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An Exploration of the Role of Virtual Reality in Early Childhood: A Qualitative Study Focusing on Parents' and Carers' Perspectives

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Declaration

I Mai Abdulkareem confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature

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Dedication

To my beloved son Hamed

Although you have left this world, after nearly a decade, you have significantly touched the hearts of everyone who knew you.

Simply looking at your warm and innocent smile, even in the most challenging circumstances, fills our hearts with boundless joy and relieves us from all the anxieties of this world.

Thank you, my little warrior. You are the one who taught me courage and made me value every moment in life. You made me think about the legacy that I will leave to the world when I meet you again in the eternal life.

To Yara, Hamed and Faris

The shining stars in my world, I am immeasurably proud of you.

I am incredibly grateful to you for making my life extraordinary.

To all children worldwide

Every child is special and unique and should grow with love and care.

The most precious thing in this world is to make childhood blissful and memorable and to make life safe and enjoyable for the future of all nations.

It is such an honour to dedicate my life to benefiting childhood.

Abstract

This study aims to investigate the potential role of virtual reality (VR) in the early childhood development (ages four to six) of Saudi children based on a qualitative approach: subjective data were collected by interviewing 20 parents or carers of Saudi children who use VR. Each child's parents or carers were selected for interview as a couple. A semi-structured interview was held with each mother, father or carer. Traditional views in Saudi Arabia were compared with those of Saudis living in the UK, which has a different culture. Participants reported some positive effects of VR on their children: they perceived it as a source of distraction from pain and fear, in some cases at the physiological level. Participants considered VR to be beneficial for developing cognitive and academic skills, self-awareness, self-confidence and empathy. VR also improved self-regulation at the emotional and behavioural levels, including attention control, working memory, impulse inhibition, waiting for one's turn and task completion. However, participants also reported adverse effects, indicating specific health risks, false memories and addiction at the physiological level; reservations existed concerning inappropriate content at the cognitive level. Other undesirable effects attributed to VR included social isolation, inability to control emotional expression at the emotional and social levels and encouragement of anger at the behavioural level. These results indicate that VR is a viable choice for young children, though adult supervision is still required. However, they also offer a warning about the effects that may result from VR overuse or misuse. The study also showed a lack of meaningful content and variety in commercial VR games, and thus it would benefit from the participation of educators and specialists in developing design strategies. This project represents a novel preliminary approach for future research concerning the influence of VR on the essential aspects of early childhood development.

Impact Statement

Questions about the role of virtual reality (VR) in the development of children in the early years have interested parents, educators, and researchers in various fields. Although VR devices are already widely deployed among children in the early years, it is necessary to understand VR effects to establish a scientific basis that considers the needs of each developmental stage of childhood before building VR content. This study bridges the knowledge gap by conducting a detailed exploration of the effects of VR on children's development in the early years: physically, cognitively, socioemotionally, and behaviourally through the live experience.

The present thesis highlights the potential advantages and disadvantages, with the importance of predicting child characteristics development based on a sizeable qualitative dataset that interviews 20 parents or caregivers of Saudi children (aged four to six) years old who use VR.

The study results demonstrate that VR, in general, is a robust system with the potential to affect children's development profoundly. Ideally, immersive media will support learning and development and empower children through equitable access and participation in positive, productive, and safe experiences with thoughtful, consistent reflection and action. In addition, VR offers unprecedented learning opportunities such as embodied learning, perspective taking, experiential learning, and empathic understanding, each differently and more intensely than with other types.

The findings augment the knowledge that concurrent interactive technology (VR) during early childhood carries significant perceived implications for child development, with certain conditions and reservations to avoid adverse outcomes also raised in the findings. Therefore, the results support VR technology intervention programmes that aim to increase positive practices, as these may improve the child's physiological, cognitive, socio-emotional, and behavioural aspects. However, concomitantly, the results warn of the undesirable effects that may result from exaggeration or misuse.

The thesis also delivers a database and a realistic picture of parents and carers of Saudi children based on the participants' perspectives and experiences. This study provides a deeper understanding of the participants ' perspectives by creating an opportunity for parents of children who were sufficiently mature and knowledgeable to

discuss their thoughts on VR technology in a semi-structured interview. In addition, interviewing two adults for each child offers a more accurate and comprehensive insight into participants' ages, social interactions, academic performance levels, and various other disciplines. In contrast, previous works involving VR have employed a quantitative and experimental approach.

Further, the results represent a significant contribution in terms of recommendations for VR use, potential empowerment and risks in children's early years for parents, kindergarten teachers, and decision-makers in the Saudi Ministry of Education. Moreover, these findings suggest that future research would benefit from this novel preliminary approach concerning the influence of VR on early childhood development to gain a more comprehensive understanding of the impact of this aspect of technology on holistic child development.

Ultimately, the study calls for individual and institutional efforts to build virtual software and content that considers diverse best practice guidelines for children and their development. Focusing on the comprehensive standards of interactive technologies and how they can positively affect children's futures is essential.

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Chapter One: Introduction

1.1 Background of the Study

The humanities can be described as the documentation of the human experience. It is regarded as one of the most prominent manifestations of civilizations. Multiple forms from inscriptions through language, philosophy, history, and literature, to understand the world, record events, and build knowledge. Given the complexity of humanitarian issues, research examining human phenomena and behaviour has become vital. Such research serves to conduct an in-depth and logical analysis, constituting a balance in building this knowledge by crystallising concepts and theories on humanitarian and social issues to address and increase public awareness (Tamm & Burke, 2018). Furthermore, researchers' appreciation of the importance of studying a specific issue capturing their interest contributes to the humanities. It adds to the knowledge balance, building a bridge of knowledge communication to address social issues and achieve well-being.

This study's focus stems from several factors: My undergraduate studies in early childhood led to discovering my main passion, enabling me to start my work immediately after graduation as a lecturer in the university department in which I was a student. Thus, I have approximately 15 years of work experience in the field. During that period, I earned an MA in Education Teaching and Learning in Early Childhood. In addition, as a mother of three children and a Saudi citizen, I have been aware of the extensive changes the country has undergone in recent years, marking the beginning of a new Saudi era with modernity strategies titled Saudi Vision 2030 (Saudi Ministry of Education [MOE], 2020).

The decision to introduce technology throughout the education system, including preschools, has stimulated the educational departments in universities to pay attention to digital technology. As a faculty member at King Abdul-Aziz University in the Early Childhood Studies Department, also, since my area of research is children in the digital age, I am interested in understanding how the personalities and identities of young learners are structured and developed and what technology's role is in this context. Additionally, I am interested in the comprehensive standards of interactive technologies and how these can have an impact on young children, which encouraged me to direct my PhD research to VR in early childhood.

Direct human interaction may remain unmatched in all aspects of life at every age, especially in early childhood. Nevertheless, the 21st century has undergone unprecedented developments in computer technology. This technology's potential has expanded continuously to include vast numbers of people of all ages, cultures, and education levels. Computer technology development has reached a level capable of creating an online world similar and parallel to the real world. A computer's memory can create a state of complete presence, enabling people to transfer human consciousness to an electronically-formed virtual environment by freeing the mind from the body and escaping to a world that is not imaginary but also not real. In 1986, Lanier referred to the occurrence and experience of this environment's structure as 'virtual reality' (Lanier & Biocca, 1992); (Bertsia, 2019).

Bailenson and Steyer (2018) stated that 'VR is arguably the most powerful medium in history and research about its effect on children is only just emerging' (p1). VR is 'a non-invasive simulation technology that allows [users] to interact with a computer-generated environment, in the three dimensions of width, height, and depth' (Rizzo & Kim, 2005). This type of technology can remove the boundary between the artificial

and real. VR users typically submerge themselves into an artificial environment using a head-mounted piece that includes devices tracking their movements. The piece monitors the user's head position and adjusts the visual imagery through motion tracking, modifying visual images to respond to the environment based on the user's body movements in real-time. The headpiece also features headphones and screens to see the virtual environment (Phillips, 2012).

By manipulating three-dimensional objects in virtual space, virtual reality (VR) allows the person immersed in this world to control the situation. VR gives virtual objects a certain level of autonomy, which is crucial to the realism of the virtual images (Menou et al., 2003). This type of environment may have many positive dimensions and effects, such as increasing the possibility of learning new skills by physically manipulating objects and concepts. This tangibility allows the learner to see and deal with causal relationships between effort and outcome. VR also helps the brain activate schemata more quickly than traditional education (Costa et al., 2013). Examples may encompass all ages and degrees of training, from pilots training on modern aviation systems to helping medical students develop their skills in a realistic environment using the minimally invasive surgery trainer (MIST) program (Karunathilake, 2018). In early childhood, a child could learn about scientific concepts such as natural phenomena or become more familiar with the world of astronomy (Schofield, 2014).

Based on Moor's (2005) view that technological advancement correlates with social and ethical effects, Kenwright (2018) introduced VR as a new dimension of ethical concerns. Although VR's potential advantages may be wide-ranging, widespread controversy surrounds the complexities of this new technology. However, VR development continues to evolve and make remarkable progress in the technology's capabilities. In the Guardian (2019), Luckin stated that the development of AI should

be focused on ethical principles and practices that are designed to benefit the world's diverse society. She emphasised that ethics had to be ‘designed’ for every aspect of AI. She also noted that the ethical vacuum created by technology should be filled with practices and moral values.

Gregg and Tarrier (2007) and Spiegel (2018) indicated that the success of VR application depends in part on the degree to which the occupant feels ‘present’ as if physically involved in the environment, which may raise the question: what is the potential impact of immersion in VR technology? Previous literature has focused primarily on adolescence (Ruiz-Ariza et al., 2018) (Burke & Duncan, 2019), while numerous studies on early childhood are confined to either VR’s role in education and cognitive aspects, as a tool to evoke empathy, or as an aid for children with special needs. The lack of investigation of the holistic impact of VR on children, specifically early childhood-age, sparked my curiosity as an early childhood specialist. Thus, there is a need for a comprehensive study that clarifies VR’s most prominent potential strengths and the threats regarding children at this early age, followed by studies in each aspect separately, with methods and participants appropriate to the objectives of each study.

VR games are gaining popularity among children at a young age, particularly as immersive media devices become more accessible to consumers (Sobel, 2019). Smirnova et al. (2018) referred to the observed increase in preschool children’s use of computer technologies, leading to a great demand for computer technologies and VR by young children and their parents in Russia. Their study indicated that the psychological exploration of this phenomenon is insufficient and contradictory. China has already applied wireless communications and VR technology to preschool education, stressing the importance of matching children’s abilities between the ages

of three and six with the rapid leaps in information technology (Li, 2021).

The Kingdom of Saudi Arabia (KSA) is undergoing unprecedented technological development. An electronic expansion has been taking place in KSA, particularly since 2017 with Saudi Vision 2030. This transformation has introduced modern interactive technology into the education system (Saudi Ministry of Education [MOE], 2020). However, studies have inadequately explored educational technologies in KSA (Sulaymani & Fleer, 2019).

Additionally, high incomes in KSA and technological development have radically changed the quality of Saudi children's games (Abdulrahman et al., 2021). Therefore, besides the increasing number of technological games being developed for children in their early years, researchers need to expand their studies on how technology affects children's development. For instance, studies on understanding the motivations behind playing modernistic technique games and the effects of these games on children's development (Sulaymani et al., 2018).

Moreover, commercials and advertisements are keen to present the supposed benefits of VR games and omit other details to increase sales. Consequently, parents and educators may need more information concerning the potential impact of VR games on children’s development.

The reasons addressed above inspired the current investigation of VR games’ potential role in the development of Saudi children aged (4 to 6 years old), focusing on parents’ and carers’ perspectives to maximise benefits from positive aspects and minimise adverse effects. Furthermore, the study results will prompt future research in the field. However, since the study is exploratory, and children of this age may not have the metacognition to discuss the potential effects of VR given the lack of specific

questions or directions (Lavis & Mahy, 2021), parents and carers acted as participants in achieving the current study's objective.

In addition, parents and carers are the ones who buy these games for their children and are supposed to set the rules at home. This study used a qualitative approach by interviewing two adults per child, providing more accurate and comprehensive results. This study is also distinguished by comparing Saudi views within Saudi Arabia and among Saudis living in a different culture, such as the UK, which may provide an understanding of the impact of cultural change.

1.2 Definition of Terms

Virtual Reality (VR): VR is usually understood as a technology that generates virtual immersion in a digital environment, thanks to a computer graphic simulation that allows users to immerse themselves in an interactive three-dimensional world in which different types of sensory and emotional experiences are encountered. Currently, with technological advances, VR technology has spread to highly diverse fields and sectors (Villena-Taranilla et al., 2022). Freina & Ott (2015) defined VR as high-tech human-computer interfaces that include real-world simulation and interactions through multiple sensory channels, prompting users to interact with virtual objects in a way that resembles how they would interact in real life. Neelakantam & Pant (2017) defined VR as a set of technologies and computer hardware that, when combined, create an immersive simulation of a three-dimensional environment. Consequently, VR refers to computer technologies that use VR headsets to generate realistic images, sounds, and other sensations that replicate a natural environment or create an imaginary setting. VR also simulates a user's physical presence in this environment. Sagnier et al. (2021) added that VR systems are computer systems that include various peripherals. These systems are referred to as 'devices' and can be classified into four

categories: display devices, motion and position capture devices, proprioceptive and cutaneous feedback devices, and sound input and presentation devices.

Early childhood: The definition shared by many leading national and international organizations is the period from birth to eight years old (Dahlberg et al., 2013). Early childhood care concerns the holistic development of a child's social, emotional, cognitive, and physical needs (Essa, 2020). Ward (2018) added that early childhood is a time of remarkable growth and development at its peak. This study focuses on children between the ages of 4 and 6 years.

1.3 Significance of the Study

The current study derives its importance from several main aspects. One is the expansion of interactive technology, precisely VR. Due to the increasing number of interactive applications available in VR across various sectors and for all ages, this study is focused on the potential impact of this technology on a susceptible early childhood stage (ages 4–6 years).

Kaimara et al. (2021) performed a systematic review of Scopus, IEEE Xplore, PubMed, and Google Scholar databases from 2010 to 2020 and selected 85 studies relating to VR and children. Kaimara concluded that although official recommendations from organisations and well-documented research by academics on child well-being have been reassuring, the academic community must prioritise conducting additional research on VR as new technology. Because results remain contradictory, Kaimara and colleagues recommended that researchers should investigate and provide evidence-based responses to parents, educators, and healthcare personnel discerning the appropriate harmful use of VR by children. Kaimara et al. (2021) added that understanding VR technology and its potential is essential as companies develop an increasing variety of VR games and more children immerse themselves in virtual

worlds. Accordingly, studies such as Sung et al.(2020) called for partnerships between educators and technologists. They indicated the necessity for integrating disciplines while the two sides exchanged knowledge, expertise and experiences in the interest of all, especially the learners.

Likewise, Rizvi et al. (2022) pointed out that the expanded adoption of digital game-based learning (DGBL) could demand a more profound acquaintance of learners' interaction with the games and how it might influence them. VR might affect users, especially children. Consequently, to minimise or control any negative factors that may affect the future generation, studies should identify potential problems that pose threats and support at-risk children. On the other hand, it is vital to maximise VR's potential benefits and ensure they align with children's best interests. Therefore, while VR may have negative or positive effects on all ages, the current study focuses on a specific age range of the target population—namely, early childhood.

Early childhood is a formative period during which the personality is crystallised and serves as the basis for a child's personality in the future, bearing in mind that what occurs during childhood development is difficult to change at a later time (Black & Hurley, 2016; De Young et al., 2021). Existing literature in the field reveals that studies have focused on adolescents while overlooking early childhood. Although the covers of certain VR games suggest these games are suitable for children three years of age and older, such as *Drive Club*, *Hustle Kings*, and *Kirby Super Star Ultra OST*, most studies were limited to measuring VR's impact on academic achievement, usefulness as a tool to evoke empathy or aid for children with special needs.

Early childhood typically covers the period from birth until the age of eight years (Dahlberg et al., 2013). However, this study focused on the age group of (four to six

years) for several reasons. First, according to the Saudi Ministry of Education regulations, the preschool age ranges from three to six years (Noor Program, 2020). The preschool stage can be a fertile environment for the influence of an external factor like the VR experience on cognitive, social, and behavioural outcomes before the restrictions imposed in primary school, which more strictly controls the child than the preschool stage (Dunlop & Fabian, 2006). In addition, at this age, children begin to learn a sense of 'self', develop relationships with others, and engage in sociability (Im et al., 2019). Doherty (2015) adds that during this stage, their emotional development includes expressions, attachment, and personality. Also, Lavis & Mahy (2021), who works on Prospective Memory (PM) in children's 4- to 6-year-olds, is the ability to remember to carry out future intentions, which is a skill they should develop to carry out their daily activities. The results indicated that children's PM increased with age, and they are shown poorly performing in the complex PM task condition, influenced by children's metacognitive monitoring. Finally, Saudi society has recently undergone noticeable changes, especially in the technological field, including Saudi Vision 2030 (Education and Saudi Vision 2030, 2020), which promotes the introduction of technology into the education system as early as preschool.

Concerning the methodology of the current study, its significance is highlighted in the fact that most of the previous studies related to VR employed a quantitative and experimental approach. In contrast to the current study, which takes a qualitative approach. Qualitative results provide a deeper understanding of participants' perspectives regarding VR's impact on their children at such an early age. Accordingly, this study aims to present a novel preliminary approach for future research concerning VR's influence on early childhood development. While the current study may be the first of its kind that tests VR's potential effects on children in the Kingdom of Saudi

Arabia, the methodology may also be a forerunner at the international level. Thus, the need exists for a study that serves as a preliminary map for VR's role in early childhood. Such a study requires the use of a qualitative approach that involves in-depth analysis.

In applying either quantitative or experimental approaches, previous research has used measurements and batteries to determine the impact of VR games on users (e.g. Ruiz-Ariza et al., 2018; Waytz & Gray, 2018). While Weinel et al. (2018) adopted a case study of deep subjectivity and empathy in VR for a child on the autistic spectrum, they called for a more in-depth qualitative analysis to be included using formal thematic analysis methods. However, a review of relevant literature reveals a lack of qualitative research, thus reducing the understanding of the VR phenomenon through an in-depth analysis and the logical prediction of future practice. Therefore, there is no comprehensive basis to explain VR users' results and perceptions or predict its possibilities and effects, whether positive or negative. Investigating children's experiences with VR games through parents' and carers' perspectives of their children's behaviour will improve understanding of VR's role during early childhood.

Because young children do not have the metacognitive skills to comment on and critically assess their perspectives (Lavis & Mahy, 2021), parents and carers are better-suited as participants for qualitative questions for this relatively new approach and in-depth exploration. In addition, parents can offer insight and serve as subjects for subsequent studies. This study is thought to begin a critical discourse on VR amongst children, parents/carers, teachers, educational researchers, as well as policymakers. Furthermore, the adopted qualitative approach of the present study is augmenting the significantly limited body of research in a field otherwise dominated by research that is primarily focused on the technological affordances. The present study

brings new evidence on people's lived experiences as well as family dynamics, within the unique social context of Saudi Arabia.

Subsequently, this study bridges the knowledge gap by providing an exploration of the potential effects of VR on early childhood from parents' and carers' perspectives. VR games are increasingly gaining popularity among children at a young age as a source of ‘edutainment’, particularly when immersive media devices are becoming more affordable and accessible to consumers. The study presents an initial map of elements that interweave and perhaps interact within a VR experience, mainly children’s physiological, cognitive, socio-emotional, and behavioural aspects. This has been an under-researched area, and the present study is hopefully a step further to closing the gap in the literature. More specifically, most previous studies have had a limited scope and foci, mainly on cognitive achievement, measuring or enhancing empathy, or within special needs education. Thus, there is a lack of deep understanding of VR's potential benefits and risks in the Early Years, which the evidence base suggests is the most critical development period.

Forthcoming studies in this field will benefit from using this present study as a theoretical underpinning. The proposed theoretical framework is holistic in the sense that it incorporates conflicting views, as distilled from the empirical research component of the present work, but also agile and extensible in stressing the need for more in-depth studies, specifically qualitative. The perceived implications shown in the initial map consider a novel preliminary approach that opens avenues for future research concerning the influence of VR on the essential aspects of early childhood development. Likewise, the results significantly contribute to recommendations for parents, educators and policymakers. Ultimately, this is the first study of its kind that offers specific perspectives from the Saudi context. Therefore, this study is likely to

inform future comparative research in this field, both in light of the Saudi sociocultural context's diversities and similarities with other loci.

The current study aims to discover how 360 immersive environments, such as VR, could influence young children, either positively or negatively. The dimensions/themes of the sub-questions of the current study were established after careful distillation of published literature and thematic classification of existing research foci. These were found to be: physiological, cognitive, socio-emotional and behavioural development as the core aspects of early childhood development (Scheiwe & Willekens, 2009), (Maholmes & King, 2012), (Benson, 2020), (Farroni et al., 2022), (Wallerstedt et al., 2023). It is hoped that the cumulative corpus of answers to these sub-questions should help enrich theoretical frameworks on exploring the parents' and carers' perspectives on the potential impact of VR on their children, which is presented as the main focus of this present study. In other words, does the VR experience enhance and complement real-world exploration, and does this type of play build a solid physiological, cognitive, socio-emotional and behavioural foundation in the early years or vice versa? That could serve as an initial map to show the areas of influence of the VR experience on children's early childhood development from their parents' or carers' perspectives.

1.4 Aim of the Study

This study explores the perceptions and experiences of parents and carers regarding the use of virtual reality (VR) in fostering the development of Saudi children during the early years of childhood (ages four to six). It thus presents a novel preliminary approach for future research concerning the influence of VR on the essential aspects of early childhood development. It does so by building upon existing literature and employing a

different lens to examine how VR affects children's development during their early years.

Accordingly, this study bridges the gap in current knowledge, linking immersion and interaction in VR environments with the potential development of several fundamental aspects of early childhood: the physiological, cognitive, socio-emotional and behavioural aspects.

1.5 Question of the Study

The following question guides this study:

What are parents' or carers' perspectives regarding the role of VR in fostering the development of Saudi children aged four to six?

From this, four sub-questions emerge:

1) What are parents' or carers' perspectives regarding the role of VR in the physiological development of Saudi children aged four to six?

2) What are parents' or carers' perspectives regarding the role of VR in the cognitive development of Saudi children aged four to six?

3) What are parents' or carers' perspectives regarding the role of VR in the socio-emotional development of Saudi children aged four to six?

4) What are parents' or carers' perspectives regarding the role of VR in the behavioural development of Saudi children aged four to six?

Chapter Two: Literature Review

2.1 Introduction

This chapter reviews studies relevant to the aim of the current study. The literature search strategy was open to international studies. Therefore, it included studies from KSA and the UK, which are associated with the study context. Also, studies from the Middle East, the USA, China and Europe, such as Finland, Greece, Germany, and others. The research was in Arabic and English or translated into one of them. Since the study revolves around VR technology which is witnessing rapid development, consideration was taken to include the most recent studies. However, exceptions might be made regarding some studies that could be remarkable in the field and significantly associated with the current study. Moreover, the search included academic literature and professional sources such as TV shows and newspapers.

This thesis explores the potential effectiveness of the virtual environment, which carries entertainment and learning distinguished by the interaction feature. First, a critical review of the role and capabilities of the immersive virtual environment is provided in section 2.2 offers a clear definition of virtual reality (VR) since it extends beyond computing devices and associated hardware such as VR sets or simulators. For instance, VR now encompasses aspects of being human, such as the sense of presence, which is not a part of the hardware itself. In other words, VR provides experiences related to being human and understanding the world. Next, 2.2.2 provides a general review of the relationship between VR and human interaction. Section 2.2.3 then focuses on VR and the brain. Finally, section 2.2.4 addresses VR in early childhood concerning VR's ability to augment or enhance the human experience.

As this study on the role of VR during early childhood focuses specifically on Saudi children, Section 2.3 presents an overview of Saudi Arabia. This overview stems from Saudi Vision 2030, which the government established to develop certain aspects of the country, including using and understanding technology in education and personal life. Consequently, the section focuses on the technological development, which includes VR technology.

2.2 Virtual Reality (VR)

2.2.1 History of VR

VR offers a unique way for people and the digital world to interact. It has inspired many researchers and developers, including those interested in information technology (IT) and educators. A third dimension, immersion, presence, and the creation of illusion, play a critical role in VR (Kamunen, 2022): the output to reality-like models fully integrating personas as if immersed in the actual (i.e. natural) environment (Kaimara et al., 2021). This technique shares human senses for an experience practically indistinguishable from reality yet not real (Tychsen & Foeller, 2020). Regarding the history of VR, this ambitious idea began to emerge in the mid-1950s. Ivan Sutherland officially introduced the concept in 1965, intending to 'make that (virtual) world in the window look real, sound real, feel real, and respond realistically to the viewer's actions' (p. 2). The application of VR was unsuccessful, but Sutherland's idea marked a starting point (Mazuryk & Gervautz, 1996).

In the 1960s, Heilig (1960; 1962) invented the Sensorama Simulator and Telesphere Mask, likely the first head-mounted monitor, incorporating multiple senses to create an immersive VR space. The first Sensorama Simulator production was a three-dimensional (3D) colour movie representing the experience of riding a motorbike with directional sound, smells, wind, and vibrations, providing complete immersion through

a multi-sensory experience (Freina & Ott, 2015). Later, Jaron Lanier invented the term 'VR' in 1986 (Lanier & Biocca, 1992).

In the early 1970s, military organisations used VR more actively as an auxiliary technique for war motion graphics and computers; VR was initially integrated into flight simulations to train US combat pilots (Craig et al., 2009). In the 1980s, VR became available for practising civilian pilots and for training assessments of surgical skills. Subsequently, VR became a more noticeable component in education, architectural and interior designing, and entertainment platforms, such as movies and video games designed for immersive entertainment (Berson et al., 2018).

At present, with tremendous progress in graphics and interfaces, VR applications have diversified and expanded. VR is an effective means of emulating reality, regardless of its circumstances and difficulties, by creating different environments and offering experiences that an individual may be unable to encounter in reality (Halldorsson et al., 2021). For example, VR offers people the opportunity to partake in an outer space environment that few, in reality, get to experience. In this VR environment, the individual can interact with its features as if actually in space. VR glasses are the key to the virtual world (Kaimara et al., 2021). When users wear these glasses, the current reality they encounter connects with their cognitive senses through computer-generated materials comprising the digital world, such as 3D objects and sounds (Phillips, 2012). The sensory devices that a VR user wears can be combined with the glasses to capture their body movements and produce sensory responses to interact with virtual objects. Thus, VR technologies provide a mediated experience involving both real situations and imagined worlds. Such real and imagined simulations were not previously conceivable. This type of mediated experience is direct and natural as

well as real and immediate, providing a genuine sensation of being present (Chohan, 2022).

2.2.2 VR and Human Interaction

Rabanus (2010) defined *virtual* as 'being such in essence or effect though not formally recognized or admitted' (p. 344). This suggests that virtual is an essence or effect but not in fact. VR is typically associated with hardware and actual digital devices such as VR interfaces and applications and tools such as headsets, simulators and Play Stations. Consequently, many definitions of VR have focused on such hardware. For example, Whyte and Whyte (2002) provided this explanation: 'virtual reality is the term used to describe a three-dimensional, computer-generated environment where individuals could immerse themselves, explore, and interact with the virtual environment by manipulating objects and performing actions as if real' (p. 22). Portman et al. (2015) suggested perceiving VR as a visualisation rather than simply as hardware. VR, as a visualisation, establishes an intimate interface with the user by creating a virtual world that immerses the user physically and mentally and provides a sense of presence via sensory feedback. Sagnier et al. (2021) added that VR systems are computer systems that include various peripherals. These systems are referred to as 'devices' and can be classified into four categories: display devices, motion and position capture devices, proprioceptive and cutaneous feedback devices, and sound input and presentation devices.

In contrast, Farrow and Iacovides (2014) argued against accepting the concepts of 'presence', 'immersion', and 'embodiment' unquestioningly. Instead, the authors distinguished between digital embodiment and primordial embodiment to support the idea of total immersion. They also posited that virtual games provided opportunities to explore human forms of embodiment. Consequently, this view leads to a consideration

of variable-based definitions of VR that go beyond technological hardware. The concepts of presence and telepresence underpin variable-based VR definitions involving a clear sense of being in the environment generated by the VR system. Since the 1990s Steuer (1992), described VR as a sense of presence further generates vividness and interactivity for the user. *Presence* is the experience of one's physical environment and encompasses one's perception of surroundings, mediated by an automatic and controlled mental process.

However, presence does not refer to one's actual surroundings in the physical world. Then, VR enables users to immerse themselves in a virtual world containing multimedia stimuli, such as visual and audio stimuli and many features rendering a user's experience vibrant while also offering extensive support (Bioulac et al., 2018). VR systems, after all, share a common basis, regardless of system diversity, that permits users to be present and interact in a 3D manner. Specifically, VR allows users to move within the industrial environment according to their field of vision, dealing with events around them. As much as the system responses interact with users appropriately and timely, VR increases the sense of pleasure, and the experience becomes a 'natural, free-flowing form of interaction' (Kyriakou et al., 2017, p. 14). Bailey and Bailenson (2017b) wrote that '[i]mmersive virtual reality (IVR) pushes the limit of mediated experiences and digital representation by blocking out the physical world and placing users directly into vivid and personal scenarios' (p. 181).

Regarding VR devices, Oigara (2018) presented these vital tools of a VR experience: a VR computer system, head-mounted devices (HMD), and motion sensing. Tactile gloves or even a full suit with motion-sensing can also create a more realistic experience. In addition, a VR experience may include multi-directional binoculars, a Binocular Omni-Orientation Monitor (BOOM), a Cave Automatic Virtual Environment

(CAVE), a nano manipulator, and auxiliary devices. Noting that these auxiliary devices are mentioned for referencing, they are not mainstream enough to be considered within the current study.

It is noticeable that theme parks, shopping malls, and many other entertainment centres around the world are taking an interest in interactive play and have even become a specialized part of VR games available for all ages (Roussou, 2004). However, children's VR use is not limited to games and entertainment; this is not a marginalisation of the value of play, especially in early childhood. Although Huang et al. (2016) pointed out, integrating interactive technologies in education systems, for example, could produce significant advantages for children in their early years. Kamunen (2022) and Kaimara et al. (2021) demonstrated that the pedagogical possibilities of utilizing VR in early childhood education would need more research that has to be a priority for the scientific community, given that VR technology evolves. The following sections explore this idea further.

2.2.3 VR and the Brain

The mind does not always differentiate between truth and fiction. The brain, a tool receiving information and transforming it into mental images, does not distinguish between what the eyes observe and collect and what the imagination receives and considers (Clark & Mackay, 2015). Accordingly, children's minds may contain false memories mixed with reality (McGuire, 2022). Therefore, as human life becomes technologically more advanced and more accessible to children at an early age, the focus will be on the power of immersion in VR.

As Coleman and Argue (2017) confirmed, the brain stores information and determines an individual's mental capacity and stores emotions and feelings in the amygdala. Joseph E. LeDoux was one of the first to discover the amygdala's vital role in shaping

the mind's actions. LeDoux determined that the amygdala triggers an emotional response before the neocortex fully processes the situation. In other words, this region of the brain can control actions while the conscious mind is still contemplating a decision. Moreover, this cluster of nuclei grows rapidly during the brain formation stages in a foetus. The amygdala records everything the eyes see and stores these visuals to form positive and negative psychological references for the child. As a result, a child's interactions, feelings, and experiences during the early years establish a lifelong set of emotional responses as a fixed and established reference to deal with their environment and other people (Ornelas, 2022). Therefore, when these emotions are aroused, a person's initial act reflects these emotions—often fear or anxiety—and this occurrence may astound the individual, which psychology refers to as 'brain hijacking'. The amygdala can react independent of the cognitive mind, driving people's emotional reactions before their conscious minds play a role in regulating their responses(Grossberg, 2021).

Dumontheil and Mareschal (2020) discussed the environment's role and the interactions the child experiences when certain functions and parts of the brain are activated—specifically, where signals and neural connections are enhanced. Thus, depending on lifestyle quality, these brain functions will grow and develop. Adverse childhood environments involving undesirable interactions will cause chronic toxic stress that rewires the brain. Family or societal neglect results in unhealthy and unsuitable conditions for brain development. Therefore, neuroscientists confirm that parents nurturing their children during the early years contributes to their transition into mature, emotionally balanced adults.

Segovia and Bailenson (2009) showed that children might retain false memories of what occurred, which may be confusing. This finding may explain why people who nourish their minds with positive ideas succeed rather than surrendering to a negative view of reality and adhering to a fixed mindset. As Erlauer (2003) asserted, when individuals are happy and positive, they seek positive images around them and nourish their brains. The brain perceives such images as facts, doubling the secretion of the hormone dopamine, which performs two functions: fostering happiness and pleasure, which leads to increased activity, vitality, and energy (Sharot et al., 2009); increasing cognitive skills to recognise and seize opportunities (Previc, 1999). These aspects help correct the former view that individuals work, persevere, and strive to achieve the goal of happiness.

Giddings (2014) pointed out the interconnection and intersection of virtual play with dramatic or imaginary activities for young children in everyday play in the real world. For instance, children often imagine themselves as superheroes and other characters in books and films. Moreover, animated films, which present stories involving love, sacrifice, and comedy, constitute a large part of reality, so these films have become examples of reality and life experiences. By combining fantasy with reality, everything in the world links closely with factors, effects, and outcomes, which are also connected. This link has led to many innovations, such as VR, which makes this fusion possible with wearing a helmet. Studies have shown that the power of imagination affects reality. VR's origin is based on the projection of reality in a fantasy world where events are controllable (Villena-Taranilla et al., 2022). This leads one to question how much VR use affects children's enhanced experiences, especially during their early years. This study explores this question and seeks to find an answer.

Roettl and Terlutter's (2018) study found that video game technology is changing from two-dimensional (2D) to 3D and VR. As a result, children at an early age are immersed in a virtual environment (VE) comprising a digital space that tracks the user's movements and digitally adjusts their surroundings accordingly in a way that affects their senses (Fox et al., 2009). They also encounter immersive virtual environment technology (IVET), which is 'digital technology that [perceptually surrounds] a user [with] sights and sounds while he or she interacts with computer-simulated environments' (Segovia & Bailenson, 2009, p. 372). Other features are also available to enhance sensory immersion. For example, audio technology produces 3D sound; haptic devices permit virtual touch (Bailenson & Yee, 2008); scent collars emit virtual scents (Tortell et al., 2007); and haptic interfaces put pressure on the tongue to enhance the virtual taste (Iwata et al., 2004). These features potentially enable children to apply their five senses. However, doing so might lead to mental confusion, creating false memories (FM); a child could confound VE experiences with actual images of past events and blur VE impressions with reality.

Since the senses are the primary outlets for forming experiences and memories (Maholmes & King, 2012), false memories can be problematic, especially in early childhood, when children's brains are still under rapid development. The risks may be represented in the emergence of false information about themselves and their abilities, for example, the ability to fly or penetrate a wall, which may lead to injury, major harm and often death. Also, perceptions of what might be a 'true' memory may become distorted, often causing confusion and perhaps diminishing confidence between the children and those around them. Accusing children of being untruthful has the potential to become a powerfully negative catalyst, particularly if it occurs systematically and can impact their ability to establish an accurate picture of the world around them. This

is not potentially detrimental to solely the children themselves, but also to their close social circle(s) and, in extreme situations, might lead to the need to involve social services and the assessment of a child's care needs, health, and well-being. On the other hand, false memories may have a positive side. For example, VR has the potential to become a safe environment for children with health challenges. It may be an outlet for a safe escape from a reality that is not necessarily desirable and/or optimal. One could perhaps consider how this technology could help a wheelchair user to run in a field, or a hospital room bound child to visit a new and exciting world for the first time. UCL (2023) confirmed that imagination and reality depend on interconnected brain circuits, according to neuroscience. Consequently, the more accurate imagination is, the more likely to be a real memory. They raised the power of VR derived from the power of adequate sensory inputs to the brain, which may lead to difficulty in distinguishing between reality and imagination.

Segovia and Bailenson (2009) conducted an experiment with 55 preschool and elementary children who experienced swimming with orca whales in a virtual environment (VE). The authors asserted that 'pre-schoolers are in general disproportionately vulnerable to suggestive influences' (p. 373) and found that most children later believed the fantasy experiment had occurred in reality. The researchers asked the children whether they believed the experience was real. At three distinct moments: before, immediately after, and approximately five days after the memory prompt. The study results showed that preschool children were equally likely to develop false memories.

