (Slegers, 2006). An acceptable intervention promotes a lack of stigma, dignity, autonomy and social integration (Moniz-Cook et al., 2011; Venturato, 2010). To support, attention and maintenance within the group, adding more staff would be useful. However, this will depend on the number of participants and their functional or cognitive

impairment. At least two facilitators are recommended for a group activity that can provide mutual support, one leading the session and the other supporting the participants. Though carers can also support activities, their presence should be carefully managed to avoid well-intentioned over-support of the people with cognitive impairment (PWCI).

Considering ABD intervention as an inclusive intervention, it not only promoted dignity, but also social integration while including PWCI. However, including people with dementia could have made it more inclusive. As mentioned by Newman et al. (2013) group dynamic is important in determining response in art interventions. A mixed group of functional and cognitive capabilities increased the group dynamics and helped in obtaining a variety of responses from participants. Although most participants were from the same socio-economic class, their past experiences were different which brought diversity in participants' responses in ABD activities sessions. A friendly environment played an important role in the ABD activities session. However, in the context of digital media, the environment can take a new meaning (Alders et al., 2011). Hence, the environment for ABD intervention referred to both virtually and physically safe and friendly environments. For example, special covers for iPads can be used as these covers can withstand even the most severe environments (Alders et al., 2011).

8.5 Reporting the potential impact of ABD intervention

From an evaluation perspective, the impact of the ABD intervention should be considered beyond the scope of this thesis because the focus of this thesis was on the process rather than the impact. However, understanding the potential impact is an interesting area for future trials. Measuring the impact of the ABD intervention was also necessary to evaluate the processes involved in it so the findings can be used to help develop a more effective and efficient definite trial because the process is important to develop full-scale trials in feasibility studies (Devine & Lloyd, 2016). However, evaluating ABD intervention presents challenges, some similar to other non-digital interventions and some relevant to arts and health disciplines. For example, the literature review revealed that the impact can be amorphous and less tangible in arts and social sciences compared to medicine. Evaluating the impact externally could also be challenging due to a small number of published articles in the relatively new area of arts in health research. Furthermore, it was interdisciplinary research while different approaches were used to report arts, culture and digital technology research. For internal validation, the lack of follow-up data made it difficult to evaluate the long-term impact of the ABD intervention.

Results showed positive changes from baseline in several outcomes and the overall direction of change was positive towards improvement at the time of the post-intervention data collection (Chapter 7). This demonstrates the feasibility of ABD interventions and their effectiveness despite being short duration, (6 weeks) intervention as found practical. However, for expecting any change, the duration might be small. However, this duration was appropriate for three reasons. Firstly, research in a busy care home with frail older people is challenging and secondly, due to the frailty of older people, long-term commitment might not be possible for older people in care homes.

Even with presenting both quantitative and qualitative findings in the previous chapters 7 & 8, links between the outcome measures were missing such as QoL, well-being and cognition, interaction, learning and health. Therefore, like Bowling (2005) linked the multi-domain QoL with the concepts and tools of well-being, I also found links between different domains of physical, mental or cognitive, emotional, social and spiritual health with the QoL using the NBHAM and discussed in the following sections.

8.5.1 Impact on QoL and well-being

Using the theoretical framework lens of NBHAM, the ABD activities were found to improve QoL and well-being as they are human needs they are the priority within care homes (O'Neill et al., 2020). The novel combined theoretical model was suitable as it recognises the capacity for imagination and creativity which play as critical components of human well-being as an important domain of QoL. While well-being itself includes positive functioning, social well-being, social acceptance and social contribution (Compton & Hoffman, 2020).

This research supports Maenhout et al. (2020) who mentioned that admission into a care home can be linked to important losses for moving into a care home. Most residents, moved to the care home, adapted to the care home environment as another way of living. However, adjusting and adapting might be difficult for some residents which put high stress on their QoL as found by Maenhout et al. (2020). Therefore, when planning an activity, what is meaningful to that person is important as each resident is unique.

Regarding demographic data which was discussed in Chapter 7, they were linked to the QoL and cognitive functions as changes may also be modulated by individual differences including sociodemographic variables e.g., age, gender, occupational status, health conditions e.g., physical activity (Elkana et al., 2020) and education. For example, higher education was previously found associated with less cognitive impairment in healthy older

people (Boller et al., 2017). Moreover, due to the link between higher education levels and mental activity, education/learning was mentioned as a protective factor for cognition (Lövdén et al., 2020). Similarly, variables such as experience and willingness of using new activities or technologies can be both moderating as well as facilitating (Shaw et al., 2018). This indicates that any change in cognition and/or QoL can be influenced by these factors hence, should be taken into account in future studies.

ABD activities brought an immediate feeling of achievement among participants without exceeding their abilities. This finding support Reynolds (2010) who found that older people felt purposeful when challenged and engaged in arts activities. However, the negative aspects were hardly highlighted in previous well-being research. Despite adapting the ill-being tool (SMGCWOT), and preparing to collect observations, no results were obtained due to the lack of video recording and incomplete observations data. Considering the observational data collected using ArtsObS, staff reported positive impacts of the ABD intervention on participants' moods, happiness, engagement and social connectedness. The field observation supported these findings and conversation with residents and staff enabled me to understand the answers received in the questionnaires and the challenges of working in real-life care homes. The storytelling approach helped participants to reflect on their past experiences and connect to their current lives. In this sense, vignettes are useful in group settings to give voice to participants (Barter & Renold, 1999). As an iterative process, it also helped in developing themes for later analysis.

The selection of EQ-5D-5L for this study was that QoL is an overall appreciation and feeling the degree of satisfaction across important domains of life as mentioned as an overall construct as mentioned by Usman (2018). However, some dimensions of the multidimensional QoL were not included in the EQ-5D-5L such as overall well-being or mental well-being or cognition. Therefore, these domains were collected using other evidence-based questionnaires. Hence, the selection of other questionnaires was found to be useful to capture the other domain of QoL. However, QoL is a subjective state which comprises several components (Boggatz, 2020).

Language, working memory, problem-solving and decision-making skills were promoted in ABD intervention which is important in maintaining cognitions (Scharre, 2019). A positive change was seen after the ABD intervention which included cognitively stimulating activities for maintaining old and learning new skills to support cognitive functions in old age. ABD activities were supported by the theoretical framework of NBHAM as cognition and learning

are important needs of older people required for healthy ageing (Pekkala et al., 2017). In the past, Purdie & Boulton-Lewis (2003) showed that older people identify their primary learning needs and the current research supports it (Kaufman et al., 2020). ABD interventions enhance learning new skills and learning new skills can enhance the QoL of older people as mentioned by Kaufman et al. (2020). The ABD activities sessions provided a safe environment for older people to learn new technology. Except for measuring computer skills, though overall learning was not measured using any quantitative measurement tool, it appeared as themes in qualitative data analysis hence revealed as an outcome of ABD intervention. Therefore, future trials can include a separate measurement tool for learning.

Considering cognitive health which is the most widely used concept in cognitive impairment prevention and health promotion study in old age (McDermott, 2020). Cognitive games activities included in the ABD interventions were found to be effective in regaining cognitive abilities on the MoCA test. Cognitive leisure activities were linked with the prevention of MCI (Verghese et al., 2006) and to delay the onset of dementia (McDermott, 2020). In this sense, the arts-based digital intervention can potentially be linked with the prevention of MCI and dementia. However, further evaluation will be required to evaluate the preventive role of ABD intervention. Increased cognitive abilities are linked with well-being (Vidovich et al., 2015). Similarly, the intervention positively impacted subjective measures of memory and well-being. The change in cognition level of participants after the intervention provided a reason to believe that the ABD activities can lead to an improvement in the residents' memory which is linked with the improvement in mental health and QoL. Improving mental health is linked to the prevention of depression and improved care home residents' health as found by (Maenhout et al., 2020). This indicates that ABD intervention has the potential to improve cognitive health according to the WHO (2019d) guidelines which emphasise cognitive activities to reduce the risk of cognitive impairment and dementia.

The residents expressed profound gratitude for providing an opportunity to allow them to learn or experience an innovative intellectually stimulating ABD fun activity. Hence, learning new technology proved interesting and relevant to older people as it maintained residents' interest by making learning time a fun time as recommended by Kaufman et al. (2020). Game activities were popular as they fulfilled the learning needs of older people in a fun way. This resonates with Travers et al. (2016) who found games useful for people with cognitive impairment in care homes. Though learning was not measured as an outcome, it emerged as a theme and the findings can be linked to the healthy ageing model in which

learning is an important domain. With better memory appraisal and well-being, cognitively stimulating activities are also linked to an increase in self-efficacy and QoL (Boller & Belleville, 2018). The findings can be validated by Kaufman et al. (2020) who mentioned that meaningful leisure digital activities are not only useful for engaging and entertaining older people, but also for learning new skills. Hence, this research indicates that fun/game activities provide a medium to learn new technology which can be linked with the potential to improve QoL and increase residents' pleasure and interest.

Participation in an ABD activity can provide a medium to express feelings and emotions, to re-construct one's thoughts and re-imagine the world. Innovative ABD apps, like the Armchair Gallery app, offer great potential for improving the QoL for older people and PWCI. Greenawalt et al. (2019) mentioned that arts health interventions have the potential to enhance subjective well-being and reduce depression in older people. However, the results showed that participants had no depression neither before nor after the ABD intervention as revealed from demographic data and the GDS scores.

The positive social environment and participation in arts activities help older people and people with cognitive impairment to even regain some of the lost cognitive skills (Eekelaar et al., 2011). Participants expressed their feelings and opinions through ABD activity as researchers linked arts-based activities, brain and cognition (Demarin et al., 2016). The research findings are consistent with other arts-based studies, showing that participating in these activities can reduce mental health issues. Hence, social participation not only helps in cognitive functioning (Bourassa et al., 2017). Reducing a frail older person's emotional reserve can trigger the expression of dementia in asymptomatic older people who are not even frail (Kuring et al., 2020; Lindsay et al., 2019). In this sense, ABD intervention brought a positive change in emotional well-being which can improve frailty and prevent dementia.

Although objectives of the ABD intervention to explore the process remained important, the feedback from the residents revealed that participants were enjoying learning new things e.g. learning to play cognitive games, making a virtual garden or learning new technology. Mutual learning was happening and both carer and residents were learning together. The process of learning in older people was both individually and collectively in association with others by directly engaging, validating, reflecting, giving personal meaning and integrating their ways of knowing (Formosa, 2019). Hence, taking a social constructivist perspective on older people's learning, older people were observed as active, curious learners who were motivated to join with other people to develop knowledge, solve problems. Hence, it

can be inferred that the intervention can contribute to the development of the learning community within the care home. Residents benefited from the thoughtful attention and support of other residents and staff who provided knowledge to allow guided participation. Mixed groups with a wide range of creative abilities provided opportunities to learn from each other as social learning. The software application used for this intervention (Armchair Gallery App) had a balance between individual differences in cognitive abilities and challenges that explains the enjoyment of digital art. Hence, future research should consider these essential features of ABD intervention to promote cognitive function which is a part of healthy ageing in care homes. In short, the primary health outcomes also show meaningful and positive change. Except for one incidence of recalling sad memories, no major negative impact of the ABD intervention was recorded in this study.

Participants found engaged in the ABD activities which can be linked with happiness as greater engagement and activity level can be positively linked to greater happiness and well-being (Winstead et al., 2014). Not only ABD intervention supports emotional well-being, but also a social relationship between staff and residents in the care home. ABD activities achieved very positive outcomes among older people including PWCI in care homes so, all residents can benefit from the ABD activities in future. If the challenges/barriers presented in this study can be overcome, all residents, including residents with cognitive impairment can benefit from the engaging ABD interventions.

Improvement in emotional well-being was found after the intervention, hence, ABD intervention has the potential to improve health as a strong link is found between emotional well-being and health by Steptoe et al. (2015). Improvement in depression further increases the quality of social networks (Winningham & Pike, 2007). Similarly, improvements were found in the cognitive test after the ABD intervention which can be linked to increased social interaction and engagement which was observed during ABD activity sessions. These findings can be validated by a previous epidemiologic study which concluded that high social engagement reduces cognitive decline in the White population (Barnes et al., 2004). Similarly, an improvement in the QoL can also be related to the improvement found in the social connectedness which can help reduce loneliness as mentioned by Band et al. (2019).

The ABD intervention demonstrated enhancements in communication, well-being and brought positive emotions which are associated with positive health as found in art viewing activity using touch screen by Tyack et al. (2015). ABD intervention as a creative activity showed positive changes in physical, emotional and social health and the results are

supported by Dunphy et al. (2019) who systematically reviewed creative arts interventions for older people and found a positive impact on physical, cognitive, emotional and social health. As health is a subjective sense of well-being and feelings of happiness, the evidence is in favour of ABD activities as an improvement was found in well-being.

This research revealed that there were variations in cognitive impairment and well-being. Researchers are agreed that participation in the arts has a positive impact on self-reported well-being (All-Party Parliamentary Group on Arts, Health and Well-being, 2017; Fujiwara et al., 2014). Though subjective well-being is a compulsory part of overall well-being on its own it is not enough for QoL. However, they are uncertain about the positive link between subjective well-being and QoL. This link was revealed when improved health outcomes were found which included enhanced QoL including physical, mental and social factors as they are broader benefits to the well-being and mentioned as well-being indicators (Reed, 2016). The potential impact found in this research can also be explained by the six ways to well-being which emphases on activity, learning, connection, giving and environment (Reed, 2016). Furthermore, considering the five pillars of well-being (engagement, positive emotions, relationships, meaning and accomplishment) mentioned by Seligman (2012), ABD activities fulfil all those criteria. Hence, promotes personal well-being by all five pillars of well-being. In the proposed framework, ABD technologies were used to integrate and engage individuals and groups, induce pleasant and positive activities, support residents' social and interpersonal relationships to improve their social connectedness. The ABD activities were found to provide social and emotional support that can be linked with the improvement found in mood and depression because poor social and emotional support increases the likelihood of feeling depressed (Cummings & Cockerham, 2004).

The positive change was obtained from subjective well-being. However, well-being is an umbrella term, an abstract entailing the reactions of individuals along a positive-negative continuum to their life experiences, such as happiness, life satisfaction and morale, but consideration should be given to perceptions of life experiences as opposed to the objective conditions of life especially for older people. Greater activity level was also linked with greater well-being and happiness by Winstead et al. (2014). Similarly, Steptoe & Fancourt, (2019) also linked happiness to well-being among older people. In this sense, the positive mood change and positive emotions recorded in the ABD intervention can be linked with overall well-being. Hence, showed the benefits of using ABD activities for older people.

As the debates usually focus on the benefit, there could be a tendency to overlook the negative impact in research as highlighted by Reed (2019). Despite adapting and preparing a tool to measure overall well-being SMGCWOT (Appendix U), this research was unable to collect data about ill-being. Hence, not just focusing on the positive of well-being, ill-being should also be measured. However, the main focus of digital health intervention should not be on the conditions, instead, it should be on promoting good health and well-being because it encourages people to live happier and fulfils lives to prevent ill-health (Astell et al., 2016).

According to some researchers, QoL should not be mixed with the quality of care, which is a risk when multidimensional QoL is measured (Haugan et al., 2020). However, the findings are particularly applicable to improve QOL indicators that may represent the quality of care for their residents. Moreover, the QoL in this research presents a complex picture that includes well-being. Contemporarily, well-being is derived from good life and happiness and they have remained relatively unchanged (Compton & Hoffman, 2020). Similarly, the value and potential of ABD interventions are attached to the pursuit of well-being and QoL (Young et al., 2016). Though subjective well-being is necessary on its own, it is not enough to cover all aspects of a good life. Hence, the discussion is under the umbrella of QoL as built on the theoretical framework (Power, 2015). Overall well-being is multidimensional and includes emotional well-being such as mood and feelings of happiness. However, happiness itself includes different domains and one can argue that it does not cover all dimensions. This argument can be ignored as the real-life complexities of care homes is well-documented in the literature (Compton & Hoffman, 2020; British Geriatrics Society, 2017). With well-being and mental and physical health outcomes, enjoyment, a sense of achievement and increased confidence are few positive emotional well-being impacts revealed after the ABD intervention which is previously not widely reported in the literature. Figure 39 shows the link between QoL and other domains of health in the ABD intervention.

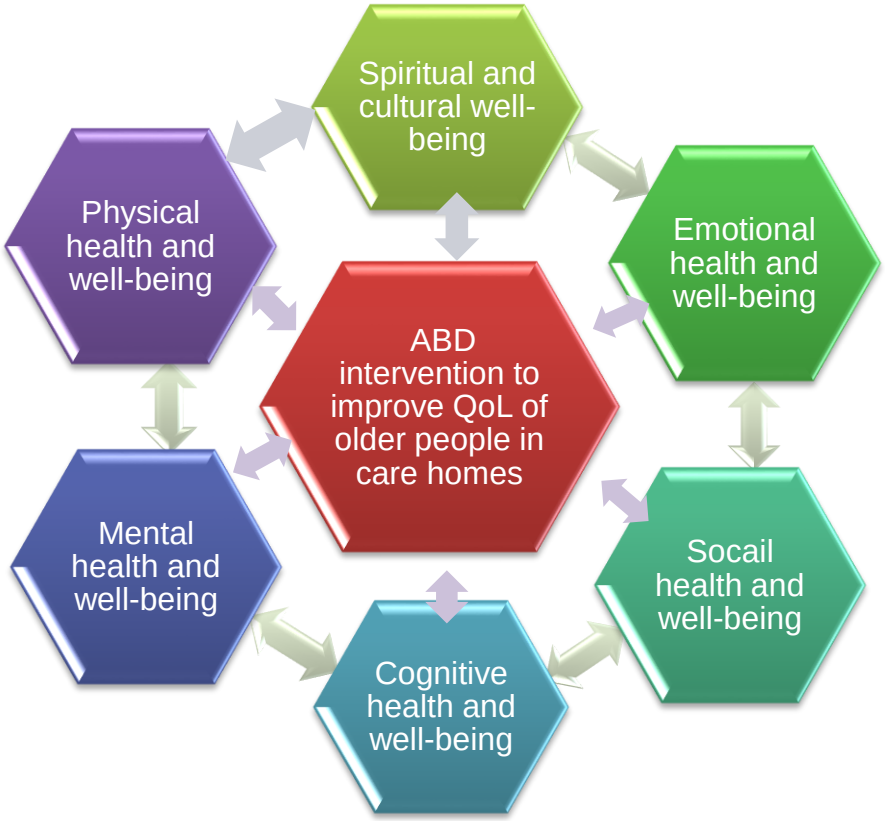


Figure 39 ABD intervention link of QoL with other domains of health and well-being

This research supports the idea that engaging older people in arts and culture-related activities are associated with a higher QoL as stated by Ho et al. (2019). Considering the improvement seen in the QoL and well-being outcomes after the ABD intervention feasibility study, ABD activities can be used mentioned as meaningful for bringing meaningful change in mental well-being as seen a 3 points change in SWEMWBS.

8.5.2 Potential impact on interaction, engagement and relationships

The ABD intervention increased engagement with arts, digital technology and culture as included in the ABD activities. This research shows that ABD group activities can be used to improve social connectedness which is important for lonely frail older people in care homes. In contrast, technology can be separating people from the world (Westerhof, 2017) or keep them static and isolated (Orr, 2010). The current situation of social isolation such as Covid-19, the disruption of established social patterns and/or poor quality of social relationships can negatively impact the QoL and well-being of older people as they are highly associated with loneliness (Desmet & Fokkinga, 2020). This indicates the importance of meaningful ABD activities as they are needed to improve social engagement, reduce loneliness and social isolation in care homes. While social isolation is related to poor mental and physical health (Domènech-Abella et al., 2020), ABD activities have the potential to

reduce loneliness and social isolation. Hence, using groups for activities like ABD activities may be helpful in both cognitive functioning and social participation. This is because people who are connected and aligned have autonomy and a sense of power (Maslow, 1987; Sosteric & Raktovic, 2020). Moreover, social activities are linked with good health (Bourassa et al., 2017). Therefore, group activities like ABD activities can promote health among older residents.

The wider concept of health includes social aspects of health as they are essential social human requirements (Artiga & Hinton, 2019). Though loneliness and social isolation were not measured quantitatively, qualitative data showed that care home residents express the feeling of loneliness even before the Coronavirus pandemic. In this research, neither loneliness nor social isolation was measured, yet they remained the focus of the qualitative part of the ABD intervention. Loneliness and social isolation look related to each other, they are two different concepts because loneliness, a subjective feeling or desire of social contact, is linked to the perceived quality of the person's relationships and their actual level of social contact (Age UK, 2018d; Gov, 2018). While social isolation as an objective measure is about the quantity of social contact a person has and not the quality of relationships (Age UK, 2018d). However, loneliness is never desired and lessening these feelings can take a long time (Age UK, 2018d). ABD activities improved social relationships and self-expression which can be linked with improved well-being in older people as loneliness and social isolation or exclusion carry health risks have a significant negative impact on well-being and QoL (Age UK, 2018c) and self-expression (Winningham & Pike, 2007; Zavaleta & Samuel, 2014).

Loneliness, cultural and social isolation are human needs (Artiga & Hinton, 2019). Loneliness was compared to hunger and as hunger drives us to eat loneliness drives us to socialise (Cacioppo & Patrick, 2008). Thus, ABD activities were focused to fulfil social needs. While Robertson (2019) compared loneliness with chronic illness; as the chronic condition can lead to a downward spiral, resembling it chronic loneliness can be linked to physical health deterioration as well as depression and even dementia. In this sense, by reducing personal and social isolation, ABD intervention improved both external and social environmental factors because these factors have been substantially correlated with mental well-being (Domènech-Abella, 2020). Social interactions brought a sense of well-being as well-being is not only dependent on mental and physical factors, but also being related to others (NICE, 2013). Hence, a positive change was seen in both mental well-being and the QoL after the ABD intervention.

In an attempt to reduce social isolation and the digital divide among older people in care homes, this research was focused on healthy ageing by engaging older people in meaningful ABD activities that have the potential to improve their QoL. Older people often accept and use new technology or app if they believe that it is beneficial to them or if it satisfies their needs (Kruse et al., 2016). This research indicates that older people were motivated to learn new technology. However, according to Chang et al. (2015), older people are motivated to use technology only when its benefits outweigh the time and effort needed to learn and use it. In this research, the participants were motivated to participate in the ABD intervention and to use new technology. Hence, the activity was perceived as beneficial for them.

ABD activities were focused on playful learning as playfulness encourages creativity, exploration and stimulates social interaction (Tsekleves & Darby, 2020). This research indicates that care home residents vary in their social interaction as some hold active community connections as previously found by Yamasaki & Sharf (2011). While others solely depend on the carer, staff and other residents living in the same household or the same care home for social interaction as previously mentioned by Ball et al. (2010). It is known that staff and residents' relationships are important for the quality of care (Ball et al., 2010), this research revealed that staff have little time to socialise with residents. Relationships with care home staff are found deemed important for the quality of care and to deliver the ABD intervention. The intervention helped staff to know their residents better such as residents shared some hidden aspects of residents' lives and interests with care home staff during the activity session. The group activities were helpful to reduce isolation when residents from one household met with the residents from other households living on the same floor or the other floor. In this sense, the ABD activities have promoted meaningful social interactions with their carer as well as other residents resulting in improved relationships with other residents in the same care home. This new relationship can be stated as 'stranger residents become friends' as used to describe residents' new relationship by Kemp et al. (2012) and Ball et al. (2010) in their research in care homes. Hence, emphasis should be given to communication and relationships when designing new interventions in care homes.

At this point, it is necessary to mention that the ABD intervention also increased staff and residents' confidence which is found both in qualitative and quantitative data. A lack of activities in care homes that can occupy residents' time is mentioned as the main reason for their care dissatisfaction (NIHR, 2013). As ABD intervention occupied residents in

meaningful creative and fun activities, it was well-received. Both staff and residents gave positive feedback. This may be a contributing factor to residents' satisfaction. The care home where the research was conducted 'Requires Improvement' when inspected by the Care Quality Commission (CQC) in 2017 and 2018 (before the start of the intervention), was recognised as 'good' in all key areas when inspected in 2019 (CQC, 2020) after the intervention.

8.5.3 Acceptability and usability of ABD

Feasibility studies point to the acceptability of the intervention to the participants. However, often evaluations studies do not consider the problems of acceptability and delivery. Regarding the acceptability of the ABD intervention as a university project, being part of university research was perceived as a privilege. Complex interventions are not homogeneous or single-element interventions (Brownie & Nancarrow, 2013). Hence, as a complex intervention, the ABD intervention incorporated several features such as involving staff in the planning and delivery phase, activities that can provide opportunities for cognitive and social stimulation of care home residents, for environmental enhancement and leadership (staff leading the activity) etc.

Despite having several benefits, complex technologies often have limited usability and could be ineffective (Kruse et al., 2016). However, residents showed positive attitudes toward the ABD app's usability, learnability and acceptability as a digital intervention. Usefulness, comfort and positive feelings about using technology and satisfaction with the activities are often linked to frequent users as linked by Vroman et al. (2015). Debatably, both quantitative and qualitative results indicate that the positive feeling for using technology or satisfaction with digital activities should not be linked to frequent users only. Participants were comfortable and satisfied after using technology and gave positive feedback about the ABD activities. Usability or technical issues and technological changes can be frustrating for older people and especially for PWCI (Petrina et al., 2008). However, this research shows that participants, including those who were cognitively impaired, were happy and satisfied after participating in the ABD intervention. This also indicates that, though often well-intended, pre-assumptions about the capabilities of residents should not be made and residents, regardless of their functional or cognitive capabilities should be offered innovative activities in care homes.

Mather and Harley (2016) highlighted that older people feel anxious due to unfamiliarity with constantly changing technologies. However, this research did not find any

anxiety/depression among participants neither before nor after the ABD intervention even when the latest mobile devices (iPads) were used which were both fast and sensitive to touch. Within the debates around the acceptability of an app or digital device, screen display, navigation and readability are important (Kaufman et al. (2020). Participants found it easy to navigate and read the instructions in the Armchair Gallery app. Hence, the technology adoption was excellent among both residents and staff. Regarding the impact of short duration ABD interventions, the findings of this study show that even one-time, short-term interventions have an immediate impact on changing care home environment. Furthermore, as found from the care home newsletter published almost 6 months later that it had a longer-term impact on staff and residents' relationships, behaviour change and decision-making. The feedback from the family members which was received by the care home management demonstrated that the ABD intervention had a good impact to improve the health of older people and bringing not only a positive change in the confidence of staff but also the residents.

Both staff and carers mentioned the convenience of using the Armchair Gallery app and its appropriateness and usability was evident from the quantitative data. However, screen glare and the freezing problem were observed during the activity session. These difficulties can decrease using the app or participating in the intervention as difficulty in navigating and visibility can inhibit technology use (Gitlow, 2014). This indicates that older people's difficulties with digital technologies can be due to their poor user-friendliness. This research supports Kaufman et al. (2020) that an app should be considered user-friendly for older people only if it is accessible to use, intuitive and adaptable to the participants' characteristics.

Despite that some participants regularly needed support; most participants were able to learn how to use the Armchair Gallery app. Therefore, the ABD app was mostly perceived as easy to learn and use. Carers reported the convenience of the Armchair Gallery app as it was easy to use and used as a means of interaction with their residents. The app's usability was a reason to engage participants in this study. Participants liked the ABD activities and using the Armchair Gallery app. To validate, older people use digital activity if they see it worthwhile in terms of the benefits they experience against the time and energy they invest (Kaufman et al., 2020). In this sense, the ABD activities can be used, particularly for older people in care homes, for whom traditional arts or social activities do not appeal. However, future trials can select any other ABD apps for the ABD intervention, but it is extremely important to determine its' technical and usability issues which could affect its

use as digital technology can also create frustration in frail older people as reported by Rantakokko et al. (2016). Hence, the key consideration for future intervention will remain the same as was recommended by Age UK (2014) that the equipment and software should be user-friendly.

Regarding the social acceptance of the ABD intervention, it was accepted as a group activity in the care home environment. Regarding the appropriateness of the innovative ABD activities in general, it *wa*s perceived as relevant and compatible with the care home environment. ABD activities were physically not demanding, yet they may have placed a few demands on older people. However, participants enjoyed them more than other past non-digital activities. If appropriateness is the perception to fit the activity to address a particular problem or issue (Weiner et al., 2017), then the innovative ABD activities perceived usefulness to resolve the issue of social and cultural loneliness and to decrease the digital divide among older people in care homes. With time, staff and residents became more confident and became more interested in the activity. The sessions also helped residents to alleviate some anxiety/depression. However, digital innovation in health care presents financial challenges which are not measured in this research.

An evaluation of the fit or acceptance of an app or a new intervention is challenging as the perception could be different for different residents who view the same activity from different angles, Hence, judging acceptability depends upon their personal needs, preferences, or expectations which differ from one person to another. Therefore, to explore the potential utility and practicality, participants can be given a daily diary which can also be used to understand their interests and to maintain their engagement. Regarding the questionnaire measuring the acceptability and usability (Appendix X), it was prepared by the researcher covering important domains published in the literature for digital intervention. However, it covered only basic questions related to the Armchair Gallery app and the activity, which can be amended according to other apps used for the ABD intervention in future trials. For future trials, researchers and facilitators should make sure that the app and the components are not overflowing the screen and fully visible to ensure that its' appropriateness, display and resolution for the devices.

Most residents were positive about their experience of participating in the ABD intervention. The data revealed that ABD intervention benefited the care home by meeting older people's needs for meaningful innovative and engaging activity. The relationship between ABD activity engagements and mental well-being was clear from the data analysis. The

qualitative data revealed positive thoughts and feelings of the participants and interpreted participants' experiences related to the ABD intervention for the app and intervention acceptability. Hence, the mixed methods approach not only helped in answering the research question but answered why the ABD intervention was accepted in the care home in addition to validating the results obtained from the quantitative data. In short, findings suggest that the intervention had a positive impact on the health outcome measures and the ABD intervention was both socially acceptable indicates its usability.

With the advance of technology, ABD intervention can become more suitable for use even for those with cognitive impairment. As the activity is straightforward and person-centred, ABD intervention has the potential to positively impact the QoL, but also to support the emotional, mental, cognitive and social well-being and to increase staff confidence. Through this study, I have found that ABD intervention can be used among older people including people with cognitive impairment so all residents in care homes may benefit from the ABD activities. However, mobile devices can be susceptible to malicious programs (O'Connor, 2014) especially for tablets (Suarez-Tangil et al., 2014). Although a definite conclusion is difficult to draw on the statistical outcomes, the supporting qualitative data indicate that the ABD intervention is a promising intervention. To recap the above discussion, Table 34 presents findings from both data which included potential impact on mental, physical, social and emotional health and the usability and acceptability of ABD intervention.

Table 34 Qualitative and quantitative Outcomes from ABD intervention

Combined results from qualitative and quantitative data				
Quantitative				
Mental	**Social**	**Physical**	**Emotional**	**Usability and acceptability**
Well-being: SWEMWBS (Mean Before=27 After: 32.70). Increase subjective mental well-being High well-being before 40% and after 90% Participants had been feeling useful, feeling optimistic about the future, relaxed, close to people, able to make their mind and think clearly **Cognition:** MoCA test Positive change Cognitive impairment (Before 90%; After 50%) **Computer Proficiency** (Mean Before: 12; After:13)	Staff confidence increased to the highest level after the second session and remained at the highest level after the intervention.	**QoL.** Increase Mobility and functional abilities increased. Health scale improved (mean Before: 72; After 80) Pain decreased Usual activities increased	**GDS** Depression decreased (Before: 11% After 9%) Mood improved, depression Anxiety decreased (Mean Before: 1.7; After 1.1) M**ood** Improved **Happiness** Increased Mean Before: 3.9; After 4.4)	Armchair galley app easy to use and functions well-integrated (70% agreed) and was easy to learn (60% agreed), Felt more confident (50% agreed).
Qualitative (observations, interviews)				
Increase, confidence, concentration, relaxation, empowerment, a sense of belonging, multi-sensory stimuli, ability to give and receive affection, sense of well-being, problem-solving, cognition, self-esteem, self-worth and emotions readily express, cognition, maintaining and learning new skills.	Increase social and cultural engagement, interaction and with the environment, choice, skills, forming new friendships, diminish feelings of loneliness and isolation, fun, joy and stimulating environment.	Participants walked or taken to the activity place, physical independence is likely to be maintained	Happiness, excitement, mood improved	The app used for the ABD activities were easy to use, engaging and can be used for the ABD intervention.

Source: Author's experiment of ABD intervention (feasibility trial findings)

8.6 Triangulation: Validating the outcomes

The evaluation and triangulation determined the effects and explain the success or failure of the intervention, understanding how and why contextual factors influenced. Hence, for an exploration of how ABD intervention influenced the residents' health and engaged them in meaningful activities both qualitative and quantitative data were combined at the end.

Through triangulating, data obtained from two different domains of mixed methods study were merged and the results were validated. Indeed, triangulation has offered richness and clarity to this research, triangulation can also add complexity to research as mentioned by Noble & Heale (2019). It proved to be a complex process that had its own limitations. I found it as time-consuming as I consciously tried to avoid overestimating the value of triangulation. The potential recruitment bias and data collection for using care home staff known to the residents were recognised during the study design. To overcome this, all data were validated independently by the researcher. Similarly, for outcome measures, all observations collected by the researcher were compared and validated by the staff's observations and any disagreements were identified and discussed with staff to conclude.

While the judgment on the quality of the qualitative study findings can be influenced by many factors, themes development helps to evaluate the research to provide new insights about the study (Vaismoradi & Snelgrove, 2019). In this sense, qualitative data analysis and themes development (Chapter 7) and coherence encompassed participants' perspectives, experiences, emotions and views. Though not all the themes were novel, they have truly and adequately represented all participants with a consideration of alternative explanations. Moreover, negative impacts were also observed and reported. The qualitative data were presented selectively to support the claims for qualitative findings.

Participants and staff's voices were included in this thesis to ensure the process and results obtained are 'fair. Positionalities are important in research (Bourke, 2014), particularly it became vital in this research because the researcher lived in the care home, took the leading role in collecting the data which may have potentially impacted the research process. To reflect on the researcher's role and position in the research process much has been said in methodology (Section 5.5) as they were fundamental to this study. The researcher's self-reflection in Chapter 7 (section 7.5) has presented my own beliefs and role in the research to demonstrate the strengths and limitations of the data analysis and the authenticity of the findings. The inclusion of field notes in this research increases the richness and showcase the complexities of living experience as they cannot be attained by direct interviews or observations (Phillippi & Lauderdale, 2018). The notes in my diary were used to understand certain attitudes toward the intervention. For example, my informal talks with the residents, recorded in my diary, helped me to understand the reason for not attending the sessions or environmental issues (room temperature, mobility issue). I observed participants' thoughts and feelings and how the activity was perceived.

My practical involvement in the research was an important element to keep in mind throughout this research. My PhD fellows, who were observing residents in the same care homes, had encountered similar observations and issues which validated my reflections of living in a care home. In some respects, there could be a possibility that my efforts to collect data and detailed analysis may have some impact on the research. However, my diary provided some complementary and some missing information. On the completion of the intervention (celebration day), my supervisors witnessed the happiness of receiving the completion certificates. Most residents shared their thought about the activity being innovative and different compared to the traditionally offered activities. Staff also reported a positive change in them and their residents.

As external and internal validity of intervention is important this research validity was enhanced internally by triangulation with staff's observational data and checking against data obtained from another method. For external validity, wherever possible work of other researchers was explored and cited, expert advice was obtained from supervisors and results were discussed with other DDRI researchers working in the same care home. This may have an impact on the transferability of trial results to use ABD activities in routine practice in care homes.

8.6.1 How did different data enable the evaluation?

Due to the no pre-existing research on ABD intervention, the trial has used a wide variety of data to make inquiries that currently do not exist in the literature especially for the context of ABD intervention for promoting healthy ageing in care homes. Therefore, the process and findings in this study are presented separately yet, I would be hesitant to take findings from one method in isolation. Quantitative findings were elaborated on using qualitative data. However, qualitative data alone generated a gorgeous description of the emotional and social impact of ABD activities on residents and staff.

The quantitative data provided valuable information about the potential impact of the ABD intervention. Yet, for quantitative researchers, a small sample size, comparison between before and after a short period without a control group and follow-up data, this research may look limited and lack robustness. However, in feasibility studies, a control group is not necessary as these studies are used to inform planning and decisions for future definitive trials (Sim, 2019). Though data was analysed and probability measurements were done to explore the potential significance, the focus remained on the process. Moreover, too strong a focus on the main evaluation can neglect the feasibility results (MRC, 2018). Despite

potentially significant positive changes, the small sample size can dilute the significance. Hence, a definite conclusion was difficult to draw on the statistical outcomes. To overcome this issue, the qualitative study played a supplementary role in this research and add comprehensiveness and completeness to this study. Although the relationship between the qualitative and quantitative data was not direct, they increased the research quality.

Despite explaining the techniques for blending results (Chapter 5), I found it difficult to triangulate and explain conflicting information collected from different methods. For example, resident (R5) had 100% attendance. Quantitative data analysis showed a positive change in the MoCA test, QoL, well-being and computer proficiency test. However, the interview of the same resident revealed that it was a challenge for her to attend these sessions and she only attended to accompany her friend. In my field notes, I found that she was not interested in arts-based activities but she liked the digital element.

It may be a possibility that the triangulation was not achieved in a uniform or consistent manner. Methods, such as using vignettes for an ethnographic approach as recommended by Barter & Renold (1999) may also be further explained using the living lab experience. However, it was not fully analysed due to some observations being anecdotally tracked due to time limitations and busy schedules in a care home. Regarding the quality of the observations as an ethnographer, I follow Hammersley (1998) who judge the quality of research with the purpose of research and its answer to produce relevant 'knowledge'. In that sense, observations during living in the care home produced some valuable information that might be missing otherwise. Though one cannot be certain about the validity of any knowledge, still sensible judgements can be made about the likely validity of those claims (Hammersley, 1998). The credibility of any qualitative study can be judged by the adequacy of the data to confirm the findings, the evidence presented to inform connections between the data and analysis and clarity in the research process and reporting its findings (Karwan, 2016). A rich description of the data collection process with explanation and context was provided in this thesis. Furthermore, reflection from the field notes has revealed the cultural beliefs of the care home to provide a holistic perspective. As readers are the best judge to assess the research quality or validity of the evidence (Hammersley, 1998), they will be able to assess the credibility of the data and all inferences that were made in this thesis.

The use of multiple methods helped to understand the difference between belief and action as it is a limitation of using vignettes as a stand-alone method (Barter & Renolds, 1999). The ethnographic observations helped to understand the care home environment instead

of taking the understanding of the social world for granted (Humphreys, 2005). It also aided to understand how the care home environment might impact the practical usability of the technologies in real life. The exploratory findings would not have been easily accessible if I had not used a range of methods and taken the time to observe the ABD intervention. Vignettes help to give light to the culture under study and can be used to explain the connection of the person to the culture (Pitard, 2019). The living lab experience and ethnographic reflection helped to understand care home culture and staff and residents' responses.

Combing the results from all methods used for this research, i.e., survey, observations and interviews, it can be concluded that ABD intervention can provide functional, creative, emotional, spiritual and cognitive stimulating meaningful activities for older people in care homes. The results showed participants expressed their happiness for using digital technology and the joy and excitement of the participants were observed during the ABD intervention. ABD activities were found appropriate for the resident's needs and preferences as evident from the results. Hence, the ABD intervention is promising to contribute towards improving well-being and QoL. As both data were integrated to produce results, triangulation has provided an overview of the key findings of this study and can help to understand how the mixed methods helped to increase the rigour of research. Results were analysed under the innovative theoretical and conceptual construct of NBHAM. Figure 40 illustrates a triangulation model of ABD intervention using the lens of NBHAM. While Figure 41 summarises the potential impact of the ABD intervention on different health domains. These figures summarise the potential impact of ABD interventions therefore will particularly be useful for future trial studies.

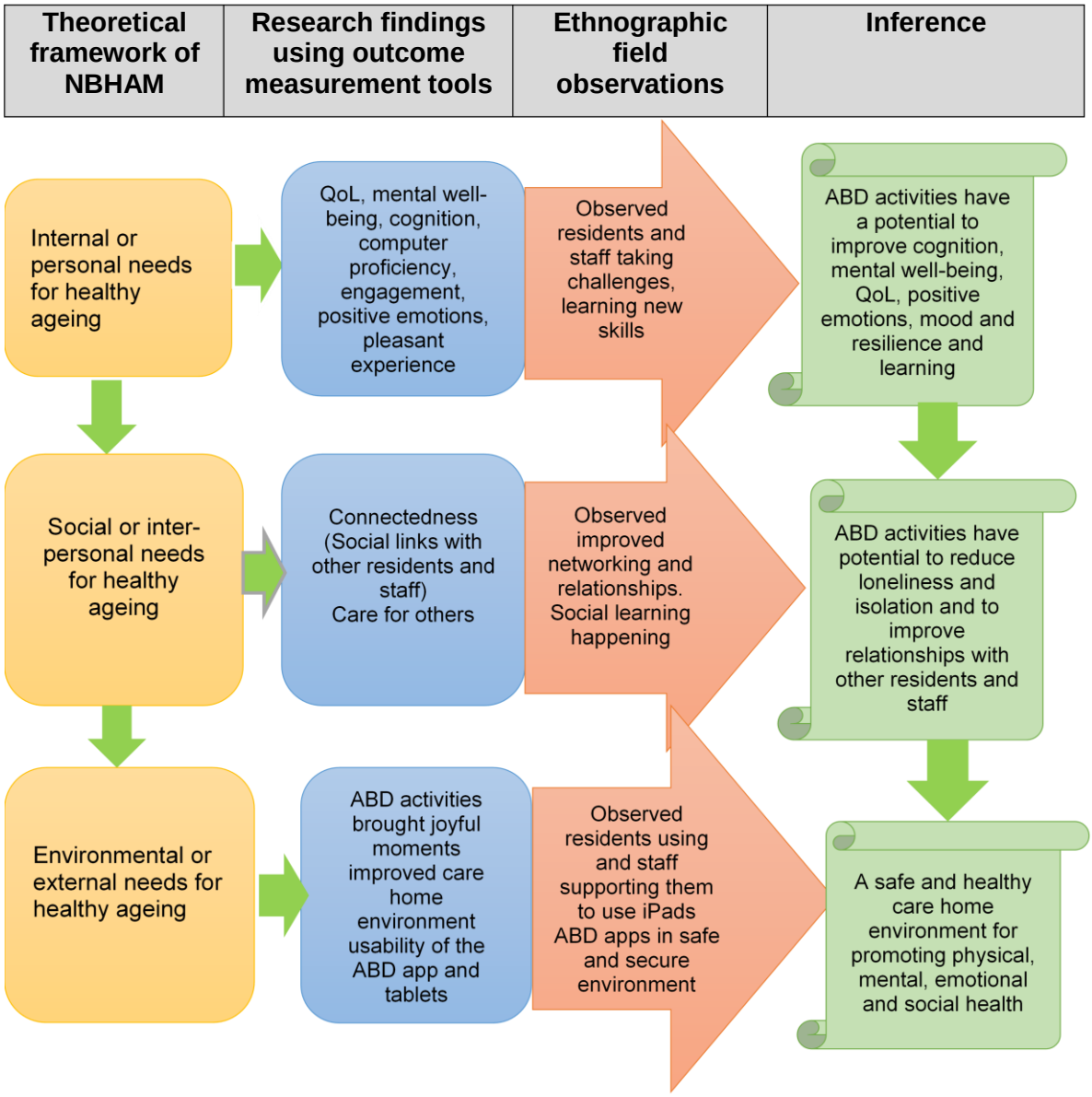


Figure 40 Triangulation of research findings with the theoretical framework

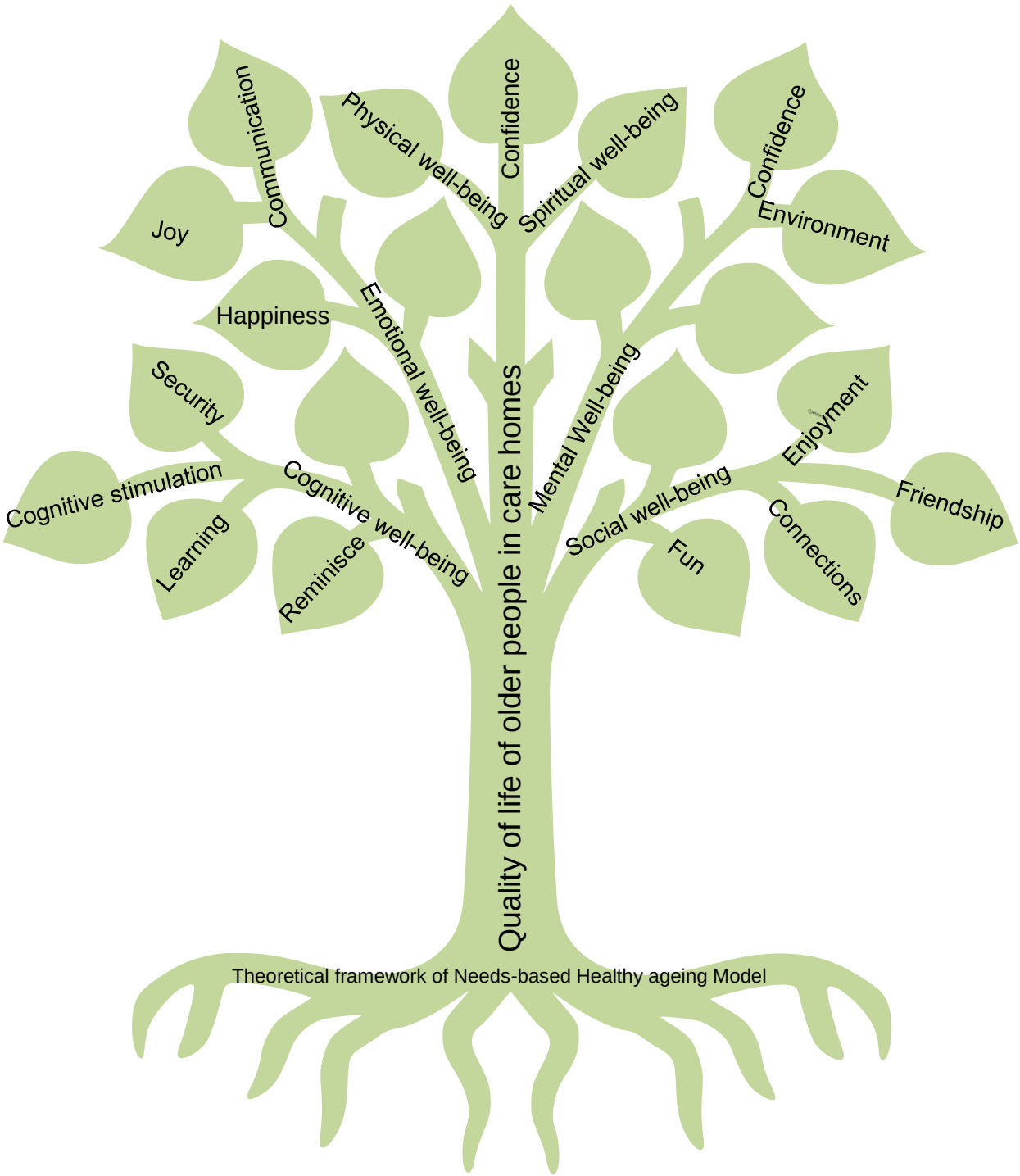


Figure 41 Impact of the ABD intervention on health using the lens of NBHAM

Acting on the NICE's (2013) recommendations for new suitable research for care homes to promote healthy ageing in care homes, this research has provided feasibility of ABD activities for the frail older people in care homes. The ABD activities went beyond many other arts activities offered in the care home. Therefore, participants wanted the programme to continue. Despite limited evidence for lasting effects due to missing follow-up data, the newsletter published five months after the intervention showed. Though follow-up visits were not possible to explore the long-term impact of the ABD intervention, after the intervention in January 2020, the newsletter provided the care home perspective about the ABD intervention. This report was not in my knowledge and was published months later after I finished my fieldwork, therefore, I did not influence the report. Though the follow-up data were missing, the newsletter provided care home management, staff and residents perceptive (Figure 41). Staff commented on the positive longer-term impact on participants and quoted one resident in these words: "Even though the Armchair Gallery has finished, I still use the iPad to go online and use some of the apps, which is great fun." (Newsletter, 2020; P18). Despite the possibility of reporting bias, the report reinforced the research findings and provided evidence about the positive impact of the ABD intervention on residents, staff and care home environment. Hence, externally validates the results of ABD intervention.