According to Schoeller et al. (2019), immersion involving all of the human senses may help strengthen human empathy skills. They claimed that the mind could develop positive emotional states and sociability. Based on connecting multimodal sensory and

motor stimulations in VR through a guided virtual environment and behaving realistically, adopting new attitudes, and modulating cognitive preferences and behavioural responses (Bertrand et al., 2018). Moreover, VR's contemporary democratisation via improved access to technology furthers the goal of developing human-machine interfaces that enhance human mental health, relationships, well-being, and empathy (Kamunen, 2022).

Similarly, past studies have investigated virtual environments (VE's) effect on the mind concerning decision-making and behaviour modification (Parsons et al., 2017). For instance, Banakou et al. (2018) confirmed VE's usefulness in reducing short-term implicit racial bias. Moreover, Seinfeld et al. (2018) determined that VR can help alter the behaviour of numerous aggressive populations. VR environments have also progressively increased altruistic intentions and self-compassion (Falconer et al., 2016). Viewing the world through someone else's eyes and abilities has the potential to reduce stereotypes and discrimination and represents a quick and practical learning method. Here lies the real power of technology (Schoeller et al., 2019).

Given that earlier studies verified the potential positive impacts of VR environments based on adults and their emotions; researchers could use VR games to stimulate positive social feelings in young children. Notably, although this potential exists, some specialists maintain that the most vital technological revolution has yet to come (Kamunen, 2022). Thus, exploring and consolidating VR games' favourable aspects and exploring and mitigating the negatives could have a significant impact on individuals and societies.

2.2.4 VR in Early Childhood

During early childhood, the psychological, social and emotional dimensions of an

individual's personality crystallise (Whiteley, 2021). Children require numerous activities from birth to eight years of age to develop their senses and mental, emotional, psychological, and social abilities. Therefore, an interest in developing these abilities is essential, and parents and carers play a vital role (Steyer, 2003). In addition, their healthy interactions with children contribute to the maturation of their children's strong relationship with them and their community (Coyne et al., 2021).

Most early childhood theories stress the importance of a child's senses and consider the five senses as entry points for childhood experiences (Hutmacher, 2021; Nicholson & Shimpi, 2015). The senses serve as a child's windows to life, and the more a particular experience involves the senses, the more deeply embedded it is in the child's memory (Bruce, 2004; Miller, 1918). Hutmacher (2021) added that each sense provides unique information that together creates early childhood memories. Hence, considering that digital games, especially VR, combine more than one sense, primarily sight and hearing, into one experience, highlighting the potential depth of its impact on a child.

Tychsen and Foeller (2020), for example, reported that immersion of young children in VR might not significantly impact visual functions. In addition, VR playing did not cause significant postural instability after VR or maladaptation of the vestibular-visual reflex. Therefore, the prevalence of discomfort and subsequent effects may be lower than that reported in adults. In contrast, Fernández et al. (2018) have argued that children's brains are more vulnerable to hazardous exposures and are believed to absorb higher doses of radiation in some brain regions much higher than adults from VR devices in front of the eyes. This indicates that more studies are needed to find judicious methods to reduce exposure, primarily to protect young children.

Furthermore, children’s immersion in VR can be a source for building their personalities. Child development is a concept explained by Vygotsky (1998) that focuses on children's relationship with their environment and acquiring personality traits. This development emphasises the role of imaginative play as integral to the child's environment. In addition, imaginative play determines the psychological age of the children, regardless of their chronological age. Quinones and Adams (2021) added that the real, imaginary, and virtual worlds of the present time had become the environment surrounding children and a source of learning and development.

With the noticeable expansion in digital technologies, particularly among children and adolescents, their interest in them has led to their widespread use for personal and academic purposes (Kamunen, 2022). Since (2009), Prensky referred to 'Generation Z', children born in the early 2000′s, as 'digital natives. However, a review of studies examining the relationship between technological developments and their types and effects reveals contradictions regarding support and opposition. Similarly, Kaimara et al. (2021) demonstrated that children had become primary users of technologies, and interactive technology has become prevalent. However, they added that there is a need to identify suitable design practices for Children's applications.

In 2012, the National Association for the Education of Young Children (NAEYC) and the Fred Rogers Centre for Early Learning and Children's Media at Saint Vincent College finalised a shared position document entitled: 'Technology and Interactive Media as Tools in Early Childhood Programs Serving Children from Birth through Age 8' (Hartle & Berson, 2012, p. 62). Kamunen (2022) states that VR is beginning to be incorporated into primary and early childhood education settings. He also remarked that the required equipment has become affordable and accessible.

Himonides (2017) discussed the importance of benefiting from the potential of technology in all ages and abilities. He argued that technology is not always employed creatively, declaring that '[t]echnology is often viewed as a tool or sets of tools that are being used not particularly creatively in order to "enable," "facilitate," or "enhance" curricular aims and objectives that might have remained unchanged for over a century' (p. 489). Bailenson and Steyer (2018), founders of the Virtual Human Interaction Laboratory, stated, 'VR is arguably the most powerful medium in history'(p. 23). They further asserted that '[b]ecause VR is in its infancy, we have a unique opportunity to stay on top of this technological wave before it overwhelms us' (Evans, 2018, p. 23).

On the other hand, Spiegel (2018) has embraced the caveats of using VR. First, beginning with potential mental health risks, including depersonalization/derealization disorder. Second is the personal neglect of users' bodies and real physical environments. Third, VR can record personal data published in ways threatening personal privacy and risk manipulating users' beliefs, emotions, and behaviours. Finally, other ethical and social risks are associated with how virtual reality blurs the distinction between real and deceptive. He also called for protecting and enhancing the autonomy of VR consumers.

However, Kaimara et al. (2021), in their systematic review of 85 studies selected from the databases Scopus, IEEE Xplore, PubMed, and Google Scholar from 2010 to 2020, concluded that findings remain contradictory. Nevertheless, official recommendations on child well-being are reassuring if health and safety specifications are met. Moreover, they call for further research to be a priority for the scientific community, given that VR evolves.

According to Bailey and Bailenson (2017), children are frequently expected to adopt this technology in their daily lives. The presence and use of VR among children has certainly become more prevalent. Sánchez et al. (2018) discussed the idea of developing VR games oriented to early childhood education, specifically for children between the ages of 3 and 5 years. They supported using these games as a catalyst for educational skills and entertainment to help children learn through play. Additionally, some children's VR games focus on motivating them to accomplish tasks of gradual complexity. Also, the authors praised VR games' many difficulty levels in helping educators cover the goals set for each child.

Likewise, Calungen and Hills (2007) consider significant improvements arising from moving education from traditional classrooms and their dynamics to engaging children in the education system through the use of an interactive, multisensory environment, such as virtual reality (VR) or augmented reality (AR). They defined augmented *reality* as an interactive technology that projects virtual objects and information into a user's natural environment to provide additional information or act as a vector. In contrast, this virtual projection in the natural environment contrasts with the prediction based on VR that matches real objects in a virtual environment.

Kamunen (2022) discussed the idea of being included in primary and early childhood education. He argued that needed equipment is becoming more inexpensive and reachable. However, more research must be conducted on how young children experience VR. In his study in one of the early childhood education centres in Finland, eight children (ages four to six years old) attended a virtual game-playing session in two separate groups. The data is based on videotaped material of VR playing situations and children´s interviews. Outcomes demonstrate that playing in the virtual world was highly motivating, delightful, and engaging for the children.

Furthermore, it suggests that children's attitudes toward VR game playing were optimistic, and they learned quickly to use VR glasses and hand devices. The study concluded that the pedagogical potential of VR in early childhood education would need more opportunities, and the educational use of VR requires more research.

Meanwhile, Yilmaz (2016) focused on VR and AR as technologies that superimpose a computer-generated image on a user's view of the real world, thus providing a composite view. She developed AR and VR games and named them the educational magic toys (EMTs). These components were used to teach children aged 5 and 6 about fruit, vegetables, animals, objects, vehicles, professions, numbers, shapes, and colours. The study aimed to understand teachers' and children's opinions about EMTs as well as their cognitive attainments. Using surveys, observation, and interviews that provided the data, the study concluded that although children played interactively with these toys and found them memorable, engaging, and perceptive, they did not demonstrate high cognitive achievement. Moreover, Minocha et al. (2018) referred to the role of technology-assisted virtual field trips in increasing the effectiveness of outdoor field science and geography experiments in primary school.

On the other hand, since (2005) Wiederhold has presented VR as a therapy tool for anxiety disorders. Similarly, Bioulac et al. (2018) have confirmed that participating in VR roles served as a treatment for children’s anxiety disorders. In addition, VR is commonly used during early childhood to develop the abilities of children with special needs, such as Down syndrome. For example, Wuang et al. (2011) and Grecco et al. (2017) observed that VR gaming technology had a positive effect on children with Down syndrome regarding motor proficiency, visual-integrative abilities, and sensory integrative functioning. They also determined that VR improves the sensorimotor functions of children with DS. Furthermore, they considered VR a therapy alongside

other proven, effective rehabilitative interventions for children with DS. Moreover, Rathinam et al. (2019) showed that VR is an intervention method that effectively improves the hand function of children with cerebral palsy compared to conventional physiotherapy and other therapeutic interventions. Martins et al. (2019) also determined that VR improves children's motor performance.

Furthermore, Li et al. (2011) found that using VR games as a therapeutic activity reduced the anxiety and depressive symptoms of Chinese children hospitalised due to cancer. Children with autistic spectrum disorder (ASD), a neurodevelopmental disorder affecting socio-emotional skills and perspective-taking abilities, can also benefit from VR. Ghanouni et al. (2019) confirmed that social stories conveyed through a VR program were valuable for children with ASD. Moreover, Vahabzadeh et al. (2018) discovered that autistic children improved in socio-emotional and behavioural functioning after using VR. Moreover, Halldorsson et al. (2021) have investigated VR impacts on children. Electronic systematic searches were conducted in Medline, PsycINFO, CINAHL, and Web of Science, targeting anxiety, depression, and phobias symptoms. They Emphasise that more research attention needs to be given to VR technology, especially for young children.

2.3 Saudi Arabia (KSA)

As part of the scope of the current study, details about the participant's country will be provided in this section.

2.3.1 An Overview of the Kingdom of Saudi Arabia (KSA)

The Kingdom of Saudi Arabia (KSA) is one of the sovereign states in the Middle East and is the largest country in the Arabian Peninsula, comprising approximately two million square kilometres. Iraq and Jordan border the country's northern region, while

Kuwait borders the northeast. Qatar, the United Arab Emirates, and Bahrain are to the east. Yemen borders the south, and Oman is in the south-east, with the Red Sea bordering the west (ALShamare, 2019). According to the General Authority for Statistics (2020), the KSA's population is nearly 35,013,414.

Many Muslims live in KSA. Muslims consider the Holy Mosque in Makkah and the Prophet's Mosque in Medina the most important holy places. On the other hand, the KSA has the second-largest oil reserves and the sixth-largest gas reserves (Khan & Khan, 2020), is the largest crude oil exporter globally and has the most significant free market in the Middle East. The country also has the right to overturn a veto of 3% in the International Monetary Fund, providing the KSA with a significant economic position and political status at the Gulf, Arabian, and international levels.

2.3.2 Saudi Vision 2030 and VR Technology

Despite the economic impact of oil on the Kingdom, Saudi Vision 2030 is based on the strengths and unique capabilities of the Saudi nation at all levels and fields. King Salman bin Abdulaziz stated, 'My first goal is to be a successful and pioneering model in the world on all items, and I will work with you to achieve this' (in-text) (Education and Saudi Vision 2030, 2020). The pioneering vision comprises three components: a vibrant society, a thriving economy, and an ambitious homeland. There are twelve major programmes to achieve these three pillars, including the National Transition programme; one of its main objectives is education development (Saudi Ministry of Education [MOE], 2020).

According to the General Authority for Statistics (2019), the percentage of age groups of general and university education is 35% of the total population of the Kingdom. Saudi Vision 2030 has focused on this ratio to achieve its general education

objectives. One of the most significant changes is curriculum changes at all educational stages starting in 2020 to achieve the general education goals in line with realising the 2030 Vision. The revamped curricula involve strengthening the education and training systems' capacity to meet the needs of the labour market (Saudi Ministry of Education [MOE], 2020).

However, KSA is looking towards a post-oil-based future by developing knowledge economising, thus investing in other forms of technology, such as VR (Rajab & Wright, 2020). The Future Foresight Foundation (2018) released a report on future careers in KSA. The report suggested 157 suitable jobs in 2040 for the Alpha Generation, born after 2010, and claimed that many existing jobs would disappear in the future. On the other hand, technology will create more jobs than those eliminated. For example, VR positions rank 17th out of 157 and include travel agents, game designers, film producers, and news producers who rely on VR (Alghamdi & Alghamdi, 2020).

2.3.3 Early Childhood in Saudi Arabia

The KSA has bestowed the best interests of the child. First, as a Muslim country, its laws derive from Islamic law, which obliges parents to custody, maintenance, and other rights. Second, in 1995, the Kingdom acceded to the United Nations Convention on the Rights of the Child (Liefaard & Sloth-Nielsen, 2016).

Concerning early childhood education in the KSA, the first kindergarten was established in 1965 in Riyadh, the capital. It was a private institution, followed by another private kindergarten in the same year in Jeddah. Thus, the private sector maintains an essential role in childhood education in the KSA. However, in 1966, the Ministry of Education opened the first public preschool; after that, preschools were available across Saudi Arabia as free public or medium-to-high fee private options.

Kindergartens originated in the KSA due to the many social changes that took place in Saudi society (Aljabreen & Lash, 2016).

First, the Saudi family structure transformed from an extended to a nuclear family. Second, Saudi women entered the workforce (Alghufali, 2017). Third, the cultural openness of many social strata in Saudi society has affected the increase in social awareness of the importance of kindergarten, which has influenced and improved children's development in all physical, psychological, mental, and linguistic aspects. Kindergarten has also played an influential role in preparing children to enter school and achieve specific objectives (Aljabreen & Lash, 2016).

Kindergartens in the KSA are non-compulsory for children aged three to six years. Children spend three years in kindergarten. The first year, 'kindergarten (1)', is for children aged three to four; the second year, 'kindergarten (2)', is for children aged four to five, and the third year is called 'kindergarten (3)' for children aged five to six years (Saudi Ministry of Education [MOE], 2020).

The Saudi Curriculum for Kindergarten has been based on frameworks designed by the UNCRC, Education for ALL and UNESCO's 2015 Sustainable Development Goals program 2015–2030 (Rajab & Wright, 2020). The curriculum consists of 10 learning units described in detail in the kindergarten self-learning teachers' guidebooks. The ministry formed specific goals, exercises, and children's assessment criteria for each academic unit. All public kindergartens and most private kindergartens track the same curriculum for all three learning levels—teachers must teach using the same methods, and children must learn the same subject matter on a specific timeline (Aljashaam, 2017). Additionally, the curriculum is intended to manage the order of the day's classroom activities, such as circle time, learning centre time, playground time,

mealtime, and final meeting time (Alsedrani, 2018). Rajab and Wright (2020) considered that the decisions to change curricula responded to 21st-century requirements and were part of the government's stated educational reform objectives. The primary goal of preschool environments is to work with children to increase autonomy while utilising technological development in the educational process.

On the other hand, Sulaymani and Fleer (2019) noted a lack of research on educational technology and how children use it, how it supports learning, and the technological devices' possible impact on children's socio-emotional outcomes in KSA. The authors confirmed that young children within the KSA struggle with self-regulation. Their study focused on how children relate emotionally to touch technologies such as iPads when introduced into educational settings in KSA, where no tradition for their use exists. They analysed 80 hours of video observations and interviews within a Grade 1 classroom in a Saudi school (six to seven years old). Their results showed that the initial introduction of the iPad acted as a tool for both explicit and implicit self-regulation. When children are learning, they might be learning about literacy and numeracy, but they are also potentially developing their ability to regulate emotions. The researchers also found that using iPads enabled teachers to develop children's emotional self-regulation and suggested an area of study for this age group to assist teachers and policymakers in developing appropriate policies and strategies regarding iPads in early learning classrooms.

Furthermore, Alzhrany (2018) supported the possibility that Internet use, in general, may be more effective on psychological well-being by strengthening family cohesion in KSA. Also, he noted that technology-based interactive learning incorporates and computerises the design of educational programmes serving the Ministry of Education's approved education curricula, which may greatly benefit students at an

early age. According to Al-Hadlaq and Aziz's (2014) study, conducted in KSA, electronic games have positive aspects. Specifically, the games develop one's memory and thinking speed, and initiative, planning, and logic. At the same time, although these types of games create familiarity with new technologies, they also have adverse social effects. Such negative effects include Internet addiction, which affects up to 75.75% of children; a game player's isolation from his or her family (71%); increased problems in the community (63.75%); and a breakdown in family relations (62.5%). These findings indicate that electronic games may produce an unsocial child. Unlike traditional games that promote communication, a child spends hours playing without contact with others in VR games and, therefore, can become non-social.

Although children's play has been a subject of analysis and discussion within the education community (Ernest et al., 2019), playing is an independent subject of debate and research. Theories on early childhood have addressed the significance of play and its role in early childhood. Vygotsky, Montessori, Piaget and other theorists have given considerable attention to play during childhood and its impact on children's physical, mental, moral, emotional, social, and educational aspects. However, the high income in the KSA, coupled with the technological development, has led to a radical change in the quality of Saudi children's games since their early years (Rajab & Wright, 2020). Thus, researchers need to explore this area further. Determining how children in their early years relate to technology—starting with understanding the motivations of play involving modernistic technique games (Sulaymani et al., 2018) to their effects on children in all respects—is valuable for this age group. Abdulrahman et al. (2021) discussed the idea of the spread of electronic games in KSA due to several factors, including the constant preoccupation of some parents, which may lead to resorting to electronic games to get rid of the inconvenience children. In addition to the sometime

excessive pampering. They also stated that there are no recent studies dealing with the impact of electronic games and the results of their spread among children at an early age, and therefore there is a need for more research in this field.

Abdulkareem (2015) observed that due to the cohesive nature of Saudi families, a child is typically surrounded by dozens of children and meets with them almost weekly in the grandfather or head of the family's home. Therefore, providing a place for children to play is essential. It may be less common than in the past, but it is still a feature of Saudi society. Such games are easy to play, competitive and entertaining, and require physical abilities, agility, manoeuvrability, accuracy, observation, intelligence, thinking, and decision-making. They also significantly contribute to strengthening social ties and familiarity between young children and youth and serve as a positive, fun way to spend leisure hours. With the succession of generations, children continue to be interested in certain games, such as football.

However, children are keen to bring their Sony or Wii with them to family gatherings. Also, each child typically has an iPad. VR games are yet another new trend. Some children prefer to play alone with their own devices, while others are excited to play together, and even they may complete their game online after returning home. This electronic play at home is in addition to its widespread use in entertainment centres and malls (Hassan, 2022). Opinions about this phenomenon within Saudi society vary. For example, the Saudi TV Channel Ekhbariya TV (2019) reported that Saudi children spend more than seven hours using electronic devices, including VR games. However, they comment that it could negatively affect their minds and memories and weaken family ties.

In contrast, Al-Sharq Al-Awsat newspaper (2019) argued that electronic games are a double-edged sword and offer benefits for children, such as rapid mental development. They reported that children who devote part of their free time to electronic games make decisions very seriously and resolutely and not be easily distracted. Unfortunately, most of what has been published are personal conclusions and observations; there is a lack of studies on VR games in particular (Abdulrahman et al., 2021). Nevertheless, the spread of this phenomenon in Saudi society, my observation of my children and my family's children, and comprehensive decisions regarding VR in kindergartens and elementary schools prompted my interest in exploring the role of VR on children in their early years.

Given the deep relations between KSA and the UK, a prominent Saudi community is present in the UK (Bin Eid et al., 2022), whether it is a diplomatic mission or for other reasons. Notably, the UK education system is highly regarded, which attracts Saudi students to UK universities. Consequently, from personal experience, living and studying in the UK develops intercultural awareness due to the proximity to different cultures, especially in London. Based on this point of view, I decided, as a researcher, to interview the parents of Saudi children in London and compare their perspectives with those in Jeddah, KSA. I specifically aimed to learn their perspectives on how VR games could affect their children's development during their early years and explore how cultural differences affect individuals' opinions.

2.4 Conclusion

This chapter addressed the key constructs of this study. Next, section 2.2 discussed VR from the perspective of human beings' enhancement, with a primary focus on early childhood. Finally, section 2.3 presented an overview of KSA, including Saudi Vision 2030.

Chapter Three: Methodology

3.1 Introduction

The inspiration for a study can be the researcher's own experience or a literature review. In this case, within the general field of Early Childhood, Digital Technologies and Learning. Specifically, I am interested in the potential role of virtual reality (VR) on children in their early years. Therefore, chapter 1 identified the research question as the need to better understand VR's effect on children's development during their early childhood years. Then, related literature from academic and professional sources has been covered in chapter 2.

Cohen, Manion, and Morrison (2007) noted that knowledge and an understanding of a phenomenon are obtainable through experience, reasoning, and research and that these categories overlap and complement each other. Hence, research serves as the source of knowledge, and educational research draws on all three categories. They counted that sufficient data, collected through appropriate methods, must support the research findings and generalisations.

John Dewey recommended conducting educational research to obtain objective and reliable answers (Ary et al., 2018). Wellington (2015) discussed some of the recurring debates in such research: quantitative or qualitative research; ethics' role and importance; drawing on the 'scientific method'; connecting basic research with practice; differing perspectives on the nature of reality (ontology); and knowledge acquisition (epistemology). These debates underpin the design of this study's research methodology, which relates to educational researchers' current research practices.

An appropriate research methodology helps ensure that the research findings become accepted knowledge, and evaluating and assessing whether the research methodology is appropriate is integral to the contribution of knowledge. Hence, operationalising the research question first requires defining the research aim and objective as presented in the first chapter. Then, designing a sound methodology for the research objective leads to studying the phenomenon in its setting (Ary et al., 2018). The research methodology detailed here aims to provide a practical framework for designing, implementing, and evaluating the proposed investigation. This study entails a robust design to ensure that the correct reasoning is applied to investigating the phenomenon and focuses on the appropriate empirical evidence to collect the required data.

In this chapter, the operationalisation of the research aim is elaborated in terms of performing research. This operationalisation requires effectively aligning the research objective with interpretive research philosophy, as explained in Section 3.2. After that, Section 3.3 addresses the selection of an appropriate methodology. Section 3.4 discusses a qualitative approach, and Section 3.5 outlines data collection procedures. Next, the details of the pilot study are presented in Section 3.6. The limitations of study and ethics and risks associated with the study are then addressed in Section 3.7, respectively, before the conclusion in Section 3.8.

3.2 Aligning the Study Objective with the Method

The participants in this study are parents or carers of children who use VR technology. The research aims to explore VR's potential role on children in early childhood by collecting data about related feelings, actions, and meanings: valuable information about daily lived experiences better understood through narration. I will employ a

qualitative research design to investigate the research question. The study design will centre on interviews.

Rigorous methodology has been a topic of discussion in books and articles about educational research. A critical aspect of a rigorous methodology involves closely aligning the research question or objectives with the planned research methods and checking that the actual execution, if adjusted to suit the context found during the research, still agrees with the intended methodology (Fairfield, 2022). As an Executive Editor of the *Distance Learning* journal, Naidu (2015) commented that the peer review process is critical because it provides a quality check that addresses the alignment of the research focus or question with the researcher's proposed and applied research methods.

There are three types of research: basic, applied, and action (Cohen et al., 2000). *Basic research* is concerned with developing theoretical knowledge. It is primarily comprehensive and is conducted to obtain an in-depth picture of a field of study, phenomenon, or theory. Therefore, basic research does not impact current society; however, it will provide far more significant benefits in the future. Universities and other institutions can benefit from basic research because it enriches the knowledge base for further studies. Researchers often conduct basic research to find new techniques, procedures, and tools to conduct additional research (Shapiro, 2013).

The second type of research, *applied research*, seeks to develop sound knowledge through empirical analysis but is focused on developing new products, ideas, and goods to help the community. In other words, applied research can solve a problem or study a situation, phenomenon, or idea, as in social science and psychology. Applied research aims vary, but its scope concerns the present and not sometime in

the future (Shapiro, 2013). With the third type, *action research*, the researcher collects data to diagnose problems, search for solutions, take action toward developed solutions, and monitor how well the action worked (Cohen et al., 2000). The present study involves basic research.

The debate among educational researchers regarding basic research mainly pertains to classifying qualitative versus quantitative research through an analytical approach. Quantitative and qualitative research collects objective and subjective data, respectively (Ary et al., 2018). Some researchers claim that qualitative research sometimes holds the reputation of being a less reliable or less trustworthy approach. More often than not, this assertion stems from a belief that qualitative research is fundamentally subjective and therefore prone to bias. Conversely, some researchers have demonstrated that a systematic, objective method does not exist. Others have argued that the procedural or step-by-step research model is a 'fraud' [perpetuating] a 'myth of objectivity' (in-text). These researchers have cited autobiographical accounts of natural science researchers, revealing that the actual research process is 'frequently not carefully planned… and conducted according to set procedures… often [centring] around compromise, short-cuts, hunches, and serendipitous occurrences' (Ary et al., 2018, p. 1).

Although some might tend to interpret numbers as more precise, reliable, and objective, information is valuable, regardless of its native form. Such information can be analysed in numerous ways, some more 'rigorous' than others, but the analytical approach used does not define the research as qualitative or quantitative, nor does the data source (Billups, 2021). Regardless of the debate's outcome, research findings are more reliable when employing a systematic method. The core of a systematic or rigorous method is aligning the research aim and objectives with the proposed

research methodology (Leavy, 2020). The following section discusses why interpretive methodologies are appropriate for achieving the current study's objective.

3.3 Determining the Appropriate Methodology

The use of a rigorous methodology is considered capable of producing quality research. The basis of such rigour is the researcher's confidence, which stems from their personal experiences and consideration of previous studies' findings to thoroughly cover all sides of an issue (Cohen et al., 2000). The researcher then analyses these aspects to select the most appropriate methodology for their current study based on its aim and objectives (Ary et al., 2018). As previously mentioned, this study seeks to determine VR's role in the development of children between (four to six years) based on their parents' or carers' perspectives.

Furthermore, since human experiences are profoundly subjective and produce unique meanings for each subject, collecting data from interviews will provide a diverse dataset (Powney & Watts, 2018). These interviews did also permit an in-depth exploration of the strengths and weaknesses of VR's potential effect on children in early childhood. As Corbin and Strauss (2014) confirmed, a qualitative approach can obtain current perspectives on phenomena about which we possess limited knowledge. In addition, Creswell and Creswell (2018) explained that a qualitative approach is appropriate when the lengthy narratives of situations, examples, and events contribute to clarifying and thoroughly interpreting results. Similarly, Johnson and Christensen (2008) conveyed that a qualitative approach allows a researcher to collect comprehensive, detailed information regarding everyday lived experiences easily understood through narration, which the present study requires. Furthermore, Patton (2002) showed that a qualitative approach is appropriate when studying

unjustified events and situations, i.e. when the type of research is inadequately explained or uncommon.

On the other hand, research has often applied quantitative research and experimental designs (e.g. Waytz & Gray, 2018; Ruiz-Ariza et al., 2018). Therefore, adopting a qualitative approach will add to the limited qualitative investigation of social trials and allow an in-depth exploration of this phenomenon (Creswell & Creswell, 2018). Quantitative methods that require inferential and descriptive statistics are not appropriate for the current study because they are inconsistent with interpretivism, which focuses on qualities. Such quantitative methods require quantifying and measuring the study phenomenon, which a survey is capable of doing. However, a survey would focus on 'variables' and their relationships to determine whether a correlation exists (Powney & Watts, 2018). This method would not provide access to the meanings and context of children's actions and VR's potential impact. This has been discussed in detail in some studies—specifically, that its strength is undeniable. However, the results might be limited and not discussed sufficiently based on the researchers' selected research methodologies. While these comments stem from my opinion, some studies have also mentioned these limitations.

For example, Waytz and Gray (2018) aimed to investigate the link between online technology use, from Facebook messaging to virtual reality, and sociability, including empathy, emotional intelligence, perspective thinking and emotion recognition. The study revealed a negative relationship between online technology and sociability. However, since the study results were based only on figures and statistics, the analysis came across as incomplete from the researchers' perspective. Therefore, they called for an additional study to interpret possible effects on socialisation:

‘Investigating these interactions would provide a more nuanced picture of the impact of online technology’ (Waytz & Gray, 2018, p. 485).

Moreover, Ruiz-Ariza et al. (2018) sought to analyse the effect of eight weeks of playing *Pokémon GO* on the cognitive performance and emotional intelligence of Spanish adolescents between (12 and 15 years). The researchers used a quantitative approach and conducted a randomised and longitudinal study on a control group (did not use *Pokémon GO*) and an experimental group (used *Pokémon GO*) for eight weeks. Although the results were positive for the experimental group, in their conclusion, the researchers emphasised a lack of evidence, and the findings did not explore causation.

Conversely, many studies have applied qualitative approaches to explore new phenomena and their impacts. Ma (2019) supported this approach and highlighted its role in evaluating critical phenomena. In addition, various phenomena studies have adopted a qualitative approach. For example, de Freitas (2018) used a qualitative approach to determine whether games were active learning tools. Lund et al. (2018) also applied such an approach examining the power of social media storytelling in destination branding.

Furthermore, ALShamare (2019) performed qualitative research to identify social media’s role in supporting parents and teachers who work with children with Down Syndrome. Moreover, Jensen (2019) applied a qualitative approach to explore whether animated characters conveyed specific meanings to children. Similarly, McMichael et al. (2020) examined VR exergaming as a promising avenue to engage adolescents (13-17 years old) in physical activity by interviewing 18 parents of adolescents. They claimed that because parental support invariably predicted

adolescents' physical activity, it was essential to collect their parents' views about this intervention.

Based on the preceding reasoning, a principle study of each new phenomenon is necessary to perform a thorough analysis and identify the strengths and weaknesses that subsequent studies can measure and compare (Ary et al., 2018). The present study involves human participants; who are profoundly subjective and produce unique meaning for each participant. In other words, subjective data refer to information from an individual's point of view and ideas associated with their way of thinking. Such data consist of their thoughts, perspectives, and experiences. On the other hand, objective data refer to measurable qualities found through tests and examination. For this reason, collecting objective data is not suitable because it does not account for individuals' unique experiences and the meanings they construct from such experiences. Therefore, this study adopts a qualitative approach to collect subjective data, adding to the social sciences' limited qualitative investigations and exploring this phenomenon in-depth.

3.4 Qualitative Approach

Qualitative inquiry makes the assumed world visible through abundant descriptions of people's unique experiences. Positivist researchers who are beginning to ask qualitative questions apply this approach. Notably, a qualitative inquiry has been an active feature of educational research (Vindrola & Johnson, 2020). Qualitative approach encompasses data collection methods that focus on meaning and context (Ary et al., 2018). Furthermore, a qualitative approach focusing on human participants involved in the phenomenon under investigation. Thus, qualitative data collection methods involve collecting data from human subjects because meanings and socially constructed realities reside in their minds (Corbin & Strauss, 2014). Qualitative data

analysis techniques then analyse participants' statements to provide thorough descriptions that comprehensively account for context, as planned in this research, or seek themes and patterns in the collected data (McMichael et al., 2020).

3.4.1 Interview Method

Boyce and Neale (2006) defined an *interview* as a 'qualitative research technique [that] involves conducting intensive individual [discussions] with a small number of respondents to explore their perspectives on a particular idea, program or situation' (p. 3). For this study, the primary reason for selecting the interview method is to gain access to parents' and carers' perspectives on VR games and explore VR's potential role in early childhood children's development. Achieving this aim requires collecting data from parents about their beliefs, feelings, and meanings that engender actions with their children. Thus, an interview can collect this valuable information about daily lived experiences. Seidman (2006) argued that interviews essentially tell stories that impart knowledge:

> Telling stories is essentially a meaning-making process. When people tell stories, they select details of their experiences from their stream of consciousness . . . In order to give the details of their experience a beginning, middle, and end, people must reflect on their experience. It is this process of selecting constitutive details of experience, reflecting on them, giving them order, and thereby making sense of them that makes telling stories a meaning-making experience (Seidman, 2006, p. 3).

As Seidman (2006) explained, the human subject of educational inquiry differs from physics or chemistry research. The human subject has language and can 'talk and think' (p. 3), as can the researcher. Therefore, language is the mode of inquiry for people in the situations in which they find themselves.

There are various in-depth interviews, including informal conversational interviews, guided interviews, and standardised open-ended interviews. From these interview methods, I have chosen to use a semi-structured interview to collect data from mothers of children who use VR. Various practical guides are available for designing and executing semi-structured interviews (e.g. Ary et al., 2018; Alhababi, 2017; Berry, 1999; Seidman, 2006; Tracy, 2013; Turner, 2010; Billups, 2021).

Berry (1999) noted that in-depth interviewing could elicit information constructing holistic knowledge about human subjects' perspectives and situations. A researcher can ask open-ended questions and probe when necessary to obtain more detailed data (Leavy, 2020). I decided to conduct face-to-face interviews to create rapport with respondents and observe the interviewees' body language, augmenting their understanding of the answers. I did not select the informal conversational interview method because it resembles a chat (Smith & Pole, 2007). In other words, informants may forget that they are participating in a formal interview. Additionally, most of the interview questions arise from the immediate context of an informal conversational interview (Creswell, 2021). Further, I opted not to use the guided interview method because it is based on a checklist to ensure that specific topics are covered and does not include precise, predetermined questions that could be pre-informed (Billups, 2021).

Obtaining people's stories and the meanings of their actions is one reason for choosing the in-depth interview method for this research. The other primary reason is that an in-depth interview method enables a researcher to collect information about the context and meaning (Creswell, 2021). In addition, this method could provide a diverse dataset (Leavy, 2020), thus allowing an in-depth

exploration of the potential strengths and weaknesses of VR's effect on children between (four to six) years of age.

3.4.2 Context, Setting and Meaning

Qualitative approaches consider the context of peoples' actions (Fairfield, 2022). An in-depth interview data collection method accomplishes this through focused questions regarding the context and other probing questions during the interview (Billups, 2021). The present research requires considering the circumstances in which children use VR and understanding the context of their behaviour.

Such a contextual account is possible through the thick description a qualitative approach offers and the collecting of qualitative data through an in-depth interview method. According to Ponterotto (2006), the first mention of the term 'thick description' appeared in Ryle's intellectual work in the mid-1960s. Ascribing intentionality is the central feature of thick description. For Ryle, thick description involves understanding and absorbing the context of a situation or behaviour. It also involves ascribing present and future intentionality to the behaviour. The current study contemplates and analyses interview data to develop thick descriptions that understand and absorb the context of a fuller account of the meaning involved in the use of VR and its potential effect on children.

3.5 Data Collection Procedures

Powney and Watts (2018) provided practical guidelines for using the interview method to collect data. They referred to three stages: preparation, initial contact with participants, and conducting the interview. This study initially involves creating an overall research plan and interview framework (Fairfield, 2022). In addition, the study design will include specific methods for recording and analysing interview transcripts

(Billups, 2021). The research objective has guided the questions asked during interviews. The in-depth interview method encouraged participants to openly discuss their children's routines and experiences with VR. Additionally, although the interviews are audio-recorded, there is also a written summary of each interview after its conclusion, considering the interviewee's body language and any circumstances during the interview.

3.5.1 Selection of Participants

Criteria, opportunistic means, and convenience will guide the selection of research participants (Ary et al., 2018). Parents and carers will be selected as interviewees for this study using a blended random and snowball model. An advertisement for participation will initially circulate through closer proximity circles of Saudi families in KSA (Jeddah) and the UK (London). Moreover, I will use the criteria technique for choosing participants. However, relevant and interesting subjects who become known through opportunistic means will also be considered. However, I will first check them against the selection criteria.