Care News 2020 01

Residents share their artistic side at [redacted] armchair gallery

Earlier this year, [redacted] was approached to take part in a study that wanted to investigate how older people responded to new technology – and residents and staff couldn't wait to get involved...

As a student studying a Masters degree in Social Care Leadership and Management, Care [redacted] was one of the first to get on board with the new project led by Coventry University, called the Armchair Gallery.

With support from another colleague, Joe Maskell (a Team Leader), fourteen residents agreed to take part in the six-

each gallery, there were activities to do – it could be pottery, painting, music or dancing for example. There were so many activities we could do together.

'One week we completed the digital side of the app, then another week we would focus on the physical side, which was all about creating. For example, one

for many years.

'We used an iPad app with seven galleries across the world. In

[redacted]

Some of the residents who took part in the project hadn't used an iPad before

learn new skills – or re-ignite existing ones – while having the opportunity to socialise, build confidence and increase stimulation.

'Even though the Armchair Gallery has finished, I still use the iPad to go online and use some of the apps, which is great fun.'

[redacted]

Figure 42 Newsletter showing the longer-term impact

The newsletter reported ABD intervention as stimulating as they receive amazing responses. Such as it reported ABD intervention as: "It's about mental stimulation, helping to reignite people's memories and skills that they might not have used for many years. We used an iPad app with seven galleries across the world. In each gallery, there were activities to do – it could be pottery, painting, music or dancing for example. There were so many activities we could do together" (Newsletter, 2020; P18). "One participant used to play as a

professional saxophone musician, so we wanted to link what we were doing to what she did. We had an amazing response." (Newsletter, 2020; P18).

8.7 Learning from this research

Due to the complex care homes system, challenges of researching in care homes were previously mentioned by other researchers (Ellwood et al., 2018; Hall et al., 2009; Luff et al., 2011). However, they were not fully understood by the researcher before commencing fieldwork. Therefore, practical challenges of researching in real-life care home settings were identified i.e., gaining approval from gatekeepers, provision of digital technology, recruitment and significant barriers for data collection. The exploration of ABD intervention has provided valuable insights into the challenges of conducting ABD interventions in care homes. The practicalities of research in care homes emerged several challenges which are mentioned throughout this thesis. Such as the provision of digital equipment (iPads). Acknowledging that a safe place to store digital equipment during the intervention period and a suitable environment for research data management was provided by the care home management. However, borrowing digital equipment added additional insurance costs and responsibility on the researcher to safely store and return the fragile and expensive digital equipment. While the required iPads for the trial period were arranged by the researcher, resourcing and receiving the equipment took considerable time. Similarly, recruitment into the research provided to be more challenging than originally anticipated, with difficulties in securing access to care home staff and residents. Therefore, considerations should be given to the time required to conduct sessions, observation and interviews and validating data with the staff or to review video recordings. The description of challenges throughout this thesis can help to identify these challenges as well as to understand how frequently they are likely to arise for which they should prepare. Not only the awareness of these challenges is important, but also the process to overcome these challenges is mentioned as necessary to understand the feasibility of conducting ABD intervention in care homes.

Despite that the collaborative approach was found as effective, it brought its challenges. Such as extra time was required for meetings with staff or flexibility to organise research schedules, issues of power and leadership etc. An extra preparation time was required to familiarise the researcher with staff and residents. There were continuing problems of communication gap and the blame culture within care homes made the research work challenging. Hence, the time requirements for researching in care homes must not be underestimated in future trials.

Overall, this research supports the involvement of staff and older people in creative and playful interventions. As Minoi et al. (2019) highlighted, play is universal that can be used to engage and create a trustworthy partnership with researchers. Despite initial plans to involve residents in co-designing the ABD intervention because co-designing incorporates factors in cultural protocols and design thinking (Minoi, et al., 2019). However, as the research participants were living in care homes and researchers had limited access to the care home residents, this approach was possible. Although the care home residents were not directly involved in designing, they were indirectly involved through the research partners during consultation for planning the ABD intervention. The residents and staff participated in the focus group discussions which helped to assess their needs. Moreover, staff indirectly involved residents in planning and scheduling activities to fulfil their needs. This approach helped to understand and incorporate cultural factors in design thinking. Furthermore, it assisted in refining, adhering to and following the protocol and in driving participants' engagement. Critically looking, neither this research was fully inclusive for the diverse care home population like participatory research nor it was fully designed by the research participants like a co-design research hence hybrid and complex. Future research can consider using a hybrid model of participatory co-creation model as they found useful to drive engagement as highlighted by Minoi et al. (2019).

This study shows that research should be conducted into the needs of older people to promote healthy ageing in care homes. The recruitment targets and plans should be structured, but flexible to account for unanticipated changes. This research supports Hall et al. (2009) that researchers should have plenty of extra time and patience to work in busy care homes. Recruitment difficulties are mentioned as awareness about these difficulties and the need for a flexible approach in the older population is vital for ageing research as also mentioned by the British Geriatrics Society (2017). Together with a flexible approach and a willingness to adjust to changing circumstances, I was able to successfully deliver the intervention in care homes. Hence, the success lies in the flexibility of researchers and being adaptable and willing to adjust to changing circumstances as often one single approach is not appropriate in the older population. The key learning points are highlighted for future trials which include needs assessment, practicalities, increasing engagement and reflection and evaluation (Table 35).

Table 35 Key learning points for future trials

Key points to help future trial studies	
Needs assessment: Better understanding	**Participation: Increasing engagement in ABD activities**
• The needs of older people and care home staff and management. • Compatibility of the activity with care home culture, ethics, values and priorities • The proposed intervention is different from other interventions in the care home setting. • -The importance of clear and simple language to convey the message. • To agree on the anticipated benefits with the care home manager.	• A combination of different arts-based activities including digital art, cultural and craft activities can be blended in ABD activity session based on person-centred approach.
Practicalities	**Reflection and evaluation**
• Checking if the care home management supports the intervention and ready to use ABD intervention. • Sourcing the required resources (Funds for iPads, WIFI or time or staff) for the ABD intervention. • Involving staff in planning is beneficial but staff only engage in the activity or can contribute to the research if they feel they can and should be part of the intervention (i.e. appreciated or rewarded). • Recruitment targets and plans need to be flexible but structured to account for unanticipated changes. • -Checking if the staff have the right skills and if they will require any training. • -Possibility of offering ABD activities in the care plan.	• Evaluating the impact of both process and impact. • Evaluating if the impact is positive and beneficial for both resident and staff. • -Checking if any further adaptation is required to suit residents' needs. • -Possibility of adding new app/technology to maintain long term interest in the activity. • Residents in care home settings usually have an activity plan which can be used to include ABD activities

Despite an increase in the use of digital technology among older people, this research indicates that often care homes are not fully ready for digital interventions such as ABD intervention. The availability of digital equipment and sparing staff for the ABD activities became a major limitation for participating in ABD interventions. Staff and facilitators obtained a key role in delivering the ABD intervention successfully. This research shows that the staff were willing and enthusiastic to participate in this research. However, the intervention might have been perceived to place additional pressures on carers and staff as technology sometimes put an additional burden on staff (SCIE, 2010). Inconsistencies are expected in collaborative research projects (Nyström et al., 2018) and in this research they were:

- Flexibility and freedom to manage and handle the research in the care home.
- Integration of different views of the participating department and care homes led to inter-organisational, intercultural and interdisciplinary problems.

- Managed access of the researcher to the care home, in contrast with the requirement of unbiased recruitment and collecting long term impact or follow-up data to evaluate the implementation in care homes.
- Resources for ABD intervention and a long-term funding plan for ABD intervention implementation.

In short, despite that the research in the care home was challenging, once the challenges were overcome, it was very satisfying to see the happiness residents' faces. Hence, challenges were only a small price to pay to improve QoL and hear the views of the under-represented OPLICH. Using Public Health England's (2016) model for arts interventions a new logic model for ABD intervention was created. As presented in Table 36 it was aimed to help other researchers who are interested in developing ABD intervention in care homes (Table 36).

Table 36 A logic model for ABD intervention

A logic model for ABD intervention (Adapted from Public Health England, 2016)				
Resources	Planning and intervention	Outputs	Outcomes	Impacts
• Staff and researchers' time including training, project delivery and evaluation. • Equipment • Software application • Arts and craft materials	• Programme planning • Ethics and governance • Needs assessment. • Identify a suitable venue and facilities. • Agreeing on aims and objectives with stakeholders. • Recruitment of facilitators. • Recruitment of participants. • Evaluation.	• Trained care home staff. • Sessions delivered. • Numbers of participants attending from target groups. • Artwork produced during the sessions. • Publications	• Primary: well-being, quality of life. cognition • Secondary: Depression, loneliness and social isolation. Intermediate: enjoyment, improved confidence and connection, expression; knowledge and skill.	• Longer-term: Improved staff and residents relationship • Sustained engagement by participants in arts and digital technology. • Greater awareness among care home staff and the residents about the value of using ABD activities for the health and well-being of residents.

8.7.1 Are care homes and their residents ready for ABD interventions?

Traditionally, care homes were focused on supporting personal care and providing accommodation. This research found that most care homes support their residents in engaging in activities and social interaction as mentioned by Ellwood et al. (2018). Like Hockley et al. (2017) mentioned some care homes became 'innovation centres'. Hence, in terms of providing activities and digital technology, diversity was seen in care homes.

This research indicates that even the modern care homes that promote themselves as technology-enabled may not be practically ready for an ABD intervention. For example, the participating care homes were unable to source digital equipment or mobile devices for the ABD intervention despite that one care home self-identified as technologically innovative. Additionally, the care home management had no formal data on how many residents would own their own digital device i.e., tablet/computer/laptop. This also shows that often researchers, like me, assume that care home staff view research as inherently beneficial and worthy of their participation. This might not be the case as this research found that it can be challenging for staff to participate in the research due to their busy schedules and limited understanding of the research's importance. Similarly, although technology can help older people in active and healthy ageing (Peek et al., 2016), the uses of technology were also rooted in residents' personal, physical and social, contexts. Hence, awareness of these factors is necessary.

Wider availability of the networks has increased portability (Ryan et al., 2020). Hence, Brandsma et al., (2020) stated that an increasing number of care homes are using advanced technology. In contrast, the field notes showed a lack of reliable wireless networks in care homes and this was mentioned as a common issue in care homes by the staff. The findings are supported by the care homes survey (Care Home, 2019) that informs that among 18,000 care homes in England, only 2,835 care homes have provided internet access to their residents. Due to the lack or poor quality of internet access, most care homes were not ready for ABD interventions. The reason for not providing a computer/tablet was mainly the financial burden on the care home and their residents as eventually the cost transfers to their residents. However, older people only avoid technology if they believe that it is not beneficial or if they have a lack of knowledge and access (Leonard & Hebblethwaite, 2017) and Wagner et al. (2010). Despite the wiliness to pay, interventions aiming at prevention should be without generating high additional costs or burden on participants as suggested by Richard et al. (2012). As found in this research in extra care, residents could have easy access to the computer located in the public library, which was part of their wider building, therefore, these can be utilised. However, using public computers for the ABD intervention required additional ethical approval from the local council and the Health Authority requiring considerable time. Though using public computers was not a feasible option in this research, researchers can consider using public computers if they can invest time and receive ethical approval. Even as a researcher, I resourced digital equipment for the trial to reduce the cost burden on the care homes, coordinated and helped in facilitating the sessions. Therefore, an innovative digital intervention like ABD intervention could be overwhelming for the care homes. To overcome this and to maintain a high level of

commitment and morale, in this research care home staff and residents to become a part of the research. This helped them to adhere to the protocol and in managing and facilitating the sessions. I found this strategy as effective in the delivery of the ABD intervention successfully. The provision of digital technology and meaningful leisure opportunities was evident in this research. Despite all the challenges and differences of care homes, they provide unique research opportunities for enthusiastic researchers. Care homes were found ready to open their doors for researchers as they wanted to improve their care system. However, there is a need of providing innovative meaningful activities such as ABD activities to their residents which are aimed to promote healthy ageing in care homes.

8.7.2 The role of staff and facilitators in the ABD intervention

Though the success of ABD intervention can be linked to several factors, the skills and qualities of the facilitator are key to a successful activity without them, it would have been likely that the ABD activity sessions were replaced by passive art-viewing activity. The role of the activity coordinator was also highlighted as a key in digital intervention by Age UK (2012). There was a challenge to simultaneously facilitate, assist and engage respectfully with all group members as higher functioning residents often avoid frailer residents, especially those with cognitive impairment (Dobbs et al., 2008; Eckert et al., 2009). This challenge of facilitating mixed abilities participants is also mentioned by Falconer & O'Neill (2007). However, facilitators approached every participant respectfully to nurture different experiences and viewpoints. The focus of the activity was on learning and empowering the participants. Using the person-centred approach based on their needs, giving them the freedom to choose their activities for their well-being helped in bridging the gap of the digital divide and reducing the cultural and social isolation in a care home. A new understanding of using digital technology blended with craft and culture in a health context addressed the participants' needs to bring a positive change in the care home environment. The testing revealed a new understanding of the feasibility of ABD activities in a challenging care home environment.

Facilitators managed the sessions and contributed to building a more cohesive care home community. They effectively bridged for connecting residents and played a crucial role in the care home community. Staff and facilitators obtain a key role in supporting participants and delivering the ABD intervention successfully. The key role staff play in ABD intervention was also mentioned by Broome et al. (2017 & 2018). Despite that some participants needed one-to-one support from carers, they all improved their computer skills. ABD activities increased residents and staff's confidence. Though no major adverse event was

observed, recalling sad memories and recalling loss made participants sad. At that point, facilitators handled the situation sensitively. Nonetheless, the high levels of acceptability of the ABD intervention in the care home and engagement of the staff suggest that future trials can also take advantage of the expertise of the care home staff. However, caution is required to ensure that carers only support them and do not create arts themselves. In the ABD intervention, even the first-time user of the mobile touchscreen participated in the activities and used mobile devices easily. This presents the positive image of ageing. Improvement was found in the QoL after the ABD intervention. Hence, this research supports Motti et al. (2013) and Moussa et al. (2017) who concluded that touchscreen devices are feasible to use as they are easy to learn without the experience of using computers and they improve the QoL of older people (Motti et al., 2013).

8.8 Concluding the discussion

As healthy ageing is a high priority (WHO, 2020d), activities like ABD intervention are ungently required to promote health among older people in care homes. This research has demonstrated that a flexible and collaborative approach is vital in the planning and successful delivery of ABD intervention in care homes. It recognises that the facilitator plays a key role in engaging residents in ABD activities sessions. The NBHAM evolved as the research progressed and provided the foundation of ABD intervention and the feasibility of combing theories. Some very tentative claims for the ABD intervention indicate several benefits for older people including PWCI (e.g., potential to enhance the QoL, to improve well-being, mood, cognition, confidence and social interaction. The triangulation and evaluation process has further increased understanding and validated the results. ABD intervention and activity sessions were well-planned. The Armchair Gallery app was useful in facilitating the ABD intervention and residents and participants were able to effectively use it. With a lot of potential benefits that ABD activities, positive change to well-being, QoL, cognition and engagement of the participants in meaningful activities are only a few of them. Though realistic evaluation of the research may not be robust, it has provided a key evaluation of the ABD intervention. Despite having a small sample size with no control group, this research is underpinned by a theoretical model. The findings related to recruitment, data collection and outcomes provides useful practical information explaining how ABD intervention may benefit older people in care homes. The research demonstrates the potential positive benefits of ABD intervention for residents and staff in care homes which are good indicators to build a foundation of future trials. It also helps in assessing whether the ABD intervention is feasible and whether it can be used effectively to promote healthy ageing in care homes. Acknowledging the missing follow-up data which could have

provided useful information about the long-term impacts of a new ABD intervention, only modest assumptions about the implication can be made. This feasibility study has made a case for ABD intervention having the potential to promote healthy ageing in care homes. However, the robust evidence of the effectiveness of the innovative ABD intervention for OPLICH aiming to promote healthy ageing requires further investigation and will be the focus of future evaluation studies.

CHAPTER 9: CONCLUSION AND RECOMMENDATIONS

This chapter summarises and concludes the research presented in previous chapters. It will help to assess whether the ABD intervention is feasible and whether it has the potential to be used to promote healthy ageing in care homes. Strengths, limitations, lessons learned from this research and recommendation for future trials are also presented in this chapter.

9.1 How the research questions were answered?

This thesis was aimed to explore the feasibility of the ABD intervention and to see if it has any potential to promote healthy ageing in care homes. It was clear from the research questions[0] that the research was an exploratory study. As feasible strategies serve as the basis for effective interventions (Burnes et al., 2019), the whole thesis provides information about the process of developing an effective targeted ABD intervention.

The exploratory questions were answered in steps. As a conceptual framework gives direction to the research (Mensah, 2020) and confirms methodologies (Miller et al., 2008), first, a conceptual framework was developed by exploring literature and conducting secondary desk-based literature research. The existing literature was searched to identify the role of arts and digital meaningful activities. As a multidisciplinary research topic of healthy ageing and ABD interventions, the literature review revealed that the research topic was approached differently by arts, health, social and technology scientists. Despite disciplinary differences, the benefits of meaningful arts, cultural, digital and cognitive activities were commonly mentioned. This developed the conceptual framework of this thesis (Chapter 1). Different theories, which were used to promote the health of older people, were explored. The conceptual framework not only helped in understanding what different terms mean and in expanding knowledge about the ABD activities but also revealed a knowledge gap about ABD interventions which stimulated another secondary evidence-based research.

9.2 Study 1: Exploration through secondary research: a realistic review

Although the initial literature review provided a conceptual framework and provided the impetus to conduct another secondary research to fill the knowledge gap. The realistic review is mentioned in a replicable manner in Chapter 3. Through the realistic review, ABD interventions and their impact on the health of older people were explored systematically and information about designs, outcome measures and the impact of ABD interventions on older people were explored. It showed a lack of agreement about a single theoretical framework to develop ABD interventions for OPLICH. The knowledge gap about the

theoretical framework gave direction to develop a theoretical framework for the ABD intervention. The realistic review revealed that though several digital well-being apps were available in the market, ABD apps in which arts, culture, cognitive and learning playful learning or cognitive training activities are included, were hard to find. However, two apps Armchair Gallery app (Duncan et al., 2018) and the ArtOnTheBrain app (Murphy et al., 2019b & 2020) combined culture, arts, cognitive and learning activities for older people including PWCI. Though both Armchair Gallery and ArtOnTheBrain apps were previously tested on older people, yet limited knowledge about ABD intervention was found related to the UK care home. Hence, there was a lack of understanding of the impact of ABD interventions for older people in care homes in the UK. The realistic review concluded that there was little published information about ABD interventions for older people in care homes. The review provided the rationale for conducting exploratory feasibility research in real-life care homes.

9.2 Developing a theoretical framework

A gap in knowledge about the theoretical framework was identified in chapter 2 & 3. In this sense, an empirical theoretical framework was required because a suitable conceptual framework enlightens the path of research (Adom et al., 2018). Chapter 4 shows how the combined 'Needs-based Healthy Ageing Model' (NBHAM) theoretical framework was developed. It helped in planning ABD intervention hence also tested with the ABD intervention. NBHAM theoretical framework built the foundation for interdisciplinary ABD interventions and guided this research at each step.

9.3 Study 2: Consultation and focus group study

To answer the research question about the feasibility of the ABD intervention in care homes, this research took a collaborative approach. Relationships were built during the consultation which was followed by the focus groups. NBHSM guided the focus group to assess residents and staff's needs. Four focus groups were arranged in two different care homes. The first focus group was attended by 2 participants, the second by 4 and the third focus group was cancelled due to the staff's busy schedule. The fourth focus group was conducted with 11 participants. 3 participants decided to withdraw from the study, therefore their data was destroyed. It was ensured that all participants had a chance to explore ABD apps (ArtOnTheBrain and Armchair Gallery app) using iPads and to participate in the group discussion. The focus group discussion helped to assess staff and residents needs and provided useful insight for developing a targeted ABD intervention. This study also helped in selecting one suitable app (Armchair Gallery app) for the trial study. As an outcome of

the focus group study, a report was prepared and shared with research partners to inform them about the suitability of ABD apps and the readiness of care homes partners for the ABD intervention. The focus group study and consultation helped to utilise staff's experience and to refine the protocol for the ABD intervention. However, it required enormous effort, extra responsibilities and compromises to bring significant possible benefits. The consultation, engagement and involvement of care home staff and residents within the research process helped to develop a deeper understanding of their needs including their training needs and logistic challenges. This first study helped to prepare a protocol for ABD intervention taking an iterative approach. Hence, this thesis presents a strong case for involving residents and care home staff in future research.

9.4 Study 3: Experimentation of ABD intervention

To answer the second research question about exploring the feasibility of the complex ABD intervention in real-life care home settings. The ABD intervention was conducted on ethical grounds. Chapter 5 describes the methodology including data collection and analysis methods showing the appropriateness of research design, process and the impact on the health of care home residents. Before conducting an ABD intervention, practical training was received. The ABD trial used a non-randomised feasibility study. The recruitment was done in three phases. The recruitment target for the first phase was achieved by the recruitment of two facilitators. The researcher was able to achieve a 100% target and recruited and trained two facilitators. For the second phase of recruitment, the target number was 12, which was achieved. Overall, 25 people were recruited (2 facilitators, 11 residents and 12 carers) and only one withdrew from the study.

The interest in this research was maximised by delivering practical training to the care home staff and helping them to facilitate ABD activities. This mixed methods research design included both subjective questionnaires and observation measurements. It allowed collecting feedback from participants before, during and after each activity and finally at the end of ABD intervention. Practically, research in care homes best works if researchers become carers and staff become co-researchers. Staff helped in the delivery and data collection and ethnographically there may be a change in role (carer acting as a facilitator and co-researcher) and researcher becoming a carer. It increased staff's confidence and brought an improvement in the care home environment as well as showed a practical example of how one can practice innovative methods in care homes. Once the ABD intervention established staff and residents' interest, it was easy to invite staff to participate

in the interviews. Despite that some staff seemed reluctant to sign at the spot, it became easier to obtain their written consent on later occasions before their interviews.

The participants joined for 45-60 minutes for the weekly sessions of ABD activities over 6 weeks with the facilitators. The activity was focused on five pillars. (i) Mental well-being (ii) Social interaction (iii) Happiness (iv) Multisensory engagement with meaningful complex cognitive activities and (v) Learning new skills such as digital technology like iPads. In terms of the duration of intervention, though the duration can be prolonged, the present study suggests that a 6 weeks' intervention for 60 min activity per week was found to be suitable for the group. This duration can give chance to other residents to try these activities after one group finishes. Holthe et al. (2007) recommended that with a break midway, an activity could last up to two hours. However, the sessions should be adjusted accordingly to the participants' needs on the day. Within ABD activities, some parts may be more engaging than others, for example, cognitive game activities were more demanding than the art-viewing. In care homes, the time of activity sessions should fit around the daily routines and activities. The use of this feasibility study will help to understand the practical issues, hence useful in planning a larger study.

9.4.1 Primary and secondary outcomes of ABD intervention

Though for this feasibility study, a small number (N=12) was set for the residents and 11 residents were recruited to participate in the weekly ABD activity. I aimed to recruit 12 staff and I was successful to recruit 14 care home staff to get the post-intervention feedback. Without staff involvement and their support, achieving 92% recruitment of the residents would have not been possible. The study received a 91% retention and 9% withdrawal. Recruited residents (N=11) were all white, female on average aged 90.2 years (range 77-94 years). 64% (N=7) were high school graduates and 27% (N=3) attended colleges.

Although often in feasibility studies the effectiveness of the intervention is not tested (Eldridge et al., 2016b), it is also not uncommon to test efficacy as done by Murphy et al. (2018 & 2020). Due to the limited available information for the ABD intervention for the older people in care homes, this study included both process and efficacy outcomes to help future trials. The research process related to recruitment; data collection has been presented in Chapters 4 and Chapter 5. This research tested several data collection tools such as SWEMWBS, GDS, MoCA test, EQ-5D-5L, and Computer Proficiency Test. Except for GCCWOT, all tools were successful in collecting data. As mentioned by Assarroudi et al. (2018) the analytical process demonstrates the robustness of the research findings, a

detailed analytical process was discussed in previous chapters (Chapters 5, 6. & 7). Transparency in developing themes included analytical movements, from coding to developing the theme is also evident in Chapter 7. The primary outcomes such as QoL, mental well-being and cognition were found to have a positive change. Similarly, secondary outcomes; cognition and computer proficiency, depression, mood, emotional and social well-being also revealed a positive change. Combing the results, it can be concluded that ABD activities can be used as innovative activities for the fulfilment of innovative, creative and learning needs of the older people in care homes.

Qualitative data revealed an increased engagement in meaningful ABD activities increased confidence, self-esteem, sense of belonging, ability to share, focus on abilities, maintaining old and learning new skills, self-worth, problem-solving, expressing emotions, cognition, improving empowerment, ability to choose, sense of well-being and decreased feelings of loneliness and isolation. ABD intervention was built on the foundation of healthy ageing which included reducing social and cultural isolation and loneliness in older people in care homes to fulfil their social and cultural needs. For residential care home staff, care duties limit the time available to build good relationships with their residents. An increase in social interaction and social learning was found in this ABD intervention causing a positive impact on social health. For instance, results showed that the residents made new friends and were able to help each other in using certain functions of the iPads and apps. This indicates that the residents were able to interact with the staff producing work and taking on new challenges in a safe and supportive environment. Participation in meaningful social activities can be a key to resolving the impact of loneliness, relationships between residents and carers which was highlighted as a major public health concern (Chapter 2).

Staff generally agreed that the sessions were effective in meeting residents' needs, increasing communication and improving their relationship with their residents. ABD intervention promoted well-being and QoL and social health by interactions beyond participants' social spheres and increased staff and residents' relationships. There was a plan to investigate if the care home continues to apply what the study introduced and if they have included it in routinely offered activities. However, due to the communication gap, post-intervention follow-up data was not collected. However, the newsletter published by the care home after the intervention showed that the ABD intervention was perceived as good practice and ABD intervention could be a valuable addition to the routinely offered activities.

The ABD intervention showed a positive change in well-being, QoL, depression, computer proficiency, depression, confidence and the intervention were well received. Regarding the third research question about the acceptability of ABD intervention, the activity was perceived as socially and culturally acceptable by staff and residents and found stimulating and engaging residents in meaningful creative and fun activities. The ABD activities were found to have the potential to improve interactions, relationships and support older people in care homes to engage in meaningful activities. This feasibility trial used a freely available software application Armchair Gallery app which provided an opportunity to visit museums and view artwork for learning and reminiscence. The ease in the usability of the Armchair Gallery app was a significant reason why participants remained engaged in the activity.

9.4.2 Evaluation and reflection upon the research

To debate, the term 'pilot' or ‘feasibility’ should not be used for a trial that evaluates an effect (Whitehead et al., 2014). However, it is not uncommon to use a feasibility study for testing efficacy. Recently, Murphy et al. (2020) tested efficacy for the ArtOnTheBrain app in a feasibility study. However, in the current research, despite measuring the potential impact of the ABD intervention, neither the aim was to evaluate the effect size of the ABD intervention nor results are presented to generalise research findings. The change before and after was measured to explore the potential benefits of ABD intervention. Nevertheless, by collecting and analysing data using evidence-based tools, this research has helped to understand the feasibility of data collection tools and the potential positive and/or negative impact of the ABD intervention. Acknowledging that the feasibility trial presented in this thesis may not be as robust as a randomised controlled trial, detailed information presented in this thesis will help readers to assess the quality of research. With a fair and honest research process, I also acknowledged personal beliefs and biases that may have influenced the interpretation process and theme development (Chapter 7). Examples from qualitative data were presented in Chapter 7 as they increase the validity of the research (Connelly & Peltzer, 2016). Chapter 8 presented an evaluation of the research process because clarifying mechanisms and identifying contextual factors associated with outcomes are necessary to assess the quality of research (Brand et al., 2019; Oakley et al., 2006).

Neither digital technology is a ‘magic wand’ that can solve every problem, nor it is a ‘silver bullet’ (WHO, 2019b). However, digital technologies are useful to promote healthy ageing wherein learning new skills is an important pillar. Being a non-pharmacological ABD intervention, it has the potential to provide a user-driven digital solution to the cognitive decline and social, cultural deprivation problem, methods used and process of conducting

the research (Chapters 4 & 5), impact (Chapters 6 & 7) and evaluation (Chapter 8) for the feasibility of ABD intervention are mentioned and discussed throughout this thesis. Though adherence to a protocol is important (Robert et al., 2020), this feasibility research took a flexible and adaptable approach as limited information was available about care home staff and their residents' needs. Further robust randomised control trials will be required to evaluate the impact of ABD intervention as evaluation of feasibility studies are more likely to succeed when spread to new locations or scaled up (Brand et al., 2019).

Despite the computers and mobile devices customised and optimised displays for older people, neither technology for older people is innovative nor is the idea of technology adoption revolutionary. Equally, the use of apps for older people that rely on the discourse of games such as digital cognitive games to enhance imagination and cognitive functions for older people are not new either (Legge, 2016). However, the use of technology for cognitive game activities and combining it with cultural activities such as the museum arts and crafts for creativity to protect against cognitive decline is relatively new. Moreover, using it to improve QoL and well-being of older populations is only recent and using it as a health intervention for the care home population is an innovation in care. Distinctive characteristics of ABD intervention are related to the promotion of health equity by including a neglected older population in care homes. This included using arts and digital technology with a new combination of culture, craft and creativity. It used multi-sensory material and group social activities for bridging technology and the cultural gap among older people in care homes. Despite managerial support such as allowing some dedicated time to participate in the research process or providing materials for the craft activity the research was at times challenging. However, reflection time built into the session design and staff involvement in facilitating were keys to delivering a targeted intervention in care homes. This research contributes to the new knowledge by providing practical information about the innovative 'living lab' approach for delivering ABD interventions in real-life care homes (Section 7.5).

The selection of mixed methods proved to be an appropriate design for this exploratory research. Through triangulation, a particular focus was to understand the real value of feasibility and to gauge the impact of ABD interventions for older people in care homes. The success of outcomes was judged by the evidence using a realist formative evaluation as it helps to understand the process and how the complex intervention can be optimised before a full trial (Brand et al., 2019; Craig et al., 2013). Chapter 8 has examined the trial design, delivery of the intervention and the assessment of the organisational context, challenges and strategies, personnel procedures, judgements about the quality of research

as it strengthens or optimises trial methodology for progression to a future large trial (Daykin et al., 2013; Devine & Lloyd, 2016). Arguably, it might be too early to expect any change in the outcomes after a short (six weeks) intervention. However, despite planning follow-up visits, no data was collected due to the lack of access to the care home follow-up information was missing. Yet, the results provided preliminary evidence suggesting improvements in outcomes, including well-being, QoL and cognition.

Due to the lack of efficacy, often feasibility studies do not obtain the same place as RCT (NIHR, 2019). However, a feasibility study receives its own importance. This research provides practical information about the feasibility and presents challenges of ABD intervention in real-life care homes. This presents a picture that approximates the reality of research in care homes. This will be, useful in planning and delivering future innovative ABD interventions. It shows that ABD intervention is theoretically based on the NBHAM framework. Though efficacy does not receive as much importance as the information about the process in feasibility studies. The efficacy signal obtained in this research increased the confidence to say that it was a worthwhile intervention. Hence, a subsequent full trial will be required as research is a process. Table 37 presents a summary of the main health benefits of ABD intervention for older people including the potential impact on health includes physical, social, emotional, mental and spiritual well-being and QoL.

Table 37 A summary of benefits of ABD intervention for older people

Potential health benefit of ABD intervention for older people			
Physical benefits	**Mental and cognitive benefit**	**Social benefit**	**Emotional benefit**
• Multisensory ABD activities brought positive change in the mobility, usual activities in EQ-5D-5L to help physical independence.	• Improvements in MoCA test indicates that ABD intervention has the potential to increase or at least maintain cognitive skills (memory). • Improvements in computer proficiency test shows that participants learned new technology and skills. • GDS scale showed positive change • Improvement in subjective sense of well-being	• Increase engagement in activities. • Increase social interaction and concentration • -Sense of Maintaining old and forming new friendships • A stimulating and rewarding activity. • Diminish feelings of loneliness and isolation.	• Increased happiness seen in ArtsObs. • Qualitative findings show increased confidence. • Fun for staff and residents • Increase confidence and self-esteem • relaxation, • Reduce the boredom • -Ability to give and receive affection • Expression of emotions

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9.5 Strengths and limitations

This research has several strengths such as:

- A collaborative approach, involving and engaging the care home staff in refining protocol and presenting a practical and realistic approach to design the ABD intervention.
- The combination of traditional and ABD activities included a wide range of art forms (visual, music, videos, literacy, craft, creative, digital and cultural activities like virtual visits to museums).
- This thesis presents both challenges and strategies for successful involvement, recruitment and retention of the care home population in research.
- This research used several subjective and objective evidence-based outcome tools, including reliable methods bringing benefits of both qualitative and quantitative data to inform the results and minimised biasing factors to pave way for the larger future trials.

- Theme construction was used to reveal a broader picture of the data and it is considered as an advantage in mixed methods studies (Johnson & Schoonenboom, 2016; Vaismoradi & Snelgrove, 2019).
- This research presents impact data collected at two different time points (before and after). The quantitative and qualitative research took place at the same time which validated data collected by each method to verify that the change is not due to other confounding variables.
- This research has recorded both negative and positive events that were collected separately by staff and researcher at the start, during and after each activity session.
- The data were validated before data analysis by staff and supported by field observations increased the trustworthiness of the results.
- General integration of ethnographic perspectives into the observations data.
- The challenges of researching in care homes were presented as they are good indicators for future studies as well as how these challenges can be addressed are mentioned throughout this thesis.
- Presentation of replicable information, evaluation of the research and transparency in reporting are the strength of this thesis.

Despite the above-mentioned strengths, I acknowledge that some important limitations may have impacted the research findings. Hence, they are necessary to mention. These were:

- Due to the restricted access, potential participants and eligibility screening were done by staff. Selection of one single care home located in a high socioeconomic area, 100% 'White', 'Females' participants, lack of any other ethnic group, people with no dementia can be seen as a selection bias. Considering the multiple ethnicities of the UK population and the large number of PWD in care homes, the sample may not be a true representation of the care home population in the UK. Though generalisability was not intended in this feasibility trial, recruitment bias may blunt any intervention effect of the trial for generalising research findings.
- The quantitative findings of this exploratory study were limited by the non-randomised design and small sample size.
- There was no control group (like activity as usual or attention control or other online activities, hence the results cannot be presented with confidence.
- Despite using several questionnaires, each tool has its own limitations, particularly for the observational questionnaire.

- There could be inconsistencies in obtaining data such as carers or staff helping some participants in reading and receiving answers for the self-administered questionnaires.
- Despite knowing the benefits of both audio and video recording and gaining informed consent from the participants, due to the poor-quality audio and inability to record video, data analysis was limited to the written notes and answers to the open-ended questions.
- Despite preparing and adapting the GCCWOT observation tool for collecting overall well-being including ill-being data, no video was recorded. Hence, missing overall well-being/ill-being data.
- I acknowledge that during this research I formed a relationship with the staff and participants which may have influenced the findings of the trial study.
- Although the research has produced a wealth of data and to some readers, this may look overly analysed considering it as a feasibility study. However, I made the best use of valuable data. Despite that, I wanted to further analyse data to evaluate links between outcome measures of each resident, it was not possible in the limited time and resources.
- Follow-up data were not collected due to limited-time access and the inability to visit the care home. This resulted in a limited exploration of the long-term usefulness and implication of the ABD activities in practice.

9.6 Outputs as a result of this research

Dissemination as a result of work from this thesis includes both academic and non-academic. Considering the academic perspective, learning from the feasibility as a process is an outcome itself. This thesis presents the feasibility of an ABD intervention to optimise older people's QoL and mental well-being residing in care homes. This thesis presents useful information useful both for researchers who are considering research in care homes or those who want to design ABD intervention and for funders who review intervention-related grants. The feasibility study mentioned thesis will also help to reduce threats to the validity of the main intervention and to prepare for a future larger trial as the focus of feasibility and pilot testing was to prepare for the successful delivery of future trials (Eldridge et al., 2016b; Tickle-Degnen, 2013). Regarding non-academic output, the creation of creative outputs such as arts, crafts and stories created in this research supports self-expression, they were outcomes themselves which participants proudly presented to others as shown in Figure 43.

Figure 43 Aesthetic output art and craft produced by participants

The ‘Pathways to Impact’ by Research Councils UK and REF have recommended using research findings to create an impact outside higher education demonstrate as the impact is a central driver in UK research policy (Wilkinson, 2019). Therefore, both academic and aesthetic outputs which demonstrate the effect of research within the real world and the review for the quality of research was created and shared by other researchers. Table 38 shows the research outputs which include posters and oral presentations in conferences, published work, highlighted in the newsletter and aesthetic outputs.

Table 38 Research output from PhD research

Research output	Details
Poster presentation	-Dementia Action Week, HEI Dementia Network meeting at the HLS Coventry University (21st - 25th May 2018) -International Conference on Global Health and Epidemiology, (20– 23 August 2018) at the University of Wolverhampton -The World Health Care Congress Europe conference 2019 (5-7March 2019) -PERC Symposium 2019 (IDP2019), Seminar February 12–14, 2019 to give at Chiba University in Tokyo, Japan. -Posters were published in the PhD Magazine on the 6th of July ,23 August23rd, and 2018 10th of March 2019.
Oral Presentations	-CTPSR Summer School (15-18 May 2018, Coventry, UK). -International Conference on Global Health and Epidemiology (20-23 August 2018, Wolverhampton, UK) -World Healthcare Congress Europe 2019 (5-7 March 2019, Manchester). -Pecha Kucha presentation at Coventry University DCAD20 conference (25 March 2020).
Aesthetic outputs	Digital, creative and craft produced by the participants.
Mentioned in the News/Media	WCS Care newsletter (WCS, 2020- Page 8-9).
Published articles	Registered a systematic review was (CRD42018082653) published at PROSPERO (Nafis et al., 2018).

9.7 The original contribution to new knowledge

An important impact of this research is developing a new understanding. By fulfilling the aim of exploring the ABD intervention, my research sought to make an innovative contribution to knowledge in two key respects where the knowledge gap was found. First, a new understanding of blending traditional art and craft with culture (museums) ABD apps in a health context and exploring the feasibility study and the potential impact of ABD activities. Second, due to the heterogeneity of theories, an innovative blended theory NBHAM was introduced and tested for the ABD intervention.

9.7.1 Contributions to the novel theoretical concept of NBHAM

At the time I undertook this PhD, ABD activities intervention did not appear to have been used as an intervention within the care home in the UK for older people or PWCI. Thus, there was no single appropriate theory to build ABD interventions because variations of theories by disciplines highlighted the need for theory development, exploration and consensus. As a contribution to new knowledge, this research has proposed a new understanding of the concept of combing the hierarchy of needs and the healthy ageing models for designing a new model of the Needs-based Healthy ageing Model (NBHAM). The combined model was used d to develop the ABD intervention and outcomes were

analysed with a lens of the NBHAM. The model was tested and evaluated (Chapter 8) and found to help the exploration of ABD intervention focusing on the needs of each resident as a unique person even in the group settings. However, as the research was conducted using a small sample size in a specific care home, further evaluation will be required to confirm the efficacy of the NBHAM.

9.7.2 Contribution to the new knowledge

Acknowledging the limitations of a feasibility study, the results are presented tentatively and keeping in mind that the pilot trial of ABD intervention was a small scale, short period trial in a unique care home with no aim to generalise its findings to the wider population. Nevertheless, this is empirical research to date, that has explored the novel conception of blending traditional arts and crafts with digital technology using the ABD app to promote healthy ageing in care homes. This work is the first step to inform the value and explore the feasibility of ABD intervention and its potential impact on health. Taking a collaborative approach and using the NBHAM theoretical framework, this research provides a knowledge base for larger trials of ABD intervention in residential care. It provides practical information about designing and delivering ABD intervention to promote healthy ageing in care homes.

The new understanding is mentioned throughout this thesis and the development of NBHAM is mentioned in chapter 4 and evaluation in chapter 8. As the value of process over product, the value lies beyond the sense of completion, therefore, the process of research will continue. For future studies, an honest reflection on the development of ABD interventions, data collection method, findings and challenges of real-life care home settings have been provided. The right context and relevant information about how future research can be created successfully which I will publish for complimentary research outputs. Further robust evidence will be gathered using multicentre RCT to robustly evaluate the ABD intervention with longer follow-ups to confirm early promising results, a plan which I want to explore in my post-doctorate research. This research has produced valuable and practical information about the process of how the ABD intervention was and can be designed and what outcome measures were which can be used. Practically, this thesis can be beneficial for carers, staff, managers and care providers who want to promote healthy ageing in care homes. Given the alarming health situation of the vulnerable older people in care homes, particularly after the COVID-19 pandemic, the focus of new research is on innovative digital research that can help and maintain care home residents' health and improve social interactions for healthy ageing. In this sense, based on the positive change and health benefits, ABD interventions have the potential to be used by geriatric

researchers in pursuit of innovative activities for healthy ageing in care homes. This may be useful for policymakers who make decisions about the use of meaningful activities and develop policies for care homes. This research found that motivation to engage stakeholders was depending on, 'what for me is in it' as mentioned by Rycroft-Malone et al. (2015). In this regard, the benefits for the stakeholders and the potential beneficiaries of this research are summarised in Table 39.

Table 39 Potential beneficiaries of this research

Stakeholder	Benefits
Residents	• Practical examples to assurance that the ABD interventions have the potential to bring health benefit and can improve their QoL, well-being, cognition and social health.
Care home	• Practical knowledge, challenges are provided to guide care homes to use ABD activities as a meaningful fun activity.
Researchers	• Guide researchers for practicalities researching should consider when planning research in care homes. • An honest and clear description of all stages to structure digital intervention proposals. • -Lesson learned and challenges presented to guide what kind of expertise would be required.
Research funders	• The potential impact presented for the ABD intervention can help funding applications. • For referees to assess and review proposals against the practicalities and challenges for research in care homes.
Intervention developers	• A conceptual and theoretical framework for the ABD intervention which clarifies the development stages for digital interventions, therefore, can be used to increase the chances of success of the intervention.
Policymakers	• Reassurance that the ABD interventions are feasible and can be used in care homes to bring health benefit.