Four categories of criteria will serve as the basis for study participant selection. First, there is a fundamental theoretical criterion for the parents or carers, besides three criteria for their children. Regarding parents or carers, a couple of them have been chosen to ensure the most accurate proxy access to children's states. Many of them are the mother and the father. However, a carer close to the child could also be involved due to several reasons, such as separation, widowhood or others; there is an explanation in each case. In terms of the three criteria for children, they must meet the following specific requirements:

1. They are between (four to six years old).

2. They have been using VR games.

3. They are Saudis (living in KSA or the UK).

Consequently, the participants in the current study are the parents or carers of Saudi children (aged four to six) years old who play VR games. Moreover, to enrich the study and determine whether being in a different social and cultural environment impacts the outcome, the participants have been in KSA (Jeddah) and the UK (London).

After sharing information about the study through social media, requesting contributions, and clarifying participants' personal circumstances, the first three participants who met the criteria (see above) were selected for the pilot study.

Pilot study participants' word of mouth snowballed to the reception of a large number of additional expressions of interest through peer-to-peer software (WhatsApp). Messages varied from gentle enquiries to a number of very enthusiastic statements of willingness to participate. This allowed me to compile a list of names of potential participants who met the above-mentioned criteria. The final set of participants was not scrutinised or vetted further. All interested parties that met all three criteria and also managed to persuade their partner and/or another carer for each child to participate in this project were included and ended up participating in the research.

3.5.2 The Interview

Interviewees have been contacted in advance by telephone to remind them of the interview meeting. Concerning the location of the interview, that was up to the participants to choose, but they were also made aware that they were welcome in my home. Given that this is a very common social practice/convention in Saudi Arabia, all

participants decided to accept this offer. For this purpose, I had prepared a quiet room to host the participants, so that the voice recordings could be clear and noise-free; I also ensured that the space provided was comfortable and hospitable for all participants.

At the interview, the parents or carers were informed about the research and asked to sign the participant consent form to obtain their permission to begin. I also explained the interview procedure, including how the interview will be recorded, to the interviewees (Vindrola & Johnson, 2020). I did my best to be as open and transparent as possible and focused on ensuring that the respondents were at ease.

A semi-structured interview schedule (Appendix C) was observed (Billups, 2021). Therefore, as the researcher, I remained aware that the meeting was for data collection and avoided expressing biases, opinions, and gestures that distracted the respondent (Creswell, 2021). Interview data were collected using an audio-recording device and by taking notes (Billups, 2021). The audio recordings are kept in a safe place to which only I have access (Creswell, 2021). The data stored on the UCL Network for the duration of my PhD. In addition, storing the anonymised data on an encrypted device and USB stick for the length of my PhD research project, additional details in 3.7.

Since the focus of the interview is conversation or dialogue, I will concentrate on the verbal interaction with the interviewees. Berry (1999) recommended learning questioning techniques. A good questioning technique makes it easier for respondents to relate their accounts, thus yielding quality data (Fairfield, 2022). Therefore, the interview structure will incorporate the following guidelines provided by Berry (1999):

1. Ask straightforward questions: The words used in the questions need to make sense to the interviewee and be relevant to their context. Therefore, the questions will omit technical jargon.
2. Ask single questions: Each question will be only one question to make it easier to understand. Two-part questions will be avoided because they require the respondent to interpret.
3. Ask open-ended questions: The questions will not pre-determine the answer. Instead, wording will enable the respondents to relate their ideas and terms.
4. Ask experience and behaviour questions rather than opinion and feeling questions: Questions about experiences will be asked first to enable respondents to settle; questions on opinions and feelings will follow.
5. Sequence the questions: The ‘funnelling’ technique will ask general questions first and specific questions afterwards.
6. Probe and follow-up questions: Probing questions will be asked to enhance the response to a question, obtain richer data, and inform the respondent of the level and depth of responses being sought. Direct questioning or the researcher’s body language, such as a nod or listening clues such as ‘mm’ or a pause, can accomplish these goals. Further, repeating a significant word can extract more information.
7. Interpret questions: I will clarify and extend the intended meanings of the questions to avoid misinterpretations.
8. Avoid sensitive questions: Questions of a personal nature or potentially offensive will be avoided. Such questions could offend the respondent and possibly interrupt the interview. If respondents feel uneasy, they might begin using avoidance tactics.

9. Encourage freedom but maintain control: Respondents should feel safe talking freely and responding to each question on their terms. However, the researcher needs to be aware of the required data and ensure that the dialogue is guided accordingly.
10. Establish rapport: Since establishing rapport is necessary to obtain quality data, the researcher should respect respondents' opinions, support their feelings, and recognise their responses. The researcher should also be aware of their body language and tone of voice throughout the interview meeting.

The richness of the data obtained depends on the researcher's ability to probe (Creswell, 2021). Berry (1999) detailed several probing techniques that this study will apply. For example, one technique is contradicting, which involves deliberately expressing a contradictory opinion to provoke additional comments. Another technique involves feigning puzzlement, which induces further elaboration by the respondent. Finally, encouragement is another technique to extract information on particular issues (Leavy, 2020).

3.5.3 Data Analysis Procedures

An audio device will record the bulk of the data collected from the interviews; some will also appear in my field notes. In this sub-section, I discuss procedures I will use to manage and thoroughly analyse the collected data. Educational researchers rely on data analysis procedures developed in the social sciences (Leavy, 2020).

Data analysis in qualitative research proceeds as a result of making interpretations (Creswell, 2021). Qualitative data are typically analysed using the thematic analysis technique, which I will use in this study to analyse the collected data. The interview data should result in a large volume of verbal data that will require interpretation

(Billups, 2021). Qualitative data analysis aims to find meaning and patterns or themes hidden within a large volume of data. When related together, meaningful themes constitute the data interpretation, which may vary throughout the study (Fairfield, 2022). However, the findings resulting from the thematic analysis may raise new questions providing new directions for the study (Billups, 2021). Moreover, Cohen et al. (2007) stated that many interpretive researchers do not draw a sharp distinction between the data collection and analysis phases. Often, researchers alternate between data collection, analysis, and further data collection as new and varied interpretations begin to surface.

A prime reason for selecting thematic analysis is its coherence with deductive reasoning. The logic of reasoning is significant in research, and deductive reasoning is a significant feature of the qualitative approach. Thus, thematic analysis is suitable for deductive and inductive reasoning (Frith & Gleeson, 2004). Additionally, it provides flexibility when dealing with a large volume of collected data to derive meaning from respondents and their different perspectives and interpret them in flexible and emerging interpretative frameworks (Creswell, 2003).

Denscombe (2010) preferred two data analysis principles. The first involves making the data compact to reduce the respondents' extensive and diverse raw responses into a succinct structure that is easier to analyse. The second and most crucial principle involves ensuring that the research questions and objectives are related to the summarised data. Based on these two principles, I will use thematic data analysis to understand and analyse the collected data comprehensively. Thematic data analysis requires the classification or coding of the data into themes and results in identifying concepts or constructs for interpretation (Alhojailan, 2012). Coding uses the principle of element-to-data, which enables a researcher to identify the frequency of

data occurrences, which a researcher can classify as a significant theme emerging from a dataset.

According to Marks and Yardley (2004), thematic analysis enables researchers to understand their data comprehensively. Namey et al. (2008) noted that thematic analysis goes beyond the simple counting of words and phrases by identifying and describing explicit and implicit meanings and ideas in the dataset. Such emerging codes, which the researcher develops, can be directly linked to the raw data and stored as a code table for further analysis, especially when adding significance and interpretations.

There are three main stages in thematic analysis: the reduction stage, data display stage, and conclusion-drawing or verification stage (Miles, 1994). Miles (1994) explained that data reduction is the process of focusing, sharpening, sorting, discarding, and organising collected data to discover constructs and relevant interpretations of the data. The three main sub-processes in data reduction are the selection, simplification, and transformation of data. The data reduction enables the researcher to draw conclusions quickly and verify the data reduction stage. As noted above, coding the data facilitates the reduction of the data into categories of meaningful data. A prime technique that can be used to achieve this is a table of codes, which I will use for the data analysis in this study. Moreover, there are various data display methods. Yin (2015) listed the most common and appropriate methods: figures, tables, charts, categorisation maps, and quotations.

The objective of coding is to identify likely themes emerging from the data and establish relationships and connections across the dataset. To develop codes, the researcher should read and re-read respondents' transcripts to establish meaningful

categories of the information that facilitate a theoretical perspective. Such coding permits the researcher to view all the data through a significant and relevant interpretation (Halldorson, 2009).

The actual coding process involves tabulating the data to ease the analysis process, as tabulated data can help identify themes (Billups, 2021). Moreover, as Bogdan and Biklen (2007) suggested, the researcher should read and re-read the transcripts several times to identify relevant themes in the dataset. Additionally, during this reading, the researcher can begin to highlight words, phrases, sentences, and portions of the responses as themes that address the research questions and provide theoretical insights.

The data display stage concerns organising the data into meaningful information; it also involves making sense of the data and assessing its reliability and validity. This step ensures that the emerging themes account for the whole data and address the research questions. As Miles and Huberman (1994) noted, the organised information in the data display stage provides immediate access to the dataset's meaning in a clear form; it assists in drawing justified conclusions or signals moving to the next step of the analysis. Displaying the data in different forms allows the researcher to gain an in-depth understanding of the data. Often, data are presented visually, such as tables and graphs of the themed data constructs (Yin, 2015), which enhances the data and aids in interpretation. It facilitates the exploration and analysis of differences, similarities, and interrelations within the data and identified themes. Such visually presented data then enables the drawing of relevant interpretations and conclusions.

In addition, researchers have argued that thematic analysis facilitates theorising (e.g. Braun & Clarke, 2006; Crawford et al., 2008). Such themes can ascribe a narrative to

the diverse dataset, reflecting respondents' experiences and authentic meanings (Crawford et al., 2008) and drawing conclusions (Alhojailan, 2012). According to Joffe and Yardley (2004), thematic analysis needs to convey the content truthfully. Therefore, the researcher's selected themes need to explain the bulk of data and note any exceptions. In thematic analysis, a single statement from a respondent can lead to a theme. However, a single statement is not sufficient because a theme needs to be evidenced across the various respondents to tell the whole story. As Blacker (2009) explained, a thematic description of data assists the researcher and the stakeholders in the research, primarily other researchers, make sense of the dominant themes and any exceptions.

Alhojailan (2012) commented on the basis for drawing conclusions from thematic analysis. Specifically, the identified themes need to relate well to the research question. In addition, the reasoning behind defining interrelationships between the themes needs to be explicit to facilitate the reader's verification. Moreover, the researcher must construct conceptual coherence and consistency within the themes and subthemes and across the themes to write a justifiable narrative or interpretation of the collected data.

Based on the above, and due to the exploratory nature of this study and the use of a qualitative approach, the thematic analysis technique has been applied to analyse, find meaning, and search for patterns or themes in the large volume of data. In addition, the interviews are recorded and the taken notes are made to reduce the risk of bias due to my interpretation of the participants' views. Additionally, direct quotes from participants are used to clarify the results section and avoid any distortion of the participants' words. Furthermore, any contexts that may affect the text, such as humour or tension, have been mentioned. Moreover, ensuring that the research study

is carried out in a thorough, rigorous and reproducible methodological coherence will ensure that the data obtained will allow the researcher to reach valid and reliable findings (Morse et al., 2002). Regarding adopting a rigorous and reproducible methodological strategy, the final analysis and interpretation have been sent back to the participants, asking them whether they agreed and asking for their comments on their contributions and how I reported their statements in order to ensure that the analysis and interpretation are rigour, robust and applicable. I received confirmation from all participants, with supportive comments.

NVivo 12 software, which analyses and organises large data sets effectively, was used to analyse qualitative data. Computer-assisted qualitative data analysis helps the researcher analyse data efficiently, because the software codes extracts of the data more quickly than the manual method, which requires cutting and pasting text from the transcript to another document (Welsh, 2002). Using NVivo software helps analyse data proficiently and adds rigour to the research. The software contains different tools and queries that allows for interrogating the data at particular levels. For example, a researcher can perform a quick search in the data an extensive data set by running the word search query and obtaining results in seconds. Similarly, a frequency query can find the most frequently used words or concepts in the data; this query helps identify potential themes in the data, especially at an early stage of the analysis process. This study used an inductive approach during the analysis process, allowing the data to determine themes rather than approaching the data with preconceived themes.

Once transcribed, the interviews were imported into the software to commence the analysis process. All the steps of thematic analysis were employed during the analysis of the data. As this study's qualitative data consisted of interviews from two groups of

respondents, separate folders were created in the software to import and save the data. The data in the folders included interview transcripts from both groups (London and Jeddah). After importing the data, the interview files were created as cases. In the first step (familiarisation), they were read and re-read to gain familiarity with the data. According to Braun and Clarke, familiarisation entails 'go[ing] beyond surface meanings of the data to make sense of the data and tell a rich and compelling story about what the data means'.

After the familiarisation step, the second step (coding) involved generating initial codes (nodes on NVivo) to capture the data's essential features. These nodes consisted of recurring patterns (themes) across the data that were developed during familiarisation. During this process, coding stripes were made visible alongside the source, revealing how the content was being coded, and which codes were being used in the process. In the third step (theme generation), after the data were coded and relevant extracts highlighted, nodes were collated and examined to identify broader meaning patterns (themes). Themes differ from codes in consisting of a sentence or phrase and sometimes a combination of codes.

After developing the data's potential themes (nodes), relevant information was organised under respective themes. In the next step, reviewing and naming themes, an iterative process refined, organised, and categorised the themes meaningfully into sub-themes to develop a thematic framework. Similar themes and ideas were clustered in groups and organised in the thematic framework. The final step entailed explaining and describing these themes and sub-themes in detail.

3.6 Pilot Study

According to Teijlingen and Hundley (2002), pilot studies fulfil essential functions. They identified various reasons to conduct a pilot study: to develop and test research instruments, design and assess the research protocol, identify logical problems that might occur, collect preliminary data, assess the proposed data analysis methods, and train the researcher. A pilot study is a preliminary, small-scale version of the intended study; it tests the research instrument and the study's likely outcome. A pilot study should include a group of respondents to ensure that the interview questions are robust. Therefore, I conducted a pilot study to gain experience conducting interviews with respondents.

A pilot test is a critical feature of preparing for an interview (Turner, 2010). According to Turner (2010), pilot tests help identify 'flaws, limitations, or other weaknesses with the interview design [that] allow… necessary revisions' (p. 757) before conducting the study. A pilot study ensured that the interview and the interview questions were relevant to the study's aim in the present research. During the pilot study, I took systematic notes about the interview, the interview questions, and the experiences gained. These notes improved my interviewing skills and the interview questions so that relevant data could be collected.

Conducting a pilot study helps form ideas about the interview (Powney & Watts, 2018). Particular points of interest included ensuring that respondents were at ease; observations about my competency conducting interviews; the start and finish time of the interview; the pace of questioning; the time needed to take field notes; and the use of probing questions. These notes enhance the interview process in the field.

The pilot study involved respondents with experiences similar to the actual research participants chosen per the criteria outlined in Section 3.5.1. The pilot study assessed the relevance of the interview questions and whether the data obtained helped address the research question (Turner, 2010). I noted whether respondents understood the questions, the usefulness of the data obtained, whether seemingly different questions yielded the same data, and whether specific questions failed to produce data. I referred to my notes to revise the interview questions accordingly.

3.6.1 Conducting the Pilot Study

The various advantages mentioned in Section 3.6 served as incentives to conduct a pilot study for the current study. The main objectives were as follows: (1) to examine the study methodology; (2) to measure the clarity of the questions directed toward participants and refine unclear questions; (3) to evaluate the possibility of the data resulting from the questions asked answering the study's central question; and (4) to provide an empirical and realistic picture of the theoretical part of the study before carrying out the primary interviews.

The pilot study took place in August 2019. It involved three volunteers: two mothers and a father, whom I selected according to the criteria outlined in Section 3.5.1. All three volunteers had resided in London for more than two years. Data were collected using semi-structured interviews. Face-to-face interviews were carried out in a conversational style and ranged from 90 to 120 minutes. The interviews started with a friendly conversation to introduce myself and provide general information about the current study. I then discussed confidentiality, anonymity, and consent, and the volunteers signed the participant consent form (see Appendix A). Next, the interviews occurred.

The interviews led to some common observations and conclusions. For example, I noticed different levels of participant comprehension. Based on this observation, I developed more precise definitions and added details about some terms. Moreover, in this pilot study, the mothers provided more precise details than the father. Although I cannot generalise, I expected this difference for two reasons.

One was the social side: mothers in KSA are the primary caregivers for their children, especially in early childhood. As a result, mothers are often closer to their children and are more familiar with their details, experiences, and stories. Certain Saudi studies, such as ALShamare's (2019), support this perspective. However, fathers are often the decision-makers in Saudi homes; as such, it is necessary to know both opinions.

The second reason involved the psychological aspect. The mothers' psychological nature, as females, prompted their detailed responses; males, on the other hand, tend to offer closed answers. Studies such as Sherr and St. Lawrence's (2000) and Chesler's (2018) have confirmed these differences.

In addition, some participants shared personal observations. For example, one of the mothers was comfortable answering when the question was presented in the colloquial dialect, while her responses were more formal when asked the question in standard Arabic. I cannot guarantee a reason, but I will consider this finding in subsequent interviews by colloquially asking one of the questions and comparing the participant's reaction.

Moreover, I applied minor alterations and additions to the primary questions. For example, I realised that examples of real-life scenarios, like asking them to provide examples of their children's attitudes toward others, could offer a more precise picture than detailed questions. Additionally, I realised that it was important for the final

interview question to focus on a summary of their views on VR games and if they affect their children. Finally, I also recognised that I should ask participants if they had anything else to add.

In the pilot study, the three volunteers offered thorough summaries. For instance, one mother (M2) stated about her daughter, ‘It is basically not her decision, and she is forced by a society where children may feel inferior and not integrate with friends unless they have a particular game’. The father (F1) referred to ‘the importance of competent authorities’ role in promoting the objectives of these games and their diversity and the possibility of linking them to the curriculum despite the lack of guidance for use, especially for children’. These unsolicited additions and the volunteers’ answers to other questions gave me a broader perspective and raised new questions that I could include.

Furthermore, the participants had different reactions, such as when I asked them about their responses compared to when I asked for their opinions of someone else's behaviour. To clarify, while the three volunteers were unanimous in their keenness to buy games suitable for their children (based on the game’s age label), two defended and gave justifications for other parents’ behaviour when purchasing games beyond the age of their children. This observation led me to change the wording of some questions to discuss interviewees’ stances instead of focusing on their actions.

Finally, welcoming participation and emphasising the significance of and need for the subject of study, especially in Saudi society, was an effective motivator for me as a researcher. The interviewees would call to offer the names of families hoping to participate in the study. Communicating with prospective participants over the phone was highly encouraging. Giving them a general idea from the three volunteers seemed

to have formed their opinions about VR game supporters, with reluctance, and those who are firmly opposed. Based on their enthusiasm, I anticipated receiving detailed information from them about their experiences and views. VR game opponents who expressed that their children could not obtain the games piqued my curiosity to learn more about their perspectives through future interviews. In general, the pilot study achieved the four stated objectives.

3.7 Study Ethics and Risks

Research involving human subjects requires approval from relevant committees or ethics committees. However, I also viewed it as my responsibility to safeguard the interests of the parents and carers and their children. As Wellington (2015) explained, ethics should guide research and continue throughout the entire project, including publication.

I obtained approval for this study from the UCL Ethics Committee (Appendix B). In addition, the study protocol includes specific steps to protect the data:

1. All identifying information has been removed from the data and replaced with identifiers.
2. The names associated with the identifiers have been stored separately on an encrypted computer, and the identifying information is kept apart from the original data.
3. The anonymised data were stored on encrypted devices, i.e. a USB stick and the UCL network, for the duration of the research project.

Before participating in the study, recruited participants signed the informed consent form (Appendix A), including my contact details as principal investigator, the supervising team's emails, and a detailed description of the research project and participation. The form also clarifies that participation in the study is entirely voluntary

and delineates participants' rights, including their decision to withdraw from the research at any time. Furthermore, the consent form guarantees anonymity and confidentiality regarding their information and responses. The informed consent form adheres to the British Educational Research Association's 'Ethical Guidelines for Educational Research' (2018), and the doctoral research ethics team at the Institute of Education (IOE) have reviewed it (Appendix B).

I have considered the risks of undertaking the current study. Potential problems have been addressed, and contingencies considered. For example, I contacted participants and offered them a draft of my analysis of their responses. I asked them to confirm whether they were satisfied with my interpretation and analysis of their statements and how I reported my findings. That might reduce the risk of interpretation bias, as mentioned in Section 3.5.3. Moreover, I contacted more parents or carers than required to avoid participant drop-out resulting in an insufficient sample size. No funding or time issues are involved.

3.8 Conclusion

This chapter has detailed this study's research methodology. This study will use the interview method to collect data and the thematic analysis technique to analyse collected data. The data collection and analysis procedures have been detailed in preparation for the fieldwork. In addition, a pilot study was conducted, as described. Finally, the ethics and risks have been considered.

Chapter Four: Data Collection

4.1 Introduction

This chapter summarises the individual responses, not a literal translation of what the interviewees said. In some instances, participants' quotes are included. This chapter aims to clarify some of the views, perspectives, feelings, and backgrounds of participants as they relate to the role of virtual reality (VR) in their children's lives. Since the current study is the first of its kind in early childhood studies and VR technology in the Saudi context, allowing parents and carers to provide their perspectives regarding VR was essential, especially after VR's formal inclusion in the kindergarten and preschool stages.

This study adopted a qualitative approach to collect data: semi-structured interviews conducted with 20 parents or carers of 10 Saudi children (aged four to six) who had used VR for at least three months. There were two groups of participants. The first group consisted of 10 parents or carers of five children in Jeddah, KSA. The second group comprised 10 parents or carers of five Saudi children in London, UK, as shown in Table 4.1. Thus, each group contained the perspectives of two parents or carers of five children. In other words, every two interviews focused on one child; each child was pseudonymised using the first letter of his or her gender (B, G) plus number to maintain anonymity, as explained in Chapter three.

In total, 10 family interviews were conducted in a semi-structured format; a schedule with five pre-identified themes and open-ended questions guided the discussions (this is available in Appendix C). The five discussion themes included perceptions of VR use, VR-playing behaviour and family experiences with VR, child experiences with VR,

household or family rules and restrictions regarding VR, and opinions and experiences with activities using VR at home.

This chapter arranges the responses in a specific sequence to make it easier to identify the topics reviewed. First, individual presentations include a general introduction to each case in this study. Next, the paragraphs begin sequentially, focusing on what participants mentioned about their children's VR use. The discussions concerned the status of VR games in the daily routine, whether or not VR games affected the child in general, and whether VR games influenced the child's feelings and behaviour. Moreover, the interviews covered VR game content, supervision, and follow-up. Any further relevant information was then included.

Therefore, this chapter provides a social background and context to participants' responses and acts as a preface to understanding the themes and discussion in subsequent chapters. This coordinated sequence stresses the importance of describing each participant or situation to allow the reader to engage with the participants' identities, views, and feelings towards the subject of study. The following table 4.1 shows the age and gender of the participants' children and the duration of their VR use. The next chapter will follow up with a more detailed contrast of the interview findings in relation to the literature.

Table 4.1 Characteristics of the participants and their children

Participant No	ID	Gender	Relationship with the child	Child ID	Child Gender	Child Age	VR Use Duration	Place of Residence
1	M1	Female	Mother	B1	Boy	4 years	5 months	Jeddah, KSA
2	F1	Male	Father					
3	M2	Female	Mother	B2	Boy	5 years	1 year	
4	F2	Male	Father					
5	F3	Male	Father	G3	Girl	5 years	8 months	
6	GM3	Female	Grandmother					
7	M4	Female	Mother	G4	Girl	6 years	2 years	
8	A4	Female	Aunt					
9	M5	Female	Mother	B5	Boy	6 years	1 year	
10	F5	Male	Father					
11	M6	Female	Mother	B6	Boy	5 years	8 months	London, UK
12	F6	Male	Father					
13	M7	Female	Mother	G7	Girl	6 years	1year	
14	F7	Male	Father					
15	M8	Female	Mother	G8	Girl	5 years	6 months	
16	F8	Male	Father					
17	M9	Female	Mother	B9	Boy	6 years	1 year	
18	GM9	Female	Grandmother					
19	M10	Female	Mother	G10	Girl	4 years	5months	
20	F10	Male	Father					

4.2 Participants Responses in Jeddah- Saudi Arabia

This section presents the interviewed parents' and carers' perspectives, attitudes, feelings, experiences, and opinions towards VR in relation to their children's development. The five families described below resided in Jeddah. The sections below provide further details on the interviewees' circumstances.

4.2.1 Interview 1 (M1)

The first interview involved a mother (M1) of five, a housewife with a master's degree from the University of Leeds in the UK specialising in special needs. The interview focused on B1.

B1 was the fifth child in the family and lived with his parents. He was four years old and was in KG2 at an international school. B1 had been playing with VR for approximately five months.

B1 attends his school in the Kindergarten Department from 7:30 AM to 3:30 PM. One year before the interview, the VR device was a birthday present for his sister who is four years older than him. B1 gets attached to the VR game and loves it quickly.

At the time of the interview, B1 spent two hours a day playing VR games, intermittently sharing with his sister.

M1 believed that this type of game had the potential to boost a child's abilities and skills, citing ‘focus, persistence, and love of victory’. Nevertheless, she stated:

> This focus makes him expend significant energy, and he is no longer interested in any other games. For example, my son was passionate about dinosaurs and everything related to them besides some books and puzzles. However, his attachment to VR increased with time, and he lost interest in dinosaurs or other ordinary games.

Surprisingly, when I asked the mother whether B1 had a VR game about dinosaurs, she answered:

> Yes, but at first, he was afraid of them because they appeared as monsters in the game, and he had to attack them. Then, however, when

> his father brought him a VR game about discovering the world of dinosaurs, he accepted them again, but not like before.

M1 didn't remember B1 talking with her about made-up stories, quite unlike his sister. The latter used to play many roles with her virtual characters in VR and tell her made-up stories as they actually happened.

M1 added:

> In general, [B1] is very calm and usually shy. After VR games, this continued for a while; he enjoyed playing regardless of whether he won or lost. However, after a while, approximately two to three weeks, his demeanour changed noticeably. He began to display anger and shouted if he lost and would not calm down until he succeeded in completing the game level.
>
> I cannot deny that his temperament is now linked to winning or losing. Indeed, I do not like to ask him to turn off the devices when he loses because this may affect his mood for the rest of the day. His emotions are evident between laughter, screaming, and crying from one game level to the next.

M1 mentioned that B1 was generally a quiet child, but confirmed that he became moody and more nervous after his exposure to VR games, as noticed by his screaming and sometimes throwing the controller. Additionally, she indicated that his older sister might hit B1 if he won when they competed against each other in the game.

The family was very keen to select academically and culturally helpful and supportive content for their children. Undoubtedly, the competitive nature of the games was not uncommon, and the family appreciated the benefits of such competition.

M1 confirmed that she followed up to ensure the playing time did not exceed two hours, which she might overlook at the end of the week. The father and sometimes the older brother (27 years old) cared about the content when purchasing games and requested the latest educational games even before available in the Saudi market. Also, M1 revealed that she did not know much about VR and that a guide booklet might be helpful if it contained advice in the form of pointers that were not overly detailed.

4.2.2 Interview 2 (F1)

The second interview was with B1's father (F1). F1 was a businessman with two master's degrees from the United States in Finance and Accounting and International Business.

Although the two interviews with M1 and F1 were separate, their responses about B1 were almost identical. F1 added that he was eager to acquire VR devices for his young children:

> VR has significant benefits in providing experiences and information in an entertaining format. Also, this type of education is better than memorising information. Likewise, electronics and virtual worlds are the language of the future, and everyone must motivate their children to learn this language.

Also, F1 enthusiastically supported the Saudi Ministry of Education's new decisions to include VR devices in curricula. He believed that VR would positively affect the quality of education and increase children's enthusiasm to learn more by developing their

sense of initiative.

F1 assured that B1 was shy and did not speak much but observed that B1 was absent-minded and tended to smile after completing virtual playtime. F1 believed that VR games stimulated the imagination, which he noticed with his eight-year-old daughter, who was regarded to be a good speaker and narrator of unique stories. According to F1, she would tell of her adventures climbing mountains or in the depths of the seas as she experienced in the virtual world. He perceived this behaviour as highly beneficial to his children and would not argue with his daughter about whether these accounts derived from real life or the virtual world. Furthermore, although B1 did not participate in these conversations, his smile would not leave his face when they talked about his sister's virtual adventures.

F1 believed that VR games had created an enjoyable atmosphere between his children and him, similar to football matches and traditional games with his older children; it might be even more enjoyable. Still, he appreciated the importance of traditional games and activities, such as swimming, with his children in general.

Another critical point F1 made was that he considered VR games as a treat, stating, 'I remember that, in the amusement park, B1 was refusing to participate in fast rides, but after trying it during VR games, these rides became his favourite'.

F1 added:

> Despite the excellent capabilities of VR games in developing skills in general, the most prominent negative aspect is isolation; even if we engaged in the game together at some time, I worry about my son's preference for isolation.

> Online games are entirely unacceptable for young children, and I do not see any benefit at this age. VR relates only to developing skills and has nothing to do with forming or developing social relationships.

F1 was aware that B1's feelings fluctuated: he did not deny that some aggressive behaviour resulted from anger after losing, but he explained that it was a natural feeling resulting from frustration. He disagreed with M1 that such behaviour was concerning and indicated it was easy to redirect B1's moods with something else that might interest him, such as swimming or watching television.

Finally, F1 stressed the urgent need to raise awareness of the use of VR, especially for parents and educators, for its prevalence among young children.

4.2.3 Interview 3 (M2)

The third interview involved a mother (M2) of three, a housewife with a bachelor's degree in mathematics. The interview focused on her youngest son (B2).

B2 was five years old and in KG3 at a public kindergarten. His parents were separated and shared custody; he lived with his mother (M2) during weekdays and his father (F2, in Interview 4) during weekends. Also, he had an older brother and sister, both in medical school. B2 had been playing with VR for more than a year.

M2 explained that the VR devices were from B2's father, who was very interested in electronics, and he was eager to play VR games with B2 from an early age. M2 confirmed that the home had a strict system designating study and play times during weekdays, for example, playing on one of the devices for a period not exceeding one hour per day. This system continued after her separation from the father approximately one year before the interview. Conversely, there were no restrictions for playing during weekends and holidays; VR play could occupy most of the day. M2 explained:

> VR games, in general, are good. I think they have helped my child analyse and learn new information, such as countries and their locations worldwide, in a fun way, but I fear that [B2] has reached the stage of addiction and isolation.
>
> I see that my son is enjoying spending time with the family, but this does not preclude that he prefers electronic games in general [sic]. As for VR games, they took up more space in [B2's] life and became more enjoyable to him after allowing him to play online with children from the family and school domain.

Also, M2 confirmed:

> I cannot deny that [B2] has become good at using words and tone of voice to discuss his feelings. He will say, 'I am so happy', and laugh while recounting a funny story like his friend surprised by the bear behind him in a VR game. On the other hand, he is sometimes sad and will say, 'I don't want to talk about this', or he cries and repeatedly asks why this happened.

M2 noted that VR was playing a major role in confronting and subsequently overcoming B2's concerns. M2 responded as well:

> This despondence might last from a few minutes to half an hour or until another event distracts him. Of course, a year ago, this would last for hours, but with time he adjusted his moods more quickly.
>
> Regarding [B2's] control of his feelings in general, I think he has matured, especially if he talks about it with me or with his brother and

sister.

When talking about game content, M2 referred to her son's fear of heights and insects. At first, B2 would throw his helmet and run out, but he became accustomed to their presence in the game over time:

> VR has played a vital role in [B2] confronting and overcoming his fears and concerns. Likewise, [B2] preferred to fly aircraft in VR. Although this experience has inspired his ambition and helped him achieve his goals, he tells me about his adventures in the air as if they were real and interact with all his senses, which worries me sometimes.

M2 commented that B2 was a quiet child at home and in school. She did not specifically recall him having violent reactions; his behaviour was generally balanced. Although some of the games that B2 plays contain violence, M2 believes that this type of gameplay was not his favourite, but he might play it to please his friends.

B2's father and older brother were responsible for everything related to the content and the purchase of the games, and M2 was only responsible for specifying the time commitment.

4.2.4 Interview 4 (F2)

The fourth interview was with B2's father (F2). F2 was an official at the Saudi Ministry of Education at the Gifted Centre in Jeddah, with his academic background in Mathematics. F2 stated:

> I believe that VR games activate a child's schemata in terms of mental processes.

F2 believed that VR games have limitless features in which all parents and educators

should participate. For example:

> Travelling into space or the depths of the sea in the virtual world with my children is an enjoyable experience after a long and hard day, and I think it has added a lot to our relationship. Besides, virtual worlds are among the fastest technological developments. Therefore, the current generation must be familiar with and deal with them as the language of the future.

F2 added, ‘My son B2 is a quiet and shy child, but his confidence increases when talking about his virtual adventures. It is clear from the tone of his voice and his body language’.

F2 rejected the idea of isolationism in VR games:

> It is quite the opposite at the family level. Also, as they grow older, they will be allowed to play online, which is a significant opportunity to get acquainted with friends worldwide. Of course, the dangers are everywhere, but with laws regulating online play to protect children, one cannot overlook the benefits.
>
> At school, VR games helped [B2] strengthen his relationship with children by talking about those games, and they began exchanging games and tips to win and move on to the following levels. He was pleased and grateful to many of his companions and sought to help them and make them happy, just as they had done for him.
>
> VR conditions the child for the idea that every action has consequences, making him think before making any decision, and yes, that affected my

> son's behaviour and our discussions. I liked how he reasoned that I was not completing one of the levels because I was angry from losing repeatedly, but I would see the goal clearly if I focused and calmed down. It was a distinct and tangible premise to discuss emotional control, which had a significant impact. Once, [B2] threw the controller and broke it. After a while, when I spoke to him, he said I was angry, then justified his behaviour by saying I had not controlled my behaviour because I lost and had to repeat everything I had passed. This thinking is profound for a child this age.

Additionally, F2 cited another benefit:

> [B2] had a phobia of heights. However, almost six months with a virtual flight training game made him dream of becoming a pilot.

F2 confirmed that he took great care regarding the games' content and suitability for the child's age. He staunchly supported the Ministry's decision to introduce VR into curricula, which he viewed as an opportunity to augment academic output and link it to the requirements of the times. F2 summarised his responses by saying, 'Everything in life has pros and cons, and addressing the cons involves awareness and choosing age-appropriate content and discussing every aspect with the child extensively'.

4.2.5 Interview 5 (F3)

The fifth interview involved G3's father (F3). He was an anaesthetist at a government hospital and married to a gynaecologist and obstetrician at the same hospital. They have a five-year-old daughter (G3), who is their only child. F3 admitted that he and his wife had demanding work schedules that required their daughter to spend most of her time with her maternal grandmother. This situation was a deciding factor for gifting VR

devices to G3 for her sixth birthday. In addition, G3 had requested VR-related gifts because she had tried VR games at her friend's house and enjoyed them.

G3 was five years old and attended an international kindergarten in the KG3 class. She spends time between her parents and her grandmother's house. F3 described G3 as a bright girl who always discussed topics older than her age, loved to theorise and was creative and passionate about science. Her ambition was to become a paediatrician. G3 had been playing with VR for almost eight months.

F3 described his daughter's experience with VR:

> VR games are an essential source for the child’s education, as they discover a great deal through them. A child's imagination is saturated in an unprecedented way. The child inside the virtual environment becomes more vital and active. In addition, VR makes it easier to engage in society, as these devices allow the child to interact with modern technology, such as the Internet and other modern means. VR games also teach scientific thinking that there is a problem and then a gradual solution to it.

G3’s favourite VR game was a jobs simulator; she always chose to play a doctor. F3 characterised it as an enjoyable game that provides the basics of the professions entertainingly. Most importantly, the child enters and experiences enriching virtual worlds, but at the same time, remains safely in the house. Lastly, F3 added that VR games prevent playing online at this age.

F3 did not consider isolation a threat:

> When a child is playing, he is often alone. Still, to find solutions and solve puzzles, he needs to inquire from his friends and sometimes sellers about games before buying them, obtaining explanations and exchanging information. These dimensions of participation are essential, even if the parents do not notice them.