9.8 Research impact

To extend the answer to question two about the impacts of ABD intervention, it includes all types of impacts. As researchers should be well equipped to capture impact (Wilkinson, 2019), therefore, from the beginning of this intellectually stimulating PhD journey. I was focused on collecting the evidence regarding the research impact which helped me to think sensitively. However, one of the largest challenges was to provide evidence and to express how the research impact can be assessed as definitions, boundaries and assessment outcomes are not set concrete (Wilkinson, 2019). Conversely to the ageing in community, the situation in care homes is different where older people live with physical and cognitive impairments. Despite physical or cognitive dependency, a variation in frailty, resilience and positivity within the residents was observed in this research. Hence, there is no doubt that frailty associated with ageing play an important role in the ability to live independently and increases the need to move into care homes. The decision to move into a care home is

often driven by family members who feel that they cannot provide the support required for their older family members. This research shows that cognitive frailty can be independent of other functional frailty and that cognitive impairment is not always associated with illness. Hence, many cognitively impaired residents live without any diagnosis of dementia. In this sense, cognitive impairment in care home residents is often normalised and not diagnosed as found by De Roeck et al. (2020). Although ageing is an unavoidable process, frailty can be avoided and ageing can be made successful or healthy. This research has played its role in providing a real-life care home, but a deeper understanding of the ABD intervention in fulfilling the needs of older people in care homes will be required. Future research must see the full diversity of people within care homes. Improving functional and cognitive function can reduce dependency, the burden on carers, health and social service resources. Hence, the emphasis of ABD intervention was on positive ageing and promoting healthy ageing.

The ABD activities changed carers' perceptions of what the residents were capable of such as learning new skills to use iPads. This, in turn, resulted in more awareness about the residents' abilities and influenced staff and carer relationships with residents. Using ABD activities, this research provides key insights into how ABD intervention can promote healthy ageing in a care home. Furthermore, the inclusiveness of the participants and care home staff were identified as 'vital' for designing targeted ABD interventions in care homes. This research sets out a path for further research explorations and the development of concrete ABD intervention, for enriching the everyday lives of older people in care homes.

9.8.1 Impact on researcher's understanding: self-reflection

It may look like that this PhD research was a smooth process, starting from an idea to a proposal that gains ethical approval and ending with timely outputs. In practice, despite all of my best efforts to plan carefully to execute this study, things went wrong on several occasions when I had to take strong and unwanted decisions such as changing supervisory teams etc. Hence, I agree with Streiner & Sidani (2011) that research is more like an uneven dirt track with confusing side roads. As this research was uniquely situated at the intersection of arts, health, digital and social sciences, I was ready to face the challenges of interdisciplinary research and considered problems as opportunities. Talking guidance and consulting with my supervision team, was greatly helpful as they had the expertise to suggest alternative ways of considering everything and evaluating each step.

The usefulness of any research findings depends on improving researchers' research skills (Connelly & Peltzer, 2016). Regarding the perceived benefits of my own positionality, this research changed my mind and develop a better understanding of the care home population, their needs and I observed sad moments but also witnessed when residents were full of life. Regarding an impact on my research skill, I previously only used quantitative methods as they are most popular in clinical research. Using mixed methods in this study has provided an in-depth understanding of qualitative further polishing my quantitative research skills. I learned to deal with the problems such as report writing, time utilisation, managing multidisciplinary teams, research partners' changing requirements, things that just do not look right or when they are contradictory; and the emotional aspects of dealing with challenges when research goes wrong. The extent of the challenges that I faced during my research in care homes, e.g. living in a care home, using new software apps and innovative activities, helped me to learn new research skills. Overall, this research gave me insights not only to understand problems or my own contribution to problems but also how to address them.

As a learning process, this research brought some positive change in my thinking related to the care home staff and residents. My reflections shaped me in many ways and have led me to consider the relationship between myself and the residents and staff who were kind enough to share their time and thoughts with me. I got a better understanding of what meaningful collaboration means and about the needs and challenges which are faced by residents and staff in care homes. This depth of understanding was facilitated by living in a care home. I gained more knowledge about the interdisciplinary, collaborative and partnership research process.

Although recognising one's commitment and passion that one can put into the research journey may look odd, I recognise my dedication, perseverance and inspiration passion. Indeed this cannot happen without the guidance of my supervisors. Coventry University secured funding and allowed an opportunity to start my PhD process, but completely relied upon my commitment and enthusiasm. This reflects an admirable array of personal qualities to take challenges as opportunities, recognising the considerable potential to participate in innovative health and well-being initiatives within care homes that can meaningfully address the needs of promoting healthy ageing in care homes.

9.8.2 Cultural impacts

The UK is a place of wide-reaching world-class arts sector which is diverse with evidence of its potential to transform people's lives, solve social problems and improve people's health and well-being (Daykin & Josh, 2016). However, older people in care homes are often isolated, marginalised and disconnected from the cultural art activities or traditional arts activities in the community outside the care homes. Similarly, the cultural element is often missing in arts-based interventions. Therefore, ABD activities included elements of culture and used arts from famous art galleries and museums. For residents who were physically unable to go out into the community and attend galleries and events as they use to do in the past, the Armchair Gallery app produces a similar effect as an actual museum visit which made participants happy. It helped them to connect with other residents and staff in a discussion of artwork from different museums and the findings provide some optimism that ABD intervention brings participants close to museums as part of the culture. Although the data analysis for cultural impact was limited as the time effect was relatively short, the findings provide some optimism that ABD intervention brings residents, who were unable to regularly visit museums, close to culture using digital technology and apps. As learning is important for healthy ageing, the socio-cultural element towards re-connecting cultural heritage by using apps like Armchair Gallery also facilitate learning because people learn as participators in social activities (Eraut, 2012). This also helps to build a more cohesive community in care homes.

Considering culture as a shared norm, habits, values, beliefs, learned patterns of behaviours and expectations learned and maintained, but influenced by developmental experiences, social norms and contexts, perceptual, cognitive and attitudinal processes (Veissière et al., 2020). In the ABD activity sessions, participants reflected on care home and their own cultures and how these influenced their perspectives on health care which contained some confidential information were not revealed in this thesis as researchers should understand the ethical issues of revealing confidential information as highlighted by Ellis (2007).

9.9 Implications of ABD interventions

The ABD intervention achieved its recruitment and retention targets and the positive change in outcomes shows that the ABD activities have the potential to engage residents and can be offered as weekly fun activities. The vulnerability of the socially isolated care home population is evident during COVID-19 (Comas-Herrera et al., 2020). This situation has enhanced the importance of innovative digital activities like ABD intervention which has the

potential to be implemented in care homes. Thus, ABD interventions can be offered as part of routine practice in care homes to promote healthy ageing which is a priority set by WHO for 2020 (WHO, 2020d). However, further evaluation will be required across a range of contexts, populations and subpopulations for implementation. Key practical and learning points from this research, useful for future trials, are presented in Table 40.

Table 40 A summary of learning and practicalities of the research project

Evidence type	Learning/understanding	Practicalities
Ethical and data protection	• The issues with taking informed consent and data protection and safety of using digital technology. • Using appropriate language and terminologies. • Issues of bias selection. • Establishing a strategy for anonymisation.	• Limitation for accessing care homes and residents. • Time to get ethical and gatekeeper's approval. • Considering selection bias. • Applying the ethical principles of consent taking, data collection, reporting and avoiding potential harms on health and safety in practice.
Literature review	• Recognising the importance of arts and digital activities for older people in care home settings and identifying the theoretical base and gap in knowledge.	• Time, resources and expert support needed to identify the key search words and relevant database when using interdisciplinary research.
Quantitative	• Identifying and testing the relevant outcome measures and understanding about the limitation of the outcome measures	• Small sample size, availability of control group, training for specific questionnaires i.e. MoCA test or using observation tool and inter-rater reliability and validate, knowledge to collect and analyse data.
Qualitative	• Understanding the circumstances, care home environment, residents and staff's perspectives	• Technical knowledge to collect and analyse data. • Understanding the reasons for retention or withdrawal and creating themes to explore the themes.
Dissemination	• Personal dispositions, trying to avoid personal, stakeholders' influence of researchers' beliefs. • -External validation by supervisors for reporting	• Understanding stakeholders' agenda. • Avoiding reporting bias or unnecessary. • Generalisation of research findings. • Considering any resources and time required for wider dissemination.

9.10 Generalisability and transferability

Though quantitative researchers tend to generalise their findings, qualitative researchers do not seek to generalise their findings to a wider population (Daly et al., 2020). However, this mixed methods study was not intended to generalise its findings to other populations. There were several reasons for it such as:

- Care home settings not only vary with the type and level of care they provide, characteristic of their residents, time of the intervention delivery but also varies geographically from country to country. The intervention was targeted for a specific care home population within a unique care home setting in the West Midlands, UK. Therefore, what is found to work in the selected care home setting may not work in other settings or other parts of the world due to the difference in care home settings discussed in Chapter 1.
- The standard trial method used in this research had no comparator. Therefore, results may be predicated on having a highly specified intervention which makes it hard to apply to other settings or other digital or art interventions.
- Though each step of ABD intervention is mentioned in this thesis to increase replicability, based on the number of diverse forms of arts and artistic activities including aesthetic outcomes it may be difficult to replicate in the same manner. This is because arts-based interventions are difficult to replicate consistently and reliably (Kim et al., 2020).

9.11 Recommendation for future research

As feasibility studies produce a set of findings that help to determine whether an intervention should be recommended for further efficacy testing (Bowen et al., 2009). This thesis determines that ABD intervention was feasible in a care home by exploring and providing valuable insights into the ABD intervention in real-life care home settings. However, considering a large variation in the cognition level of the participants and the variations in the care home population, the results do warrant further exploration into the possible impact that the ABD intervention may be having on residents with undiagnosed dementia. Future research can build on this research to evaluate the impact of ABD intervention on health. Larger trials with control groups in multiple care home settings are recommended to robustly evaluate ABD intervention. RCT design with longer follow-ups can confirm early promising results of the impact of ABD intervention. It may also help to minimise bias and for an in-depth longer-term evaluation of the impacts of ABD interventions.

Areas that can be explored in future trials are:

- An increase in social interaction was reported by staff during the ABD intervention which indicates a positive impact of the ABD interventions on social health. However, this research did not measure social connections using a specific tool. Therefore, future research can explore their intrinsic value by using an evidence-based questionnaire to measure engagement and interactions.
- Further investigation to clarify the utility of each component of the multidimensional complex ABD intervention in improving quality of care.
- Considering globalisation and demographic changes in the UK, reflecting increasing diversity, evaluating a culturally sensitive ABD intervention with residents from diverse backgrounds. Ethnographic study with resident and staff perspectives at the pivot of the research question, rather than to attempt it to include their perspectives within broader research questions.
- Though depression and cognitive impairment can negatively and independently impact QoL, no data analysis was done to explore any link between them. Hence, the link between the different domains of ABD intervention such as the association between QoL and social interactions in the context of ABD intervention to explore social connections using an evidence-based tool remained an area of further investigation.
- Economic realities are important when planning any intervention in care home settings (Travers et al., 2016). Therefore, collecting socioeconomic data to increase socioeconomic diversity for a true representation of the British care home population. Evaluating the cost-effectiveness and economic benefits of the ABD intervention.
- In this research, the Armchair Gallery app was used for ABD intervention to engage residents in meaningful creative and cultural activities. However, as technology advances and new apps become available, other apps can also be tested for future ABD intervention.

To conclude the discussion, this has thesis achieved key aims and objectives by exploring the ABD intervention in care homes and offered evidence that should be considered in combination with other limitations (chapter 9) of research in real-life care home settings. The research project is summaries in a quad chart to help other researchers who are planning to develop ABD interventions (Table 41).

Table 41 Quad chart PhD project

Quad chart of the PhD project	
Why this research was needed?	**What methods were used?**
P**roblem** Despite the benefits of arts-based cultural activities such as visiting museums to promote healthy ageing in care homes, the population is deprived of these activities. OPLICH were socially, culturally and digitally isolated due to their functional and cognitive frailty and dependency which negatively impact on their QoL and well-being. The realistic review revealed the benefits of Arts-Based Digital (ABD) activities, but limited research on the ABD intervention in care homes. **Solution** Advance mobile technology and arts-based digital well-being software and Arts-based digital (ABD) Intervention can decrease the social, cultural and digital divide among older people in care homes and have the potential to improve QoL and well-being of this population. **Research problem** A knowledge gap was revealed through literature and realistic review about the feasibility and the impact of ABD activities on the health of older people in care homes.	**Theoretical framework** Innovative combined essential Needs based model and Healthy ageing model (NBHAM) **Methods** Mixed methods feasibility trial with pre and post-test experimental design. Data collected before and after the intervention to explore any change after ABD intervention. **Primary outcome measures** Quality of life (EQ5D-5L), Well-being (SWEBMES), Cognition (MoCA test), Mood (ArtsObs), **Secondary Outcomes:** Depression (GDS), Computer proficiency test, Confidence, happiness, mood, confidence & engagement.
How the research problem will solve?	**What this research found?**
Aim To fill the knowledge gap about the feasibility and the impact of ABD intervention for older people in care homes. **Research Questions** What is the feasibility of ABD intervention in a real-life care home setting? What are the health impact of ABD intervention on older people in care homes? **Objective**s Study 1: to explore literature, Study 2: to consult stakeholders and conduct focus groups to assess needs, Study 3: to test feasibility and pilot trial of the selected app and evaluate results **Approach** A collaborative approach to design the feasibility research by involving research partners (care homes and app developers). Activity sessions were approach using a person-Centred approach. **What was the intervention?** A 6 weeks' feasibility trial of ABD intervention utilising iPads and arts-based digital app (Armchair Gallery app) for 45-60 minutes' weekly group activity for older people in care homes.	**Results:** Though ABD intervention was a complex and challenging intervention in care homes, it was a feasible and targeted health intervention for OPLICH. Recruitment and retention targets were achieved. Positive changes were seen in both primary and secondary outcomes. The ABD intervention has the potential to improve QoL, mental, cognitive and social well-being of OPLICH. Qualitative data showed improved social interaction, empowerment and increased engagement. ABD intervention improved confidence and brought happy moments and sense of achievement for both residents and staff. ABD intervention was feasible, practical and acceptable for both staff and residents. **Output and impact** Both academic (thesis, conference papers, and non-academic (aesthetic) output were produced. **Recommendations** Further robust evaluation using multicentre RCT trial of the ABD intervention will be required to confirm results obtain from this research.

9.12 Conclusion

This multidisciplinary research was built on a collaborative approach in which care homes became research partners. This research has explored the feasibility of engaging older residents in meaningful ABD activities in which traditional forms of arts and crafts were blended with culture using digital health technologies. The innovative combined approach of Hierarchy of Needs and Healthy Ageing produced a framework, 'Needs-Based Healthy Ageing (NBHAM) was successfully used to guide this research. Thus, contributes a new theory in the multidisciplinary field useful for ABD interventions.

This research has enabled me to confidently present and make safe assumptions about the impact of ABD intervention. The mixed quantitative and qualitative methods research design, using a personalised approach, selection of several evidence-based subjective and objective data collection instruments, systematic data collection strategies with good control of the process, triangulation for obtaining validated results not only coherently shaped this research but also helped in answering the research questions and delivering the intervention as intended in a challenging real-life care homes. Overall, the study was successful in achieving its aim and objectives by meeting recruitment targets, collecting validated data, exploring the potential impact of ABD activities on residents' health and evaluating the process of ABD intervention for promoting healthy ageing in care homes while decreasing the digital and cultural divide among older people in care homes. This thesis has contributed to a valuable understanding and practical knowledge of the feasibility, factors that are likely to facilitate and challenges when conducting ABD intervention in real-life care homes.

The process mentioned in this thesis can be used to anticipate and interpret outcomes, and acceptance of ABD interventions for the older people in care homes, who are unique in their demography and characteristics. This will help other researchers to plan more persuasive, feasible, relevant and targeted ABD digital interventions in care homes. It is acknowledged that it may be difficult to draw a definite conclusion about the definite impact of the ABD intervention based on the small sample size and dilution of the outcome of statistical analysis. Yet, numerous benefits were perceived after the ABD intervention as positive changes were recorded in functional (QoL), cognitive, mental, emotional and social health. Despite facing numerous challenges of living in a care home, I witnessed happiness and excitement on previously sad faces during and after the ABD activities. This forced me to conclude that more innovative meaningful activities like ABD activities are required for older residents to promote healthy ageing in care homes. This feasibility study has played

a crucial role to prepare for larger trials and will be useful to reduce threats to the validity of future ABD interventions. Looking at the perceived benefits of ABD interventions and considering all challenges, I can confidently conclude that the ABD intervention is a feasible and worthwhile option to meaningfully engage older people living in care homes. This thesis has provided a base on which more robust studies can be built as research is a continuous process and not an end product (England, 1994).

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APPENDICES

Appendix A Decision matrix for secondary research

Review type	Reasons to consider for this research	Reasons to reject/select
Mixed methods review/mixed studies review	Could be used to combine methods including retrieving all studies or separately conceived qualitative and quantitative strategies	It requires a very sensitive search, therefore after considering logistic and time limitation
Systematised review	Could be used to provide the basis for a more extensive systematic review process, but may not fulfil the requirement for a full systematic review. Could include comprehensive searching and quality assessment.	Rejected due to the imitations of methodology, uncertainty around findings and lack of methodological considerations.
Umbrella review	Could be used to compile evidence from multiple reviews Focuses on the broad problem for interventions and includes reviews that address those interventions and their results. . Quality assessment of studies within component reviews and/or of reviews themselves and recommendations for future research. The analysis could be tabular and graphical with a narration.	Could be used for the identification of reviews, but it is not suitable to search for primary studies. In the absence of previous reviews on the topic, it was not feasible for this research.
Scoping review	Could be used to specify a viable review by a preliminary scope of available research literature. Characterises quality and quantity of literature by study design and other key features, but no formal quality assessment. To identify the extent and nature of ongoing research evidence.	Only a preliminary evaluation of the potential scope and size of available research literature. Another full systematic review would still be needed.
Realist review	The completeness of searches is determined by scope and time constraints which could include research in progress. Iterative process Exploratory and explanatory on how interventions work, context, why and how. Non-linear involves stakeholders	Fulfils the aim of identifying the nature and extent of interventions. Robust like a systematic review Iterative process Transparency in reporting of methods to replicate the process

Matrix of evidence-based secondary research (Adapted from Grant & Booth, 2009)		
Review type	Reasons to consider for this research	Reasons to reject/select
Critical review	Literature could be extensively researched and critically evaluated. Could evaluate the previous body of work and results in hypothesis or model and seeks to derive new theory.	Limited published literature on ABD intervention therefore, an evaluation was not the focus. It lacks a formal quality assessment with no systematic methodology.
Mapping review/ systematic map	Could be used to identify the need for primary or secondary research Could be used to map out and categorise existing literature to further reviews or primary research Could be used for identifying gaps in the research literature. Completeness of searching determined by time/scope constraints.	The need was already identified by the initial mapping literature review Lacks formal quality assessment, synthesis and analysis of the considered approach.
Rapid review	Could systematically review methods to search and critically appraise existing research, but time-limited formal quality assessment The completeness of searches is determined by time. Assessment is about a policy or practice issue and analysis is tabular and narrative. Quantities of literature and direction quality of effect of literature.	Lack of both systematic methods and explicit reporting, Overlook inconsistencies or contradictions. Includes less sophisticated search strategies, fast-tracked or even sidestepped carries the risk of introducing bias.
Qualitative systematic review/ Qualitative evidence synthesis/ Meta-ethnography	Could be used to broaden understanding or to look for 'themes' or 'constructs' in qualitative studies. Could use selective or purposive sampling and quality assessment Inclusion/exclusion and insights are generalisable. Qualitative, narrative synthesis.	The method for comparing findings from qualitative studies only. Missing studies using other methods
Systematic review	An exhaustive, comprehensive systematic search for appraising and synthesis research evidence and adheres to guidelines on conducting a review. Could inform what was known and what remained unknown by drawing together all known knowledge The quality assessment could determine inclusion/exclusion to provide insights about the effectiveness of the intervention for recommendations for future research	Uncertainty around ABD interventions. Only a limited number of peer-reviewed published articles which were heterogeneous Grey literature could not be included due to the poor quality Strictly adhere to the guidelines to conduct a review provided by the Cochrane Collaboration.