However, F3 sometimes worried about two matters:

> First, I worry about reincarnation and imitation of each game champion. Immersion in the game may continue, even after its completion, for a long time. Children may tell stories in fine detail as if they had actually occurred; it was later discovered that the story happened in VR.
>
> Second, my mom tells me that after a helmet-wearing game—she means VR—G3's eyesight may suffer. Also, VR may cause nausea. So, I am afraid that when she plays too long, VR might cause health problems.

F3 indicated that G3 was a girl who expressed her feelings well, and in playing VR games together, he found that she thoughtfully controlled her feelings. For example, in games requiring focus to hit the target, G3 would 'say, "Dad, don't be anxious to hit the target". I was very proud of her, and when we talked about how this mentality could apply to real life, I found out how deep her thinking is'. Also, F3 pointed out that:

> [G3] has a valuable set of VR movies. Although she lives in the story and reckons it for days, some stories make her more aware. For example, she has a movie about refugee camps. She was so

> sympathetic to the children there, and she kept asking the family and me how we could help them, and she never stopped asking questions about their situation and rights. Honestly, your vision of the standard movie is completely different from the immersion in VR technology. Also, at my brother's home, we tried a seat dedicated to some games, such as flying.
>
> Moreover, we saw a VR movie about a child's difficulty in a wheelchair, and I also remember that this is a very moving cam for children. So there was a long conversation between us about that. What also intrigued me while discussing with her is that the [G3] remembered most of the details very accurately.

On the other hand, F3 explained that ‘setting a specific time for play and sticking to it: I consider that a test of her discipline. And she is quite disciplined even when we're not there’.

F3 confirmed that he controlled the content of the games and discussed their details with his daughter regularly.

4.2.6 Interview 6 (GM3)

The sixth interview was with a paternal grandmother (GM3), a retired school director. She had sixteen grandchildren. She dedicated two large bedrooms to her grandchildren because they often wanted to spend the weekend with her: one to boys and the other for girls. GM3 also allocated a third room as a playing area that contained a wide array of cognitive, action, and electronic games. Her youngest son had added VR devices to the collection of games.

GM3 started by saying that she had tried VR games by herself. Although it caused her

to feel dizzy, the experience was fun. Like all other technologies, she added, it was a double-edged sword. GM3 stated that ‘as much as VR may be useful, inappropriate content may create a violent generation devoid of religion, values, and principles' [sic].

Regarding her granddaughter, G3, she was a smart, high-energy girl. Her teachers always praised her cleverness and morals during parent-teacher conferences. GM3 added that:

> In terms of games, I remember that when [G3] was younger, she preferred drama games, even if she was alone. That was when she was four or five years old. Now, video and VR games have become her favourite.

GM3 emphasised the importance of electronic games in general to developmental processes but signalled that VR reinforced empathy by developing experiences related to real-life: ‘The experience of playing with different perspectives and abilities is gratifying. Besides, putting yourself inside someone else’s life will cause you to experience mixed feelings and think in a different manner that is deeper, broader, and more sophisticated’.

GM3 explained that the experience of leading a personal life, for example, in a refugee camp, added a lot to her grandchildren, including G3. It made them more sympathetic to the children in the camps and increased their awareness of events in the world. GM3 confirmed that VR provided a completely different experience than viewing a movie or documentary on camp children. The VR experience integrated feelings with the senses. GM3 added:

> That experience will definitely affect the children’s behaviour. The maturity of thinking from experiencing VR lives in a controlled

> environment leads to more mature behaviours, improving emotional regulation. VR gives children real-life experiences that may build character and confront feelings that one may not want their children to experience in reality. Still, it is important for their intellectual development, which affects their behavioural maturity.

On the other hand, GM3 pointed out that some troublesome issues may result from using VR, including physiological ones, such as feeling dizzy, nauseous, and unbalanced for a while. Also:

> I think that, due to the complete immersion in the VR game, sometimes [G3] tells me stories that struck her as true in the game. For example, we were watching a movie together, and there were scenes in the Himalayas. Suddenly, [G3] jumped with joy and excitement and told me, 'My father and I went there', and she started telling me about fictitious details and events.

GM3 tried to ask her granddaughter if this account occurred in the game, but G3 insisted on telling the story. GM3 did not want to spoil her enthusiasm with many questions, especially as she knew that G3 might be missing her parents.

In following up, GM3 confirmed that she committed to setting specific time limits, such as not exceeding two hours of electronic games in general, including VR and video games. Concerning the content, G3's father and uncles were the ones who brought the games. Generally, GM3 discussed the contents of existing games with her grandchildren and warned them of the dangers, especially for violent games. However, G3 had no affinity for these types of games.

4.2.7 Interview 7 (M4)

Interviewee M4 was a mother and housewife with a General Certificate of Secondary Education (GCSE). Her husband worked in the petrochemical field. They have three children; G4 is the younger sister of two brothers.

G4 is six years old. Two years prior, she had suffered a painful accident when boiling oil had spilt on her in the kitchen. The accident scarred her neck, chest, and parts of her arm and thigh. However, the disfigurement was not the only problem; the pain was excruciating despite strong analgesics. The mother told me that the home's VR devices were a gift from her sister to G4. In the beginning, G4 refused to wear the VR helmet. Still, the parents, brothers, and aunt (A4) intentionally put on the VR helmet in front of G4 and laughed loudly to attract and encourage her attention. Finally, the plan succeeded, and G4 became attached to VR games.

M4 confirmed that plunging into a virtual world like diving into the sea or seeing alien beings had helped relieve [G4's] pain significantly:

> The VR helped [G4] enormously, especially when changing the wound dressing or applying creams. The situation was tragic before VR: [G4] would not allow anyone to touch her body, and she was screaming day and night. After VR, when she wore the helmet, we usually left her some moments before we started applying antibiotics and ointments and changing the dressings, which went more smoothly.

M4 pointed out that her concern was to relieve her daughter's pain. She ignored other benefits.

However, VR provided a source of amusement for [G4] and her brothers. M4 believed it served as a tool for their bonding and sharing common interests.

Nearly a year after the accident, VR became a daily routine for G4. A4 gave her numerous VR games and movies, gifting her with a new one almost monthly.

M4 concluded the interview by saying:

> [G4's] father and I do not possess much experience in electronics. However, my sister has a master's of education. She oversees the game content and discusses it with [G4]. I always hear her telling [G4] not to play more than a half-hour at a time and teaching her to set the alarm to mark when time is up. [G4's] aunt is responsible for the follow-up and content of VR and the electronic devices.

4.2.8 Interview 8 (A4)

A4 was G4's only maternal aunt and held a master's degree in education. About her relationship with G4, A4 has a close relationship with G4 due to family circumstances.

A4 explained that

> From my sister gave birth to [G4] , I became very attached to her as if she were my daughter.

A4 stated that G4's burn accident was a catastrophe for the whole family. All she could think about was how to relieve G4's pain. She recounted:

> I had heard about VR at this time. First, people were talking about children's immersion in VR. Then I found that it was what [G4] needed. Besides, the helmet played a significant role in covering [G4's] eyes while changing bandages and applying creams; previously, she would never allow anyone to touch her.

A4 added:

> I always read with [G4] and play drama games and enact live stories together, but VR presents a unique kind of immersion. It encompasses the senses, thinking, and feelings. So undeniably, VR had a part in overcoming the crisis. It was as important as pharmacological analgesics.

A4 indicated that ‘G4’s thoughts and feelings became related to VR games as if she were escaping her reality to a more beautiful, or let us say, different reality. Even anxiety or loss scenarios distracted from her pain’. Almost six months after she began using VR, it was time to join the first grade. Due to the accident, G4 was unable to attend school, which started to worry her aunt. A4 started searching for VR games with academic content; unfortunately, they were not available at the time. A4 indicated that, even though educational VR games were not yet extensively available at the time of the interview, the selection was better than a year ago. There was a game that teaches numbers and letters by searching for them in a VR room. Although VR games did not provide academic content at the time, A4 viewed VR games as having a positive impact on mental and cognitive development:

> When a child plays VR games, they give him an authentic experience. In many of these games, he develops skills such as abstract thinking at a higher level. Unfortunately, the school does not teach these skills. Instead, playing VR games develops intellectual skills such as following instructions, problem-solving, thinking speed, quick analysis, and decision-making. In addition, VR improves motor skills, including precision and hand-eye coordination. For example, in first-person

> shooting games, the player must run and shoot simultaneously, requiring the player to track the opponent's impact, where he went, the speed required to injure the target, and, finally, hitting the player opponent successfully. All of these actions are well-thought-out, and this process requires a degree of coordination between the eye, brain, and hand and the visuospatial ability to succeed.

On the other hand, A4 indicated:

> The extent of feelings a player can feel in VR is unprecedented and the basis for a fruitful modern axis between the educator and the child concerning feelings he may encounter in the real world. VR even gives him the consequences of his emotions and actions immediately. If you get angry, that misplaced focus causes you to miss your target and lose the game. Opportunities to learn this cause-and-effect relationship may not be available in real life. All of this cognitive training is a productive life lesson. Experiencing VR affected [G4's] feelings considerably after several months by allowing her to associate emotional influence on cognition when taking medicines or going to the hospital, and it had an apparent positive effect.

The idea of isolation was reversed in G4's case, as she was already isolated from people in the real world. When children were looking at her burns, that was painful for her. G4 was passionate about her virtual character. This observation encouraged A4 to play games online with her to foster G4's social relationships almost a year before the interview. A4 reflected that 'G4 succeeded in making friends worldwide, contributing substantially to her self-confidence. Until now, G4 had not to overcome

the barrier of making friends in real life'.

Regarding G4's behaviour, A4 revealed that:

> It is undeniable that after the painful affliction, [G4] has developed some severe behaviours: she can resort to violence sometimes if someone tries to touch her body. After a while, she excluded her mom and me. Ironically, it is not like that in the virtual world; she is very sympathetic to her friends in the virtual village where she spends her best time, as she said.

A4 stressed that she approached VR game content very carefully and had an agreement with G4 on a specific time that suited both parties to enter games online, such as the virtual village or other games, under direct supervision.

4.2.9 Interview 9 (M5)

The ninth interview was with B5's mother (M5). She worked in the education sector with a bachelor's degree in psychology and held a diploma in electronic network technology. M5 was married and had three boys; B5 was the youngest. B5 was six years old and in first grade at a public school. B5 had been playing with VR for approximately one year.

In general, M5 described B5 as a 'brilliant' child, calm and inclined to analyse, as exemplified in the quality of his questions and interests. At first, B5 was not interested in electronic games, but his older brother (13 years old) was devoted to them, particularly the Sony device PlayStation. B5 started paying attention to electronic games because he liked to spend time with his brother, serving as the nucleus of the relationship between B5 and electronics. B5 became engrossed in VR games, a gift from their father, because of his attachment to Spider-Man. He typically assumed this

character in VR. With his immersion in the game and ability to jump between buildings and face evil characters using superhuman abilities, B5's affinity for VR increased progressively. M5 explained:

> I am not against electronic games in general, but I have reservations about their drawbacks. For example, before attaching to VR games, [B5] was more committed to his homework. Then his interests became focused on VR, especially after what he and his schoolmates became when playing online, so much so that he would lose track of time. Our agreement is two hours a day for electronics, but he tells me that he only played for a few minutes after more than two hours.

M5 also indicated that because some VR games required skipping successive levels, B5 began to display nervousness by screaming and throwing the helmet at times until he might reach the point of crying. These symptoms peaked in the first months of dealing with a specific type of game that involved winning and losing. In addition, since many of his friends at school have a VR and might play online together; the game outcome might positively or negatively affect their relationship. On the other hand, the effect might be so intense that some of his best friends would stop communicating for a while, whether through VR games or mobile phones.

M5 commented that this was laughable for his father and older brother, but it was very worrisome for M5. She began talking to B5 and showing him the adverse effects of his reactions. As a consequence, sometimes, she would not allow him to play a game for a certain period not exceeding three days due to her knowledge of the extent of his attachment to the games. On the other hand, she would reward good behaviour with VR games and accessories such as a glove, joystick, and other add-ons.

M5 expressed that VR games had a positive role in developing some of B5's skills, for example:

> VR games developed [B5's] skill in persistence and continuing challenging missions as he was trying to curb anger and focus his attention beyond the critical stages. In addition to focusing, predicting sudden changes, and improving his kinetic synergy, he would develop hypotheses and plans and test them. Additionally, he experienced remarkable progress in the English language and, finally, the development of leadership skills. Through communicating with his friends inside the game, I can see the seeds of the character's leadership, but they need support in controlling anger.

Through the discussion, M5 clarified that B5's impulsive behaviour in loss situations in general, whether in video, physical, or mental games (such as Monopoly), might reach the point of quarrelling with his brothers or even his father.

As for the content, it was varied and still tended towards games of supernatural transformation. Having two older brothers meant there were games for the ages of 13 to 15, and sometimes he played with them, but there was a kind of censorship with his two brothers. In addition, he was forbidden to add a person online who was not a relative or schoolmate, and M5 supervised this personally. Finally, the household had a clear rule enforced on everyone regarding the number of hours of play, not to exceed two hours per day.

At the end of the interview, M5 indicated that B5 was attached to scenes of celebrity YouTube videos in some games and followed them on the pretext that they were giving tips to level up. Still, M5 was upset with his fixation on these videos because of their

profanity and inappropriate content.

4.2.10 Interview 10 (F5)

The tenth interview involved B5's father (F5). F5 worked in the military sector concerning computer networks.

F5 described the VR experience:

> VR is an adventure that is filled with excitement, enthusiasm, and control. It provides a rich experience in educational and interactive content and simulated reality. The greatest danger is the increased fascination with the available capabilities, such that the child prefers VR over his real life. This preoccupation may include neglecting homework and may lead to isolation and separation from reality.

F5 stressed the importance of the parent's role in achieving a balance between taking advantage of the virtual and real worlds:

> There must be a balance in the child's life by giving the child a space to play with the presence of breaks, so he must have the ability to quit playing at any moment without feeling excessive attachment. At the same time, there is a social life for the child between visiting family and friends. Therefore, attention to study and personal hygiene and outward appearance is also essential.

F5 pointed out a significant difference between the child's awareness that he controls the game and that the games control him in actions and temperaments.

> Over a period, [B5] increased his attachment to VR games to the point that they dominated his mood. Also, he forewent joining our weekly

> outings to spend more time playing VR. Sometimes, in the event of losing, he erupted and might even cry, and in some cases, the win or loss directly affected his relationship with real friends at school, actually fighting for days. On the other hand, difficult missions became a challenge that he could only accomplish through perseverance. Besides strengthening his attention span, he became aware of sudden changes. In VR, [B5] is exposed to risks as in real life, predicts and avoids consequences, makes assumptions and tests them before deciding on a course of action. I find VR games a great advantage to sowing the seeds of all these skills and more. Honestly, parent and teacher awareness may play a role in balancing the pros and cons of real and virtual life.

The interview concluded with F5's suggestion of the importance of acquiring age-appropriate content, even if limited in the academic aspect. Still, in general, he maintained that the experience of real-life had many advantages. Thus, electronic game time should not exceed two hours a day. Furthermore, there were red lines or boundaries in playing online, such as playing only with school friends and relatives and direct parental supervision.

4.3 Participants Responses in London- UK

This section presents the interviewed parents' or carers' perspectives, attitudes, feelings, experiences, and opinions on VR regarding their children's development. The five families lived in London due to one of the parents studying in the UK or serving in a diplomatic capacity. The paragraphs below provide further details on the interviewees' responses.

4.3.1 Interview 11 (M6)

The eleventh interview was with G6's mother (M6), a housewife with a General Certificate of Secondary Education (GCSE). M6 had lived with her five children in London for almost four years because of her husband's work at the Saudi embassy.

B6 was the youngest son, with two brothers in the elementary and intermediate stages and two sisters in the secondary stage. B6 was five years old in KG3. His older brothers had had VR devices at home for almost two years. Over the prior eight months, VR had become one of B6's favourite games.

M6 explained that their father's (F6) desire was the reason for acquiring electronic games devices, whether PlayStation or Virtual Reality, based on the boys' eagerness for entertainment. As for her, M6 was adamantly opposed to owning these devices and games, thoroughly explaining her reasoning:

> Electronic games, in general, but particularly VR, because it is closer to reality, is one of the leading causes of the spread of terrorism. The amount of violence found in some games and the ease of killing, beating, and theft are the main reasons children find it easier to do so in real life. Even worse, it shows them how to do this: how to steal a car, types of pistols to use, and bombs to make.

On the other hand, M6 agreed that there might be some positives, for example, 'developing intelligence, teaching self-defence, and increasing attention and focus. B6 became aware of how to think and became energised. Besides, some skills may be found in educational games'. Nevertheless, she tempered her response with the following:

> However, children do not desire educational games. Despite my son's young age, [B6] tends towards violent and combat games. This tendency affected his behaviour in terms of violence and rapid decision-making without considering the consequences. [B6] was not like that before he became addicted to these games.

Additionally, despite pointing out the benefits, M6 conveyed that they were outweighed by the wasted time and educational relapse that may occur due to neglecting homework and delaying sleep. She also alluded to constantly ruminating about games and neglecting anything else, even sports clubs. Furthermore, when B6 was prevented from using VR games as a result of his violence with his siblings or neglecting his duties, he felt that he was wronged and persecuted. These feelings negatively affected his relationship with his parents. M6 described it as:

> If we unintentionally cause him to lose by calling him in the middle of the game, or when we prevent him from playing, [B6] enters into a world of misery and tells us that we are transgressing his rights and depriving him of his desires. Plus, he feels sad throughout the day. Sometimes, he refuses to go out with us for a walk, and if he goes out, he remains anxious and depressed. But, on the contrary, if we allow him to play, especially if he wins a level, he is ready to repeat the game for days until he wins.

When the conversation touched upon her child's fears, M6 mentioned:

> [B6] used to be scared of the dark. When he started playing VR games and encountered darkness, he would ask me to sit beside him until the darkness in the game was gone. He made me hold his waist so he could

> feel my presence. After a period of two or three months, [B6] no longer feared darkness. Also, [B6] used to become bored quickly. After experiencing VR, he has become insistent on following the stages of the games and has no objection to repeating until he wins.

On the other hand, the M6 indicated that B6 may tell her about places unfamiliar to her, for example, when he saw the lion and fed him. When M6 said this did not happen, he confirmed that and told her that she may have forgotten. M6 believes that this phenomenon was due to VR.

Regarding the follow-up, M6 mentioned that the father was the one who purchased the games, and B6 might also use his older brothers' games. Sometimes the games were unsuitable for the three children. 'I do not deny that there are some abuses', said M6. In general, M6 noted that society needs awareness. She hoped to know the best way to deal with children and electronic games in general and wanted suggestions for appropriate games and the optimal time allocated to play.

4.3.2 Interview 12 (F6)

F6 was B6's father and worked at the embassy of the Kingdom of Saudi Arabia in London.

F6 believed that electronic games were part of keeping up with the present and that depriving children of them was no longer a viable option. F6 and his kids came to admire VR games by trying them out at an amusement park. Their appreciation for the extent of immersion and realism in adventures motivated them to buy VR devices for use at home. F6 was unsure whether he would buy VR for his five-year-old son but was encouraged by the presence of B6's older brothers. This hesitancy did not mean

that he was dissatisfied with B6's attachment to VR, and he remarked that it had added a lot to B6. For example:

> [B6] becomes bored quickly; it is difficult for him to complete a game or book, and he is not enthusiastic about any game, especially if he has to wait in a queue. This was also one of his teacher's notes in kindergarten. There is nothing that catches his eye entirely and makes him excited about finishing it. I noticed his eagerness for VR games in the mall, and he became passionate about completing the stages. Even more, he has become patient to return some of them when he is losing. I do not deny that some negative behaviours have accompanied it: he becomes easily angered, hitting his brothers or screaming if he loses. However, he listens to us and tries to curb his anger from time to time, especially when we warn him to prevent him from playing VR.

F6 also mentioned some of the positive attributes he observed about his son after using VR:

> Immersion in VR gives the child the principles of planning, identifying patterns, and forming and testing hypotheses in a fun and entertainment format. Besides, VR games stimulate focus and memory. Because the scenes and events mirror reality so closely, the child must consider the consequences more fully in addition to the incentives in virtual life that encourage continuity and resistance.

F6 stressed the importance of monitoring and following up. He gave his full attention to supervising the games his children played. F6 also clarified that although some VR games contain violent scenes that may affect children's behaviour, these kinds of

games also have a positive side. F6 added that VR game designers and producers should focus on enhancing VR's positive attributes and not make profit the only goal. Educational games must be produced at the same level of professionalism and excitement in others. F6 concluded the interview by saying that the advantages of VR cannot be overlooked even if there are some disadvantages.

4.3.3 Interview 13 (M7)

Interviewee M7 was G7's mother; she held a bachelor's degree in nutrition and food science. A high school teacher in Saudi Arabia, M7 was now on sabbatical to accompany her husband. At the time of the interview, she was studying the English language in London. M7 had three children: two boys in secondary school, and a six-year-old daughter, G7, in the first grade.

M7 indicated that the VR device and equipment are for the family and not a specific person, but the types of games differ according to each family member's interests. G7 started playing VR games almost a year ago, and she has special care due to her young age.

M7 indicated that the benefits and challenges in VR may be due to the type of games, explaining:

> With my daughter, I play a profession game, which we both greatly enjoy. We often choose interior design. During this game, my daughter learned many skills, such as colour coordination, stereoscopic relationship to space, thinking speed, quick analysis and decision-making, accuracy, memory stimulation, and increased attention and focus. In contrast, games of killing, beating, and violence exacerbate distraction and cause anxiety and tension. I notice that effect in my

> older sons; fortunately, [G7] does not enjoy this game genre. She often cries when she sees those scenes.

M7 also pointed to a lack of educational games despite VR's effectiveness as a teaching tool:

> VR captures the child's attention and focuses for a much more extended period than traditional teaching methods. For example, I remember some VR games that significantly impacted my daughter's learning of numbers and patterns. Besides, she became passionate about educational VR. Plus, the abundance of sensory stimuli helped her retain information much better, motivated her to complete complex tasks, and piqued her curiosity to complete the levels.

In terms of influencing behaviour, M7 noticed:

> When my daughter immersed herself in simulated roles and events, that emboldened her to make decisions after considering the consequences, which gave her more control over her reactions in both virtual and real life. VR also added to her awareness of the dangers and risks.

M7 expressed that following up on G7's VR use was manageable. M7 tried to limit VR time to no more than an hour, but she often turned a blind eye to playing time, noting G7's interest and pleasure. In addition, M7 and G7 tended to play together, which made observing her VR play easy and was even regarded to have enriched their relationship, as well as G7's relationship with her father, who was frequently absent for a long time. M7 concluded, 'This is completely different for my older boys'.

4.3.4 Interview 14 (F7)

F7 was G7's father and had worked at the Embassy of the Kingdom of Saudi Arabia in London for about two years. F7 lived with his wife and three children. The interview focused on his six-year-old daughter, G7.

F7 confirmed that VR games provide a child with an authentic experience, which may not be available in other games. Furthermore, that experience offers many benefits, such as:

> Encountering dangerous or costly experiences that children may not be able to live with in real life. At the same time, they feel every detail. Children can face their fears and repeat the experience by trying various approaches until they overcome them. They make hypotheses and test them. As a result, they acquire information in a fun, entertaining, and highly appealing way.

F7 added that he ardently supported the Ministry of Education's decision to introduce VR into the educational system starting in preschool. He emphasised that VR would make education more enjoyable, break the boredom, and attract children's attention. Furthermore, VR might improve their behaviour in specific scenarios after seeing the consequences of some of their reactions in an educationally, psychologically, and studied form.

Moreover, he pointed out that these games supported his relationship with his children and created an enjoyable atmosphere and happy memories, even if in a brief but cherished time.

F7 concluded that VR supervision was left to the mother because of his significant job duties, and he was confident in her choices and her ability to control situations.

4.3.5 Interview 15 (M8)

M8 was a housewife and mother to three children. After high school, she married a doctor who came to London to pursue a clinical fellowship. The interview centred on her eldest daughter, G8.

G8 was a five-year-old in KG3 in London. She had a four-year-old brother and a three-month-old sister. M8 described G8 as an intelligent and very organised girl whose reactions always suggested that she was older than her age.

M8 mentioned that her husband had the idea of having VR. After the family moved to London eight months earlier, several factors encouraged the father to purchase VR for his children. One is the small size of the house, as well as the father's demanding working hours, both in the hospital and in his studies. Additionally, M8 did not like taking the children to the neighbourhood garden without her husband. More importantly, G8 and her brother were highly energetic and needed to play. So, six months ago, the father decided to acquire VR devices. He had previously tried it with the children at their uncle's home. M8 confirmed that VR games and movies added joy to her children's daily routine. Besides, VR had many advantages, for example:

> Some games, such as building and occupations, supported my children in learning the English language to read instructions. As a result, they became more committed to following instructions and distributing roles among them and working as a team. In addition, they learned patience and commitment to the role. And they had fun together, which added greatly to their relationship.

M8 added that their father was cautious in choosing games. Some of them involved direct learning that taught colours, patterns, geometric shapes, and many

mathematical principles in fun ways, like searching for a square shape inside a virtual room full of shapes. Some of them were scientific, such as a trip to the digestive system. Also, the father was keen to acquire meaningful films:

> One of the films that have influenced [G8] for a long time is about a child's life in a wheelchair. I noticed that experience expanded her awareness, and she became more sympathetic than before. She became more attentive to detail, focused, and passionate about events than watching regular films.

M8 did not mention any drawbacks except her fear that her children might be too attached to VR. However, they were very committed to their parent's rules: that play should not exceed an hour a day and up to two hours on weekends and holidays.

4.3.6 Interview 16 (F8)

F8, G8's father, was a physician who came to London with his family for a clinical fellowship in Gastroenterology.

F8 mentioned that his family and children have always been a priority in his life. He was also very interested in reading books about child psychology. However, he felt guilty for being too busy and not spending enough time with them. Although he bought VR for entertainment, F8 confirmed that VR supported the children's skills significantly:

> VR creatively combines education and entertainment. From my experience with my children, they became passionate about learning. The games stimulated their memory, doubled their focus, turned their attention to detail, and applied what they learned to real life. Besides, VR has made them more mature in completing tasks, adhering to rules such as a traffic light, persevering for the role in professions,

> multitasking, tracking variables, and managing multiple goals. In addition, they learned strategies in certain games, for example, when planning to build a city. Moreover, VR could be a fantastic tool to develop children's empathy, to live with different abilities and circumstances. This has a significant impact on the acquisition of complex experiences.

F8 continued:

> These games help the child enter the world of computers and the Internet. We must admit that we live in the era of high technology and the world of development, and helping your child adapt to the concepts of computing is essential.

F8 emphasised parents' roles in 'choosing the most appropriate content for their children and the need for follow-up, supervision, and setting time limits to avoid turning VR into an addiction'. Additionally, 'the possibility of vision damage and balance issues should be mitigated by observing and monitoring children'.

4.3.7 Interview 17 (M9)

M9 was a PhD candidate in the field of electronic crime. She was separated and lived with her ten-year-old daughter and six-year-old son (B9). Due to her doctoral scholarship, M9 was currently staying with her mother (GM9) and children in London.

B9 was a student in the first grade. M9 recounted B9's passion for electronics and that he was enrolled in a robotics course and endeavoured to apply all that he was learning. B9 had been playing VR games for nearly a year.

M9 submitted:

> Immersion in VR games develops the child's self-confidence and self-esteem. In certain games, the difficulty level is adjustable. The beginner starts with easy games and slowly develops skills, then begins to trust himself in dealing with difficult challenges. Since failure is unthinkable, the player is not afraid to make errors, take risks, and discover more of challenges. The child can transfer this experience to the real world, and these games give the child a feeling of self-worth and success, a feeling that a person needs in life.

Further, M9 added:

> VR has a role in developing children academically. When education occurs through entertainment, the child's focus and attention to detail increases. It also encourages continuity.

Moreover, M9 pointed out that VR was one of the reasons that B9 was social in school, due to his talk about his adventures, mostly in car racing, which increased his confidence. Although he sometimes believed these adventures and recounted them as if they had happened in reality, M9 could convince him when reminding him that they were in the VR game and not real.

On the other hand, M9 remarked:

> Sometimes [B9] becomes nervous because of his loss of a game or his inability to skip a level. But he does not project his nervousness onto others. He may scream, cry, or want to be alone, but he does not abuse his sister, for example, or break something. He is despondent for a

> while. Nevertheless, on the positive side, [B9] sometimes resists his grief and anger to complete the level, which I admire.

Regarding online games, M9 rejected this idea:

> My children know that playing online is unquestionable. I cannot expose my children at an early age to the risks of playing online. Mainly, I spend many hours outside the home, and my kids are with my mom, who does not know much about this field.

M9 revealed that she primarily feared that passion for VR could develop into addiction. However, this risk could be avoided with supervision and setting a time limit: B9 and his sister did not play VR games for more than two hours a day, even on weekends. M9 added that ‘access would be easier to control at a young age rather than during adolescence’.

4.3.8 Interview 18 (GM9)

GM9 was a widow whose life centred on her only daughter (M9) and her grandchildren. Because M9 was preoccupied with her studies, GM9 was responsible for delivering her grandchildren to their schools and taking care of most life matters.

GM9 started by saying:

> All virtual games are nothing but a waste of effort, time, and money to create a generation without culture, knowledge, or morals.

GM9 found that the popularity of these games among young children was illogical and unjustified. For example, wearing helmets on children’s small heads may affect their heads as well as their eyes.

Furthermore, the complete immersion led the children to confuse virtual with real-life or to lie for attention; however, this behaviour was not justified. GM9 also noted that, in the past, children were their mother's primary concern. Now, with the multiplicity of their responsibilities, it was easier for mothers to leave their children with these games for convenience. Plus, the games offered an escape from their children's demands that felt like a burden after a long day outside the home.

From GM9's perspective, VR negatively affected children's academic achievement because they rushed through homework to play VR. Furthermore, no matter what they experienced in VR, the crucial issue was that physical movement like running and jumping was lost in the lives of the current generation of children, carrying severe consequences for their health.

On the other hand, GM9 saw one positive aspect within this multitude of negatives:

> [B9] is a quiet, shy, and skinny kid compared to his peers at school. Yet, I see a glow in his eyes as he talks about his adventures in the game with confidence and has an audience. And I find the kids around looking at him admiringly.

GM9 admitted that she did not have any experience with VR game content, but she heard from B9 that he preferred car racing and mountain climbing in the snow. Regarding supervision, GM9 counted two hours from the time B9 started playing, and he typically took a five- to ten-minute break during play.

4.3.9 Interview 19 (M10)

M10 came to London almost five years ago with her husband, intending to study. After her husband obtained a doctorate, he was forced to return to Saudi Arabia because of his work policy. However, he use to visit her and their only daughter, G10. M10 was

almost in the final stage of her PhD in biochemistry. M10 and her husband (F10) were faculty at the same university.

G10 was a four-year-old only child in KG2 at a nursery in central London. G10 had been using VR for almost five months. M10 pointed out:

> VR is an impressive and very attractive learning tool for children. VR increases [G10's] focus and her attention on learning. Moreover, it develops her imagination and creativity.

M10 gave several examples, such as searching for geometric shapes; in the VR game, G10 became aware of pillars and shapes and would tell her mother about their names. Even the kindergarten G10's teacher praised her skill in several topics. M10 knew that G10 was learning through directed VR games, for example, colours, vital systems in the human body, and the names of occupational equipment for medicine, farms, and other fields. In addition, G10 learned about ecosystems such as deserts, forests, and organisms that live within these environments. M10 added:

> Most importantly, [G10] began remembering what she had learned in VR and talking about it with confidence and expansion. VR has also added to [G10's] linguistic output. VR provides all of these benefits, despite my great preoccupation with pursuing my PhD in the previous period. VR does not just entertain [G10]; it enriches her as well.

Regarding the skills she cited, M10 pointed out:

> VR encourages [G10] to keep track of tasks, persevere on missions until she completes them, and simulates real-life skills.

M10 mentioned her daughter's fear of insects: after several months of exposure to insects in VR, G10 overcame her fears in the virtual world and real life.

M10 assured that gaining benefits and avoiding harm depends on the choice of content. It was also essential to determine the playing time for G10, for example, not exceeding two hours a day, which might increase to three on holidays and weekends. In addition, discussing VR with the child and commenting on her achievements and pride in them was important.

4.3.10 Interview 20 (F10)

F10 was a faculty member in the field of bio-nutrition. At the time of the interview, he moved between Saudi Arabia and London while his wife (M10) finished her doctorate, which was only several months away from completion.

F10 stated that:

> VR games help entertain and educate: the child loves games with colours, animation, and the interaction, challenge, and reward when winning. The best way to learn is when the player enjoys the game. For this reason, VR games have become a learning environment enjoyable to children, making them play and drawing them to the game to master skills such as mathematics, science, language acquisition, as well as motor skills and kinetic visual synergy. They also hone their cognitive skills, such as planning, focusing, and strengthening attention and memory. VR also stimulates effort in the real world, like tracking tasks and responding to challenges.

F10 added that the VR games offer an integrated environment for children's development within a limited space. VR exposes children to experiences and risks that

may be impossible to achieve in reality, making children face their fears. For example, F10 mentioned G10's fear of insects and heights, and when practising VR games and knowing it was not real, she could face her fears and control them in reality.

F10 indicated that he had heard about the risks of addiction and isolation for children due to electronic games. However, F10 believed that the key points in combatting these risks were observation, follow-up, and determination of playing times. He also maintained that choosing the right age-appropriate content according was vital. F10 emphasised that these were of his and M10's priorities in raising G10.

4.4 Conclusion

This chapter presented the participating individuals' backgrounds and concise responses, covering their attitudes, experiences, and feelings. The information in this chapter is concise and organised sequentially, emphasising the most important topics raised and has been intended to provide a wider family context for the following thematic analysis. The individual responses presented above are organised by theme in the next chapter. The thematic analysis (TA) of the data above will highlight the most pertinent issues raised by the participants and enhance our understanding of VR's role in early childhood-age development from parents' and carers' perspectives, providing the basis for developing a theoretical framework for this study.

Chapter Five: Findings and Thematic Analysis

5.1 Introduction

This chapter provides a thematic analysis of the interviewees' perspectives. The participant's responses were organised into common themes and sub-themes. As explained below, seven themes, three sub-themes, and twenty-eight codes emerged from the interview data to answer the main question within the current study: What is the potential role of VR play in the development of Saudi children aged between four and six, as reported by their parents or carers? Each theme will be discussed in turn.

5.2 Thematic Analysis

In this study, respondents presented their views on VR's potential role in the development of Saudi children (aged four to six) throughout 20 interviews. During the interviews, parents provided reasons why they bought these games for their children. They shared how these games had helped their children acquire personal and academic skills. They discussed the challenges of using VR and discussed its impacts on a child's personal and social life.

A thematic analysis approach was used to analyse data as it is one of the most common approaches used in qualitative research (Guest et al., 2012). Braun and Clarke proposed and defined *thematic analysis* as a method used for 'identifying, analysing, and reporting patterns (themes) within data' (Braun & Clarke, 2006, p. 80). Researchers worldwide have used this method of analysis for their qualitative studies because it is a relatively simple method that minimally classifies data while describing it comprehensively (Boyatzis, 1998). Thematic analysis was appropriate for this study because evidence suggests that it 'can produce an insightful analysis that answers particular research questions' (Braun & Clarke, 2006, p. 80).

Seven main themes emerged during the analysis from both data sets, the first group of participants from KSA and the second group from the UK, which were divided further into sub-themes to provide a detailed overview of the topic being studied. The themes developed during the analysis are discussed in detail below.

5.2.1 Theme 1: Reasons for Using VR

In this theme, participants from both groups discussed why they chose VR games for their children. The views shared by both groups were divided into three sub-themes, which are explained in figure (5.1).

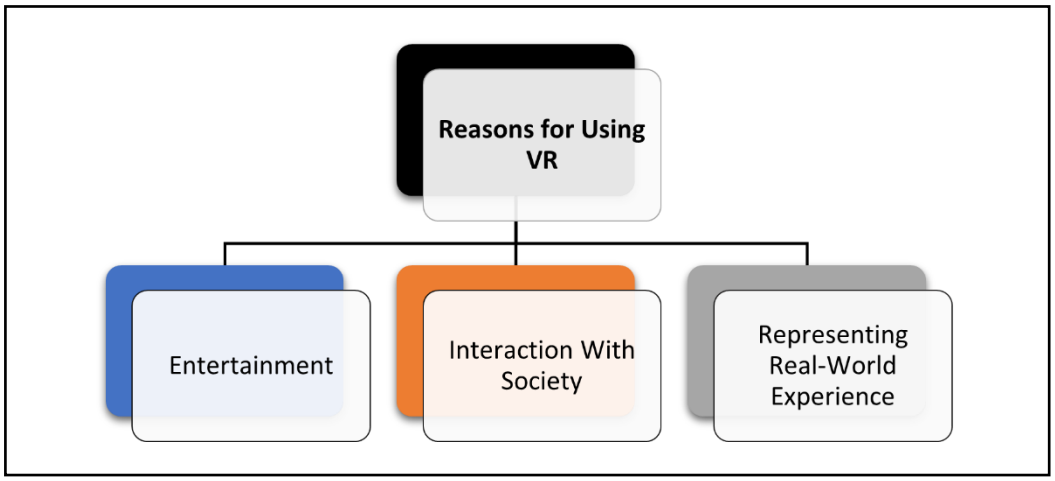

Figure 5.1 Theme 1: Map of reasons for using VR

5.2.1.1 Entertainment

There is considerable debate among people regarding the use of VR games, especially for young children. Some people do not support their children using VR games because they believe VR might negatively impact children's health or behaviour. However, this study showed that a significant ratio of people felt that VR games were, in fact, beneficial to children. According to participants, one of the benefits of VR was that it exposed children to different and exciting experiences without leaving the house. The analysis findings showed that the majority of

participants in KSA believed that VR, with its informative and exciting content, provided a great source of entertainment for their children, especially for those whose parents were working long hours and unable to spend time with them. At the same time, the frequency of responses from the UK participants was lower than that of the KSA group. As shown in Figure 5.2, the numbers on the y-axis indicate the frequency of responses of participants in both groups calculated by NVivo software.

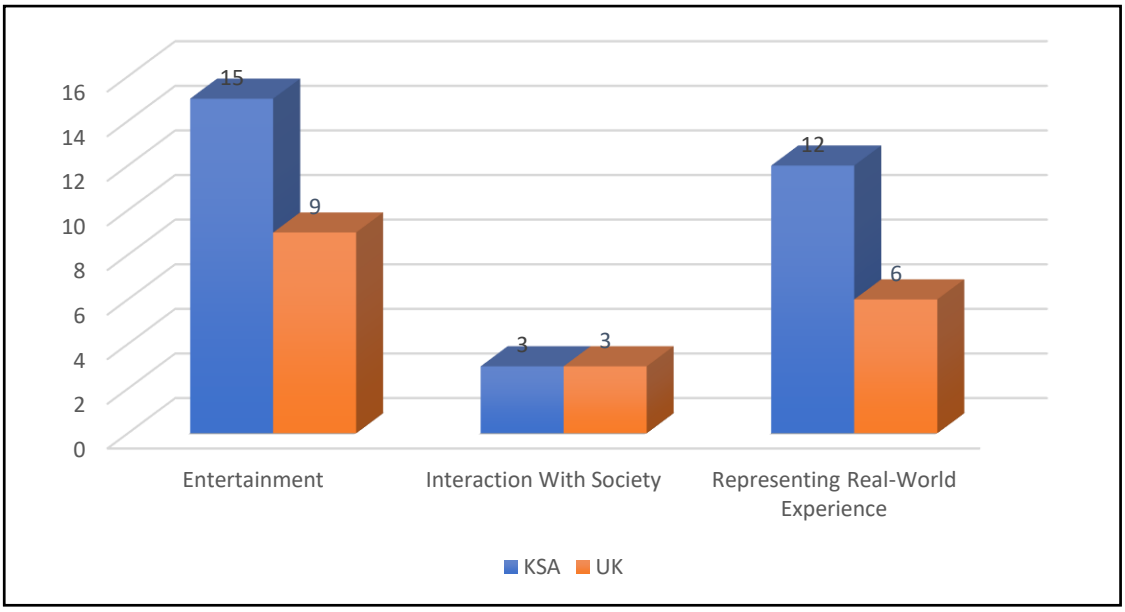

Figure 5.2 Theme 1: Reasons for using VR

For example, [F1] believed that VR games had created an enjoyable atmosphere between his children and him, similar to football matches and traditional games with his older children; it might be even more enjoyable. This study's analysis also revealed that some of the parents felt guilty for not giving enough time to their children and purchased VR games to keep them busy and entertained at home, such as [F3]. [F3], who had an eight-year-old daughter [G3], admitted that he and his wife had demanding work schedules that required their daughter to spend most of her time with her maternal grandmother.

Similar responses were observed from the participants in UK, who also thought that, through VR, children could have fun at home. They indicated that, since buying these games, their children enjoyed VR enormously and loved to play with their friends and siblings at home, strengthening their personal and social relationships. Most of them stated that they purchased these games because their children showed great interest in VR, and they wanted to fulfil their children's wishes. For instance, [M6] explained that her husband [F6] desire was the reason for acquiring electronic games devices, whether PlayStation or VR, based on the boys' eagerness for entertainment.

Some parents reported that they bought VR for their children because they felt that children were safer at home with VR games, and they did not have to worry about their children being outside. [M8] as an example, she explained that due to the small size of the house, and the demanding father's working hours, whether in the hospital or his studies, she would prefer her children to play in VR rather than go to the neighbourhood park.

On the other hand, some notable perspectives, such as GM3, stated that 'as much as VR may be useful, inappropriate content may create a violent generation devoid of religion, values, and principles' [sic].

5.2.1.2 Interaction with Society

This study's findings showed that some participants in KSA, felt that VR helped children interact and socialise with people. They cited it as one of the reasons they bought VR devices for their children. These participants felt that collaboration with other game users would allow their children to communicate with their peers effectively in real life and help them strengthen their social relationships. For instance, [A4] noted

that when [G4] had virtual friends, that significantly contributed to her self-confidence and reintegration into society, especially under her health conditions.

As shown in Figure 5.2, participants in the UK also provided little information in this regard. However, some of them supported the view that VR could help children build social relationships with others. For example, where [M9] pointed out that VR was one of the reasons why [B9] socialized at school because he talked about his adventures, mostly in motor racing, which increased his confidence.

5.2.1.3 Representing Real-World Experience

According to most participants, VR helped children experience real-life situations while sitting in the safety of their homes. They expressed that VR allowed their children to experience places or situations that were not possible in real life. They added that such experiences were filled with excitement and enthusiasm and stimulated children's imagination. According to participants, if this technology were used for educational purposes, children could benefit as greatly as from real world experience, because they could visit different parts of the world and learn from them. They could visit the Great Wall of China, go back in history and explore ancient times; they could even travel to the moon. Thus, VR created many opportunities for children to explore and learn simultaneously. For example, F2 stated that:

> Travelling into space or the depths of the sea in the virtual world with my children is an enjoyable experience after a long and hard day, and I think it has added a lot to our relationship.

Participants in the UK also described how VR could immerse users in the most amazing experiences that they could have never thought possible in real life. They also shared that it could develop children's interests in various fields. The participants

added that VR provided children with limitless opportunities to explore career pathways. M9 as an example recounted [B9's] passion for electronics and that he was enrolled in a robotics course and endeavoured to apply all that he was learning.

5.2.2 Theme 2: Benefits of Using VR

In this theme, participants discussed several benefits of VR technology for children. Based on their views, this theme was divided into three sub-themes, further divided into sub-categories to provide an in-depth understanding of the topic being studied. An overview of this theme with all its sub-themes can be seen in Figure 5.3.

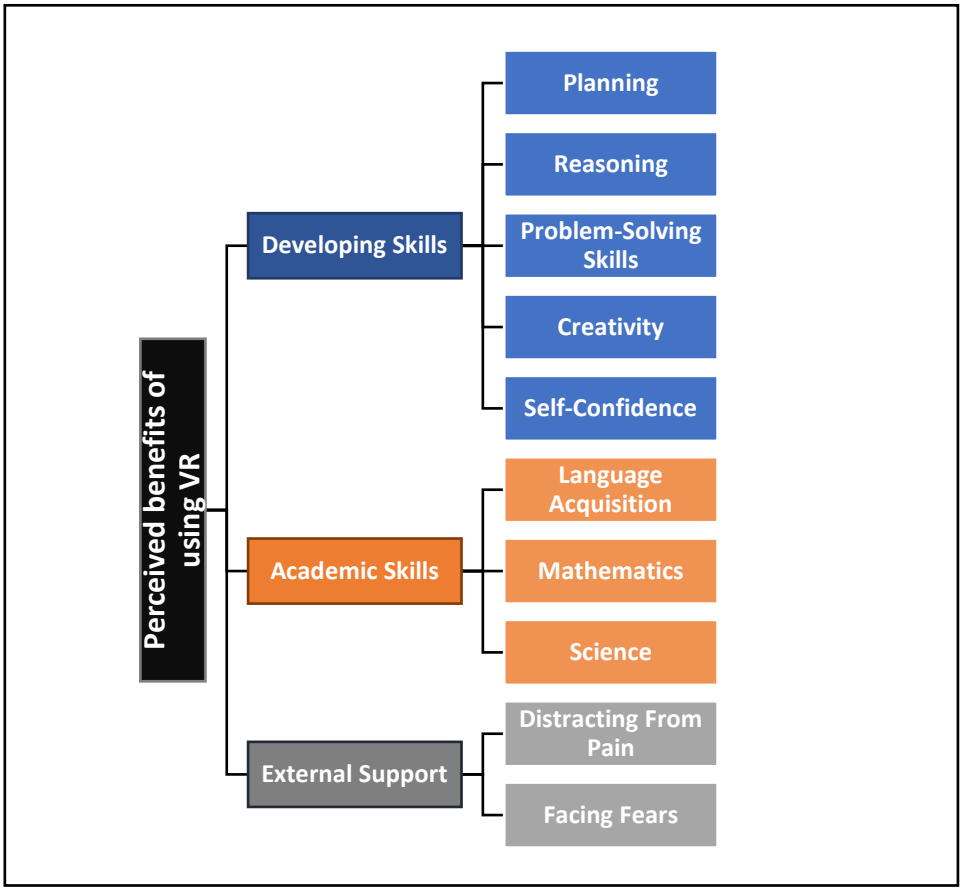

Figure 5.3 Theme 2: Map of VR and perceived benefits

5.2.2.1 Developing Skills

According to most participants in both countries, KSA and UK, VR was a valuable tool for children learning and developing skills. They discussed various skills that a child could develop using VR games as shown in Figure 5.4. As mentioned earlier, the numbers on the y-axis indicate participants' frequency of responses in both KSA and UK countries, calculated by NVivo software. The skills mentioned by the participants are discussed in detail below.

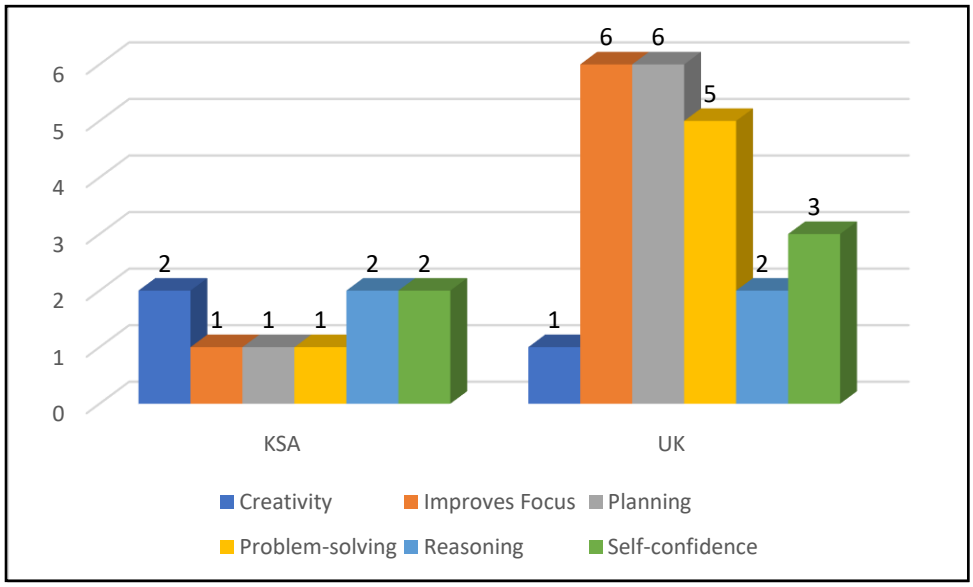

Figure 5.4 Sub-theme 2.1: VR and perceived developing skills

5.2.2.1.1 Planning

As illustrated in Figure 5.4, the majority of participants in both countries, especially in the UK, regarded that VR helped children learn essential skills, particularly planning and organising. They said that in most games, completing a mission involved planning that required children to analyse a situation and its associated risks carefully. This practice helped children think critically and plan their steps accordingly to complete the level successfully. F6 mentioned that:

> Immersion in VR gives the child the principles of planning, identifying patterns, and forming and testing hypotheses in a fun and entertainment format.

5.2.2.1.2 Reasoning

The analysis showed that most parents thought that immersive technologies such as VR stimulated critical thinking in children. Critical thinking involves reasoning, problem-solving, and making difficult decisions and is an important skill that can help children in their personal and professional lives in the future (Pollarolo et al., 2022). According to some participants in KSA, VR developed critical thinking effectively in children by presenting challenges allowing them to develop their own understanding of the problem, encouraging them to analyse and make judgements accordingly. They maintained that these skills could help their children make thoughtful and informed decisions in their real lives as well. F5, for example, pointed out that:

> Besides strengthening his attention span, he became aware of sudden changes. In VR, B5 is exposed to risks as in real life, predicts and avoids consequences, makes assumptions and tests them before deciding on a course of action. I find VR games a great advantage to sowing the seeds of all these skills and more.

Parents in the UK also supported this view that VR helped develop important skills in children, especially reasoning and problem-solving skills. They felt that these skills were imperative for students in dealing with real-life challenges as well. F7 expressed that he ardently supported the Ministry of Education's decision to introduce VR into the educational system starting in preschool. He emphasised that VR might improve

their behaviour in specific scenarios after seeing the consequences of some of their reactions in an educationally, psychologically, and studied form.

5.2.2.1.3 Problem-Solving Skills

This analysis also revealed that, in addition to reasoning and creative thinking, VR helped children gain problem-solving skills. Some participants in KSA and most in the UK believed that VR was a powerful tool to develop problem-solving skills in children. According to these participants, VR proved an excellent tool for learning such vital skills because it afforded children the opportunity to explore new ways to find a solution. VR also provided a safe environment and platform where children could make mistakes and learn from them. A4 viewed VR games as having a positive impact on mental and cognitive development:

> Playing VR games develops intellectual skills such as following instructions, problem-solving, thinking speed, quick analysis, and decision-making.

The participants in the UK asserted that these skills were the result of the iterative process of brainstorming that included analysing a situation and testing various solutions. During the game, children applied this technique to go through different levels of challenges to complete a mission. M9, for instance, submitted that:

> In certain games, the difficulty level is adjustable. The beginner starts with easy games and slowly develops skills, then begins to trust himself in dealing with difficult challenges. Since failure is unthinkable, the player is not afraid to make errors, take risks, and discover more of challenges.

5.2.2.1.4 Creativity

Parents also felt that one of the benefits of the VR games was that they inspired students to be creative and sparked their imagination. As these games provided limitless opportunities for children to explore and learn, VR encouraged them to think outside the confines of tradition and develop innovative ideas. According to A4 VR could have an impact on creativity development:

> When a child plays VR games, they give him an authentic experience. In many of these games, he develops skills such as abstract thinking at a higher level. Unfortunately, the school does not teach these skills.

Participants in the UK also believed that VR facilitated learning and creative thinking in children as it required them to innovate and allowed them to analyse situations by carefully considering challenges and finding ways to create new possibilities. M10, for example, pointed out:

> VR increases [G10's] focus and her attention on learning. Moreover, it develops her imagination and creativity.

5.2.2.1.5 Self-Confidence

According to participants from both groups, VR played an important role in boosting their children's self-confidence. Some of the parents from group 1 reported that their children were very shy and quiet before they started playing VR games, but through online gaming, they made friends worldwide, contributing significantly to their self-confidence. The parents observed a difference in their children's tone and body language when they talked about their experiences and adventures in games with self-assurance. M5 expressed that:

> Through [B5] communicating with his friends inside the game, I can see the seeds of the character's leadership.

Similarly, participants in the UK felt that VR was the reason behind this positive change in their children. They stated that VR provided different challenges to boost confidence in children; it encouraged children to face different social settings, including those that might cause anxiety and avoidance in real life. As soon as they succeeded in these situations, their self-confidence automatically improved. M9, as an example, pointed out that VR was one of the reasons that [B9] was social in school, due to his talk about his adventures, mostly in car racing, which increased his confidence.

5.2.2.2 Academic Skills

This theme represented participants' views regarding academic skills. A comparison of both KSA and UK participants can be seen in Figure 5.5. The y-axis indicates participants' frequency of responses in both countries, calculated by NVivo software.

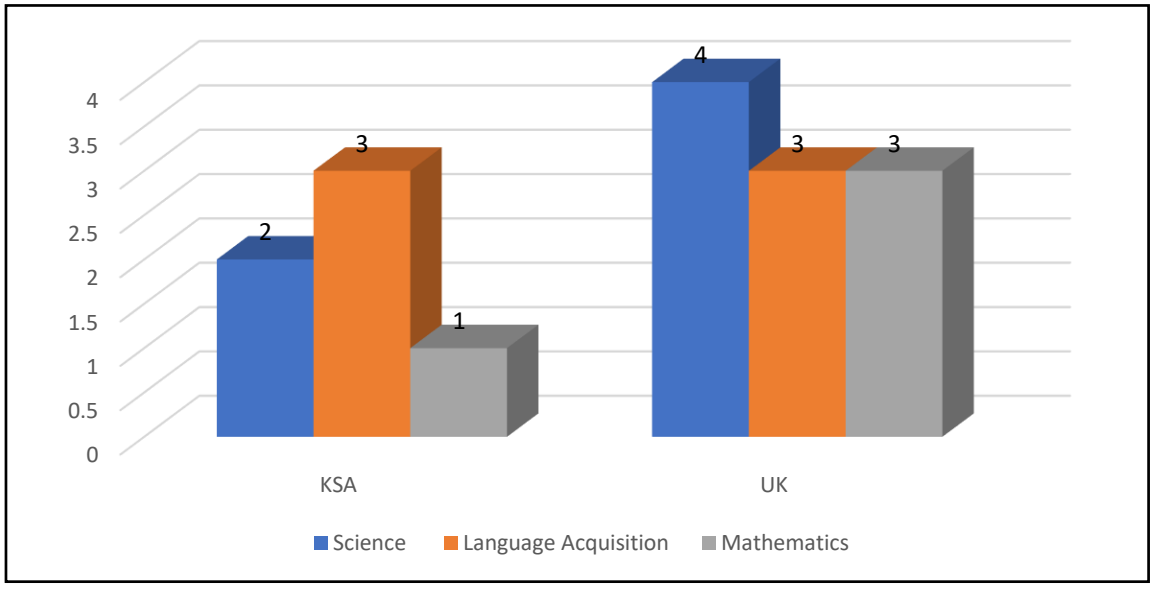

Figure 5.54 Sub-theme 2.2: VR and perceived academic skills

5.2.2.2.1 Language Acquisition

This analysis suggested that VR played an essential role in developing children academically in an entertaining manner. Participants perceived that VR had increased their knowledge regarding various fields in an enjoyable way and helped improve their linguistic abilities. Participants from both groups observed a significant change in their children's language as they gained confidence in speaking and reading English. They believed that, through reading or listening to instructions in VR and communicating with other users during games, most of the children had improved their proficiency in the English language. M5, for example, expressed that '[B5's] experienced remarkable progress in the English language' after using VR. Similarly, M8 added that:

> Some games, such as building and occupations, supported my children in learning the English language to read instructions.

5.2.2.2.2 Mathematics

Participants also believed that VR had proved effective in terms of learning to solve mathematical problems. According to the participants, VR offered educational games, specifically for young children, which helped them effectively identify letters and numbers. For instance, A4, during her talk, mentioned the VR game's positive impact on learning numbers and letters by searching for them in a VR room. M7 also pointed to VR's effectiveness as a teaching tool:

> VR captures the child's attention and focuses for a much more extended period than traditional teaching methods. For example, I remember some VR games that significantly impacted my daughter's learning of numbers and patterns.

M10 also described how [G10] searched for geometric shapes; in the VR game and how she became aware of pillars and shapes.

5.2.2.2.3 Science

Parents from both countries reported that VR games cultivated children's interest in science. They stated that they had observed their children showing interest in different professions after experiencing them in VR. For example, F2 cited that:

> [B2] had a phobia of heights. However, almost six months with a virtual flight training game made his dream of becoming a pilot.

Also, F3 described how the jobs simulator is an enjoyable game that provides the basics of the professions entertainingly. It was [G3's] favourite VR game; she always chose to play a doctor. Furthermore, some participants stated that VR games provided educational content regarding different fields. M10,for example, mentioned that [G10's] kindergarten teacher praised her skill in several topics, such as colours, vital systems in the human body, and the names of occupational equipment for medicine, farms, and other fields. In addition, G10 learned about ecosystems such as deserts, forests, and organisms that live within these environments.

5.2.2.3 External Support

As shown in Figure 5.6, the data produced two sub-themes. The sub-themes are discussed in detail here.

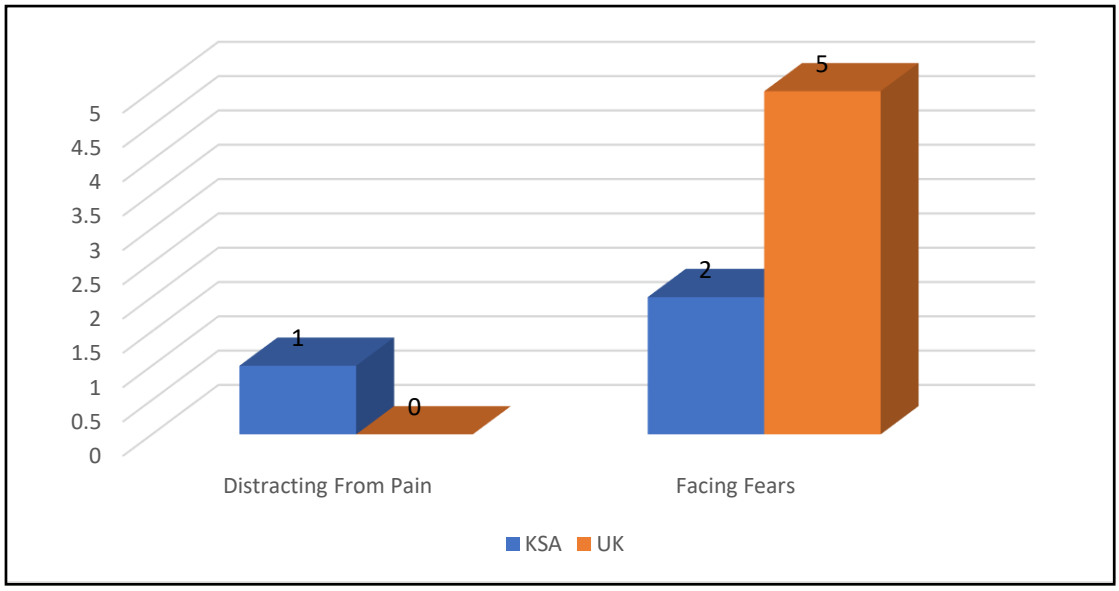

Figure 5.6 Sub-theme 2.3: VR and perceived external support

5.2.2.3.1 Distracting From Pain

One of the benefits of VR games, raised by participants, is that VR could provide a safe environment for children to come in contact with what they feared in real-life. To illustrate, A4 stated that after [G4's] burn accident, all she could think about was how to relieve [G4's] pain. She recounted:

> I had heard about VR at this time. First, people were talking about children's immersion in VR. Then I found that it was what [G4] needed. Besides, the helmet played a significant role in covering [G4's] eyes while changing bandages and applying creams; previously, she would never allow anyone to touch her.

5.2.2.3.2 Facing Fears

Some participants expressed their children's experiences of overcoming their fears through VR games. They reported that VR proved effective in reducing different fears, such as fear of heights, insects, or darkness. They described how this technology could help children confront their fears without placing them in dangerous situations.

For example, F2 VR not only helped his child [B2] to get over his phobia of heights but also motivated him to become a pilot. He added that VR provided real-life experiences and trains its users to overcome their anxiety and phobias by offering various challenges. Moreover, A4 added that VR games had a substantial role in overcoming her child's fears and provided an effective distraction from her anxiety. She stated that '[G4's] thoughts and feelings became related to VR games as if she were escaping her reality to a more beautiful, or let us say, different reality'; A4 believed the game had a positive impact on her child's mental health. F7, also confirmed that VR games provide a child with an experience that offers many benefits, such as:

> Children can face their fears and repeat the experience by trying various approaches until they overcome them. They make hypotheses and test them. As a result, they acquire information in a fun, entertaining, and highly appealing way.

5.2.3 Theme 3: VR Risks

This theme represented the risks associated with VR raised by the participants' views during interviews; this theme was divided into six sub-themes, as shown in Figure 5.7.

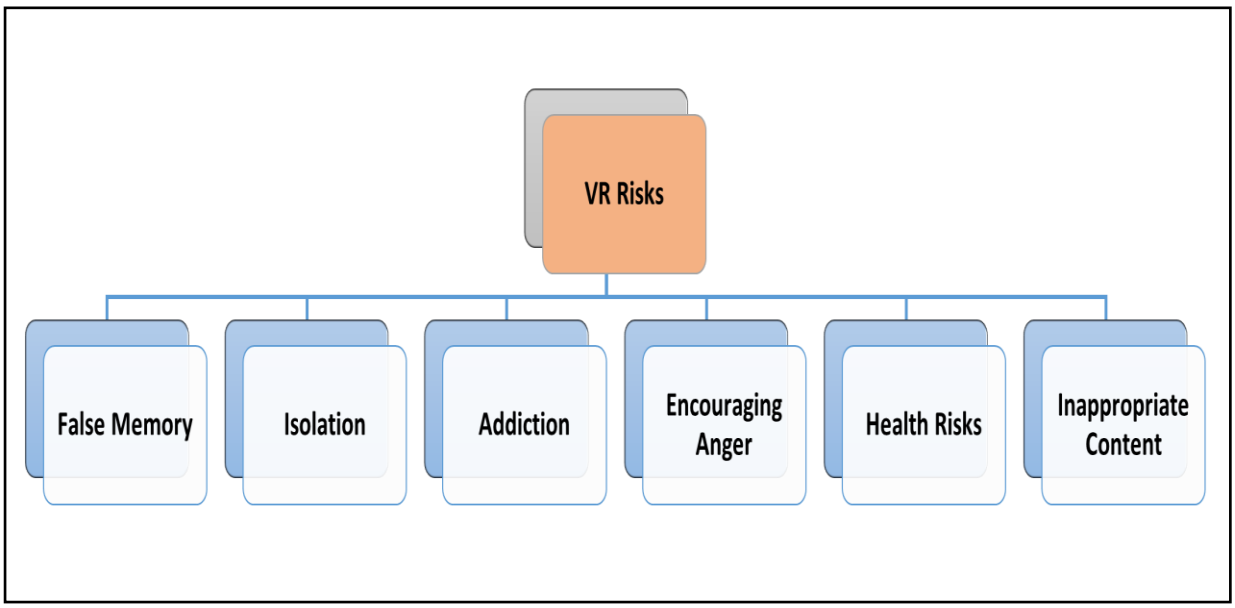

Figure 5.7 Theme 3: Map of VR risks

Figure 5.8 compares responses observed from both countries.

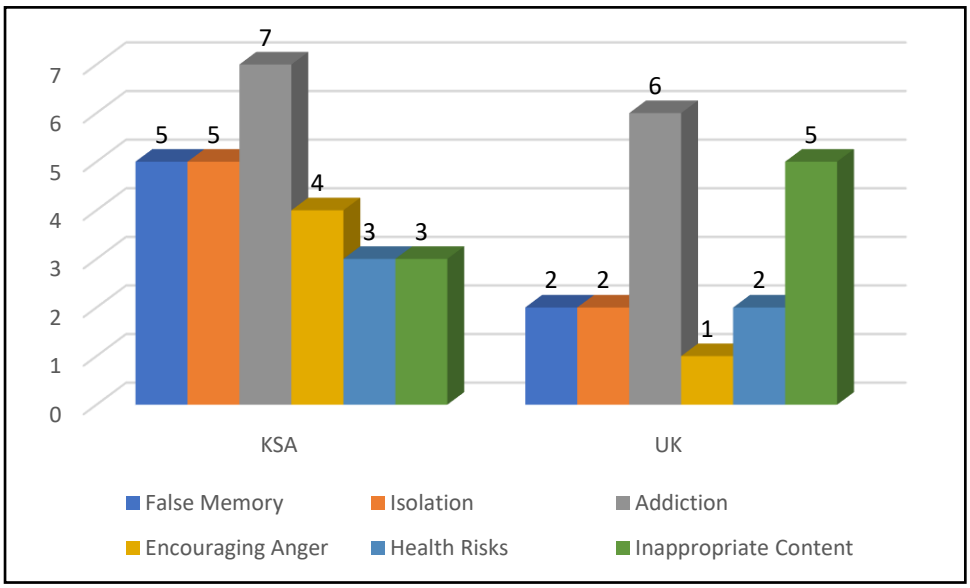

Figure 5.8 Theme 3: VR perceived risks

5.2.3.1 False Memory

While discussing the risks associated with VR, participants mentioned children's acquisition of false memories. As clarified in Section 2.2.3, although these memories are not literally "false"; they are under this scientific classification (Otgaar et al., 2018). The children have already experienced these adventures in VR. However, the participants said they had observed their children confusing a VR experience with a real-life event. Participants saw that, as VR offered a real-world experience, sometimes these experiences altered their children's real-life memories. Thus, their children started thinking that they had encountered situations in their real lives that they had only experienced in VR. GM3, for example, pointed out that:

> I think that, due to the complete immersion in the VR game, sometimes G3 tells me stories that struck her as true in the game. For example, we were watching a movie together, and there were scenes in the Himalayas. Suddenly, G3 jumped with joy and excitement and told me, 'My father and I went there', and she started telling me about fictitious details and events.

Participants in the UK also cited the same concern during the interviews. They expressed their concern when they heard stories from their children that had never happened to them in reality. They said that it was worrisome that such technology could influence children in this way. M6, as an example, indicated that [B6] may tell her about places unfamiliar to her, for example, when he saw the lion and fed him. When M6 said this did not happen, he confirmed that and told her that she may have forgotten. M6 believes that this phenomenon was due to VR.

5.2.3.2 Isolation

Considerable parents in KSA were concerned that VR could be an isolating experience for a child because children are often glued to their devices and fully immersed in the game for hours. In addition, parents reported that they had observed that their children did not want to socialise or go outside with their friends or family; instead, they preferred sitting alone and playing in their room. F1, as an illustration, reported that:

> Despite the excellent capabilities of VR games in developing skills in general, the most prominent negative aspect is isolation; even if we engaged in the game together at some time, I worry about my son's preference for isolation.

likewise in the UK, participants believed that there were always advantages and disadvantages of technology for children. However, monitoring children carefully could prevent undesirable behaviour. F10, as an example, indicated that he had heard about the risks of addiction and isolation for children due to electronic games. However, F10 believed that the key points in combatting these risks were observation, follow-up, and determination of playing times. He also maintained that choosing the right age-appropriate content according was vital.

5.2.3.3 Addiction

According to most participants, one of VR's significant disadvantages was children's addiction to games. The majority of participants from both countries expressed that their children had become addicted to VR games. They divulged that their children did not want to socialise, go out with their families, or spend time with them: the only thing they enjoyed at home was putting on a VR helmet and spending hours in it. As a result,

VR usage has affected their children's social life and academic performance. M5 explained:

> I am not against electronic games in general, but I have reservations about their drawbacks. For example, before attaching to VR games, [B5] was more committed to his homework. Then his interests became focused on VR, especially after what he and his schoolmates became when playing online, so much so that he would lose track of time.

Similarly, participants in the UK think that when their children spend extended time playing VR, that might lead to addiction. They raised that they had observed that the games dominated their children's moods, and when they could not play for any reason, they may become anxious and sad. At the same time, their children may ignore their studies, which was a severe drawback. by way of illustration, from GM9's perspective, VR negatively affected children's academic achievement because they rushed through homework to play VR.

5.2.3.4 Encouraging Anger

Participants from both countries reported that one of the disadvantages of using VR for children was that they grew too attached to it. If they were unsuccessful in completing a mission or disturbed by anyone during the game, they tended to behave aggressively. The majority of participants from KSA stated that immersion in VR games could lead children to violence if they did not fulfil their desires.

For example, F2 cited that:

> Once, [B2] threw the controller and broke it. After a while, when I spoke to him, he said I was angry, then justified his behaviour by saying I had not controlled my behaviour because I lost and had to repeat everything I had passed.

Most participants experienced the same behaviour at home, with children throwing tantrums over losing in a game. They related that their children's temperament was linked to winning or losing a game, so they screamed, cried, and sometimes hit their siblings when they lost a game. They also reported that this behaviour had affected their children's relationships with their siblings and friends, as they would sometimes block them from the game and stop talking to them out of anger. M1, for instance, mentioned that [B1] became moody and more nervous after his exposure to VR games, as noticed by his screaming and sometimes throwing the controller. Additionally, she indicated that his older sister might hit [B1] if he won when they competed against each other in the game.

Furthermore, participants' views in the UK also described aggressive behaviour from their children associated with VR. Some participants reported that they had stopped their children from using VR unless they controlled their behaviour. For example, M6 described how [B6] was prevented from using VR games due to his violence with his siblings or neglecting his duties, and [B6] felt that he was wronged and persecuted. These feelings negatively affected his relationship with his parents.

5.2.3.5 Health Risks

Participants from both countries raised that the immersive nature of VR games could cause severe effects on children if they spend extended hours playing them. Some also believed that VR could cause nausea and anxiety in children if they used it for too long. They stated that they had observed their children sometimes becoming dizzy and nauseated after spending more than one hour in VR. In addition, they expressed concern that too much time in VR might affect children's vision. GM3, for instance, pointed out that some troublesome issues may result from using VR, including physiological ones, such as feeling dizzy, nauseous, and unbalanced for a while.

Participants in the UK also thought that VR could negatively impact children's health. They maintained that parents need to monitor and limit playing time because excessive immersion could cause serious health issues, such as GM9. She said that wearing helmets on children's small heads may affect their heads as well as their eyes.

5.2.3.6 Inappropriate Content

Parents also conveyed their concerns regarding the VR content available. They worried that VR could expose children to violent or dangerous content. Furthermore, they pointed out that many children used VR, and regardless of age, inappropriate content could negatively affect them. GM3, for instance, stated that 'as much as VR may be useful, inappropriate content may create a violent generation devoid of religion, values, and principles' [sic].

Similarly, parents in the UK expressed that they had seen violence in various games, including beating and killing characters. However, they also observed that most of their children enjoyed playing such games. For example, M6 was adamantly opposed to her children owning these devices and games; she explained:

> The amount of violence found in some games and the ease of killing, beating, and theft are the main reasons children find it easier to do so in real life. Even worse, it shows them how to do this: how to steal a car, types of pistols to use, and bombs to make.

5.2.4 Theme 4: VR and Self-Awareness

This theme represented participants' views concerning VR use and self-awareness. It is divided into two sub-themes, which are shown in Figure 5.9.

5.2.4.1 Naming Emotions

Some of the parents mentioned that their children had become more self-aware, recognising that they occasionally behaved irrationally when losing. They intimated that their children identified their emotions and attempted to regulate them. F2, for example, cited that:

> Once, [B2] threw the controller and broke it. After a while, when I spoke to him, he said I was angry, then justified his behaviour by saying I had not controlled my behaviour because I lost and had to repeat everything I had passed. This thinking is profound for a child this age.