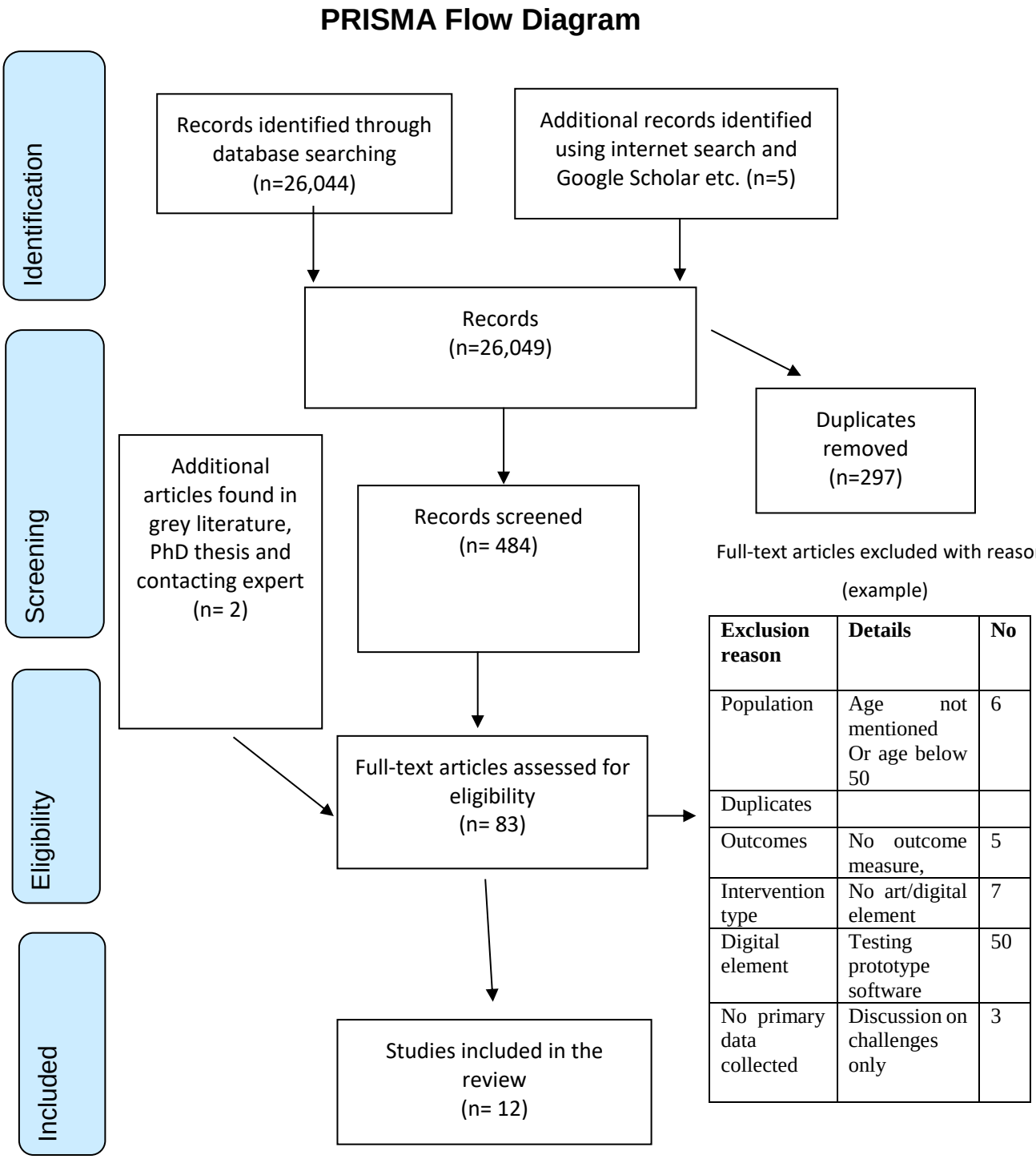
Appendix B Key search terms strategy PICOTS for the realistic review

Key search words and terms for realistic review of ABD intervention	
category	
population	(MH "Aged") OR (MH "Aged, 80 and Over") OR "older adult*" OR elderly OR aged OR senior* OR geriatric* OR ageing OR "age-related" OR “older people” retired OR "over 60" OR "60+ years" OR "≥ 60" OR “65”
Intervention type	(MH "Art Therapy") OR (MH "Art+") OR "digital art*" OR "visual art*" OR art* OR "art view" OR "art intervention" OR "art-based" OR "virtual art" OR "art act" OR "art activit*" OR draw* OR sketch* OR doodle* OR paint* OR "art trial" OR "technology-based art" and (MH "Computers, Portable+") OR (MH "Internet") OR (MH "World Wide Web") OR "web based" OR tech* OR digit* OR app* OR tablet* OR computer* OR software OR hardware OR web OR internet OR online OR program* OR ipad OR "mobile device*" OR smartphone OR "cell phone"
Condition	(MH "ageing") OR “healthy ageing” OR “normal ageing” functional* OR “successful ageing” OR “active ageing” OR “cogniti*” OR “frail* OR functional disable*” OR CI* Or * OR "cognitive impair* OR "cognitive decline" OR "cognit* disorder" OR forgetfulness OR " OR “PLWCI" OR “PLCI” OR “cognitive impairment*”
Outcome	(MH "Quality of Life") OR "Outcomes OR “Health Care" OR (MM "Activit* of Daily Living") OR "quality of life" OR "health outcome" OR health* OR QoL OR "activities of daily living" OR ADL OR agitation OR cognit* OR mood OR mental* OR “well-being” OR “wellbeing” OR “wee-being” OR "health care utili?ation OR emotion* OR depress* OR engagement OR “social function*” OR behavi* OR “outcome measure*” OR outcome OR impact OR “burden”
Time	No limitation
Setting	(MH "Homes for the Aged") OR (MH "Residential Facilities") OR "care home" or "residential care" or "nursing home" or "residential home" or "long term care"

Appendix C Quality assessment checklist

Quality Assessment adapted from the Critical Appraisal Skills Programme (CASP, 2017).	
Qualitative studies	**Quantitative studies**
Defined aims of the research Appropriate Qualitative research Appropriate research design Appropriate recruitment strategy Appropriate data collection Relationship between researcher and participants considered Ethical issues considered Appropriate data analysis Findings described Value in research.	Defined target population Ethical issues considered Probability sampling Sample characteristics match the target population Sufficient response rate Standardised data collection Reliability of data collection instrument, The validity of data collection instrument Appropriate statistical methods. Value in research

Appendix D PRISMA Flow diagram for realistic review (ABD interventions)



Full-text articles excluded with reasons (example)

Exclusion reason	Details	No
Population	Age not mentioned Or age below 50	6
Duplicates		
Outcomes	No outcome measure,	5
Intervention type	No art/digital element	7
Digital element	Testing prototype software	50
No primary data collected	Discussion on challenges only	3

Appendix E Example of data extraction sheet (PICOST)

An example of the data extraction sheet PICOST for the realistic review						
Author(s) and date of publication	**Population & sample size**	**Intervention**	**Comparison**	**outcome measure**	**Setting**	**Timing**
Astell et al. (2010a)	**Study 1:** **Older People with No Dementia** N= 5, (men=2 women=3. **caregivers** (N= 5; 4 males). Age 62-79y (Mean= 72.2). Caregivers Mini-Mental State Examination (MMSE) and their scores ranged from 26 to 30 (Mean= 28). **Study 2**: **Caregivers** (N= 5; 4 males). 62 to 79 years of age (Mean= 72.2). Caregivers MMSE and their scores ranged from 26 to 30 (Mean= 28)	**Study 1:** Personal photographs (Family member selected 6 personal photographs which were shown to stimulate reminiscing, discussed with older adults using Laptop encouraged labelling and description against storytelling **Study 2:** generic photographs CIRCA software on Laptop to stimulate reminisce. The session includes storytelling. Content-type (scene, people, food) and colour format (black and white and colour on stimulating reminiscing Group activity with staff acting as a facilitator Sessions was audio & video recorded.	Traditional pictures (Era and Region)	Observation, interviews and questionnaires were used to see the difference between Personalised and non-Personalised photos using a laptop. Video recorded and coded. Participants' responses: The type and quantity of information and whether stories were told in response to the photographs. The analysis was on the stimuli compared to the speech production abilities of the participants.	UK Day-care and residential facilities care home	2 sessions for 20 minutes, but no time limit on how long the discussion could go
Astell et al. (2010b)	N= 22 (PWD=11 (F=6, M=5, staff=11) Age=65–95year (mean= 83.54) Mean age= 83.54 years (range Cognition: MMSE 9-25(mean 20.4). 23/30 (mild) 9 (severe), mean: 15.9	Touching the relevant category name on the screen Laptop, monitor, speakers Photographs, text, video (CIRCA) Prototype Photographs, video, music, touching category name on the screen (Era and region)	Traditional reminiscence.	The interaction behaviour of care staff and PWCI gaze direction Enjoyment (laughter)) mixed ANOVA. Relationships between caregivers and PWCI	UK day-care and residential facilities	Two 20-min sessions. the

Alm et al. (2007)	N= 18 people with moderate to serious CI (13 women and 5 men)	**Active group** using the prototype. Computer Laptop, monitor, speakers Photographs, text, video Interactive reminiscence Session and Conversation Aid (CIRCA) (Era and region). Prototype Photographs, video, music (Era and region). Videotaped the sessions and logged items accessed using the prototype.	Traditional reminiscence.	Video-taped and logged items accessed using the prototype. Acceptability & reactions to different interfaces Caregivers appreciated the system's ease of setup and use.	UK Day-care and residential facilities Dundee and Scotland	Not mentioned
Gowans et al. (2007)	Mild, moderate and severe cognition, based on MMSE	Use of 'Computer Multi-media i.e. CIRCA (Computer Interactive Reminiscence and Conversation Aid) by utilising specific' and 'general' prompts and, apps photographs of 6 annual events. Discussion about memories of each event alternate use of 'general' and 'specific' prompts. Recording of a family member, 3D animations and virtual reality environments	Traditional reminiscence	Video analysis of social, meaningful interaction like smiles, laughter, talking, singing and eye contact allied video analysis and simulation comparison between traditional and modern reminisce A questionnaire to record impressions of usability and design of the system 'usability' to record and gauge the impressions of both family and professional	Care facilities are located throughout Dundee and the North Fife Region of Scotland.	Not mentioned
Lazar, 2015 (PhD thesis)	Older adults living in the residential setting N=21 People with MCI N= 5 (n=4) with moderate or severe CI Older adults N=3 Staff N=9	Residential-based, recreational activity group for PWCI, leisure and reminiscence activities (video calling, memory games, puzzles, video Commercially available touchscreen monitor that can be plugged into an external monitor and could be wheeled from room to room. The system had a webcam, speakers and microphone.	No control groups	**Quantitative:** Demographics Examination (MMSE) GDS QoL in Alzheimer's Disease Cornell Scale for Depression in Dementia Resource Utilisation in Dementia Care **Qualitative**: Staff and Observation/interviews	USA Apartment of Senior housing community, 26 apartment memory care unit	Baseline, 1-6 month optional interview at three months, Weekly hour-long sessions with the researcher.

Leuty (2013)	N=6 Older adults over 65 age with mild-to-moderate dementia MMSE score of 10-24 out of 30, Therapist participants (No= 6) 2 years of clinical experience working with PWD	Computer-based art device Engaging Platform for Art Development (ePAD) To support art therapy in a group setting. Engaging PWD in creative art occupations. To pilot test the prototype of ePAD.	None	Questionnaires Likert questions for Engagement, usability, satisfaction effectiveness and efficiency of ePAD for therapists and older adults with mild and moderate dementia.	Creative Arts Therapies studio at Sunnybrook Health Sciences Centre	5 one-hour trials.
Tyack et al. (2015)	N=24 (12 PWCD, 12 caregivers)	Art viewing 5 sessions	No	**Quantitative**: Using visual analogue, visual analogue subscales QOL-Alzheimer's Disease Well-being. **Qualitative** (participants experience thematic analysis)	Society Dementia Café	5 times" for 2 weeks
Horwitz & Huss, E. (2016)	N=68 Residents (PWD) N=4 Nurses N=Two relatives N=4 playmaker	Technology/internet-based visual art) playmaker Intergeneration (Art viewing and making) First meeting with playmaker (young person) Then afternoon group activity Tablet	No	Observation/interviews Phenomenological impact Non-verbal embodied communication, emotional mind, arts in health and psychosocial intervention	2 residential wards in Sweden	Not mentioned
Mihailidis et al. (2010) multi-national survey,	Participatory design	-Art-therapist and people with dementia as an engaging platform -Art Development prototypes	No	Survey and ethnographic analysis, structural implications and design implications, behaviour, engagement and colour response	Canada (88), the UK (39), Ireland (1), The Netherlands (1), Switzerland (1), Taiwan	Not mentioned
Duncan et al. (2018)	Report. No sample size mentioned	Armchair Gallery app. Session as workshops in different settings	No	Qualitative	UK	Not mentioned

Murphy et al. (2018) RCT	N=110	ArtOnTheBrain application 30 minutes sessions for 6 weeks 3 groups. (i) Waitlist Control (ii) Active group	Seniors Online Victoria 30 to 45 minutes twice per week, over 6 weeks	Primary: EQ-5D-5L Short Warwick-Edinburg Mental Well-Being Scale (WEMWBS), Short-Form Health Survey, Stanford Health Care Utilisation Secondary: Physical Activity Scale in the Elderly, Social Engagement Survey, Alternative Uses Task, Digit Span Test, Means-End Problem Solving, Art Engagement Survey, Life Space Questionnaire, Autobiographical Interview Results not available or published until Nov 2020	Canada, USA	30 to 45 minutes twice per week, over 6 weeks
Murphy et al. (2020) Feasibility trial	convenience sample N=31 Partner play (Female=25, Male=6) Group play (Female=14; Male=3) Age= average 86.8	Arts recreation activity using ArtOnTheBrain for 30 minutes sessions for 6 weeks. Groups of 5-6 participants led by a therapeutic recreationist using partner play	No	MoCA, GDS, Openness-to experience personality trait, WEMWBS, EQ-5D-5L Nonparametric tests Kendall's rank correlation method, Wilcoxon signed-ranks tests	USA care homes	30 minutes for 6 weeks

Risk Assessment for focus groups

Research Study: Focus group to explore arts-based digital activities for old people living in care homes.
Review date: 26/11/2018
Appropriate methods of work and precautions are identified as part of risk assessment.

Hazard/Activity	Plan	Risk level	Existing measures to control risk	Action required
Location Off-campus UK	Extra Care and residential care homes	Low	Location visited my supervisors	No
Time of focus group	Working hours during the day	Low	staff support will be available	No
Research environments	Safe	Low	Researcher and staff hold valid DBS clearance	No
Communication in emergency	Mobile and laptop	Low	Will have mobile data. Can call to inform the university of any problem ASAP. The extra battery bank will be kept	No
Health	Germs/bacteria	Low	Always wash hands before eating, preferably using antiseptic medical wipes.	No
Lone working	Select neutral locations Working	Low	Not working out of the eyesight of other people. If working alone I will ensure somebody reliable knows my location and have contact detail of phone, email to receive a safeguarding response.	No
Harm to people	No action will be taken that could harm anyone.	Low	Received Good Clinical Practice training	No
Causing offence to people	Will behave inconspicuously. I will be prepared to explain who I am and what I am doing.	Low	Will avoid aggressive behaviour. I will not speak in an officious way and will not pass comments on the people and environments I encounter. Be aware of any sensitive issues involved in discussions or interviews.	
Traffic	I will walk facing oncoming traffic in areas with possible kerb-crawling.	Low	I will keep myself busy and use well-lit roads. I will report any accidents or incidents to my supervisor.	No
Extreme weather	I will keep updated and will listen to weather forecasts	Medium	I will plan work accordingly, including appropriate clothing.	No
Attacks on people and property	Will plan my journey. Will carry a mobile phone	Low	I will avoid walking alone at night and keep to well-lit streets. Will leave any area immediately if I feel uneasy. I will not carry valuables or more money than I need to.	No

Are you interested in art and leisure activities using

Come and join us in the friendly discussion

Coventry University is arranging a focus group. You can share your views about using a computer, laptop or tablet for art activities.

We will have an informal discussion in a friendly environment. The discussion will last for 90 minutes but you have the right to withdraw anytime without giving any reason.

The participants will be asked to provide their consent for the voluntarily participate in the discussion.

Can I join the discussion?

You are welcome to join us. You can ask the staff to provide further details or contact researcher (Saima Nafis: Email: [redacted]).

Coventry University's Research Ethics Committee has approved this study.

PARTICIPANT INFORMATION SHEET (Focus Group)

Research Study: Exploring online activities for old people living with cognitive impairment or mild dementia in residential care home settings.

I am inviting you to take part in a focus group (small discussion group)
Date ----------
Time ----------
Location----------
Duration----------

This is an information sheet that explains what the research is and why it's being done. Please take your time to read this sheet as it's important you understand what the focus group is and why it's being done.

The study is a part of a PhD research project. It's up to you to decide if you want to take part. Please ask any questions if there is anything that isn't clear or if you want more information or email the researcher at [redacted]

What is the focus group about?
This focus group aims to discuss how online activities could be used to improve the well-being of older people living in care home settings. The focus group will provide you with an opportunity to share your views or to suggest ideas about engaging older people or people with memory problems in leisure online activities. Particularly, we would like to know about arts-based leisure activities for older people using a computer, laptop or tablet. The focus group will consist of no more than eight people. The discussion will be in a friendly environment at a location convenient to you. The discussion will be tape-recorded. At the beginning of the focus group, you will be briefed about the research and you will be given an opportunity to ask questions and discuss matters relating to your participation before the focus group. You will also be given the contact details of the researcher if you want to ask questions or need further detail. The information collected from this focus group will help us to design online activities to improve the well-being of the residents in care home settings.

Why have I been contacted?
I am contacting you because you are an old person living in a care home setting or you are a carer or a family member of the resident and interested in online activities for older adults. Your views/ideas/experiences are highly valuable to us and will help us to design meaningful online activities for the residents to improve their well-being.

Do I have to take part?
No, it's up to you to decide if you want to take part. Your participation is completely voluntary and you are not obliged to take part in this study whether you are a resident, carer, or a staff member of the care home. If you decide to participate

you can inform your organisation or researcher (Saima Nafis). You can also email the researcher ([redacted]) who will get in touch with you.

Why should I take part?
Your participation in the focus group is entirely voluntary and the participants will not be paid for their time. However, your participation will add to our understanding when designing leisure activities for older people or people living with memory problems living in care home settings. The information you give or the experience you bring to the project will help us in designing future leisure online or arts-based activities for the residents of care home settings.

What are the possible disadvantages and risks of taking part?
There is a time cost when taking part in the focus group discussion. It might also be that you find talking about the subject difficult or uncomfortable. You do not have to talk about personal experiences unless you want to and you can stop the discussion at any time if you do not wish to continue. We do not anticipate any disadvantages from taking part although, sometimes, people might at first be a little anxious about taking in front of other people or meeting new people or using new software or using an online activity. This will hopefully not be the case as the discussion will be in a friendly environment. If you are a staff member you will need to inform your line manager/organisation to get their permission and it might take some time from your busy schedule.

What are the possible benefits of taking part?
By taking part in the research, you will have the opportunity to have your say about online leisure activities for older adults. It will also give you the chance to contribute to research aimed to improve the well-being of older people especially those who are living in residential care homes**.**

Can I withdraw?
You can opt-out without giving a reason. A decision to withdraw, or not to take part, will not affect you in any way whether you are a resident or a carer or a staff member. To withdraw, please contact the lead researcher (email: [redacted]).

What will happen if I choose to take part in the focus group?
If you are happy to take part, you will be asked to sign a consent form. Participants will be given a number to anonymise the data. The focus group will run for approximately 90 minutes in a friendly environment. There will be 10 minutes break in the middle. In participating in this study, we would like to know more about your role if you are staff to help us to understand your point of view when designing activities for care homes. The discussion will be about the benefit or challenges of using online activity or technology for older people in care home settings. All the information you disclose during group participation will be strictly confidential.

You will also be given a chance to explore arts-based online activities or software applications on your own or with a partner or in a group. We are interested in knowing your views on benefits or challenges or any training you would think will

be required. You will also be shown some questionnaires to get your view which will help us to understand the difficulty level of challenges to fill these questionnaires.

What happens when the project is finished?
The information that is recorded during interviews will be written word for word and information will be analysed to compile results. You would be able to see your transcript and a copy of the focus group report, if you so wish, by contacting the research team. You can request to receive a brief written report or summary of the results. The non-identifiable data might be shared with other colleagues who are researching in the field and the report could be published in a national or international journal.

Will my data be kept confidential?
Yes, all information you give us and the content of the sessions will be confidential. Your data will be processed following the General Data Protection Regulation (2016). Information you give us will be stored in a locked filing cabinet and will be anonymised when the project is being written up so that participants cannot be identified. All identifiable information received from the focus group will be destroyed as soon as the audio recording are written. Direct quotations of what you have said in the tape recordings may be used in the final write up of the project. However, these will be anonymised and you will remain unidentifiable. Any information received from you on paper will be kept in a locked cupboard and will be destroyed as soon as a digital copy is made. All data will be password protected and will be stored within Coventry University's secure system. All the information will be destroyed after 3 years, in line with Coventry University's policy.

Can I withdraw my data?
You are free to withdraw your responses from the project data set at any time until the data are fully anonymised in our records in March 2020. You should note that your anonymous data may be used in the production of formal research outputs or publications (e.g., journal articles, conference papers, theses and reports) before this date. Therefore, you are advised to contact the researcher at the earliest opportunity should you wish to withdraw from the study.

Can I access my data?
You have the right to access information held about you following rules and regulations. You also have other rights including rights of correction, erasure, objection and data portability. For more details, including the right to complain with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your data can also be sent to the University Data Protection Officer (email: enquiry.ipu@coventry.ac.uk)

Who is organising and conducting the research?
The study is being organised by Coventry University. It is being funded by Data-Driven Research and Innovation (DDRI) Programme. WCS care Home and Orbit Housing group are participating in the DDRI programme.

Who has reviewed the study?
This project has been formally approved through the Research Ethics Committee at Coventry University, which is an independent group of people to protect participants' rights, safety, well-being and dignity.

What if something goes wrong or if I am not happy about something?
If there is anything you are unhappy about let the researcher Saima Nafis (email: [redacted]). Similarly, if you have any queries or if you wish to discuss the project further or want to receive more information, you can contact the researcher.

If you have any concerns that cannot be resolved through the researcher or if you have any complaints, you can contact
[redacted]

If you are still unhappy and want to complain further, you can contact:
[redacted]

Thank you for taking the time to read about this new project and we look forward to meeting you if you decide to participate in this focus group.

Your help is very much appreciated.

Participant No _____

Appendix I Consent form for the focus group

INFORMED CONSENT FORM

Focus group to explore arts-based digital activities for old people living in care homes.

You are invited to take part in this **focus group** for discussing/exploring online activities for older people or people living with dementia or cognitive impairment in care home settings. Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research.
If you are happy to participate, please confirm your consent by inserting your initials at the YES column against each of the below statements and then writing your full name and signing and dating the form as a participant.

No	Statements	Please initial
		Yes
1	I confirm that I have read and understood the Participant Information Sheet for the above study and have had the opportunity to ask questions	
2	I understand my participation is voluntary and that I am free to withdraw my data, without giving a reason, by contacting the researcher at any time until March 2019 as specified in the Participant Information Sheet	
3	I have noted down my participant number (top left of this Consent Form) which may be required by the lead researcher if I wish to withdraw from the study	
4	I understand that all the information I provide will be held securely and treated confidentially	
5	I am happy for the information I provide to be used (anonymously) in academic papers and other formal research outputs	
6	I understand and agree that the information I provide may be shared (anonymously) with the research team members and the research collaborators (Baycrest, WCS and Orbit housing groups)	
7	I agree to be filmed/ audio recorded (delete as appropriate) and for anonymised quotes to be used as part of the research project	
8	I agree to take part in the research project	

Participant's Name	Signature	Date
Researcher	Signature	Date
Saima Nafis		

Thank you for your participation in this research.

Focus Group Moderator Guide

Project title: Focus group to explore arts-based digital activities for old people living in care homes.
Researcher: Saima Nafis

Rules for the focus group

Thanks, participants for attending the focus group. The moderator will lead and direct the discussion. The session will last for approximately 60-70 minutes with a 5-10 minutes comfort break. You are under no obligation to continue your participation in the focus group and you may withdraw from taking part at any time, including choosing to withdraw your data. Data will be transcribed and analysed to get general themes. The benefit of participating in this focus group is that the results will help to develop targeted arts-based digital interventions in care home settings as the aim of this research is to improve the well-being and quality of life of older people living in care homes. The anonymised results could be published in journals or could be presented in conferences to share knowledge with a wider research community. However, all data will be anonymised and will be dealt with according to the General Data Protection Regulation 2018 (GDPR). Participants will be encouraged to contribute as we want your views. Try and let others speak and respect peoples' opinions, the moderator will intervene if necessary. Please be polite if you don't agree. The moderator will intervene if there is a point where everyone wants to say something, and let people speak in turn. It is important that everyone feel that they have had the opportunity to contribute and if anyone wishes he/she had something earlier in the conservation allow contributing point at the end of the focus group. Please remember that your contribution is very important and there are no right, or wrong answers and you will not be judged.

Hand out consent forms and name badges. Request participants to complete the consent forms at the start of the focus group.

Introduction (5 minutes)

Moderator to introduce first and briefly state her background, interest in the project, what the project is seeking to achieve and explain rules to the participants. Remind participants that all data will be anonymised and that only the general themes for the discussion will be reported.
("My name is Saima Nafis, I am a PhD researcher at Coventry University. I am interested in the health and well-being of older people. My PhD project is aimed to evaluate digital applications to improve the well-being and quality of life of older people with cognitive impairment or mild dementia who are living in residential care home settings. This focus group will help me in designing arts-based activities to improve the health of older people in care home settings. I will be asking questions and making comments/managing the discussion.)
It is important that you feel you have had the opportunity to contribute and if you wish you had something earlier in the conservation you will have the opportunity to contribute your point at the end of the focus group.
"Please introduce yourself by telling the group your name, whether you have had any personal or professional experience of using technology/touchscreen technology and online activities (this can include all touchscreen devices e.g., mobile, iPod, software app technology) with older people.

Semi-structured questions to guide the focus group

I will be asking a few questions to start our conversation; however, you are allowed to add anything you think will be relevant to the discussion. We have 80 minutes including 10 minutes break.

Use of software/online digital leisure activities	(15 minutes)

What comes to your mind when you think about arts-based digital activities?
To your knowledge, has the care home ever engaged in online activities or digital art or game activity using digital technology such as a computer or tablet?
If yes, what kinds of digital or online activities or programming does this facility offer for the residents in the residential home settings?
What personal experience do you have with digital activities?
Do the residents use online activities or software and if yes then how often are those activities offered?
What kinds of arts or digital activities do you or residents seem to like?
Do the residents like to involve in art or digital activities? If yes, do they like using activities alone or with a partner or in a group?

Integration of digital leisure activities in care home settings	(10 minutes)

Ideal programme
What do you think residents might like to do when introducing an arts-based digital activity if that is not currently available (in an ideal world, what kinds of art activities or programs using desktop or tablet would you have for the residents?
What special considerations (individual activity, group activity) would you think will be suitable for residents?
What would be difficult about the arts-based digital activity to residents?
Questions on training
Would you like to receive training on arts-based digital activity in your care home setting?
What would be the most useful method for giving training and what format would work best?

Comfort break	(5 minutes)
Introduction of software application / online activity	(15 minutes)

Questions on arts-based apps features
Demonstrate software applications such as ArtOnTheBrain or Armchair Gallery application.
Do you have any questions or comments on any of the features?

Benefits/Challenges of software application / online activity	(10 minutes)

Now that you have looked at these features, can you think which is the best feature you like and which feature do you like that might be more useful?
Which feature do you think is challenging when using or which feature you did not like?

Outcome measures tools or questionnaires	(10 minutes)

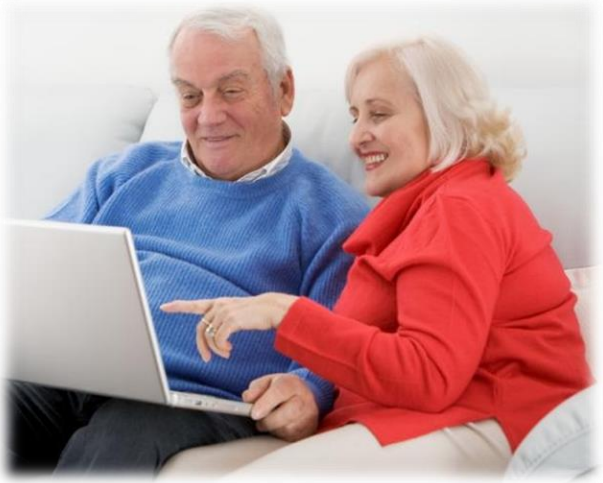
Hand baseline questionnaires to get their ideas. Walk participants through questionnaires and give them 5 minutes to fill out one sample questionnaire.
How it would best suit you to complete the questionnaire i.e., online or paper or pencil?
What issues do staff or residents face when completing the self-reported questionnaire?

Final Comments	(5 minutes)

What kind of support residents might require when filling the self-reported questionnaires?
Is there anything else you would like to add that we have not discussed as part of this focus group?

"Thanks, everyone for attending and giving us your valuable time"
FOCUS GROUP – END

Are you 60+?
Are you interested in leisure activities using computer or laptop or tablet?



Coventry University is conducting a research study to explore whether digital activities can benefit the health of older adults.

If eligible, you will be invited to play fun online activities twice a week, for 30-45 minutes at a time. The study will run for six weeks in total but you will have the right to withdraw anytime without giving any reason.

All participants will be asked to complete questionnaires before and after the study.

Can I join this study?

If you would like to know more about this study, please contact Saima Nafis (E-mail: [redacted]).

The Coventry University's Research Ethics Committee has approved this study.

Participant no _____

Participant Information Sheet

Project title: Exploring arts-based digital activities for old people living in care homes

I am inviting you to take part in the research.

This is an information sheet that explains what the research is and why it's being done. Please take your time to read this sheet as you must understand what the research is and why it's being done.
It's up to you to decide if you want to take part. Please ask any questions if there is anything that isn't clear or if you want more information. You can contact the researcher ([redacted]).

What is the project about?
This study aims to evaluate whether viewing and making arts on a tablet or iPad can benefit the health of older adults. For this study, we will be using a digital software application (App) known as Armchair Gallery App based on some visual arts or pictures and videos taken from museums or art galleries and natural history parks. It is specially designed for older adults and is free to download on an android tablet or iPad. If eligible, you will be invited to use an app known as the Armchair Gallery app as a fun art activity twice a week, for 30-45 minutes at a time. The study will run for six weeks in total. The participants will be asked to answer some questions or to complete questionnaires at the beginning, at the end and one month after finishing the programme. Care staff and the researcher will help you to fill questionnaires. These will help us in determining whether there is any positive influence on your well-being and quality of life of engaging with these digital activities.

Why have I been contacted?
I am contacting you because
You 65 years and over
You can consent yourself.
You are proficient in English.
You are interested in arts

Do I have to take part?
No, it's up to you to decide if you want to take part. Your participation in the study is entirely voluntary and participants will not be paid for their time. A decision not to take part will not affect you in any way and will not have any impact on your care plan or your job/work if you are a carer.

What do I have to do if I choose to take part in the project?
If you are happy to take part, you will be asked to sign an informed consent form. You will be given a number to participate which will also help us to anonymise the data.
You will be guided on how to use the Armchair Gallery app. You will be asked some questions to fill some baseline questionnaires which will take approximately 10-15 minutes to complete. At the start of 6 weeks, you will be guided to use the Armchair Gallery app for about 30-45 minutes twice weekly for six weeks. You can use the Armchair Gallery applications on your own or with a partner or in a group. If you are using the application yourself then a schedule of play will be determined by you and you will keep a log of

activity. If you are participating in a group activity, then the schedule will be determined by you or your care home management. If you are a part of a group activity, then you will be observed to evaluate well-being during the sessions and a video will be recorded only with your informed consent.

After 6 weeks, you will be asked to fill questionnaires such as questionnaires about your well-being, quality of life and memory function etc. As part of the evaluation, you will be interviewed by the researcher at the end of 6 weeks. If you like, you can continue using the Armchair Gallery app after 6 weeks. For a follow-up, we will contact you again after 1 month of finishing the activity. The same questionnaire will be asked to evaluate any difference in well-being and quality of life after one month of finishing the activity.

What benefit will I get if I decide to take part?
We are hopeful that you will enjoy the experience and benefit from meeting people with similar difficulties and find the activities stimulating and interesting. You will be provided with different enjoyable activities to which you will have access even after this study ends.

What are the possible disadvantages and risks of taking part?
There is a time cost as we will ask you to give up some of your time to take part in the study. We do not anticipate any disadvantages from taking part. Sometimes, people at first might be a little anxious about using the new software activity. However, this will hopefully not be the case as you will be guided on how to use art activities and you will be more comfortable using the Armchair Gallery app yourself after the first session. If you remain anxious or uncomfortable then you can inform us and we will make sure to offer you further advice and support.

Can I withdraw?
You can opt out at any time without giving a reason. You are free to withdraw your questionnaire responses from the project data set at any time until the data are fully anonymised in our records on 31st October 2019. A decision to withdraw, or not to take part, will not affect you in any way. To withdraw, please contact the lead researcher (Saima Nafis. Email: [redacted]

Will my data be protected and kept confidential?
All information you give us and the content of the sessions will be confidential. The information you give us will be stored in a locked filing cabinet in a secure office at Coventry University. All identifiable information will be destroyed securely on the 31st of October 2019 when all data will be anonymised. All data will be destroyed after 3 years from when the project is finished, in line with Coventry University's policy.

All the information you disclose during group participation gathered from the computer or collected from the paper questionnaire will be strictly confidential. Once audio data is transcribed, participants will be able to check transcripts and will be able to check and make any relevant changes. For observational data video recording will be used only to analyse well-being during the session and will be destroyed as soon as the observed data is validated. All artworks will be your property. Pictures of any artwork will be taken with your informed consent only. Direct quotations of what you have said in the tape recordings may be used in the final write up of the project. However, these will be anonymised and you will remain unidentifiable. Any names spoken during the audio recordings will be erased or anonymised from the audiotapes once transcribed and validated. Your answers will be treated confidentially and all data will be held securely at Coventry University. Information about how you use the application will be stored on a secure hosting platform and meet the General Data Protection Regulation 2018.

Can I withdraw my data?
You are free to withdraw your responses from the project data set at any time until the data are fully anonymised in our records on 31st October 2019. You should note that your anonymous data may be used in research, the production of formal research outputs/publications (such as journal articles, conference papers, thesis and reports) before this date. Therefore, you are advised to contact the university at the earliest opportunity should you wish to withdraw from the study.

Can I access my data?
You have the right to access information held about you following the rules and regulations. You also have other rights including rights of correction, erasure, objection and data portability. For more details, including the right to complain with the Information Commissioner's Office, please visit www.ico.org.uk. Questions, comments and requests about your data can also be sent to the University Data Protection Officer via Email: enquiry.ipu@coventry.ac.uk.

What happens when the project is finished?
You could request to receive a brief written report or a summary of the results. You will also be encouraged to continue using the enjoyable leisure activities however, you will not receive reminders from the research team to use these activities. The results will hopefully add to our understanding of memory problems and the benefits of an arts-based digital activity for older people with memory problems. The project report will be shared with local practitioners and published in a national or international journal. The anonymised data might be shared with other colleagues who are researching the arts-based digital app interventions.

Who is organising and conducting the research?
The study is being organised by Coventry University. It is being funded by Data-Driven Research and Innovation (DDRI) Programme. WCS care Home and Orbit Housing group are part of this programme.

Who has reviewed the study?
This study has been reviewed by an independent group of people in the Coventry University Research Ethics Committee to protect your rights, safety, well-being and dignity. The project has been reviewed and formally approved through the Research Ethics procedure at Coventry University.

What can I do if there is a problem?
If you have any queries or if you wish to discuss the project further or want to receive more information, you can contact the researcher (Saima Nafis; email: [redacted]
If you have any concerns that cannot be resolved through the researcher or if you have any complaints, you can contact Prof Andy Turner (Director of Studies) [redacted]
If you are still unhappy and want to complain further, you can contact: [redacted]
Thank you for taking the time to read about this new project and we look forward to meeting you if you decide to participate in this research project.

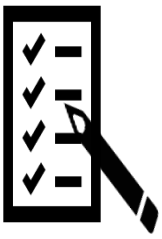
Your help is very much appreciated.

Why have I been chosen?

You are 60 years or over

2) You live in a residential care setting

3) You are proficient in English

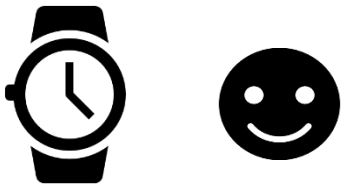


4) You are experiencing an age-normal cognitive decline or mild cognitive impairment or early dementia, but you can use a computer and able to give consent.

If you want to participate you will

5) Use tablet/computer and will have access to Wi-Fi to participate in online activities

6) Compliant with the activity for 30-45 minutes each week over the specified period of 6-weeks



Before your participation

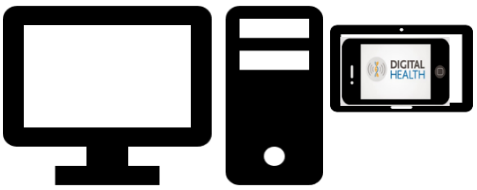
You will sign the informed consent form to agree with the term and conditions, but you can withdraw anytime without telling a reason.

You will be asked to complete a baseline demographic questionnaire. Pre-test questionnaires about your computer proficiency (self-reported) health, well-being, quality of life, depression and health care utilisation.

What do you have to do if you decide to participate?

Activity (6 weeks intervention)

You will be asked to participate in recreation or leisure online activities for 30-45 minutes twice a week for 6 weeks.



After 6 weeks of participation

You will be asked to provide answers to the same questionnaire (about your health, well-being and quality of life and health care utilisation) that would have been filled at the start of the search. You will be asked to fill the feedback questionnaire and will be interviewed to evaluate the impact of the activity.

I have read and understood the above information ☐

Thank you

Participant No.

INFORMED CONSENT FORM

Research title: Innovation for Dementia & Cognitive Impairment: Evaluation of Digital Health and Well-being Apps in 'Real-Life' Residential Care Settings.
Researcher: Saima Nafis

Before you decide to take part, you must **read the accompanying Participant Information Sheet (PIS).** Please do not hesitate to ask questions if anything is unclear or if you would like more information about any aspect of this research. It is important that you feel able to take the necessary time to decide whether you wish to take part. If you are happy to participate, please confirm your consent by writing your initial against each of the below statements and then signing and dating the form as a participant of this research.

No	Statement	Initials
1	I confirm that I have read and understood the Participant Information Sheet for the above study and have had the opportunity to ask questions	
2	I understand my participation is voluntary and that I am free to withdraw my data, without giving a reason, by contacting the lead researcher at any time until March 2019 when all identifiable data will be destroyed	
3	I have noted down my participant number (top left of this consent form) which may be required by the lead researcher if I wish to withdraw from the study	
4	I understand that all the information I provide will be treated in confidence, held securely and treated confidentially	
5	I am happy for the information I provide to be used (anonymously) in academic papers and other formal research outputs	
6	I understand and agree that the information I provide may be shared (anonymously) with the research team members at Coventry University and the research collaborators (Care housing groups).	
7	I understand and agree that my anonymised data may be transferred outside of the EEA and that I may not receive the same level of data privacy protection as in the UK	
8	I am happy for the interview to be audio/visual recorded (delete as appropriate) as part of the research project	
9	I agree to take part in the research project	

Name of participant: .....
Signature of participant: .....
Date: .....

Name of Researcher:.....
Signature of researcher: .....
Date:.....

Thank you for your participation in this research project

Appendix N Arts-based digital activity rules

Arts-Based Digital Activity Rules

There are a few rules that should be remembered when facilitating arts-based digital activities with older people.

Rule 1

Keep instructions simple. (Understand problems of ageing, cognitive impairment)

Rule 2

Listening to the answers carefully is very important to know what that person has to say. Provide space to talk about themselves and enable them to feel confident about whatever words they use and whatever way they choose to express themselves. Being listened to should be empowering participants.

Rule 3

There is no wrong way to answer a question. Let people talk about what they did. Acceptance is vital- correction is not required. Accept the words or phrases that someone chooses to use to describe a feeling or idea without comment. See the creative possibilities behind the word or phrase, painting or image. When somebody is excited or stimulated, they may want to talk about what they have done. It can also be very emotional, but all expressions should be valued.

Rule 4

Person-centred care- value the individuality of expression & encourage the contributions of each person. Reassure them that it was fun and that they did well.

Rule 5

There should be no embarrassment in encouraging other people to feel confident and safe to take part. Learn not to be afraid, to act on behalf of the people you care for. An activity or workshop initially may feel awkward, but after a while, the joy and power of the activity will lead the way.

Rule 6

Laughing should be with people and not at them to have fun together. Try to relax and enjoy the activities.

Rule 7

Deliver sessions that enable inspiration, imagination, creativity, enjoyment and celebration

Be positive!

The activity should be fun for all!

Enjoy the ABD ACTIVITIES.

Appendix O Participant's Activity Log

Participant's Activity Log

Project Name: Exploring the Impact of Arts-based digital activities
Researcher: Saima Nafis (Coventry University)
Activity Schedule:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
☐	☐	☐	☐	☐	☐	☐

Weekly reminder: (between 9:00 am – 9:30 am)

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
☐	☐	☐	☐	☐	☐	☐

Session	**Date**	**Start Time**	**End Time**	**Did someone help with the computer/tablet?**	**Did someone help with the activity?**
1				☐Yes ☐No	☐Yes ☐No
2				☐Yes ☐No	☐Yes ☐No
3				☐Yes ☐No	☐Yes ☐No
4				☐Yes ☐No	☐Yes ☐No
5				☐Yes ☐No	☐Yes ☐No
6				☐Yes ☐No	☐Yes ☐No
7				☐Yes ☐No	☐Yes ☐No
8				☐Yes ☐No	☐Yes ☐No
9				☐ Yes ☐No	☐ Yes ☐No
10				☐Yes ☐No	☐Yes ☐No
11				☐ Yes ☐No	☐ Yes ☐No
12				☐Yes ☐No	☐Yes ☐No

Appendix P Demographic data collection sheet

Background Survey

Project Name: Exploring arts-based digital activities for old people living in care homes
Researcher: Saima Nafis

Background Survey & General Cognitive / Functional Status

Participant No: Date: ……..

Age: …..years
Gender: ……..
Ethnicity: ……
Language: ……

Education history:

Some high school	☐
High school graduate	☐
College (non-degree)	☐
College graduate	☐
Some university	☐
University graduate	☐
Some postgraduate training	☐
Postgraduate degree	☐

Work history

Professional	☐
Non-professional	☐

Medical history

Mental or emotional problems requiring treatment

Yes ☐ No ☐

Neurological disorders (PD, AD etc.)

Yes ☐ No ☐

If yes then, time since diagnosed----------

Are you currently depressed/sad?

Yes ☐ No ☐

Are you currently anxious/worried?

Yes ☐ No ☐

Subjective health rating:

How would you rate your overall health at present?

Poor ☐ Fair ☐ Good ☐ Excellent ☐

1. Do your health problems stand in the way of you doing things that you want to do?

A great deal ☒ A little ☐ Not at all ☐

2. How would you say your health compares with most people your age?

Not as good ☐ Same ☐ Better ☐

COMPUTER PROFICIENCY QUESTIONNAIRE (CPQ)

Participant No: ……. Date: ……

Project Name: Exploring arts-based digital activities for old people living in care homes
Researcher: Saima Nafis

This questionnaire asks about your ability to perform a number of tasks with a computer. Please answer each question by placing an X in the box that is most appropriate. If you have not tried to perform a task or do not know what it is, please mark "NEVER TRIED", regardless of whether or not you think you may be able to perform the task.

Scale 1 Never tried	Scale 2 Not at all	Scale 3 Not very easily	Scale 4 Somewhat easily	Scale 5 Very easily

Total average score= Overall=

Computer Basics

I can:	Never tried	Not at all	Not very easily	Somewhat easily	very easily
Turn a computer on and off	☐	☐	☐	☐	☐
Use a computer keyboard to type	☐	☐	☐	☐	☐
Use a trackball Use a mouse	☐	☐	☐	☐	☐
Adjust the volume of the computer speakers	☐	☐	☐	☐	☐
Adjust the size of the text on the screen	☐	☐	☐	☐	☐

Average score: Round up score

Printer

I can:	Never tried	Not at all	Not very easily	Some what easily	very easily
Print documents	☐	☐	☐	☐	☐
Print photographs	☐	☐	☐	☐	☐
Load paper into the printer	☐	☐	☐	☐	☐
Load ink into the printer *	☐	☐	☐	☐	☐
ix the printer when paper jams *	☐	☐	☐	☐	☐

Average score: Round up score

Communication

I can:	Never tried	Not at all	Not very easily	Somewhat easily	very easily
Open emails *	☐	☐	☐	☐	☐
Send emails *	☐	☐	☐	☐	☐
Send the same email to multiple people at the same time	☐	☐	☐	☐	☐
Store email addresses in an email address book or contact list	☐	☐	☐	☐	☐
View pictures sent by email Send pictures by email	☐	☐	☐	☐	☐
Chat using Internet chat rooms	☐	☐	☐	☐	☐
Chat using instant messaging	☐	☐	☐	☐	☐
Post messages to the Internet (e.g., to blogs, Facebook, Twitter, online forums)	☐	☐	☐	☐	☐

	Average score	Round up sore

Internet

I can:	Never tried	Not at all	Not very easily	Somewhat easily	very easily
Use search engines (e.g., Google)	☐	☐	☐	☐	☐
Find information about local community resources on the Internet	☐	☐	☐	☐	☐
Find information about my hobbies and interests on the Internet	☐	☐	☐	☐	☐
Read the news on the Internet	☐	☐	☐	☐	☐
Make purchases on the Internet	☐	☐	☐	☐	☐
Bookmark websites to find them again later (e.g., make favourites)	☐	☐	☐	☐	☐
Save text and images I find on the Internet.	☐	☐	☐	☐	☐

Average score:	Round up score

Calendar

I can:	Never tried	Not at all	Not very easily	Somewhat easily	very easily
Use a computer to enter events and appointments into a calendar	☐	☐	☐	☐	☐
Check the date and time of upcoming and prior appointments	☐	☐	☐	☐	☐
Set up alerts to remind me of the events and appointments	☐	☐	☐	☐	☐

Average score:	Round up score

Entertainment

I can:	Never tried	Not at all	Not very easily	Somewhat easily	very easily
Use a computer to watch movies and videos *	☐	☐	☐	☐	☐
Use a computer to listen to music *	☐	☐	☐	☐	☐

Average score:	Round up score

Thank you for your participation in this study. Your help is very much appreciated!

Appendix R Cognitive test (MoCA test)

Project Name: Exploring arts-based digital activities for old people living in care homes

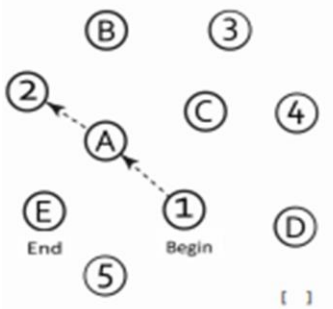
Participant No:

MONTREAL COGNITIVE ASSESSMENT (MoCA®)
Version 8.2 English

Name:
Education:
Sex:
Date of birth:
DATE:

VISUOSPATIAL / EXECUTIVE

Copy chair



[ ] [ ]

Draw CLOCK (Ten past nine)
(3 points)

[ ] Contour [ ] Numbers [ ] Hands

POINTS __/5

NAMING

[ ]

[ ]

[ ]

__/3

MEMORY Read list of words, subject must repeat them. Do 2 trials, even if 1st trial is successful. Do a recall after 5 minutes.

	HAND	NYLON	PARK	CARROT	YELLOW
1st TRIAL					
2nd TRIAL					

NO POINTS

ATTENTION Read list of digits (1 digit / sec.).
Subject has to repeat them in the forward order. [ ] 8 1 5 2 4
Subject has to repeat them in the backward order. [ ] 2 4 7
__/2

Read list of letters. The subject must tap with his hand at each letter A. No points if ≥ 2 errors.
[ ] F B A C M N A A J K L B A F A K D E A A A J A M O F A A B
__/1

Serial 7 subtraction starting at 70. [ ] 63 [ ] 56 [ ] 49 [ ] 42 [ ] 35
4 or 5 correct subtractions: **3 pts**, 2 or 3 correct: **2 pts**, 1 correct: **1 pt**, 0 correct: **0 pt**
__/3

LANGUAGE Repeat: The robber of the gray car was stopped by the police. [ ]
The student went back to school without his books and pencils. [ ]
__/2

Language Fluency. Name maximum number of words in one minute that begin with the letter S. [ ] _____ (N ≥ 11 words)
__/1

ABSTRACTION Similarity between e.g. banana - orange = fruit [ ] bed - table [ ] letter - telephone
__/2

DELAYED RECALL

		HAND	NYLON	PARK	CARROT	YELLOW	
(MIS)	Has to recall words WITH NO CUE	[ ]	[ ]	[ ]	[ ]	[ ]	Points for UNCUED recall only
X3							
X2	Category cue						MIS = ____/15
X1	Multiple choice cue						

Memory Index Score (MIS)

__/5

ORIENTATION [ ] Date [ ] Month [ ] Year [ ] Day [ ] Place [ ] City
__/6

© Z. Nasreddine MD **www.mocatest.org**
Administered by: _____
Training and Certification are required to ensure accuracy.