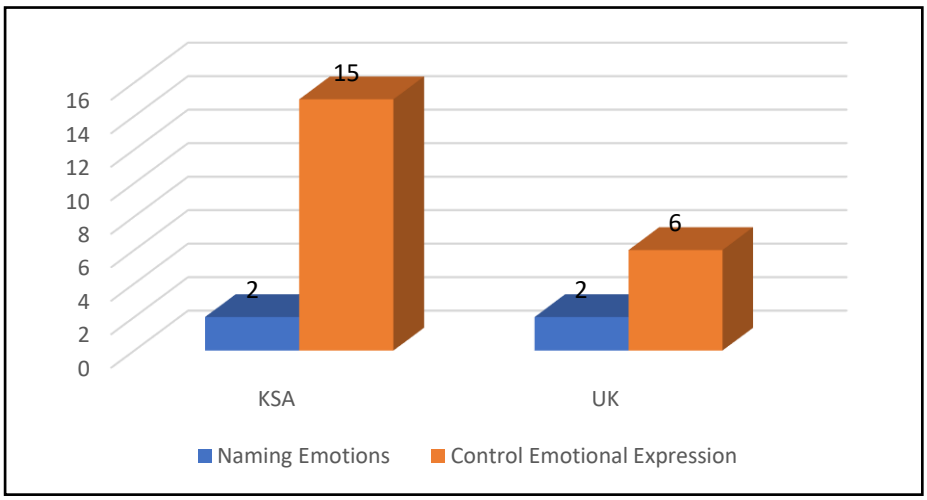

Figure 5.9 Theme 4: VR and self-awareness

5.2.4.2 Control Emotional Expression

This sub-theme represented the participants' views regarding their children's emotional expression in front of others. Emotions can be expressed in many ways, such as body language, tone, facial expressions, and gestures. While discussing VR's impact on children, the majority of participants in KSA reported that, frequently, when children lost a game, they were unable to control their emotions. Their children would start crying, screaming, or hitting each other, though sometimes they tried to control their anger but remained sad and anxious for some time. M1, as an example, mentioned that [B1] became moody and more nervous after his exposure to VR games, as noticed by his screaming and sometimes throwing the controller.

Also, most of the parents in the UK said similar views that children could not regulate their emotions in cases of defeat. Participants recounted that losing or difficult challenges often made their children anxious and stressed, which resulted in crying, screaming, or throwing objects. At times, their children wanted to discuss their feelings; other times, they just cried and became despondent for hours. F6, as an instance, said that:

> I do not deny that some negative behaviours have accompanied it: he becomes easily angered, hitting his brothers or screaming if he loses. However, he listens to us and tries to curb his anger from time to time, especially when we warn him to prevent him from playing VR.

5.2.5 Theme 5: VR and Self-Regulation

This theme represents the participants' views regarding self-regulation while using VR. The theme is divided into two sub-themes, Attention Control and Working Memory-Booster, as shown in Figure 5.10.

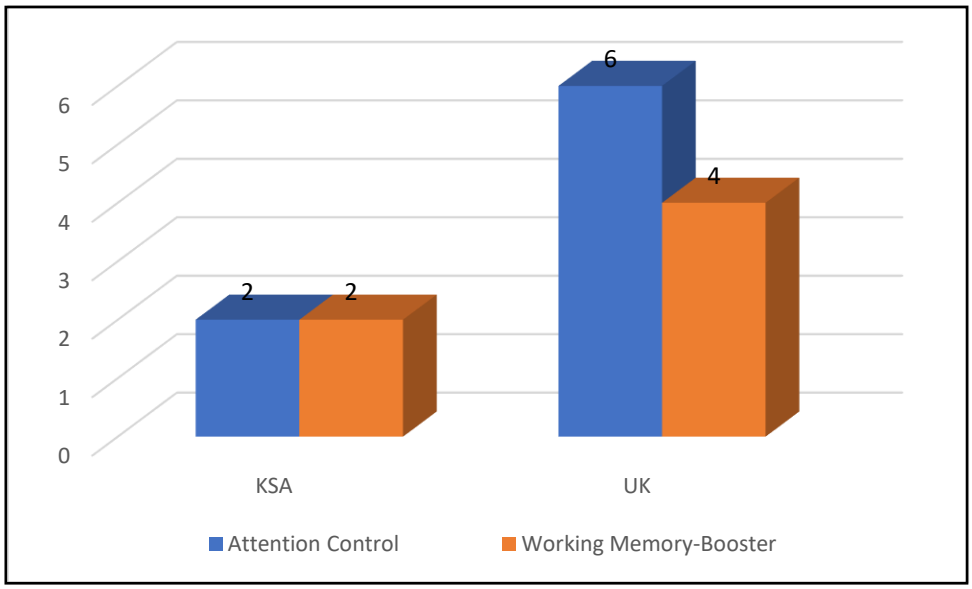

Figure 5.10 Theme 5: VR and self-regulation

5.2.5.1 Attention Control

Most participants in both countries believed that VR could enhance learning and cognitive abilities in children. Remarkably, they described how VR games could improve attention in their children. In addition, they maintained that VR technology could increase children's ability to concentrate by providing an environment conducive to learning. Also, they expressed that VR had positively impacted their children, such as stimulating focus and memory. For example, M7 pointed to VR's effectiveness as a teaching tool:

> VR captures the child's attention and focuses for a much more extended period than traditional teaching methods. For example, I remember some VR games that significantly impacted my daughter's learning of numbers and patterns.

Likewise, as shown in Figure 5.10, most participants in the UK described how VR could be effective in enhancing children's attention because they had observed that children become more focused and attentive while playing these games. They shared that it could improve children's attention spans and help them learn to focus on the given task. M10, for instance, pointed out:

> VR is an impressive and very attractive learning tool for children. VR increases [G10's] focus and her attention on learning. Moreover, it develops her imagination and creativity.

5.2.5.2 Working Memory-Booster

Participants from both countries raised that VR could help improve children's working memory in an effective and entertaining manner. According to participants, children could remember information better if it was presented in a virtual environment. They asserted that VR could be an effective tool if used for educational purposes. Participants from both groups described how their children remembered the events or situations they experienced in virtual games. For example, F3 indicated that:

> What also intrigued me while discussing with her is that the [G3] remembered most of the details very accurately.

Participants in the UK also believed that VR could benefit many children by stimulating memory performance. For instance, F8 supported that:

> From my experience with my children, they became passionate about learning. The games stimulated their memory, doubled their focus, turned their attention to detail, and applied what they learned to real life.

5.2.6 Theme 6: VR and Social Awareness

This theme represented the participants' views on VR's impact on children's social awareness. As illustrated in Figure 5.11, participants from both countries produced the same responses.

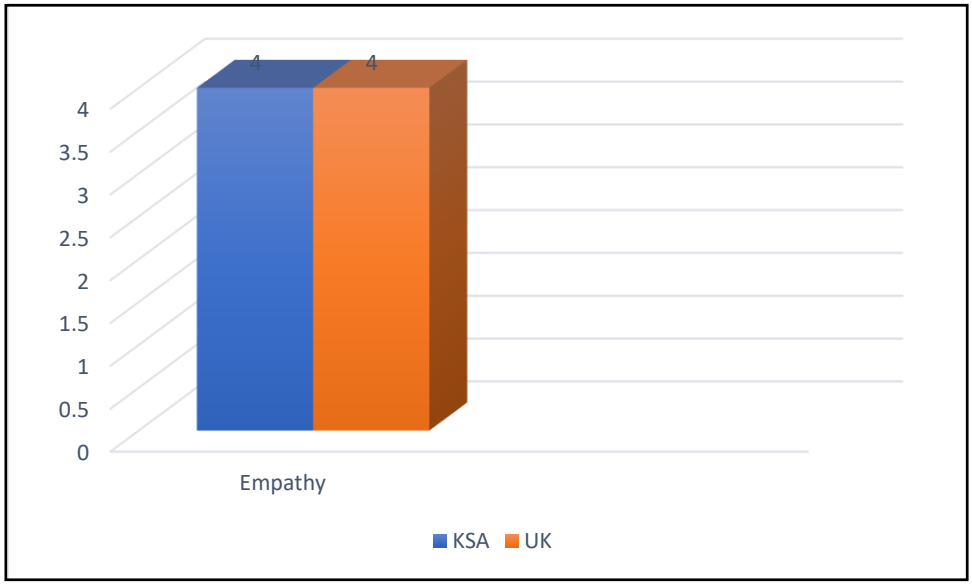

Figure 5.11 Theme 6: VR and social awareness

5.2.6.1 Empathy

Participants from both countries raised that one of VR's benefits is promoting empathy in children through its empathy-related content and stories. According to participants, VR had the power to make children more compassionate towards people than other games. Participants shared that children who watched stories of people in VR and appreciated that these individuals were coping with distressing circumstances became more empathetic towards them in real life. For example, F3 pointed out that:

> [G3] has a movie about refugee camps. She was so sympathetic to the children there, and she kept asking the family and me how we could

> help them, and she never stopped asking questions about their situation and rights.

According to participants, VR helped children develop and enhance empathy-related abilities and also encouraged them to have prosocial responses. M8, for example, pointed out:

> One of the films that have influenced [G8] for a long time is about a child's life in a wheelchair. I noticed that experience expanded her awareness, and she became more sympathetic than before.

5.2.7 Theme 7: VR and Behavioural Response

This theme represented the participants' views regarding VR's impact on children's behaviour. As shown in Figure 5.12, this theme is divided into four sub-themes. While Figure 5.13 compares the responses from both countries.

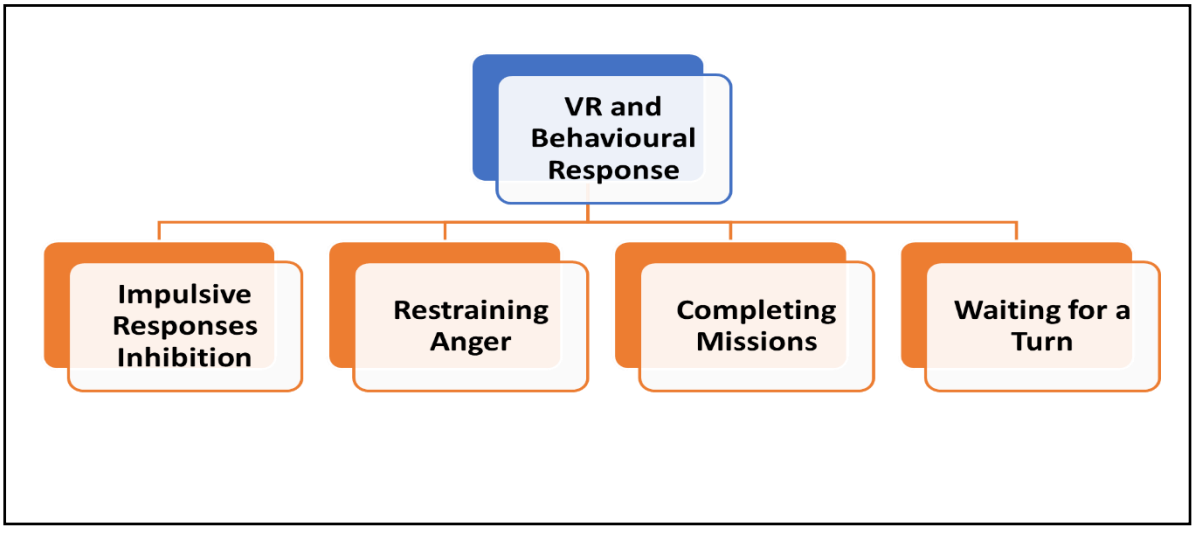

Figure 5.12 Theme 7: Map of VR and behavioural response

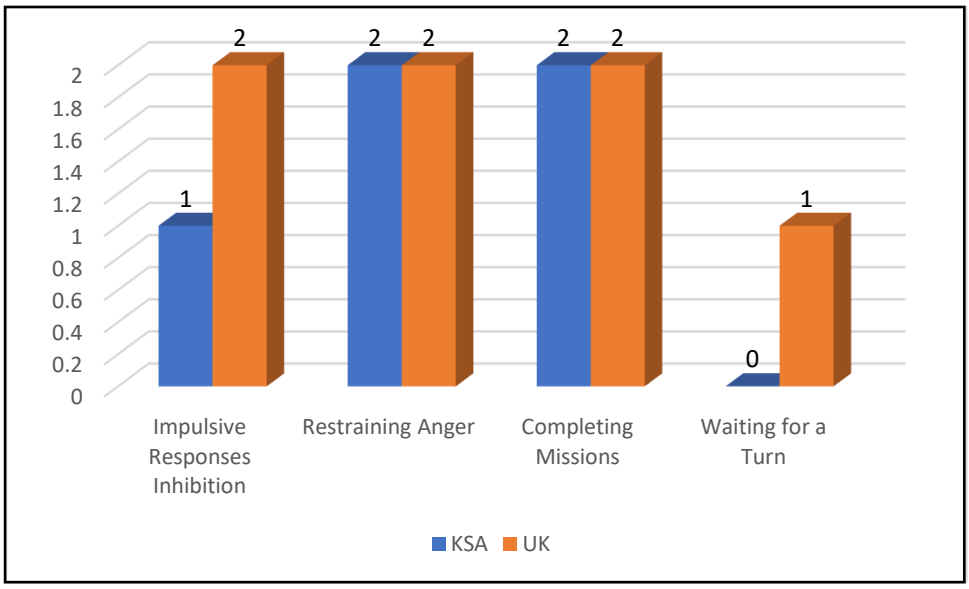

Figure 5.13 Theme 7: VR and behavioural response

5.2.7.1 Impulsive Responses Inhibition

Participants from both countries observed VR's impact on their children's behavioural responses. They reported that their children might exhibit violent behaviour in defeating or losing a challenge. However, many children try to control their emotions and handle such situations calmly. GM3 commented that she thought this kind of maturity in children would lead to more mature behaviours in life and help them be more in control of their emotions. Also, M5 expressed that:

> VR games developed [B5's] skill in persistence and continuing challenging missions as he was trying to curb anger and focus his attention beyond the critical stages.

Likewise, participants in the UK, for example, M9 remarked:

> Nevertheless, on the positive side, [B9] sometimes resists his grief and anger to complete the level, which I admire.

5.2.7.2 Restraining Anger

As mentioned in 5.2.3.4, participants from both countries said their children found it challenging to control their anger when losing a challenge in a VR game. However, as shown in Figure 5.13, some participants expressed that VR games, which may be the reason in the event of a defeat to provoke their children's anger, may at the same time be the reason for curbing this anger. This could be for various reasons, such as the desire to win. M5, for instance, said that:

> VR games developed [B5's] skill in persistence and continuing challenging missions as he was trying to curb anger and focus his attention beyond the critical stages.

Another reason could be the fear of deprivation from playing virtual reality as a punishment from parents. For example, F6 said:

> I do not deny that some negative behaviours have accompanied it: he becomes easily angered, hitting his brothers or screaming if he loses. However, he listens to us and tries to curb his anger from time to time , especially when we warn him to prevent him from playing VR.

5.2.7.3 Completing Missions

Participants from both countries noted that their children become thrilled when they finish a level in some VR games and move on to the higher level, especially those that require skills and have some challenges. However, they revealed that their children might remain restless and anxious until they complete the challenge. On the other hand, they added that VR has also positively affected their children by helping them focus and pay attention to their goals, besides the enthusiasm that drives them to complete tasks.

F6, for example, said:

> [B6] becomes bored quickly; it is difficult for him to complete a game or book, and he is not enthusiastic about any game, especially if he has to wait in a queue. This was also one of his teacher's notes in kindergarten. There is nothing that catches his eye entirely and makes him excited about finishing it. I noticed his eagerness for VR games in the mall, and he became passionate about completing the stages. Even more, he has become patient to return some of them when he is losing.

F8, also confirmed that VR supported the children's skills including focus on the mission and keep track of the task at hand until its completion.

> VR has made [G8] more mature in completing tasks, adhering to rules such as a traffic light, persevering for the role in professions, multitasking, tracking variables, and managing multiple goals. In addition, they learned strategies in certain games, for example, when planning to build a city.

5.2.7.4 Waiting for a Turn

As shown in Figure 5.13, the responses regarding this theme came only from participants in the UK, whereas no such information emerged from participants in KSA.

Participants in the UK commented that VR games could positively affect their children in terms of waiting for their turn by comparing the child's behaviour before and after VR games. F6, for example, said:

> [B6] becomes bored quickly; it is difficult for him to complete a game or book, and he is not enthusiastic about any game, especially if he has to

wait in a queue. This was also one of his teacher's notes in kindergarten. There is nothing that catches his eye entirely and makes him excited about finishing it. I noticed his eagerness for VR games in the mall, and he became passionate about completing the stages. Even more, he has become patient to return some of them when he is losing.

5.3 Conclusion

This chapter provided a thematic analysis of the individual responses. Seven main themes emerged during the analysis. Chapter Six links the themes presented here with previous studies' results and the context of the research reviewed in Chapters Two.

Chapter Six: Discussion

6.1 Introduction

This chapter discusses the current study's main findings. This study is the first of its kind to discuss virtual reality's (VR) potential role in early childhood, focusing primarily on children (aged four to six years). However, since this study is exploratory, there are no questions aimed at specific objectives; adult parents and carers are the closest to and know most about a child of this age. As indicated in Chapter 4, they select and purchase VR games for their children and set the rules at home. This is the reason for selecting parents and carers to serve as study participants. From their perspectives, this study's findings create an initial map to highlight the areas of influence of the VR experience on pre-schoolers' development.

This study employed a qualitative approach to study the potential impact of VR, which can be considered a novel approach to studying VR, especially in Social Sciences, Arts and Humanities (SSAH). This approach is advantageous in providing parents' and carers' perspectives in-depth. In this study, seven main themes emerged throughout 20 interviews. In light of the study's context, this chapter discusses these themes by presenting VR's aspects perceived to be more or less favourable, in other words, more beneficial and more of a challenge. This is followed by general reflection, including a critical comparison between study results and existing literature. Finally, it also provides an assessment and interpretation of these findings by offering possible explanations; or speculation.

6.2 Themes in the Study's Context

The current study sought to answer the question: what is the potential role of VR in developing Saudi children aged four to six, as reported by their parents or carers? Participants in both countries, KSA and UK, presented varied responses during the study; some participants believe that VR technology is exceptionally beneficial for children, offering entertaining and informative age-specific content advantageous for their knowledge and learning. In contrast, others believed VR technology posed severe risks to young children's development. However, as noted from the participants' responses, it is rare to get rigorous opinion about VR since some of the perceived positive aspects have some potentially negative issues as well, and vice versa. Therefore, the discussion of the results would be in three motifs by providing an outline of the perceived benefits of VR and then the perceived challenges and concerns of VR, followed by a general reflection on the findings. Figure 6.1 presents a map of VR's potential impacts on aspects of early childhood development.

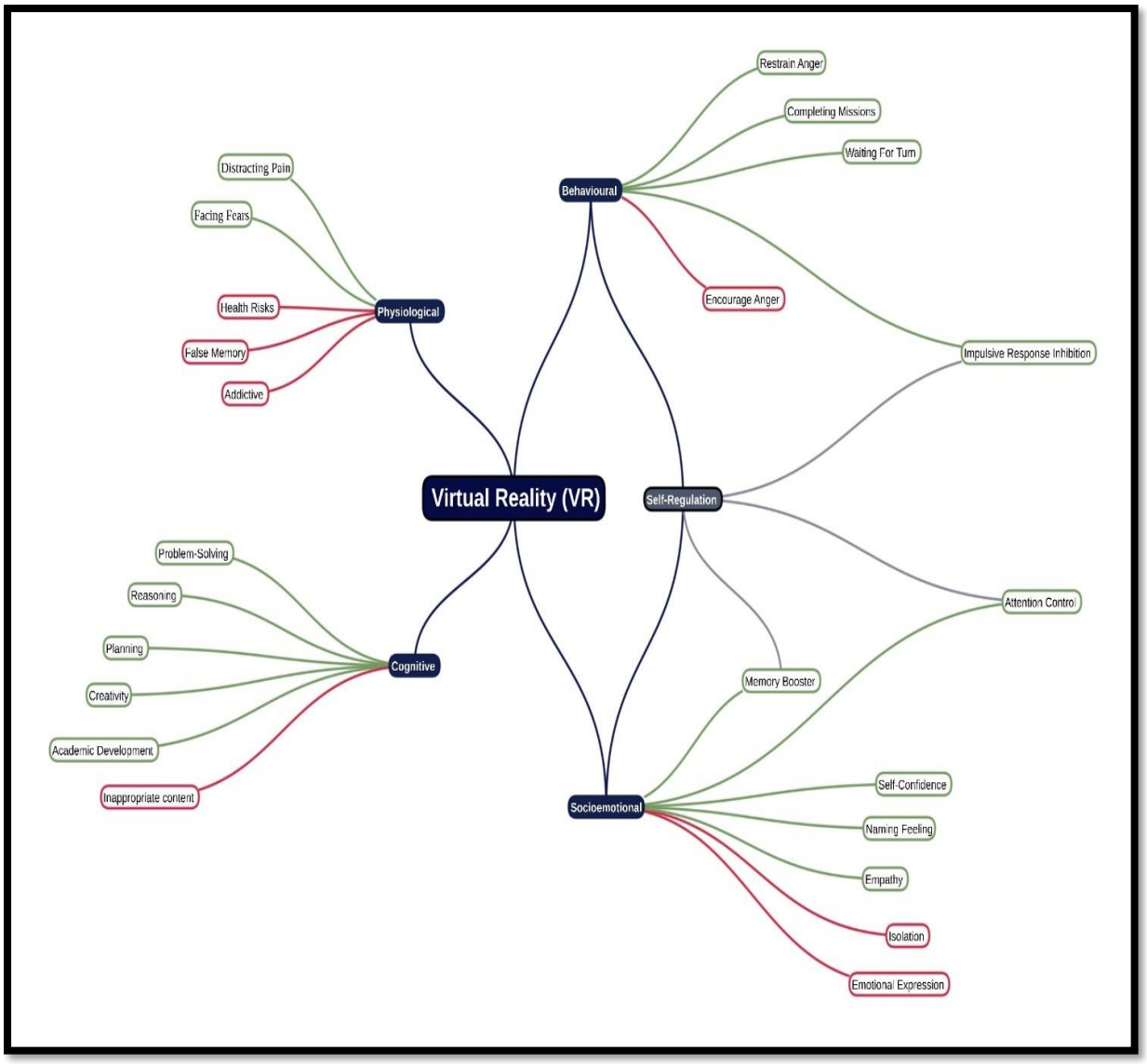

Figure 6.1 Map of VR's perceived impacts on aspects of early childhood development

6.2.1 Perceived Benefits of VR

Participants in both KSA and UK reported that VR gaming might provide immense possibilities for learning and improving skills. The majority believe VR could play a vital role in children's academic and personal skills. More precisely, most UK participants maintained that VR might help improve children's interpersonal skills compared to the KSA participants.

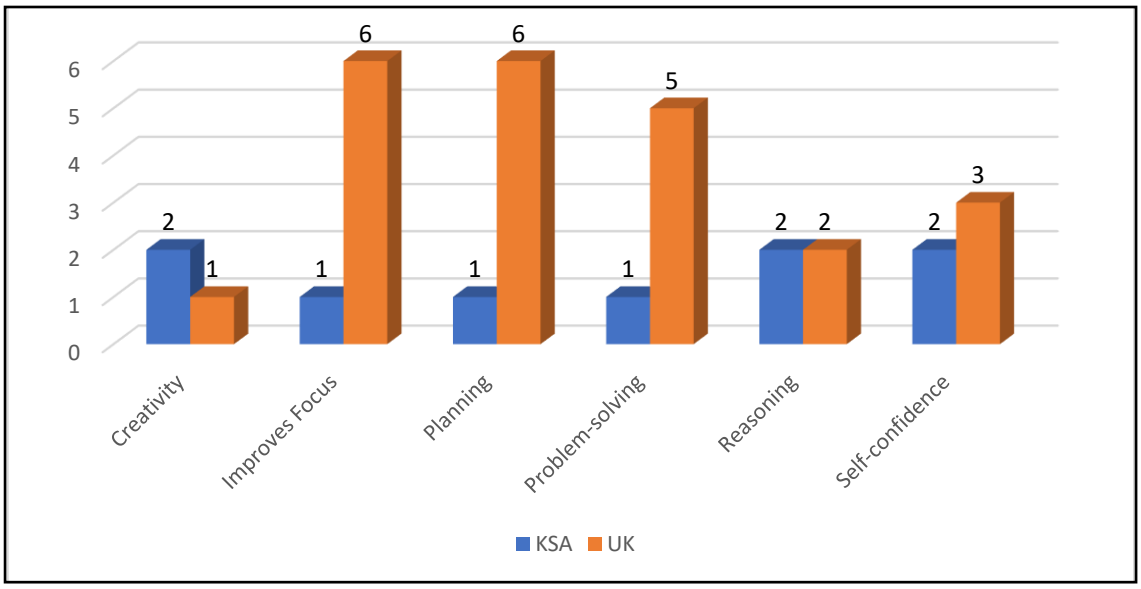

Figure 6.2 VR and perceived benefits

As shown in Figure 6.2, the numbers on the y-axis indicate the frequency of appearance of key themes/nodes from the analyses of the transcribed data from participants in both countries (calculated using the NVivo software). Most participants from the UK stated that VR might play a vital role in improving problem-solving skills, reasoning skills, planning skills, and concentration. In addition, they expressed that VR might help children improve their focus and make them a better planner through its different challenges.

According to the participants, VR could provide an innovative experience for children by testing their abilities within a safe environment. They expressed that different levels of games might encourage children to try harder to reach the final level of the game, allowing them to take risks and improve their reasoning abilities, ultimately helping them gain confidence by passing challenging levels. In addition, they stated that the immersive nature of VR games might help children act in situations that might be challenging in real life, helping them overcome their social anxiety.

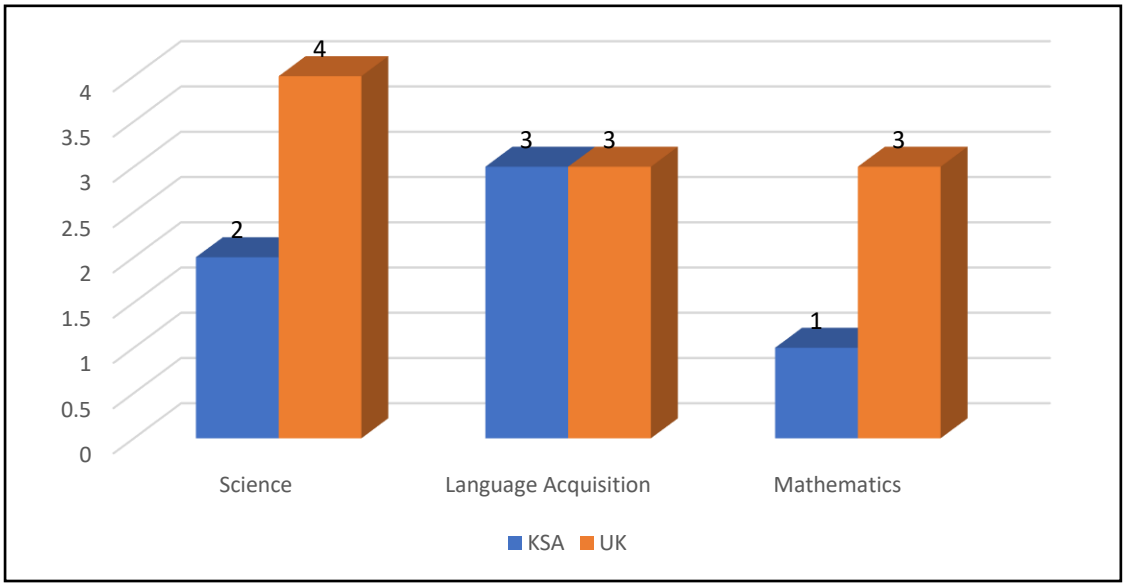

Figure 6.3 VR and perceived academic skills

Regarding academic skills, participants from both countries reported that children's English language proficiency has increased due to prolonged exposure to VR. Also, most participants from the UK stated that VR games positively impact their children's knowledge of science and mathematics. They said that, as VR facilitates learning concepts such as computing and fractions, their children's understanding of such concepts has significantly improved after using VR. Similar responses were observed from KSA participants, but the response frequency is lower than participants in the UK, as Figure 6.3 illustrates.

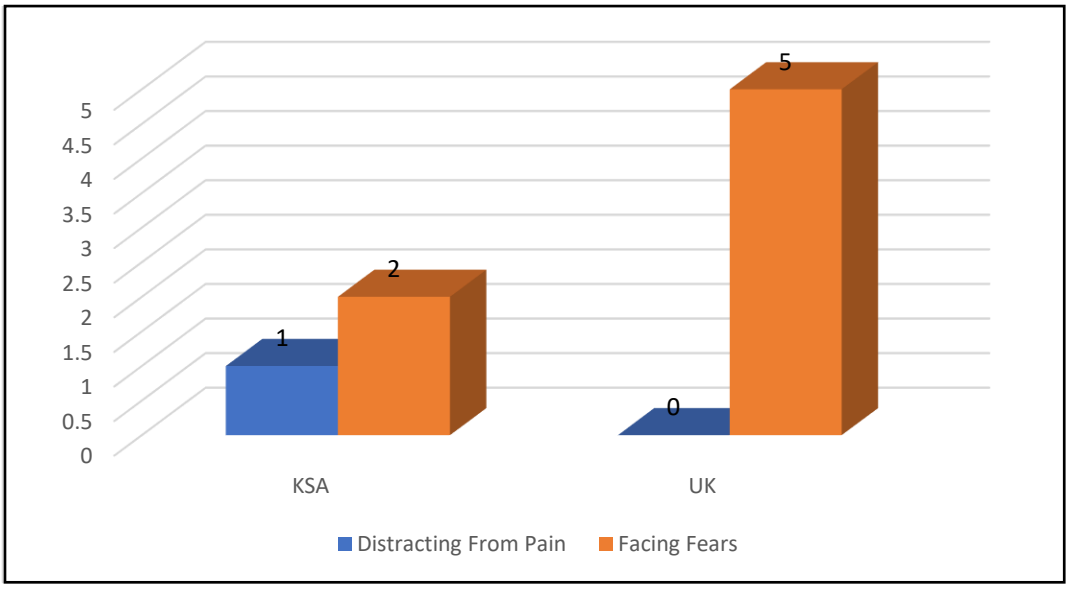

Figure 6.4 VR and perceived external support

Participants also expressed that VR games could help children to distract from pain and lessen their social anxiety. Figure 6.4 compares participants' responses from both countries, where the majority of participants in the KSA said that VR has helped their children conquer their fears. However, participants in the UK stated that VR distracts their children from pain and stress.

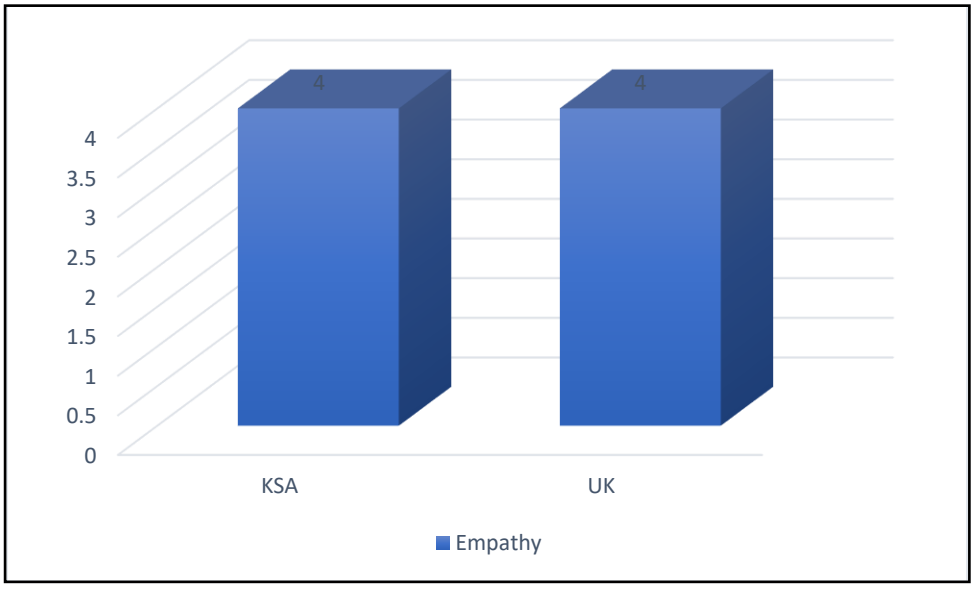

Figure 6.5 VR and perceived developing empathy

Analysis of participants' responses also demonstrates that one of the significant strengths of VR is developing empathy in children. As shown in Figure 6.5, participants from both countries stated that VR help cultivates empathy in their children by experiencing others' emotional states in VR.

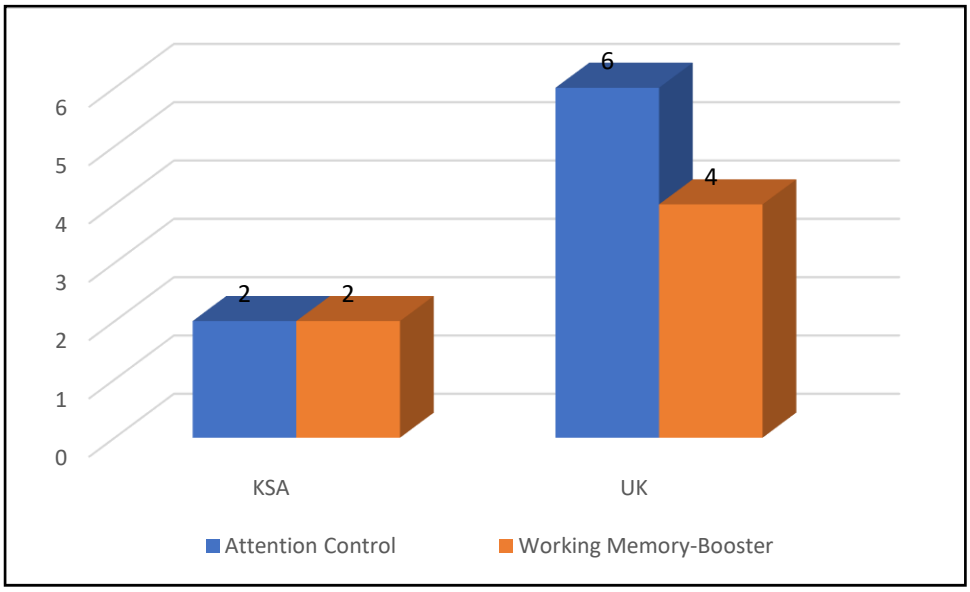

Figure 6.6 VR and perceived self-regulation

In addition, participants stated that VR might effects self-regulation positively, observing that immersion in VR technology stimulates focus and memory in their children. By comparing the participants' responses from both countries, as Figure 6.6 shows, the majority of the participants from the UK expressed that VR has improved their children's ability to focus and increased their working memory. However, the frequency of responses was less in KSA.

6.2.2 Perceived Challenges and Concerns of VR

The analysis indicated that VR also harbours perceived risks from the participant's experiences with VR and their children. For example, some participants stated that one of the significant disadvantages of VR games is that their children become addicted to VR.

As shown in Figure 6.7, participants from both countries reported that their children's addiction to VR was the most significant risk associated with this technology. The frequency of responses citing this perceived risk was higher in KSA. Similarly, isolation was another risk mentioned by participants from both countries. Some of them expressed that their children might avoid social gatherings to play VR.