MIS: /15
(Normal ≥ 26/30)
Add 1 point if ≤ 12 yr education

TOTAL __/30

The Short Warwick–Edinburgh Mental Well-being Scale (SWEMWBS)

Participant No: Date:

Project Name: Exploring arts-based digital activities for old people living in care homes

Researcher: Saima Nafis

Short Warwick Edinburgh Mental Wellbeing Scale (S) WEMWBS

Below are some statements about feelings and thoughts.

Please circle the number that best describes your experience of each over the last 2 weeks.

	None of the Time	Rarely	Some of the Time	Often	All of the Time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5

Thank you for your participation in this study. Your help is very much appreciated.

Modified Arts Observation scale

Project Name: Evaluation of Digital Health and Well-being App in Real-Life Settings: Armchair Gallery App Feasibility Trial.

Researcher: Saima Nafis (Coventry University)

PART 1
ONS4 QUESTION (Happiness scale)

Please circle the face the most reflects the response to the following question:

1 How happy did you feel yesterday?

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

Additional Survey Questions

2 How confident do you feel in supporting residents to take part in art activities? Please circle the number on the scale below that corresponds with your answer to this question

Not confident at all | Not confident | Neutral | Somewhat confident | Highly confident

1 2 3 4 5

☐ ☐ ☐ ☐ ☐

5 Please note the number of structured formal visual art sessions that have taken place since you last completed this questionnaire- dates and short summary of what happened and any progress made (Only to be included on PARTS 2 & 3)

6 Has there been any increase or change in the amount of informal art viewing or making/use of tablets as part of the day-to-day activity in the home? Yes / No (Only to be included on PARTS 2 & 3) If yes please describe.

7 If you wish please add any other comments on taking part in the residency. PARTS 2 & 3 to Repeat above

PART 2

ARTS-BASED DIGITAL ACTIVITY IN CARE HOME

OBSERVATION SHEET

Date…… Location…… Completed by……

Assess individuals Residents A, B, C, D, E on the following scales before, during and after the session

ASSESSMENT BEFORE DIGITAL ART ACTIVITY

Resident A Before

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident B Before

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident C Before

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident D Before

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident E Before

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident F Before

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Residents Rating Before

A ……1 2 3 4 5 6 7
B……1 2 3 4 5 6 7
C ……1 2 3 4 5 6 7
D ……1 2 3 4 5 6 7
E ……1 2 3 4 5 6 7
F ……1 2 3 4 5 6 7

NOTES and COMMENTS TO ILLUSTRATE ASSESSMENT ABOVE
……
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……
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……

……

ASSESSMENT DURING DIGITAL ART ACTIVITY

Resident A During

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident B During

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident C During

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident D During

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident E During

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident F During

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Residents Rating During

A 1 2 3 4 5 6 7
B.....1 2 3 4 5 6 7
C 1 2 3 4 5 6 7
D 1 2 3 4 5 6 7
E 1 2 3 4 5 6 7
F 1 2 3 4 5 6 7

NOTES and COMMENTS TO ILLUSTRATE ASSESSMENT ABOVE

……
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ASSESSMENT AFTER DIGITAL ART ACTIVITY

Resident A After

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident B After

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident C After

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident D After

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident E After

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Resident F After

						
Visibly expressed	Moderate	Mild	Neutral / Unresponsive	Mild	Moderate	Visibly expressed
1	2	3	4	5	6	7
☐	☐	☐	☐	☐	☐	☐
Angry	Frustrated	Sad	Calm	Satisfied	Happy	Excited
Depressed	Restless	Bored	Reserved	Focused	Receptive	Delighted
Aggressive	Anxious	Listless	Quiet	Alert	Entertained	Appreciative
Distressed	Irritated	Tense	Still	Relaxed	Interested	Enthusiastic
Hostile	Upset	Distracted	Passive	Content	Amused	Friendly

Residents Rating After

A ……1 2 3 4 5 6 7
B……1 2 3 4 5 6 7
C ……1 2 3 4 5 6 7
D ……1 2 3 4 5 6 7
E ……1 2 3 4 5 6 7
F ……1 2 3 4 5 6 7

NOTES and COMMENTS TO ILLUSTRATE ASSESSMENT ABOVE
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QUALITATIVE DATA and OTHER FEEDBACK

1. Please add any positive feedback or quotations from residents, staff or relatives

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2. Please add any negative feedback or quotations from residents, staff or relatives

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3. Please add any anecdotal evidence or case studies from the responses of residents, staff or relatives

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Appendix U Modified Greater Cincinnati Chapter Well-Being Observation Tool

Modified Greater Cincinnati Chapter Well-Being Observation Tool

Participant No. Date: _____

Researcher: Saima Nafis

Project Name: Exploring arts-based digital activities for old people living in care homes

Modified Greater Cincinnati Chapter Well-Being Observation Tool									
Wellbeing domain									
Domains	Operational definition	Indicators	Frequency / Intensity	Time/interval					
Social interest	The participant makes eye contact, eyes following object or person; attempts to socialize by extending a hand, pat on the shoulder; turning body toward or moving body toward person; chats with others (does not have to have sustained conversation or even intelligible conversation); smiles; offers and receives support from others during session.	Signs		5/1	10/2	15/3	20/4	25/5	30/6
		Interest in others (e.g.eye contact, politely smiling.)		☐	☐	☐	☐	☐	☐
		Without prompts offers support		☐	☐	☐	☐	☐	☐
		Acknowledges support		☐	☐	☐	☐	☐	☐
		Seeks approval/ affirmation		☐	☐	☐	☐	☐	☐
		Initiates or engages in conversation		☐	☐	☐	☐	☐	☐
		Verbal/non-verbal expression of assertiveness		☐	☐	☐	☐	☐	☐

Scripps Modified Greater Cincinnati Chapter Well-Being Observation Tool										
Wellbeing domain										
Domains	Operational definition	Indicators	Frequency/ Intensity	Time/interval						
Engagement	The participant is able to attend to project or activity for 5 min at a time; participant stays focused on the task at hand; ideally enters a state of ‘‘flow’’ or total engagement; engages with others for task-related support and initiates in task-related conversations; the participant may engage in conversation with the facilitator during the activity, but major focus is task-related	While engaged sustain attention		☐	☐	☐	☐	☐	☐
		Responds to verbal prompting or cueing		☐	☐	☐	☐	☐	☐
		Seeks support to do the activity		☐	☐	☐	☐	☐	☐
		Engaged in activity-related conversation		☐	☐	☐	☐	☐	☐
Pleasure	Verbal expression of pleasure while participating in the actual activity; eyes crinkled, smiles, laughter, relaxed facial expression; nods positively, relaxed body language; participant expresses enjoyment of being creative, the pride of his/her piece of art and satisfaction both verbally and non-verbally	Smiles laughs		☐	☐	☐	☐	☐	☐
		Verbal/non-verbal expression of pleasure/enjoyment		☐	☐	☐	☐	☐	☐
		Verbal/non-verbal expression of pride		☐	☐	☐	☐	☐	☐
		Verbal/nonverbal expression of satisfaction		☐	☐	☐	☐	☐	☐

Modified Greater Cincinnati Chapter Well-Being Observation Tool									
Ill-being domain									
Disengagement	The participant is not engaged in the activity; stares down or into space; falls into a deep sleep; leaves the activity area	Staring into space		☐	☐	☐	☐	☐	☐
		Sleeping/nodding off		☐	☐	☐	☐	☐	☐
Negative affect	Closed body language, frown on the face, angry verbal outbursts; facial grimacing, or browse furrowed; psychomotor agitation (hand tapping, moving in chair, leg jiggling, wincing); rapid breathing, eyes wide, frightened look.	Anger		☐	☐	☐	☐	☐	☐
		Physical signs of agitation		☐	☐	☐	☐	☐	☐
		Verbal/non-verbal expression of anxiety		☐	☐	☐	☐	☐	☐
		Verbal/non-verbal expression of frustration.		☐	☐	☐	☐	☐	☐
Sadness	Flat affect or weeping quietly; verbalization of feeling sad over the situation; eyes drooping; sighing	Behavioural signs of sadness		☐	☐	☐	☐	☐	☐
Confusion	Participant shrugs his/her shoulders and does not know what to do with the materials at hand (e.g. paintbrush, colour palette); verbalizes feeling lost and asks what is happening.	Verbalizes feeling sad		☐	☐	☐	☐	☐	☐
		Verbal/non-verbal expression of confusion		☐	☐	☐	☐	☐	☐

Frequency: 5: Most of the time; 3: Sometimes; 1: Infrequently; 0: Never.

Health Questionnaire

English version for the UK

Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

I have no problems in walking about ❑
I have slight problems in walking about ❑
I have moderate problems in walking about ❑
I have severe problems in walking about ❑
I am unable to walk about ❑

SELF-CARE

I have no problems washing or dressing myself ❑
I have slight problems washing or dressing myself ❑
I have moderate problems washing or dressing myself ❑
I have severe problems washing or dressing myself ❑
I am unable to wash or dress myself ❑

USUAL ACTIVITIES *(e.g. work, study, housework, family or leisure activities)*

I have no problems doing my usual activities ❑
I have slight problems doing my usual activities ❑
I have moderate problems doing my usual activities ❑
I have severe problems doing my usual activities ❑
I am unable to do my usual activities ❑

PAIN / DISCOMFORT

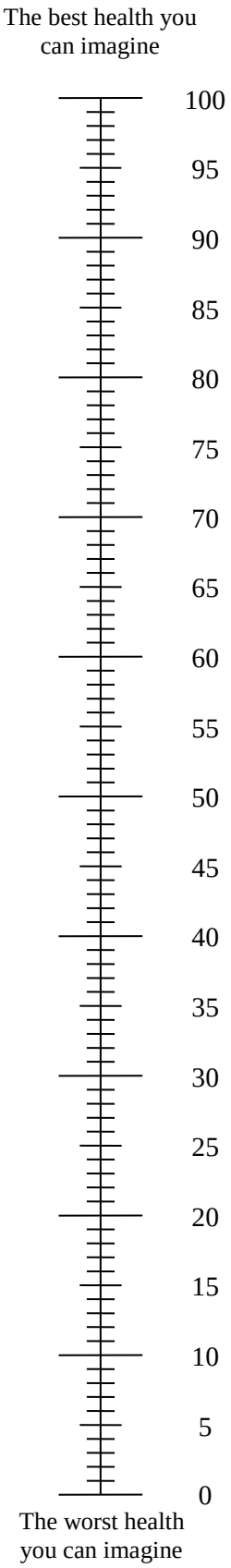
I have no pain or discomfort ❑
I have slight pain or discomfort ❑
I have moderate pain or discomfort ❑
I have severe pain or discomfort ❑
I have extreme pain or discomfort ❑

ANXIETY / DEPRESSION

I am not anxious or depressed ❑
I am slightly anxious or depressed ❑
I am moderately anxious or depressed ❑
I am severely anxious or depressed ❑
I am extremely anxious or depressed ❑

- We would like to know how good or bad your health is TODAY.
- This scale is numbered from 0 to 100.
- 100 means the best health you can imagine.
  0 means the worst health you can imagine.
- Mark an X on the scale to indicate how your health is TODAY.
- Now, please write the number you marked on the scale in the box below.

YOUR HEALTH TODAY= ☐



Appendix W Geriatric Depression Scale

Geriatric Depression Scale (Short Form)

Participant No.

Date:

Project Name: Exploring arts-based digital activities for old people living in care homes.

Researcher: Saima Nafis (Coventry University)

No.	Question	Answer	Score
1.	Are you basically satisfied with your life?	YES / NO	
2	Have you dropped many of your activities and interests?	YES / NO	
3	Have you felt that your life is empty?	YES / NO	
4.	Do you often get bored?	YES / NO	
5	Are you in good spirits most of the time?	YES / NO	
6.	Are you afraid that something bad is going to happen to you?	YES / NO	
7.	Do you feel happy most of the time?	YES / NO	
8.	Do you often feel helpless?	YES / NO	
9	Do you prefer to stay at home, rather than going out and doing new things?	YES / NO	
10.	10. Do you feel you have more problems with memory than most people?	YES / NO	
11.	Do you think it is wonderful to be alive?	YES / NO	
12	Do you feel pretty worthless the way you are now?	YES / NO	
13.	Do you feel full of energy?	YES / NO	
14.	Do you feel that your situation is hopeless?	YES / NO	
15.	Do you think that most people are better off than you are?	YES / NO	
			TOTAL

(Sheikh & Yesavage, 1986)

Thank you for your participation in this study. Your help is very much appreciated.

- A score of 0 to 5 is normal
- A score > 5 suggests depression
- A score ≥ of 10 is almost always indicative of depression

1	NO	4	YES	7	NO	10	YES	13	NO
2	YES	5	NO	8	YES	11	NO	14	YES
3	YES	6	YES	9	YES	12	YES	15	YES

Appendix X Apps usability Scale

Apps Usability Scale

Project Name: Exploring arts-based digital activities for old people living in care homes
Researcher: Saima Nafis

Please indicate how much you agree or disagree with the following statements. For each statement place a tick in ONE column.

No.		Strongly disagree 1	Disagree 2	Undecided 3	Agree 4	Strongly agree 5
1	I would like to use this app frequently	☐	☐	☐	☐	☐
2	I needed to learn a lot of things before I could use this app	☐	☐	☐	☐	☐
3	I thought the app was easy to use	☐	☐	☐	☐	☐
4	I needed the support of a technical person to be able to use this app	☐	☐	☐	☐	☐
5	I found the various functions in this app were well-integrated	☐	☐	☐	☐	☐
6	I thought there was too much inconsistency in this app	☐	☐	☐	☐	☐
7	I found the app difficult to use	☐	☐	☐	☐	☐
8	I felt more confident after using the app	☐	☐	☐	☐	☐
9	I imagine that most people would learn to use this app very quickly	☐	☐	☐	☐	☐
10	I would recommend others to use this app	☐	☐	☐	☐	☐

Thank you

Participant No.	**Post-participation Feedback Questionnaire**

Date: _____ Group: Location: ……

Project Name: Exploring arts-based digital activities for old people living in care homes

Researcher: Saima Nafis

Part A

We would appreciate your feedback about the digital activity. Please circle the response corresponding to your opinion about the following:

Using the digital application was enjoyable

Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐

I feel using the digital application was good for my health

Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree
				
1 ☐	**2** ☐	**3** ☐	**4** ☐	**5** ☐

I would like to have access to the digital application after 6 weeks

Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree

1	2	3	4	5
☐	☐	☐	☐	☐

If I could, I would use the digital application at least two times a week or more

Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree

1	2	3	4	5
☐	☐	☐	☐	☐

I would recommend the digital application to a friend

Strongly Disagree	Disagree	Somewhat Agree	Agree	Strongly Agree

1	2	3	4	5
☐	☐	☐	☐	☐

Thank you for your participation in this study. Your help is very much appreciated

Post-participation Feedback Interview Questions

Project Name: Exploring arts-based digital activities for old people living in care homes

Researcher: Saima Nafis

Part B

We would appreciate your feedback about the Armchair Gallery app

1. Why would you recommend the Armchair Gallery app to a friend?

2. Why would you not recommend the Armchair Gallery app to a friend?

3. How did using participating in the activity make you feel?

4. What did you like most about the activity?

5. What did you like least about the activity?

6. What are the benefits of participating in the activity and/or using the Armchair Gallery app?

7. What are the Challenges of using the Armchair Gallery app?

Thank you

Appendix Z Thematic analysis of ABD intervention

Thematic analysis of ABD intervention qualitative data				
Main theme	**Superordinate categories**	**Subcategories**	**Selective coding**	**Examples**
Common themes for both staff and residents	**Learning**	Staff's learning	Staff enjoyed learning	'You know the staff is really busy and we need more time to plan and order things for the activity, but I am really enjoying it and I learned many things.
		Residents' learning	Social learning	"I am learning from her as she knows how to use it"
				"Something new to learn…. I look forward to"
			Computer learning	"I never touched a computer before, but now I learned how to use it"
			Using	"I told my family and friends how to use the app"
			Learning	"Will you teach me how to take a picture"
			Computer (iPad) proficiency	"Now I know more than I knew before"
				"Now, I know how to open it (iPad)"
				"It is so fast, I like it"
			App learning	"I can make a perfect pie using this app"
	Challenge	Staff faced challenges	Time	"I like to come for the activity, but I feel sleepy after lunch. It is a challenge for me… I take medicines after lunch and want to take a nap"
		Caring is demanding	Hectic	'Sometimes it is hectic… I'm in a rush"
			Residents with dementia	'Loads of residents in here live with dementia and sometimes they shout at you. Even, they can hit you, but you get used to it.'
			Pressure	Sometimes I feel tired. ..A lot of pressure in a care home".
			Time	It takes my time and sometimes difficult to manage everything together".
			Staff hierarchies	"I will prepare a report for the top management as it is important to make this activity a regular activity"
				"I am the right person to involve in this activity, but I was not asked"
				'I've made arrangements to stay, but you know it is a real-life situation and an emergency can come at any time."
		External factor		'I think it should be the management that can take it further forward. In care homes, it is not easy. We have got a lot to do and are responsible for the household. (Carer)
			Challenge	"It is (activity) quite challenging"
			Language	"It is a challenge for me"
				Sometimes the words are difficult"
		Internal factor	liking	"I like challenges and I told my son that I am participating in the university challenge" (RP-GB1)
			Physical	"She is somebody who likes to participate in all activities, but since she is not feeling well due to her arthritis she doesn't want to talk and wants to leave her alone"

				“When residents get infections like water infection, you know they can get quiet or lethargic and tired. Obviously, it makes it difficult to participate in any activity”
	Engagement	Residents’ engagement	Commitment	“I had to go to attend an appointment, but I have re-arranged it as want to come for the activity.”
				“Even though I have a urine infection and I’m on antibiotics, I still wanted to come and participate in the activity. I really enjoy it (activity)”
			Absorbed	They all were absorbed and looked really excited.
			Engagement	“I can use it in my free time”
			Creativity	“Wow, it is amazing to grow flowers” (virtually)
				“I am making my own card”
			Enjoy	“Like today, this morning I went to see her and she asked me if I can help her to download the app. She enjoys arts and craft activities.’
				Like today, this morning I went to see her and she asked me if I can help her to download the app. She enjoys arts and craft activities.’
				“I enjoy the activity”
				Even though I have a urine infection and I’m on antibiotics, I still wanted to come and participate in the activity. I really enjoyed it”
				‘I was surprised at how R6 participated in the activity. Even the family member noticed the change in her behaviour and asked us what change has been made in the care plan.”
			Fun	“It is fun”
			Virtual reality	“It was a different activity; therefore, they were fully engaged and you can see they enjoyed it.”
			Engagement outside session	“When I took her to her room after the activity, she asked me if I could be on the next session to help her using her iPad…they talk about it if they enjoy at dinner time.
		Staff’s engagement	Engagement	‘I was surprised at how the staff participated in the activity. Even the family member noticed the change and asked us what change has been made in the care plan.
				“I enjoy the activity” ‘
	Acceptability and Usability of the app	Acceptability	likeness	I” liked the information and I can learn easily”
			amazing	“The app is amazing”
		Ease of use	Informative	“lots of information to help”
			Visual art	I like watching it… making a model is difficult, but. I will colour it”
		Arts and creativity	Creativity	“I want to use all bright colours”
			Virtual	“It is amazing to see flowers growing”
			Part of care	“Since started, it became a part of our duty. I know they like the activity and they keep asking me when they can use it again.”
			Acceptable	“It was so special ...and the celebration was a memorable event.”
		Feedback	Overwhelming	“It is overwhelming”
			Impressive	‘I think that's quite impressive”
			Takes stress away	“It takes away my stresses of being a carer. I can’t wait for the next week.”

			Break	“It is a break from everyday routine”
			Delighted	“An activity which gives break.., different from every day have before.”
Themes for residents	**Quality of life and well-being**	Happiness ”	Happy	“This made me so happy…I wait for it.”
				“I feel happy”
				“It lifts your mood”
			laughing	“I am no more sad …and delighted to play games”
				“She was laughing and I was surprised to see the change in her”
			Pleasure	“It is joyful”
		Self-expression	Excitement	‘“I am excited”
			Flexibility	“I am flexible”
		Resilience	Strength	“Despite the repeated infections, I don’t want to miss this activity and feel strong.”
	Reminiscence	Remembrance	Memories Reminiscence helped staff’ to know residents	“It opened my mind”
				“Lots of good memories”
				‘Memories are important to me’
				“The app helped the group to reminisce and to bring back past memories. Residents shared so many memories and only now I came to know her.”
			Connection with museum .	“I remember going to the Lowry and have lots of good memories.”
				“I remember going to the museum”
				“I remember attending a wedding ceremony there”
				“I think back to my life”
		Recall past	Looking back	“I can’t forget the place”
				“It is still in my mind”
				“If I look back on… reminds you of so many things.”
				“You can look at something and it reminds you”
	Empowerment		Ability	“I am able to use my finger for it”
		Achievement		“See, I can bake my own perfect pie”
				“I know how to open and start the game”
		Confidence	Confident	“I feel more confident”
				“I am more confident now”
			Competency	“I was thinking, I might not be able to use it, but now I can, my confidence is improved.”
	Environment		Comfort	“I am comfortable here”
				“It was very hot inside (cinema room) and should have some open space for this activity”.
			Temperature	I had never noticed the beautiful picture on the wall. I like it, I hadn’t noticed it before. We don’t often notice things around us as we live here. The picture had blended into the wall very well.”
			Busy setting	“It is a busy environment and we have emergencies almost every day.”
			Things around us	“Coming to another household is a new experience for me”

				“She never looked outside her room, but today she was looking through her window and enjoying”
	Social connection	Admiring	Like	“I liked what she said”
		Peer support	Friendship	“She will help me to find a ration card”
				“I have more friends now”
				“We both are good friends and go together ... now we met new people”
			Relationship with staff	“This is the first time she told me her story. I feel closer to her”
		Interaction	Discussion	“We were discussing it at dinner time”
Themes for staff	**Staff knows residents**		Know well	‘I mean, staff know them well, obviously, I know what they like or dislike. You just know the residents”.
		Understanding	need	“I know exactly what she wants”
			understand	I understand exactly what they are going to do’
				You just know when something is wrong.