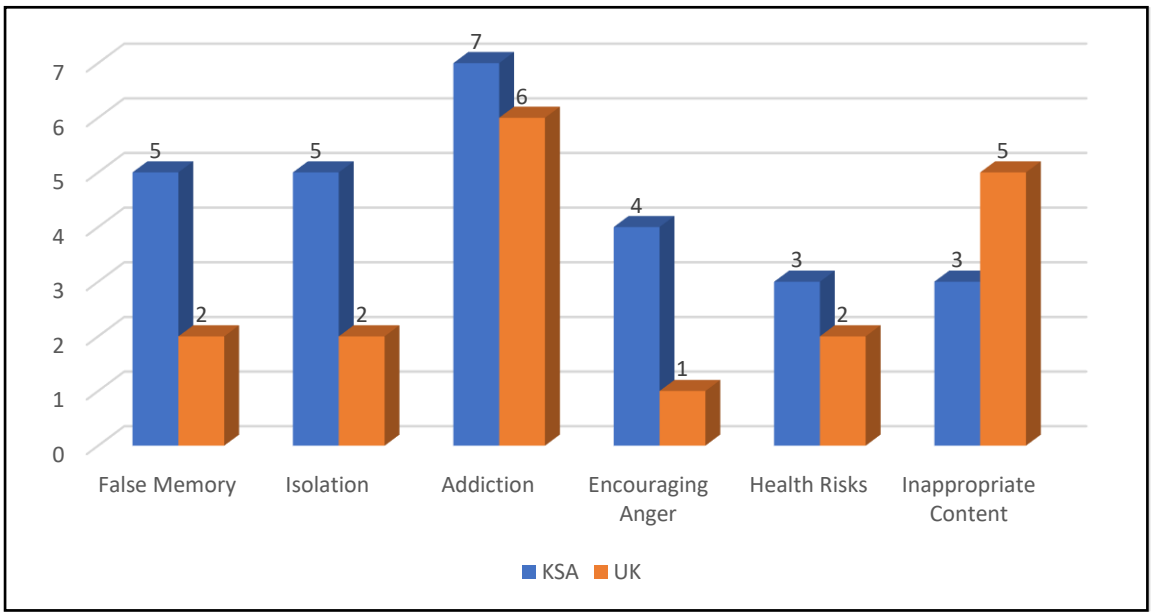

Figure 6.7 VR and perceived challenges and concerns

At the same time, from the participants' perspective, when their children play with VR, that might make them vulnerable to false memories. Sometimes, their children confuse their virtual experiences with what happened in reality. This perception is largely from the participants in KSA.

In addition, participants reported a perception that exposure to violence in VR games could affect children's psychological health. The frequency of responses highlighting this risk was higher in the participants in the UK than in KSA, where some expressed concern regarding the inappropriate content in VR games. They maintained that violent and frightening content could provoke anxiety and fear in children, affecting

their behaviour and temperament. Figure 6.7 demonstrates the participants' response regarding VR, which may encourage anger and causes extreme temperamental changes in their children.

Furthermore, some participants attributed a perception that their children's aggressive behaviour, such as hitting, shoving, throwing things, or crying uncontrollably, could be due to VR. Also, they claimed that extended VR use could pose serious health risks for young children, a child's vision, for example. Moreover, some participants reported perceiving anxiety and dizziness in their children might be side effects of using VR for a lengthy period.

6.3 General Reflection on the Findings

This section will discuss the analysis results according to the study sub-questions based on the essential aspects of early childhood development since contemporary psychology studies approach human development as a comprehensive, lifelong process (Kaimara et al., 2021). Therefore, in this section, the results will be discussed according to physical, cognitive, socio-emotional and behavioural development. Moreover, the results will be supported and critiqued in relation to the relevant literature cited. Furthermore, the interpretation of the discrepancy from considering the existence of meaningful differences in viewpoints between participants in KSA and the UK.

6.3.1 The Physiological Aspect

Concerning physiological development, the current study indicates VR’s effects on children's physical development in early childhood by addressing health concerns parents or carers have for their children. This study focused on brain and nervous system-related influences, which are essential for healthy physical development.

According to Riva et al. (2019), VR and the brain share ‘the same basic mechanism: embodied simulations’. They explained that neuroscience showed that by ‘[creating] an embodied simulation of the body in the world used to represent and predict actions, concepts, and emotions’, the brain ‘regulate[s] and control[s] the body in the world effectively’ (p. 82).

One of the themes that emerge from the analysis is health risks. Participants perceived that the immersive nature of VR could cause physical harm if children spent too much time playing. For example, participants noticed that their children sometimes developed dizziness and nausea after spending around half an hour playing VR. They also expressed concern that overly wearing VR helmets could affect their children's eye health and might cause blurred vision after removing the VR helmet. Referring to Tychsen & Foeller (2020), among 50 children who completed 46 (94%) two sessions of VR gaming, none of the children who finished the two trial sessions asked to end the play, and most were also disappointed when playing stopped. Except for two girls (five and six years old) and one boy (seven years old). Girls reported discomfort consistent with mild motion sickness; The boy said he was bored and that the headset was uncomfortable. Concluded that young children may tolerate a fully immersive 3D VR game without notable effects on the visual motion functions. In addition, VR play did not cause considerable postural instability after VR or maladaptation of the vestibular-ocular reflex. Therefore, most of the discomfort and subsequent effects may be lower than that reported by adults. However, this may be acceptable compared to the frequency of responses in both countries of the current study participants. Although proven by rigorous medical measures, additional medical studies may be beneficial.

Despite concern for the child's health, which should not be risked in any way, some

participants allowed their children at this age to spend longer than an hour immersed in VR. This extended time is an infringement resulting from the unstudied use of immersion devices such as VR (Kaimara et al., 2021). Therefore, in addition to the physical health requirements for VR-producing companies called for by numerous studies, parents and carers must be aware of the guidelines for handling their children's use of VR devices. Bailey and Bailenson (2017) discussed specific physical safety considerations for VR, including helmet size, weight, and line-of-sight spacing about vision through the helmet. Some VR and augmented reality companies have released guides to help developers create safe and comfortable content and hardware for their users. They inspire designs for younger children but are not for children per se. For example, Google (2019) offers VR content designers and developers Designing for Google Cardboard, which discusses physiological considerations for design and guidelines to help users avoid experiencing simulator sicknesses, such as visual display, locomotion, position, and tracking. These physiological details ensure that users have safe, comfortable, and enjoyable experiences in VR (Sobel, 2019).

Moreover, although VR contains some physical movement, even offering physical sports games, the participants were divided on this point. Some were supportive because the child was safer indoors or busy spending part of their time outside to play sports with their children. Others preferred that their children play sports in the real world and did not consider what they did in VR as a real sport. As McMichael et al. (2020) demonstrated, most parents of adolescents preferred ‘real’ physical activity over VR physical gaming.

Likewise, the participants conveyed perceived concern about their children's potential addiction to VR. Nevertheless, the participant's awareness of the dangers of addiction to electronic devices was surprising, as the majority were cautious and

sought to mitigate this harm by specifying times and supervising play. This improved understanding can be explained from their point of view by the warnings on Saudi TV and radio programs regarding electronic devices in general; addiction tops the list. The frequency of participants' responses revealing their children's addiction to VR was minimal in both countries, which might reflect increased awareness.

Despite the impossibility of ignoring the positive impact of Saudi TV and radio warnings on Saudi social awareness concerning children and reducing the dangers of electronic devices, there are reservations about some of this, as some are not based on scientific evidence. Some are based on personal opinions or unjustified concerns that may be by inaccurate generalizations. For example, Al-Hadlaq and Aziz's (2014) study, conducted in KSA, pointed out the advantages and disadvantages of electronic games, which may be considered quite broad. Among the disadvantages discussed is Internet addiction, which affects 75.75% of children, a result that might need much more detail. Remarkably, despite the vast number of warnings against addiction to video games, limited studies indicate the dangers of VR addiction, such as McMichael et al. (2020) who stated the danger of addiction to VR, particularly in adolescents (13-17 years old), based on interviewing 18 parents.

On the contrary, numerous search results demonstrate the efficacy of VR cognitive behavioural therapy for Internet addiction and Internet gaming disorders in adolescents (Zhang & Ho, 2017; Mishkind et al., 2017; Riva et al., 2019) interpreted that the simulation technology in VR simulates the brain's work, enabling cognitive modelling and designing targeted virtual environments capable of simulating both the external and internal world and body. This therapy may succeed in a clinical approach that compares VR favourably with contemporary treatments for mental health disorders and addictions. Participants in the current study did not report any

experiences with the use of VR to treat addiction. However, future research must examine whether this benefit may extend to children at an early age.

Moreover, most of the participants from both countries perceived that their children might confuse some experiences they had in VR with their experiences in the real world. Therefore, although the children had already gone through the details of this experience during the virtual immersion, scientifically, it is classified as a false memory (Otgaar et al., 2018). Many psychologists and academics consider false memory one of the dangers of immersive media, particularly VR (Lombrozo et al., 2020). Several studies have confirmed the relationship between the brain and the formation of memories and experiences surrounding an individual (Addis et al., 2015; Coleman and Argue, 2017; Thompson and Madigan, 2007). Segovia and Bailenson (2009) confirmed VR's influence on generating false memories in preschool and elementary school children. According to Segovia and Bailenson (2009), Belli (2011), and Clark and Mackay (2015), the mind does not always differentiate between truth and fiction; children' obtain false memories' that are mental experiences they might believe are authentic images of past events.

False memory is also confirmed by some of the participants in the current study by recounting many of the stories their children told as factual, even after some parents and carers argued that it had happened while they were playing VR, while the children confirmed the opposite. However, some participants interpreted these stories from their children as lying to attract attention or express their longing for someone. Nevertheless, such stories are most likely a mixing of memory inputs rather than a conscious fabrication, even if the participants' motivations may be valid according to their child's experience. Unsurprisingly, the origin of VR is based on the projection of reality in a fantasy world in which events are controllable, and this technology can

remove the boundary between the artificial and real (Villena-Taranilla et al., 2022), which might stimulate the development of false memory in young children.

On the other hand, Tychsen & Foeller (2020) stated that through recordings of 50 children aged (4-13 years old), none of the children showed after-effects false memory in the days following exposure to VR. This also agrees that some of the participants in the current study did not indicate false memories in their children. There was no consensus among the participants on its existence or non-existence.

However, the frequency of responses in having their children false memories is approximately twice in KSA compared to respondents based in the UK. The reason may be due to several factors, the difference in the environment could be one of them. The time children spend immersed in VR, parents' discussions with their children about their experiences, how they spent their day in general, and precisely the most notable moments of their day could also be affected factors. Nevertheless, looking at individual cases, such as G3, for example. Her parents' preoccupation in the medical field and spending long periods away from them with her grandmother GM3 may have contributed to retaining G3 memory with her father F3 in VR as an authentic memory. Thus, it is necessary to dwell on this point specifically, and this is the aim of this study to identify the most prominent points for further study with different methodologies.

Although there are perceived misgivings about VR, it also has perceived positive effects. For example, participants reported a perception that VR helped their children face fears and distracted them from pain. Maren (2015) discussed neuroscientist LeDoux's statement '[carving] the emotional brain into two parts: an evolutionarily old threat detection system, centred in the amygdala, and a new system that underlies the conscious feeling of fear, centred in the prefrontal cortex' (p. 39), indicating the

possibility of the effectiveness of VR concerning confronting fear. A series of articles have followed, endorsing the positive effects of immersion in pre-studied and controlled VR environments on facing fears, anxiety and distraction from pain. For example, Won et al. (2017) confirmed that VR might facilitate rehabilitation for paediatric patients suffering from chronic pain by providing a restorative psychological and physiological environment. Similarly, Riva et al. (2019) pointed out nearly 20 supporting articles comparing VR positively with clinical treatments for anxiety disorders, eating and body dysmorphia disorders, and pain management, with long-term effects generalisable to the real world for adults.

The results of these studies align with most statements of participants from both countries; they reported the perception that VR could have a clear progression in facing their fears, such as heights, insects, or darkness. Furthermore, they described how VR could help children confront their fears without placing them in dangerous situations. The progression was gradual and varied from one child to another, but it was noticeable. At the same time, it is seen that children who have faced their fears with VR find support from their parents. For example, discussing the idea that it is just a game, and once you take off the helmet, everything that might be bothering you is over, as well as other stimuli such as holding the child's hand while facing fears with encouraging comments.

Moreover, Easterlin et al. (2020) confirmed VR's effectiveness in managing medical trauma for children and youth with special healthcare needs during infusions through semi-structured qualitative interviews with 18 patients and guardians. Ahmadpour et al. (2020) also showed that VR effectively manages pain and anxiety for children and adolescents. Likewise, after their randomised experimental selection, Hundert et al. (2022) determined the feasibility of VR in distraction in children and adolescents aged

(8 to 18) years undergoing cancer treatment with incoming SCP needle insertion. They confirmed that VR might reduce distress even more than the iPad's distraction.

Managing pain is also confirmed in the current study in a special case, G4. Participants expressed how effectively VR distracted their child while changing burn dressings. Although none of the participants from the UK mentioned this, I think conditions such as the G3 case may be unique to participants. Nevertheless, it could represent a category of the Saudi community and children worldwide. However, it is necessary to increase studies that may support young children through their treatment in all possible ways.

On the other hand, Litwin et al. (2021) concluded that using VR to reduce procedural pain in a paediatric emergency department for a sample of 116 children aged (8 to 17 years old) did not make a notable difference in fear or distress. However, the children reported distinguished immersion in the VR environment. Although the effect of VR on facing fear cannot be generalized, children's age may play a role, as the extent of facing fears through VR may be more significant and pronounced at a younger age. Accordingly, the field requires further studies concerning children at an early age. VR may extend beyond serving as a pain distracter in being an interactive tool that provides age- and development-appropriate cognitive education in a safe environment, whether at home, in the hospital, or at school.

6.3.2 The Cognitive Aspect

Regarding the cognitive aspect, both countries' participants reported that VR is a vital motivational factor for children's cognitive perception in early childhood. Children were considered by their parents to have gained skills such as problem-solving, reasoning, planning, improving concentration, developing academically in mathematics and

science, inspiring creativity, and acquiring a second language such as English. In addition, the participants maintained that these accomplishments helped foster the children's self-confidence, which is essential for the emotional and social aspects of development.

Considerable studies support participants' indications, such as Calongne and Hiles (2007) reflected on the significant improvements that stem from transitioning education from the traditional classroom and its dynamics to a multi-sensory environment, such as VR. In addition, Checa and Bustillo (2020) emphasised user interactivity in VR as a key element necessary to achieve high learning rates. Furthermore, Yilmaz et al. (2017) studied a sample of 92 children (49 boys and 43 girls) aged five and six: most of them reported feeling very happy and excited and having fun. In their study, VR was attractive to the children, which they enjoyed more than conventional books.

Furthermore, Bailey and Beilinson (2017a) considered a child's immersion in a hypothetical experience that affected at least three senses (sight, hearing, and touch). They find that it can be important to a child's experience and can lead to more enthusiasm and fun in nurturing preschool education, without even bypassing the senses of smell and taste. Notably, this agrees with the participant's statements in the current study from both countries. They were referring to the unconventional role of VR in education by promoting desire, interest, and attention, which postulate the critical factors in education.

In addition, Sánchez et al. (2018) praised VR games' many difficulty levels, which benefit the educator cover the goals set for each child, specifically for children aged (three to five years old). Also, Vertemati et al. (2019) reported that the impulse to learn in VR could create emotional reactions that ultimately, after practice, lead to increased

learning. Simultaneously, in their study, users favoured learning through VR, although retention of information was the same in both the VR and non-VR scenarios. Minocha et al. (2018) referred to VR as safe outdoor trips that increase the effectiveness of science and geography experiments. Mikropoulos and Natsis (2011) conducted a ten-year critical review of empirical research on VR's educational applications. The authors highlighted the sense of immersion and presence in VR environments as a valuable tool for promoting information retention and retrieval, thus heightening learning rates. Moreover, Riva et al. (2019) described VR as the most remarkable cognitive technology tool, as VR can simulate both the external and internal world. They elucidated that VR offers the possibility of structuring, augmenting, or replacing various test aspects of physical self-awareness. Similarly, studies have supported the positive effect of all forms of immersive media on cognitive and skill development. For example, Sobel (2019) stated that:

> Immersive media—augmented, virtual, mixed, and cross reality—are powerful systems. Ideally, with thoughtful, consistent reflection and action, immersive media will support learning and development and empower children through equitable access and participation. Their experiences are positive, productive, and safe. (p. 24)

It can be seen that the current study participants in the UK highlight these skills, such as the gradation in difficulty levels, improving concentration, and development academically more precisely than the participants in the KSA. This may be due to several reasons, most notably the increasing interest of the participants in the UK in the academic aspect, as it was one of the main motives for purchasing VR for their children. Another reason is that most of the participants from the UK are researchers in different fields. Their skills as researchers may be focused on these skills, such as

problem-solving, reasoning, planning and inspiring creativity, so they note them more prominently than others.

Nevertheless, Yilmaz (2016) used educational magic toys (EMT) that included VR games and stories for a sample of 30 teachers and 33 children aged (five to six years old). The study concluded that although both teachers and children appreciate and interact positively with VR activities, the children did not demonstrate high cognitive achievement. Unfortunately, Yilmaz did not explain why children's cognitive achievement was not high. However, if her findings were based on predetermined expectations or compared the intervention group to children who did not engage in the experience, the study did not imply cognitive harm to the children. Although no perceived cognitive defects were reported from participants in the current study either, the inappropriate content was one of the principal concerns in both countries.

Fortunately, the Initiative Centre of the Mohammed bin Salman Charitable Foundation (MSK) launched its '*Values Platform*' (https://values.sa/qayyem/) in December 2019, which aims to protect children and adolescents from observations and risks they are exposed to while playing electronic games. The platform provides youth and their parents with brief information revealing the content of these games and the religious and behavioural irregularities that may negatively affect young players. Furthermore, recognising the potential to motivate positive behaviours steeped in values, the platform, the first of its kind for electronic games, collaborated with education and psychology specialists to evaluate games online.

Via the same link, under Qayyem Methodology, there is an explanation of the platform's role; for example, it covered five essential criteria: religious, psychological, mental, moral, and financial, raising awareness of players and educators' values to

help them take appropriate action. Moreover, the project categorises games according to age groups to illustrate suitable games for each criterion and describe game content in a timesaving manner to facilitate educators in choosing the most appropriate content. The platform also restricts ethical irregularities in offending games and disseminates game information classifications through the portal. Through these actions, the platform aims to raise the level of values, create a generation aware of the dangers of electronic games in compromising behaviour, help responsible authorities monitor what is put on the market, and guide educators and parents.

It is worth mentioning that the interviews in the current study coincided with the launch of the *Values Platform*. Therefore, there were no comments from the participants about their interaction with this platform. However, there have been considerable pressing requests for a platform in this role.

6.3.3 The Socio-emotional Aspect

In the context of Socio-emotional perceived effects of VR. As mentioned in the cognitive aspect, cognitive development has significantly increased children's self-confidence. Additionally, this study's participants perceiving identifying feelings and empathy as a significant influence on their children indicates a positive relationship between the VR experience and pre-schoolers social and self-awareness. At the same time, many studies interested in VR's socio-emotional effects have focused on VR's ability as a fully immersive technology to stimulate empathy in children, such as (Waytz & Gray, 2018) and (Kamunen, 2022). It can be seen in the congruence between their results and the participants' perceptions in the current study. The case of the G3 with the VR movie may have explained the significant impact of virtual immersion. The child interacted with the events of the film as if she was in a wheelchair and remembered

the minor details, and her interest in children in wheelchairs and what they might suffer could support the effect of sympathy through VR.

Berger (2011) defines Self- Regulation as a set of skills known as executive functions that include attention, working memory, and inhibitory control, which are skills that work together to facilitate purposeful and directed behaviour. Simultaneously, it is perceived by participants from both countries that VR may stimulate attention, working memory, and inhibitory control positively. This could be interpreted as suggestive of VR's role in pre-schoolers' self-regulation.

Nevertheless, some studies have claimed that VR reduces memory retention. Fox et al. (2009) found a decrease in recall of details or content found in the virtual environment. The authors interpreted this finding as a result of complete immersion in VR, citing VR's depletion of mental resources that would have been devoted to memory due to its highly engrossing qualities (Bailey et al., 2012). Thus, controlled training environments should be used for VR to avoid overloading users' mental resources. In contrast, when comparing the two-dimensional screen (2D desktop) to VR, the results showed higher accuracy by VR participants when recalling faces (Krokos et al., 2019). Furthermore, experiences that take place in VR environments can influence memory retrieval outside of VR scenarios (Bailey et al., 2012). Plus, procedural memories built through VR simulations while practising skills to be learnt should be better retained because using the entire body makes the lessons more engaging (Smith et al., 2018).

On the other hand, based on participant perceptions, their observations of their children of heightened attention, improved working memory, and behavioural control predict a relationship between experiencing VR and these three elements of self-

regulation. Blume et al. (2017) and Fromberger et al. (2018) hinted at VR's relationship to self-regulation. Blume at al.'s study concerned children with attention-deficit/hyperactivity disorder (ADHD), while Fromberger at al. focused on the context of Criminology and forensic psychology of child abusers; both studies supported the role of VR. However, this may be one of the most significant results perceived by participants of the current study because it is from pioneering studies to reach this result. Children in the preschool years, away from ADHD and crime cases, may exhibit any external factor's influences their self-regulation since the first grade of elementary school directives can be considered stricter than the directives that the child receives in kindergarten. Therefore, depending on their enrolment in the primary stage may develop self-regulation for most children after entering school automatically.

Conversely, in the current study, participants reported a perception that inability to control emotional expression and isolation are two perceived negative influences of VR on their early childhood-aged children. As mentioned in 5.2.4.2, control of emotional expression represented children's suppression of emotional inhibition, in other words, incomplete emotional expression processing (Vingerhoets et al., 2008). Participants' perceptions regarding their children's control of emotional expressions were negative. For example, when children lose a game, they start crying, screaming, or throwing things like the controller. This perception is similar to Carlson and Wang's (2007) results. Their study investigated the relationship between individual differences in inhibitory control and monitoring emotion regulation in preschool children (ages four to six) that were assessed on brief batteries of inhibitory control of prepotent responses and emotion regulation. They also confirmed that parent report of children's emotional control was disappointing. They refer to the overlapping thought processes and actions that rapidly develop in preschool. For example, (four-year-olds) have more

difficulty with tasks that require inhibitory control of emotional responses, such as suppression of the norm-dominant response, than (five-year-olds), who are more efficient at these tasks. That may be a logical explanation if applied to the participants' negative perceptions of their children expressing emotional control and VR. However, due to the lack of studies in this area, emotional control may need more studies, especially concerning VR.

Regarding isolation, participants in this study's perceived differed from Maloney et al.'s (2020) finding that VR is a social system since VR platforms tend to situate users of different ages within the same digital social spaces. However, they also confirmed that children and adolescents have more freedom and time than adult users to explore social VR. Moreover, Maloney et al. (2020) suggested separating VR social age groups by young children (under five years old), children (6 to 10 years old), tweens (10 to 12 years old) and teens (13 to 18 years old), based on purpose, communication, participation, lay, artefacts, and rules for children and youth. Opinions differ according to interpretations and consequences, as with most human subjects. The impact of studies on video and online gaming in isolation may negatively affect participants' opinions. However, there is a lack of studies proving that isolation is an effect of VR, so more studies are needed.

6.3.4 The Behavioural Aspect

In terms of VR and the behavioural aspect, it is s observed by participants that there is a tendency in their children to inhibit impulsive responses, complete tasks, and wait for their turn. The above forms have a positive curve for VR's relationship to pre-schoolers behaviour. Moreover, these tendencies are practical examples of self-regulation, supporting VR's role in pre-schooler self-regulation. Similarly, Torres et al. (2021) performed a systematic review of the physical-digital play technology and child

behaviour (0- to 12-year-olds) and indicated that new interactive play technologies may have a positive effect on children's developmental behaviour. However, there is a need for more studies related to VR in particular and the behavioural aspect with different methodologies.

On the other hand, the participants' perceived on whether VR restrains or encourages anger diverged concerning the behavioural aspect. A child's violent reactions, nervousness, crying, and screaming may follow frustration due to electronic, interactive, or other games; however, this does not necessarily establish causation. For example, a child playing a football match may hit the winning team members in the event of a loss. In this case, it is necessary to re-evaluate the child's behaviour and expand his perception of victory and defeat, self-confidence, acceptance, and sportsmanship, viewing loss as a value and knowing its impact on self-development.

In conclusion, although direct human interaction may remain unmatched in all aspects of life at every age, specifically in early childhood, VR has perceived to be a viable choice by parents and carers for young children. The participants' responses demonstrated the positive effects of VR on their early childhood-aged children in distracting them from pain and facing their fears at the physiological level. Additionally, VR was regarded as beneficial for developing cognitive and academic skills, self-awareness, self-confidence, and empathy. VR was also perceived to improved self-regulation at the emotional and behavioural levels, including attention control, working memory enhancement, impulse inhibition, waiting for a turn, and task completion.

On the other hand, participants perceived that VR might have a potential role in some health risks, false memories, and addiction at the physiological level; reservations existed concerning inappropriate content at the cognitive level. VR's undesirable

effects at the emotional and social levels included inability to control emotional expression and social isolation. At the behavioural level, VR use encouraged anger.

The current study highlighted an absence of meaningful content and a lack of multifariousness in commercial VR games. Therefore, design strategies should strive to thoughtfully align entertainment value with the significant goals that advance the child's abilities and skills by capitalising on VR's advantages while mitigating its disadvantages. Accordingly, the study calls for the participation of educators and specialists in developing design strategies.

In addition, the current study's qualitative results provide a deeper understanding of the participants' perspectives. Interviewing two adults for each child offered more accurate and comprehensive insight into the children's ages, social interactions, academic performance levels, and various other disciplines. Unlike this study, previous studies involving VR have employed a quantitative and experimental approach. Furthermore, the focus on early childhood distinguishes this study from most research on VR use in children; these studies were limited to VR’s effect on cognitive achievement, measuring or enhancing empathy or assisting children with special needs. In contrast, this study created an opportunity for parents who were sufficiently mature and knowledgeable to discuss their thoughts on VR in a semi-structured interview.

This study represents the first to account for cultural influences, specifically Saudi children and VR. Saudi society is undergoing unprecedented civilisational and technological development with the new Saudi Vision 2030 strategy. This study compared traditional Saudi views with Saudis who have lived in different cultures, such as the UK, contributing to understanding the cultural impact of change for the participants.

In line with what one would witness in the majority of humanities and social science studies, each interview was unique, even if they were about the same child, as there were two separate interviews conducted regarding each child. However, sometimes contradictory views and interpretations are noted, which increases the depth of understanding in an integrated way. Nevertheless, the findings could monitor the influence of social and lifestyle factors on the responses of participants from KSA and the UK. Additionally, it was insightful to witness what attracts participants' attention most regarding the perceived effects of VR on their children.

For example, regarding participants from KSA, their observations were more related to the risk of isolation and a preference for the virtual world over face-to-face interaction, which may be observed at frequent family events. Additionally, observing false memories, that is, stories in which reality is mixed with the virtual experience of their children, especially in cases where parents are absent for long periods that may exceed the day from their children due to work preoccupation or separation. While the increasing interest of the UK participants in the academic aspect has been shown as most of the participants from the UK are researchers in different fields. To illustrate, participants' skills as researchers may focus their observations on the impact of VR on those skills in their children, such as problem-solving, logical thinking, planning, and inspiring creativity, so they note them more prominently than others. At the same time, there are similarities between participants from both countries on social awareness, such as empathy, control of emotional expression and behaviour.

Finally, this work represents a novel preliminary approach for future research concerning VR's influence on essential aspects of early childhood development (ages 4–6 years), including physiological, cognitive, socio-emotional, and behavioural aspects, in an unprecedented and detailed manner.

6.4 The Impact of the COVID-19 Pandemic on Saudi Children

Immediately after collecting data for this study, the world was hit by the COVID-19 pandemic, an ongoing global outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In late March 2020, many countries implemented stay-at-home quarantine policies that restricted the majority of daily activities and organisations, including businesses, schools, kindergartens and childcare centres (Loewenson et al., 2020), in an attempt to limit the spread of COVID-19. Consequently, everyday activities stopped suddenly, which had a detrimental impact not only on health but also on the psychological, economic and social aspects of life.

Societies measure progress through advancements in health and education at present; with the COVID-19 pandemic, societies have competed for the continuity of these two areas in particular (Ahmed, 2021). Focusing on children in their early years, the cessation of the traditional educational process and social activities is the most prominent. However, given the Saudi Ministry of Education's keenness to continue the educational process and based on the guidelines for returning to kindergartens in light of the COVID-19 pandemic in KSA, the Ministry of Education has activated e-learning for kindergartens through its platforms, applications, and websites (Alharthi, 2022). Thus, reliance on e-learning has intensified and is unprecedented in Saudi education. Although interviews with participants were completed before the global pandemic, it could be essential to address the impact of the pandemic and lockdown policies on society and the consequent paradigm shift towards strongly technology-mediated educational provision globally. However, most of the participants were contacted during the pandemic. They were able to share some of their and their children's lived experiences and challenges. They offered further reflective input on pre and post-pandemic changes, mainly centred on education and 'edutainment'. Some parents

reacted to their children's preoccupation with electronic devices and admitted that, in general, they had become the centrepiece of their children's lives.

Nevertheless, some of the parents' comments were concerning, such as M1, who stated, ' My child's immersion in VR has become terrifying'. She added:

> As quarantine restrictions loosened, I invited his close friend to spend time together; observing them from afar showed no interaction, unlike what I hear between them while playing online. The surprise was when my son asked him to go to his house and play online.

As confirmed by the current study, the more immersed in VR, the more likely it is to negatively affect several aspects of the child, not just the social aspect. Still, there may be a positive sign, despite reservations. The ability of children at such a young age to create a virtual social environment to maintain their social connections under globally challenging conditions and quarantines cannot be underestimated. Undoubtedly, this phenomenon in an exceptional period in a child’s life may need further study.

Quinones and Adams (2021) highlighted this particular point. Their study focused on the relationship between two seven-year-olds during the COVID-19 quarantine and commended the children's ability to build a social pattern in a virtual world where they experienced happy moments, empathy, and harmony. Although VR may open new horizons for children's adaptive skills and activate their schemata, the overuse of technology during this pandemic is concerning. Most mothers in this study commented that sometimes they needed time to relax and were the ones who asked their children to play with their online friends. It was also the easiest solution for some mothers when the fathers asked them to control the children's disorder.

The effects from the COVID-19 pandemic mean that children aged two to nine are participating in more digital activities than ever before (Sonnenschein et al., 2021). Educational institutions are asking children to submit homework online. Parents have pinned their concerns on their children regarding usage times or monitoring contacts while studying or playing online games (Quinones & Adams, 2021). Most concerns and warnings about children's excessive use of technology, and increased usage periods regardless of the child's age, have suddenly been ignored.

Although the tremendous efforts made to continue education under the narrowest of available solutions are undeniable, the results will come later. For example, raising expectations in distance education for children at an early age is inappropriate (Alharthi, 2022). Additionally, some loopholes in distance education require correction in the coming periods so that its undesirable effects do not multiply (Foti, 2020). Moreover, e-learning should constitute part of an integrated educational system rather than serving as its basis on a general level.

On the other hand, the pandemic may have highlighted other benefits of interactive technology, such as VR. For example, some children might be considered highly vulnerable, especially if they contract any virus such as COVID-19. VR could provide education in a safe environment (dos Santos et al., 2021), whether in a state of isolation temporarily suffered by most of the world's population or long-term, such as in children with immunodeficiency diseases or children with cancer who are undergoing chemotherapy and radiation. These children represent a group with needs that require a focus on providing education appropriate to their cognitive needs according to their health status. VR may have a prominent role in covering these needs.

6.5 Conclusion

This chapter provided a detailed discussion of the main findings of the current study. After a presentation of the perceived aspects of VR from participants about the most informative and challenging, a general reflection follows, including a critical comparison of the study findings with the existing literature. It also provides an assessment and interpretation of these findings by offering possible explanations; or speculation. Finally, the chapter concluded with the impacts of the COVID-19 pandemic that coincided with the study.

Chapter Seven: Conclusion

7.1 Introduction

This chapter gives a detailed summary of the current study, followed by its limitations. Recommendations are made to parents, caregivers and Saudi officials responsible for educational policy. The chapter closes with a discussion of the study's results and how they open avenues for future research.

7.2 Summary of the Study

The current study aimed to contribute knowledge of the potential relationship between VR and child development during early childhood, a period of tremendous physical, emotional, social, and cognitive development. During this stage of development, the child's executive functioning (including impulsivity, working memory, reasoning, behaviour, and attention) emerges and develops rapidly. This study is the first of its kind that allowed parents and carers to discuss their perceptions concerning these areas. Furthermore, contemporary Social Sciences, Arts and Humanities (SSAH) and psychology studies approach human development as a comprehensive, lifelong process with relevant interrelationships between physical, mental, social, and emotional aspects (Kaimara et al., 2021). Therefore, this study provides future researchers scope for each point separately according to its importance and consequences from the perspective of adults closest to the child. The results are discussed according to fundamental aspects of early childhood development (ages four to six), including physiological, cognitive, socio-emotional, and behavioural.

The study involves two groups of participants to provide their perceptions regarding VR and the development of their children. The first group comprised participants living in KSA (Jeddah), and the second group consisted of participants living in the UK

(London) to compare the impact of the surrounding environment. Participants in both countries were Saudi with children under six years old who were using VR. Nevertheless, there are no appreciable distinctions between the KSA and UK groups, as the results demonstrated that the two groups did not significantly differ based on the thematic analyses. Each child had two parents or caregivers involved: both parents, or one parent with a grandmother, aunt, or another carer, according to the parent's marital status or childcare circumstances. This selection provided a more comprehensive picture of the child's state from different points of view.

The participants' responses provided answers to the four sub-questions. First, what are parents' or carers' perspectives regarding the role of VR in the physiological development of Saudi children aged four to six? They perceived the positive effects of VR on their early childhood-aged children in distracting them from pain and fear in some pathological conditions and phobias. On the other hand, the results revealed the perceived adverse effects of VR, indicating specific health risks, false memories and addiction.

Second, what are parents' or carers' perspectives regarding the role of VR in the cognitive development of Saudi children aged four to six? Participants perceived that VR is beneficial for developing academic skills, specifically math, science and acquiring a new language, such as English but, also, problem-solving, reasoning, planning skills and creativity. In contrast, reservations were expressed regarding exposure to malicious and/or age-inappropriate content.

Third, what are parents' or carers' perspectives regarding the role of VR in the socio-emotional development of Saudi children aged four to six? Participants provided views on the positive effects of VR on improved attention control, working memory boosting,

self-confidence, naming feelings and empathy. However, isolation and control of emotional expression were seen as antipodes and perhaps points of concern.

Fourth, what are parents' or carers' perspectives regarding the role of VR in the behavioural development of Saudi children aged four to six? Positives attitudes were expressed under the behavioural development umbrella, such as impulse inhibition, collaborative strategies, team spirit development and turn-taking. However, at the same time, there was a conflict of opinion about whether VR can be used for mediating anger in some perspectives; or to foster anger in others. In addition, a connection between VR and improved self-regulation at the emotional and behavioural levels could be realised based on participants' perspectives about improving self-regulation's main elements of attentional control, working memory, and impulsivity inhibition. However, the results warn of the effects of overuse or misuse. It also showed an absence of meaningful content and a lack of multifariousness in commercial VR games. Thus, the study calls for the participation of educators and specialists in developing design strategies that consider the best practice guidelines for young children and their development.

This study augments our understanding of the role of VR within early childhood, as critically unpacked from the analyses of new empirical data from parents and carers. An initial map of different elements that interweave and perhaps interract within a VR experience, mainly children's physiological, cognitive, socio-emotional, and behavioural aspects is offered. This has been an under-researched area, and the present study is hopefully a step further to closing the gap in the literature. More specifically, most of the previous studies have had a limited scope and foci, mainly on cognitive achievement, measuring or enhancing empathy, or within special needs education. Thus, there has been a lack of deep understanding of the potential benefits

and risks of VR in the Early Years, which the evidence base suggests to be the most critical period for development. This study is the first of its kind in this partocular context. Future studies in this field will benefit from using this present study as a theoretical underpinning. The proposed theoretical framework is holistic in the sense that it incorporates conflicting views, as distilled from the empirical research component of the present work, but also agile and extensible in stressing the need for more in-depth studies, particularly qualitative in nature. The perceived implications shown in the initial map, consider a novel preliminary approach that opens avenues for future research concerning the influence of VR on the essential aspects of early childhood development. Also, the results represent a significant contribution in terms of recommendations for parents, educators and policymakers. Finally, this is the first study of its kind that offers specific perspectives from the Saudi context. It is therefore likely that this study can also inform future comparative research in this field, both in light of the diversities of the Saudi sociocultural context, but also similarities with other loci. The current study also suggests that new technological inovations, such as VR, could influence young children, either positively or negatively. The dimensions/themes of the sub-questions of the current study were established after careful distillation of published literature and thematic classification of existing research foci. These were found to be: physiological, cognitive, socio-emotional and behavioural development as the core aspects of early childhood. The synthesis from the rehearsal of the evidence-base, in conjunction with the findings of the empirical component of this research, offer a cummulative corpus of answers to these sub-questions that can help enrich knowledge on the potential impact of VR on their children.

7.3 Limitations of the Study

Since this is an exploratory study, participants were interviewed about their perceptions, interactions with their children and VR. Accordingly, all results are based on perceptions rather than experimental work. However, this could be one of the limitations that could not be mitigated due to the suitability of the methodology and method to the nature of the study. Moreover, future studies would also be needed to identify children's perspectives.

This study's findings are restricted to Saudi children; comparing children from different cultures, such as children in the UK, might enhance the study. On the other hand, since the objectives and scope of this work concerned VR, approximately half of the respondents fell in the mid to high-income levels, possibly leading to response bias.

Furthermore, the sampling strategy for the empirical part of this study could have introduced bias; it would have been somewhat impossible to introduce a sampling method that was immune to this. For this reason, I tried to act as transparently as possible, to advertise the project openly and accessibly, to make the recruitment criteria clear and deterministic, and to not exclude any expression of interest that met the clearly advertised criteria.

Although the current study could be considered the first to use a qualitative approach concerning VR and children in early childhood (although important qualitative work had been conducted in a case study project by Weinel et al. in 2018), proponents of quantitative research may see limitations in the results. Criticisms and responses to the qualitative approach are detailed in Chapter 3, Section 3. However, this study necessitated this approach to understand the relatively new phenomenon of VR in the Saudi home in both KSA and the UK — but the latter were from Saudi cultural

backgrounds, including the families' dynamics and why they introduced this new technology into their children's lives at this age; what are the parent's views on the potential impacts of VR on their children, their views on VR comprising part of the Saudi kindergarten education system, and what does VR mean in the Saudi cultural context.

The semi-structured interview was necessary for an in-depth understanding from which to build a perceived potential impact map for further intervention studies in the future. The current study aims to create an illustrative map not previously presented, enabling researchers to then quantitatively or experimentally answer their questions using the most appropriate methods. This academic study aimed to inform researchers interested in VR's areas of influence. The results were founded on an analysis of the opinions and perspectives of adults closest to the child at this age who are knowledgeable and have the metacognition to elucidate aspects that might affect the child. Results from deep understanding are one of the keys that reveal the strength of the qualitative approach, which is why it was best suited for the current study.

Additionally, there are two categories of limitations applicable to this study's methodology to consider: methodological limitations and generalisation limitations. Griffee (2005) examined both types of limitations in educational research. Several limitations related to data collection and analysis might arise. One is the veracity of self-reported interview data. The interview method is limited because the data obtained through talk, as reported by the participants, are self-reported and cannot be verified. Thus, the researcher has to assume its validity. In this study, I was careful to ensure the data's validity by asking safe questions that would not alienate the mothers participating in the research. I also rephrased the questions in different contexts to confirm answers. Furthermore, verifying the validity of self-reported data involves

gauging whether it is consistent across the respondents; the identifiable themes derived from this study's data would confirm this consistency. Such evidenced themes support the veracity of the data.

Another methodological limitation to consider is the Hawthorne effect. Researchers have reported that more positive results are obtained when subjects are observed, especially in intervention studies. Wickström and Bendix (2000) offered this explanation of the Hawthorne effect:

> The 'Hawthorne effect' is often mentioned as a possible explanation for positive results in intervention studies. It is used to cover many phenomena, not only unwitting confounding of variables under study by the study itself, but also behavioural [sic] change due to an awareness of being observed, active compliance with the supposed wishes of researchers because of special attention received, or positive response to the stimulus being introduced (p. 363).

Therefore, it is possible that the participants may have exaggerated their actual experiences in the presence of a researcher. For example, they may have wanted me to believe they are good parents. However, the same check used for self-reported data can be used to help to minimise the acceptance of skewed data as valid. If the data across the participants are consistent enough to identify themes, the researcher can assume the Hawthorne effect does not compromise the data.

Griffee (2005) also mentioned other limitations related to the interview method. For instance, parents may not have said what they were actually thinking. This may be because they wanted me (and others) to believe that their parenting was of a high

standard to avoid judgement. Assuring the parents of their anonymity and confidentiality encouraged them to share their actual experiences with me.

Generalisation is the second category of limitation to consider. Interpretive researchers have expressed the opinion that generalisation is impossible because of the single or few cases studied in interpretive research. However, this study's findings can arguably apply to similar contexts in general, though not all. For example, Williams (2000) explained that generalisation is 'inevitable, desirable and possible' (p. 209) in interpretive sociology:

> It is held that interpretivism must employ a special kind of generalisation, characterised here as *moderatum*. However, an acknowledgement that such generalisations can be made must bring us to specify the limits of generalisation in interpretive research. These limits are the limits of interpretivism itself and the paper concludes that this implies the adoption of methodological pluralism in order to realise the full potential of the method (p. 209).

Similarly, Gobo (2008) asserted that interpretive research can achieve 'generalisation without probability' (p. 194). Gobo (2008) further argued that ideographic research, such as some interpretive research, could be generalised across similar contexts.

7.4 Recommendations for Parents, Carers, Educators, and Policymakers

The current study's results demonstrate that the positive effects of VR outweigh the adverse effects based on parents' and carers' perceptions. Accordingly, a complete rejection of the VR experience will not be the best choice, as it could deprive children of numerous benefits. Thus, VR does not necessarily take a one-way view, and the parents or educators need to regulate, supervise, and not wholly prevent its use. Furthermore, in light of VR's increasing popularity and potential, continued

development of new applications may extend beyond entertainment, as VR may play a leading role in children's lives from an early age in the coming years, especially in KSA on the basis of the perceptions of parents and carers. Therefore, VR applications must be based on balanced, conscious, and thoughtful planning. Undoubtedly, the partnership between VR programmers and designers and specialised educators will have a practical impact on highlighting VR in a purposeful educational aspect that combines entertainment with the acquisition of knowledge and skills.

For parents and carers, monitoring the duration and content of VR use is essential. Parents may have to dedicate themselves to playing VR games with their children to improve awareness and appreciate the implications of this type of game from a child's perspective. This gap in understanding may be due to the parents' lack of mastery of this type of technology; currently, children's electronic skills often surpass their parents. Parents' experiences with their children and their participation in gaming adventures before engaging in a discussion of regulations can play an essential role in facilitating a child's compliance with them.

The existence of clear and realistic boundaries in purchasing electronic devices, including VR, could require strict parenting while allowing some flexibility. Suppose the child has reached the stage of playing VR games for long periods, as indicated in some interviews with parents (up to more than an hour of play). In that case, it is impossible to implement the time limits; the World Health Organization recommended that continuous VR play for children in early childhood should be at most ten minutes per session (Data from WHO, 2022). Instead, parents can use gradual reduction to decrease VR time optimally. This is because they must take a break of at least forty-five minutes before returning to VR, provided that it does not exceed the maximum total of three gaming sessions during the day, the session does not exceed ten minutes

of VR play during the day (Kaimara et al., 2021).

Parents should implement effective monitoring and limit-setting if the child plays online, such as only playing with family, children, and classmates and not allowing strangers to join the game. Also, the child should be familiar with the principles of electronic security, preferably through specialised age-appropriate courses.

It is necessary to differentiate between playing electronic games, including VR, and watching them on YouTube. For example, the time spent watching is non-immersive entertainment and should not count towards actual playtime. Moreover, as important as adhering to specific times for VR and electronic games is in general, there must also be alternatives and various daily and weekly physical, mental, and social activities, such as participating in sports clubs and meeting directly with peers.

Regarding educators and policymakers, VR may offer a desirable experience for training children of all ages and remarkably impact the speed and effectiveness of training when designed appropriately. This exceptionally engaging experience should be used in the student's interest, attracting their attention and treating the traditional study environment as a secure and stable space. VR use should also account for the potential benefits of VR stimulating working memory and improving self-regulation.

However, optimising VR use requires consideration of essential factors, such as training teachers to use VR. Training should cover technical aspects and include supportive academic use for children. Teachers should prioritise establishing clear objectives consistent with academic content and determine the most appropriate time to present information in the form of a live experience, whether before or after traditional teaching and the appropriate duration of the training program before introducing this technology to the education system at such an early age. At the same

time, there must be a degree of flexibility to consider children's differences and circumstances that the teacher may encounter. Also, teachers should be trained to deal with health symptoms that the child may be exposed to as a result of using VR, such as dizziness, nausea, and headaches, to ensure the complete safety of the child, with the presence of the health practitioner in the kindergarten if possible.

7.5 Recommendations for Future Research

As mentioned previously, this work represents a novel preliminary approach for future research concerning VR's influence on essential aspects of early childhood development. Accordingly, each outcome from the study may generate a new research idea further contributing to knowledge.

Future research could draw on the current study's findings as a guideline to investigate children's perspectives on VR experiences. Specifically, future research in VR should focus on children's self-regulation. Possible areas for further investigation include VR and children's behaviours. One avenue for further study is to research VR and online sociability and explore the implications of developing strategies and methods for combating harassment in social VR, essentially towards children. Potential areas for further investigation could include whether VR may cause or treat early childhood cyber addiction, as VR has demonstrated efficacy with cognitive behavioural therapy for Internet addiction and Internet gaming disorder in adolescents. Future research on VR comparing children's experiences and interactions from different cultures and nationalities could be needed. Finally, researchers may need to investigate VR's impact on children using multiple research approaches and methods.

Furthermore, there is a need for a partnership among designers and creators of educational content for children of different ages and needs. For example, most

children may need supportive content for their education, while some may rely almost entirely on interactive content due to health or other conditions.

Without further research into VR experiences, it will not be possible to face what Bailenson (2018) described as ‘the most powerful medium in history’ (p10). Undoubtedly, the field demands further research as VR applications proliferate across various sectors and for all ages.

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Appendices

9.1 Appendix A Participant Consent Form

Institute of Education

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PARTICIPANT CONSENT FORM

Title of Project

An Exploration of the Role of Virtual Reality in Early Childhood: A Qualitative Study Focusing on Parents' and Carers' Perspectives'.

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Brief Description of Research Project, and What Participation Involves

This study seeks to determine the role of Virtual Reality in children between four to six years old from their parents' or carers' perspective. The study will look at the implications of using Virtual Reality for the development of children in their early childhood and will also try to develop further our understanding about how to improve achievements and minimize the disadvantage of using Virtual Reality by early-age children. This study will also try to offer recommendations for parents and educators on using virtual reality during early childhood.

Participation involves being interviewed by the researcher between 90-120 minutes. The interview will be audio recorded and some additional written notes might be kept by the researcher during the interview.

No personal data will be recorded, and participants will not be identifiable within the transcripts and/or analyses of the interview data.

Participants will be able to change their minds and withdraw from the study at any given point, and without any need to justify their decision.

This research adheres to the BERA "Ethical Guidelines for Educational Research"[1] and has also been scrutinised by the appropriate doctoral research ethics team of the UCL Institute of Education.

[1] https://www.bera.ac.uk/wp-content/uploads/2014/02/BERA-Ethical-Guidelines-2011.pdf?noredirect=1

Participants have the right to request transcripts of their interview, as well as copies of consecutive analyses that use data drawn from these transcripts. Participants will also be offered the opportunity to assess whether they agree with the accuracy of the transcripts as well as their consecutive analyses.

Participants will be offered the option to become informed about any publication that might arise from this research project.

Notice:

-The controller for this study will be University College London (UCL). The UCL Data Protection Officer provides oversight of UCL activities, involving the processing of participants personal data, and can be contacted at data-protection@ucl.ac.uk.To understand more about how your personal data are processed and lawful bases for processing, please read the UCL General Research Participant Privacy Notice.

- The lawful basis that will be used to process your personal data are: 'Public task' for personal data.

-Your personal data will be processed so long as it is required for the research project. If we are able to anonymise or pseudonymise the personal data you provide we will undertake this, and will endeavour to minimise the processing of personal data wherever possible.

-If you are concerned about how your personal data is being processed, or if you would like to contact us about your rights, please contact UCL in the first instance at HYPERLINK: "mailto:data- protection@ucl.ac.uk" data-protection@ucl.ac.uk.

Participant Identification Number for this trial ☐

Please initial box

1. I confirm that I have read the information for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. ☐

3. I understand that the information I provide will be treated in confidence by the investigator, and the data will be collected and processed in accordance with UCL data protection policy. ☐

4. I understand that my identity will be protected in the publication of any findings. ☐

5. I agree that the interview is audio recorded. ☐

6. I agree to take part in the above study. ☐

Name of Participant	Date	Signature

The contact information

Name of Person taking consent	Date	Signature

9.2 Appendix B UCL Ethics Application Form

Institute of Education

UCL

Doctoral Student Ethics Application Form

Anyone conducting research under the auspices of the Institute of Education (staff, students or visitors) where the research involves human participants or the use of data collected from human participants, is required to gain ethical approval before starting. This includes preliminary and pilot studies. Please answer all relevant questions in simple terms that can be understood by a lay person and note that your form may be returned if incomplete.

Registering your study with the UCL Data Protection Officer as part of the UCL Research Ethics Review Process

If you are proposing to collect personal data i.e. data from which a living individual can be identified **you must be registered with the UCL Data Protection Office before you submit your ethics application for review**. To do this, email the complete ethics form to data-protection@ucl.ac.uk. Once your registration number is received, add it to the form* and submit it to your supervisor for approval. If the Data Protection Office advises you to make changes to the way in which you propose to collect and store the data this should be reflected in your ethics application form.

Please note that the completion of the UCL GDPR online training is mandatory for all PhD students. The link is here: *https://www.ucl.ac.uk/legal-services/ucl-general-data-protection-regulation-gdpr/gdpr-online-training*

Section 1 Project details

a.	Project title			Exploring the Role of Virtual Reality on Emotional Intelligence in Early Childhood: Parents' and Carers' perspectives.
b.	Student name and ID number (e.g. ABC12345678)			Mai Abdulkareem (1714650)
c.	***UCL Data Protection Registration Number**			Z6364106/2019/07/157
c.	Supervisor/Personal Tutor			Primary: Dr Evangelos Himonides Secondary: Dr Ross Purves
d.	Department			IOE- Culture, Communication and Mdia.
e.	Course category (Tick one)	**PhD** ☒	EdD ☐	
		DEdPsy ☐		
f.	**If applicable,** state who the funder is and if funding has been confirmed.			Saudi Culture Attaché- yes it is confirmed
g.	Intended research start date			24/9/2018
h.	Intended research end date			15/9/2022

November 2018

*If research to be conducted abroad please check www.fco.gov.uk and submit a completed travel risk assessment form (see guidelines). If the FCO advice is against travel this will be **required** before ethical approval can be granted:*

http://ioenet.inst.ioe.ac.uk/about/profservices/international/Pages/default.aspx

j. Has this project been considered by another (external) Research Ethics Committee?

Yes ☐	External Committee Name:
No ☒ ⇨ *go to Section 2*	Date of Approval:

If yes:

- Submit a copy of the approval letter with this application.
- Proceed to Section 10 Attachments.

Note: Ensure that you check the guidelines carefully as research with some participants will require ethical approval from a different ethics committee such as the National Research Ethics Service (NRES) or Social Care Research Ethics Committee (SCREC). In addition, if your research is based in another institution then you may be required to apply to their research ethics committee.

Section 2 Research methods summary (tick all that apply)

☒ Interviews	☐ Controlled trial/other intervention study
☐ Focus groups	☐ Use of personal records
☐ Questionnaires	☐ Systematic review ⇨ ***if only method used go to Section 5.***
☐ Action research	☐ Secondary data analysis ⇨ ***if secondary analysis used go to Section 6.***
☐ Observation	☐ Advisory/consultation/collaborative groups
☒ Literature review	☐ Other, give details:

Please provide an overview of the project, focusing on your methodology. This should include some or all of the following: purpose of the research, aims, main research questions, research design, participants, sampling, data collection (including justifications for methods chosen and description of topics/questions to be asked), reporting and dissemination. Please focus on your methodology; the theory, policy, or literary background of your work can be provided in an attached document (i.e. a full research proposal or case for support document). *Minimum 150 words required.*

Aim of the study

This study seeks to determine the role of Virtual Reality on Emotional Intelligence in children between 5 and 8 years of age from their parents' or carers' perspective. I will explore whether achievement can be improved using VR and whether VR can foster effective development of young learners. The study will therefore aim to augment existing literature and employ a novel lens for looking at VR beyond the surface, as an agent for the development of emotional intelligence.

Question of the study

What is the role of Virtual Reality in the development of Emotional Intelligence of children between 5 and 8 years of age, as reported by their parents or carers?

Methodology

The study Design & Data Collection: The participants in this study are parents' or caregivers of children who use Virtual Reality technology. The research aims to explore the role of Virtual Reality on Emotional Intelligence in children by collecting data about such feelings, actions, and meanings, which is need information about daily lived experiences that can be easily understood through narration. Consequently, to investigate the research question, I will be employing a qualitative research design. The study design will be centered on interviews.

While existing literature significantly comprises of quantitative research designs and experimental designs (e.g. Waytz & Gray, 2018 & Ruiz-Ariza, Casuso, Suarez-Manzano, & Martínez-López, 2018), the adoption of a qualitative approach will

add to the limited qualitative investigation of social trial and will allow an in-depth exploration of this phenomenon.

Besides, Corbin and Strauss (2008) confirm that to obtain current perspectives on phenomena we know few about, a qualitative approach could be applied. Also, Creswell and Creswell (2017) point out that a qualitative approach is appropriate when the lengthy narratives of situations, examples and events contribute to the clarification and interpretation of the results deeper. Similarly, Johnson and Christensen (2008) consider that a qualitative approach allows the researcher to collect comprehensive, detailed information regarding everyday lived experiences that seat is easily understood through narration, which is what the current study needs.
Moreover, Since the emotional states are deeply subjective and that they produce unique meaning for each individual subject, collecting data from interviews will provide me with a diverse dataset, allowing for an in-depth exploration of the strengths and weaknesses of the role of Virtual Reality on Emotional Intelligence.

Participants
The study participants will be selected based on four categories of criteria. There are fundamental theoretical criteria for the parents' or carers' and three for their children.

First, one of the parents' of the child who uses virtual reality will be chosen as an integrated emotional couple, the mother or father or carer and the child. This is to ensure the greatest proxy access to children's emotional states. So the parents' should have good knowledge of their child's use of virtual reality, for example how often it is used and for how long, and detailed knowledge of the games the child plays. Besides, parents' should have a special interest in or concern about the child's emotions and emotional development. For the children there are usage criteria; they should meet the following requirements:

- Be between the ages of 5 to 8 years old.
- Have been using VR games.
- Saudi nationals.

Consequently, the research participants in the study are parents' or carers' of Saudi children in early childhood (5-8) playing with VR games. Moreover, to enrich the study by seeing if there is any impact of being in a different social and cultural environment, the participants will be in Jeddah, Saudi Arabia as well as in London, United Kingdom.

Data collection
Interviewees will be contacted in advance by telephone to remind them of the interview meeting. At the interview the parents or carers will be informed about the research and asked to sign the participant consent form to give their permission to begin the interview. The researcher will be open and transparent and make the respondents feel at ease. The procedure of the interview and how the interview will be recorded will be explained to the respondents. A semi-structured interview schedule will be observed. The researcher herself will remain aware that the meeting is for data collection and avoid expressing her biases, opinions, and gestures that detract the respondent. Interview data will be collected using audio recording and taking notes. The audio recording will be kept in a safe place accessible only to the researcher. Since the focus of the interview is conversation or talk, the researcher will concentrate on the verbal interaction between herself and the interviewee.
Data Analysis
Due to the exploratory nature of the study and the qualitative approach, the thematic analysis technique will be used to analyze the collected data. Qualitative data analysis aims to find meaning and patterns or themes hidden with the large volume of data. Such meaningful themes when related together constitute the interpretation of the data.

Section 3 Research Participants (tick all that apply)

- ☐ Early years/pre-school
- ☐ Ages 5-11
- ☐ Ages 12-16
- ☐ Young people aged 17-18
- ☒ Adults *please specify below*
- ☐ Unknown – specify below
- ☐ No participants

NB: Ensure that you check the guidelines carefully as research with some participants will require ethical approval from a different ethics committee such as the National Research Ethics Service (NRES) or Social Care Research Ethics Committee (SCREC).

The consenting adult participants will be Saudi parents and/or carers of children

between 5–8 years of age that are users of virtual reality technologies.

Section 4 Security-sensitive material (only complete if applicable)

Security sensitive research includes: commissioned by the military; commissioned under an EU security call; involves the acquisition of security clearances; concerns terrorist or extreme groups.

a.	Will your project consider or encounter security-sensitive material?	Yes ☐ *	No ☒
b.	Will you be visiting websites associated with extreme or terrorist organisations?	Yes ☐ *	No ☒
c.	Will you be storing or transmitting any materials that could be interpreted as promoting or endorsing terrorist acts?	Yes ☐ *	No ☒

* *Give further details in* ***Section 8 Ethical Issues***

Section 5 Systematic reviews of research (only complete if applicable)

a.	Will you be collecting any new data from participants?	Yes ☒ *	No ☐
b.	Will you be analysing any secondary data?	Yes ☐ *	No ☒

* *Give further details in* ***Section 8 Ethical Issues***

If your methods do not involve engagement with participants (e.g. systematic review, literature review) ***and*** *if you have answered* ***No*** *to both questions, please go to* ***Section 8 Attachments.***

Section 6 Secondary data analysis (only complete if applicable)

a.	Name of dataset/s			
b.	Owner of dataset/s			
c.	Are the data in the public domain?	Yes ☐	No ☐ ***If no,*** *do you have the owner's permission/license?* Yes ☐ No* ☐	
d.	Are the data special category personal data (i.e. personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation)?		Yes* ☐	No ☐
e.	Will you be conducting analysis within the remit it was originally collected for?		Yes ☐	No* ☐
f.	**If no,** was consent gained from participants for subsequent/future analysis?		Yes ☐	No* ☐
g.	**If no,** was data collected prior to ethics approval process?		Yes ☐	No* ☐

* *Give further details in* ***Section 8 Ethical Issues***

If secondary analysis is only method used ***and*** *no answers with asterisks are ticked, go to* ***Section 9 Attachments.***

Section 7 Data Storage and Security

Please ensure that you include all hard and electronic data when completing this section.

a. **Data subjects -** Who will the data be collected from? participants will be Saudi parents and/or carers of children between 5–8 years of age that are users of virtual reality technologies.

b. **What data will be collected?** Please provide details of the type of personal data to be collected the main body of collected data will be participants' personal views about the use of virtual reality technologies by the children under their care. The research does not involve the collection of personal data (e.g. Name, email address, age, gender allocation, contact information) but, nevertheless, participants might decide to offer information at interview. All recorded data will be pseudonymized and no personal information and/or other information that might lead to the identification of any participant will become transcribed.

c.

Is the data anonymised?	Yes ☒	No* ☐
Do you plan to anonymise the data?	Yes* ☒	No ☐
Do you plan to use individual level data?	Yes* ☒	No ☐
Do you plan to pseudonymise the data?	Yes* ☒	No ☐

* *Give further details in* ***Section 8 Ethical Issues***

e. **i. Disclosure** – Who will the results of your project be disclosed to? The results of this research project will become published initially in the researcher's written doctoral dissertation. Sections of this research might also be published within academic and professional journals, conference papers and/or posters and other research related outlets.

ii. Disclosure – Will personal data be disclosed as part of your project? None of the published materials will contain information that could lead to the identification of individual participants to this research project.

f. **Data storage** – Please provide details on how and where the data will be stored i.e. UCL network, encrypted USB stick**, encrypted laptop** etc. Data will be stored on an encrypted storage device and laptop. Audio recordings of interviews will be transcribed and digitalized and stored securely on the UCL Network and an encrypted USB Stick. Once transcribed, the audio recordings will be securely deleted from the audio recording device and/or computer where they will be transferred for transcription.

** Advanced Encryption Standard 256 bit encryption which has been made a security standard within the NHS

g.. **Data Safe Haven (Identifiable Data Handling Solution)** – Will the personal identifiable data collected and processed as part of this research be stored in the UCL Data Safe Haven (mainly used by SLMS divisions, institutes and departments)? Yes ☐ No ☒

h. How long will the data and records be kept for and in what format? The data will be stored on the UCL Network for the duration of my PhD. I will store the anonymised data on an encrypted devices & USB Stick for the length of my PhD research project.

Will personal data be processed or be sent outside the European Economic Area? (If yes, please confirm that there are adequate levels of protections in compliance with GDPR and state what these

arrangements are) No data is going to be held and/or processed outside the EEA. For the few cases of Saudi participants that will be physically based outside the EEA at interview and therefore interviewed online (e.g. skype), consent forms are going to be made available online, on a server located within the EEA. Signing of these forms will be performed using secured and encrypted digital protocols. Furthermore, data recorded over Skype and/or WhatsApp are encrypted on both ends of the online conversation, the decryption of the data is going to be happening on the researcher's personal computer, which will always be located within a secure network within the EEA.

Will data be archived for use by other researchers? (If yes, please provide details.) No. The data will be destroyed upon the successful completion of the doctoral research project.

If personal data is used as part of your project, describe what measures you have in place to ensure that the data is only used for the research purpose e.g. pseudonymisation and short retention period of data'

i. The project will not involve the recording of personal data.

* *Give further details in* ***Section 8 Ethical Issues***

Section 8 Ethical issues

Please state clearly the ethical issues which may arise in the course of this research and how will they be addressed.

All issues that may apply should be addressed. Some examples are given below, further information can be found in the guidelines. *Minimum 150 words required.*

- Methods
- Sampling
- Recruitment
- Gatekeepers
- Informed consent
- Potentially vulnerable participants
- Safeguarding/child protection
- Sensitive topics
- International research
- Risks to participants and/or researchers
- Confidentiality/Anonymity
- Disclosures/limits to confidentiality
- Data storage and security both during and after the research (including transfer, sharing, encryption, protection)
- Reporting
- Dissemination and use of findings

Sampling will have to be in line with the need for participants to fit a very specific profile (i.e. parents and/or carers of Saudi children between the ages of 5 and 8, that use virtual reality technologies). This will be achieved using a blended random/snow-ball model, where advertisement for participation will be initially conducted through closer proximity circles of Saudi families within the U.K. that use the international school system.

Informed consent will be sought, and participants will be made clear about the study design, aspirations, as well as their rights.

This research project is not going to be recording personal data, or any other data that will be able to lead to the identification of any individual, adult or child. As mentioned in the section above, in the unlikely case that a participant shares personal information at interview, this information will not be transcribed and therefore it will disappear upon the deletion of the original audio data.

This research is not focused on a topic that is perceived as sensitive and/or threatening. Nevertheless, any real-life discussion with a parent or carer might lead to a point, realisation or shared experience that is of sensitive nature. The researcher, who is also a parent of young people and an experienced educator, will ensure that the interview environment is non-threatening, friendly, and supportive. Participants will also be continually reminded that they can withdraw or reconsider their decision to participate at any given time, whilst being certain that their decision will not have any negative impact. The researcher is also going to be able to offer advice about organisations and/or channels that can offer further support, in case participants discover that certain issues discussed at interview have caused distress.

Section 9 Attachments Please attach the following items to this form, or explain if not attached

a.	Information sheets, consent forms and other materials to be used to inform potential participants about the research *(List attachments below)*	Yes ☒	No ☐
	If applicable/appropriate:		
b.	Approval letter from external Research Ethics Committee		Yes ☐
c.	The proposal ('case for support') for the project		Yes ☐
d.	Full risk assessment		Yes ☐

Section 10 Declaration

I confirm that to the best of my knowledge the information in this form is correct and that this is a full description of the ethical issues that may arise in the course of this project.

I have discussed the ethical issues relating to my research with my supervisor.	☒	☐
I have attended the appropriate ethics training provided by my course.	☒	☐

I confirm that to the best of my knowledge:

The above information is correct and that this is a full description of the ethics issues that may arise in the course of this project.

Name	Mai Abdulkareem.
Date	24/4/2019

Please submit your completed ethics forms to your supervisor for review.

Notes and references

Professional code of ethics
You should read and understand relevant ethics guidelines, for example:
British Psychological Society (2018) *Code of Ethics and Conduct*
or
British Educational Research Association (2018) *Ethical Guidelines*
or
British Sociological Association (2017) *Statement of Ethical Practice*
Please see the respective websites for these or later versions; direct links to the latest versions are available on the Institute of Education http://www.ucl.ac.uk/ioe/research/research-ethics

Disclosure and Barring Service checks
If you are planning to carry out research in regulated Education environments such as Schools, or if your research will bring you into contact with children and young people (under the age of 18), you will need to have a Disclosure and Barring Service (DBS) CHECK, before you start. The DBS was previously known as the Criminal Records Bureau (CRB) . If you do not already hold a current DBS check, and have not registered with the DBS update service, you will need to obtain one through at IOE.

Ensure that you apply for the DBS check in plenty of time as will take around 4 weeks, though can take longer depending on the circumstances.

Further references
The www.ethicsguidebook.ac.uk website is very useful for assisting you to think through the ethical issues arising from your project.

Robson, Colin (2011). *Real world research: a resource for social scientists and practitioner researchers* (3rd edition). Oxford: Blackwell.
This text has a helpful section on ethical considerations.

Alderson, P. and Morrow, V. (2011) *The Ethics of Research with Children and Young People: A Practical Handbook.* London: Sage.
This text has useful suggestions if you are conducting research with children and young people.

Wiles, R. (2013) What are Qualitative Research Ethics? Bloomsbury.
A useful and short text covering areas including informed consent, approaches to research ethics including examples of ethical dilemmas.

Departmental use

If a project raises particularly challenging ethics issues, or a more detailed review would be appropriate, the supervisor **must** refer the application to the Research Development Administrator (via ioe.researchethics@ucl.ac.uk so that it can be submitted to the IOE Research Ethics Committee for consideration. A departmental research ethics coordinator or representative can advise you, either to support your review process, or help decide whether an application should be referred to the REC. If unsure please refer to the guidelines explaining when to refer the ethics application to the IOE Research Ethics Committee, posted on the committee's website.

Student name	Mai Abdulkareem
Student department	Culture, Communication and Media
Course	MPhil/PhD
Project title	Exploring the Role of Virtual Reality on Emotional Intelligence in Early Childhood: Parents' and Carers' perspectives.

Reviewer 1	
Supervisor/first reviewer name	Dr Evangelos Himonides
Do you foresee any ethical difficulties with this research?	This is a very straight-forward empirical research project that involves semi-structured interviews as the main empirical data collection method. Participants will be informed and consenting adults and the researcher has demonstrated that they are informed about established guidelines and ethical practice in ensuring that their work is going to be conducted in a professional, transparent and non-biased manner. I have no concerns to report and am happy with the level of detail provided by Mai about her exciting work.
Supervisor/first reviewer signature	[redacted]
Date	04 June 2019
Reviewer 2	
Second reviewer name	Dr Ross M Purves
Do you foresee any ethical difficulties with this research?	
Supervisor/second reviewer signature	[redacted]
Date	14.06.19
Decision on behalf of reviews	
Decision	Approved ☒ Approved subject to the following additional measures ☐ Not approved for the reasons given below ☐ Referred to REC for review ☐
Points to be noted by other reviewers and in report to REC	
Comments from reviewers for the applicant	

Once it is approved by both reviewers, students should submit their ethics application form to the Centre for Doctoral Education team: IOE.CDE@ucl.ac.uk.

9.3 Appendix C Semi-structured Interview Schedule

Title of the study

An Exploration of the Role of Virtual Reality in Early Childhood: A Qualitative Study Focusing on Parents' and Carers' Perspectives

Question of the study

What is the parents' or carers' perspective of VR's role in the physiological, cognitive, socio-emotional and behavioural development of Saudi children aged four to six?

personal information

- Participant's Name (Number or Alias)
- Marital Status
    - Married
    - Separated
    - Divorced
    - Widow
- Education & Qualification
- Occupation
- Home Address
- Mobile Number or preferred means of communication
- E-mail

Information about the child

- Name of child (Number or Nickname)
- Gender
- Age
- Number of brothers and sisters
- Name of kindergarten or school
- What age did your child start playing VR games?

General questions

- Who bought VR devices?
- In the case of parents, What motivated you?
- How many hours does your child play with VR games?
- How much time your child spends on VR games during week day?
- How much time your child spends on VR games during weekend?
- How much time your child spends on VR games during holidays?
- At any time of the day your child prefers playing with VR games , for example morning, afternoon, evening or before sleeping?
- How does your child get VR games?

EX: Friends, asking adults, advertisements on social media, ….

- From the opinions of some parents that it is not necessary to adhere to the age recommended on the cover of the game What do you think about that?

The role of VR from the participant perceptions

1. What do you think of VR games?
2. Have you noticed any changes in your child since using VR?
3. Could you explain the positive effect on children of VR?
4. Could you explain the adverse impact on children of VR?
5. What is your primary goal (hope) of using your child for VR from your point of view?

Physiological development

6. Have you noticed any physical changes in your child since using VR? Could you describe it?
7. Does your child , in reality, has any fears, such as the darkness or the heights?
8. What happens if s/he finds them inside the game in VR?
9. To what extent does your child fear elements in the game like dinosaurs or Aliens?
10. Does s/he continue playing or wearing the VR helmet when s/he sees one of her/his fears?
11. Does your child overcome her/his fears when s/he repeated playing?
12. What makes you see this result?
13. Do you think VR experience is the reason that makes your child overcame his/ her worries?

    Or Do you think that VR is the reason for your child's fears?

14. To what extent do you think your child believes what s/he sees in her/his VR game?
15. Have your child ever told you about his/her VR experiences as a reality?
16. If yes, could you give me some examples?
17. What was your reaction when you heard the story from him/her?
18. Do you think that it has become part of his/her memories?
19. In your opinion, that has a positive or negative effect on your child? Why? How?

Cognitive development

20. Do you think your child is learning a new skills and information from VR games? Could you give me some examples?
21. To what extent do you think the VR games could affected your child learning achievement?

- There is no effect**:**
- Positively:
- Negatively:

22. Do you think the VR games might influenced your child ideas and the extent of his/her perception? If yes in what way?

Socio-emotional development

23. How did VR games may affect your child's attitudes towards others?
24. Does your child prefer to play VR game with specific people from family, friends or alone?
25. Would your child prefer to play VR rather than meet with her/his family? Examples?
26. Would s/he prefer to play VR rather than meet with her/his friends in the real world? Examples?
27. How does your child express his/her feelings in case of winning?
28. How does your child express his/her feelings in case of loss?
29. During team play, how does your child express her/his feelings for her/his competitors in the game if s/he wins?
30. During team play, how does your child express her/his feelings for her/his competitors in the game if s/he loses?
31. What impacts, if any, have you seen of VR games on your child's feelings?
32. Can you give me examples or situations?

Feelings	**happened or not**	**How they were expressed ‘Responds’**
33. Happiness and joy		
34. Entertainment		
35. Enthusiasm		

36. Thrill and excitement		
37. Surprise		
38. Astonishment		
39. Love		

40. For how long time would you say usually your child sense of positive feeling continues after playing VR?

41. Do VR games could have a negative impact or hurt your child feeling? If yes, could you give me some examples or positions?

Feelings	**happened or not**	**How they were expressed ‘Responds’**
42. Grief		
43. Disappointment		
44. Despair		
45. Frustration		
46. Suffering		
47. Anger		
48. Hatred		

49. Do any of these feelings affect his/her behaviour when playing?

- There is no effect**:**
- Positively:
- Negatively:

50. Do any of these feelings affect his/her behaviour after playing?

- There is no effect**:**
- Positively:
- Negatively:

51. For how long time would you say usually your child sense of negative feeling continues after playing VR?

Behavioural development

52. In what ways do you think VR games could affected your child's behaviour?

- There is no effect**:**
- Positively:
- Negatively:

53. Do you think VR games could affected your child thinking style and decision-making speed? If yes in what way?

Follow-up the child

54. What do you think about the follow-up of children in relation to VR games?

    If NO: What causes do you think are not worth pursuing?

    If Yes: What causes do you think are worth pursuing?

55. What do you think of producing a guide book about children and VR games?

56. To what extent do you think parents will be keen to read it? Why?

57. What are the key points you could suggest for the guide book?

58. What advice would you give to other parents to ensure their child's safety and well-being while using VR?

Finally

59. Could you please summarize your views on VR games on your child?

60. Anything else you would like to add?