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Reliability and Validity of an Assessment of Engagement in Nursing Home Residents during Bingocize®

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RELIABILITY AND VALIDITY OF AN ASSESSMENT OF ENGAGEMENT IN NURSING HOME RESIDENTS DURING BINGOCIZE®

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Elizabeth Batson Apelt

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RELIABILITY AND VALIDITY OF AN ASSESSMENT OF ENGAGEMENT IN NURSING HOME RESIDENTS DURING BINGOCIZE®

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Graduate Dean Date

I dedicate this thesis to my family. Thank you for your constant love and support. To my husband, Jacob, I could never have done this without you. Thank you for being a steady source of strength, encouragement and love.

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Completing this thesis has certainly taught me how to complete research, but more than that, this thesis has taught me about perseverance, self-discipline, and teamwork. This thesis represented a challenge that I could never have accomplished alone.

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Lastly, I want to give a very special thank you to each and every one of my participants. It is my hope that the results and conclusions gained from your participation in this study will lead to even more advancements in discovering the most important factors in successful aging and quality of life in older adults. Your willingness to participate in research and your support of WKU students has already made a profound impact.

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Research suggests nursing home residents are often socially isolated and physically inactive despite overwhelming evidence that both social engagement and physical activity are crucial for healthy aging (Jones, Sung, & Moyle, 2018; Yen & Lin, 2018; Ice, 2002; Jansson et al., 2017). Bingocize® is a program that combines exercise and the game of Bingo to improve the quality of life, physical health, and social engagement of certified nursing facility (CNF) residents. The purpose of this study is to determine the level of social engagement displayed by CNF residents during Bingocize® using the Fun and Social Engagement Evaluation (FUSE). Reliability and validity of the FUSE were also investigated.

The FUSE was administered to 57 nursing home residents across four Bingocize® sessions in each of four CNF locations. Two of the Bingocize sessions involved nursing home staff and university students interacting with residents (i.e. with students) and two other sessions were conducted by nursing home staff only (i.e. without students). Two additional sessions were completed at one CNF to gauge interobserver reliability of the FUSE.

Comparisons of FUSE scores from sessions with and without students via paired samples t-tests did not yield significant results ($p>.05$). Residents were not significantly

more engaged when students were present. The Mann-Whitney U Test comparison of "happy" and "not happy" scores from all sessions was statistically significant indicating a direct positive relationship between observation engagement scores and self-reported happiness ($p<.05$). The vast majority of participants self-reported happiness (81.02%). Interobserver reliability of the FUSE was between 68%-100% agreement for each participant. The total average percent agreement for all participants was 80.9%. To account for chance agreement between the observers, the Cohen's Kappa statistic was calculated ($k=0.66$).

Interobserver reliability measures and the Cohen's Kappa statistic indicate substantial agreement on the FUSE between two observers (McHugh, 2012). A comparison of the FUSE and an independently developed tool for engagement, The Engagement of a Person with Dementia Scale (EPWDS; Jones, Sung & Moyle, 2018) revealed that the majority of items on both measures were similar in content thus supporting validity of the FUSE.

Introduction

Individuals around the world are now living longer than ever thanks to medical advancements and lifestyle improvements. According to the World Health Organization, "global average life expectancy increased by 5.5 years between 2000 and 2016" (WHO | Life Expectancy, n.d.). With greater life expectancy comes an increase in age-related diseases such as Alzheimer's disease. As cognitive decline often accompanies reduced independence and ability to complete activities of daily living (ADL), many older adults with dementia must transition to life in a long-term care facility. In fact, Gaugler, Yu, Davila, and Shippee (2014) found two out of every three nursing home residents within the U.S. will present with some manner of cognitive impairment, such as dementia. Individuals living in nursing homes often experience social isolation, loneliness, and decreased physical activity due to difficulty adjusting to the many changes in their health, living arrangements, and social circle (Prieto-Flores, Forjaz, Fernandez-Mayoralas, Rojo-Perez, & Martinez-Martin, 2011). Prieto-Flores et al. (2011) found older adults living in nursing homes were twice as likely to feel alone than community-dwellers.

Unfortunately, reduced levels of social interaction and physical activity may lead to even more negative effects for older adults, such as greater fall risk and decreased happiness (Cress et al., 2006; Schreiner A.S., Yamamoto E., & Shiotani H., 2005). Social engagement and physical activity have both been found to positively contribute to older adults' well-being (Livingston et al., 2017), and quality of life (Rosso, Taylor, Tabb, & Michael, 2013). They are also suspected to play a role in reducing older adults' risk of disease and mortality (Ahlskog, Geda, Graff-Radford, & Petersen, 2011; Kiely, Simon, Jones, & Morris, 2000). Understanding the fundamental positive impact social

engagement and physical activity may have on the growing older adult population, it is vital that researchers and healthcare professionals seek evidence-based methods to increase and measure levels of social engagement and physical activity in older adults within the long-term care setting.

Some of the most effective methods of providing nursing home residents with opportunities for social engagement and physical activity include group-based health and fitness programs such as Bingocize®. Group-based activities have been found to be more effective than individual tasks or unstructured time for individuals with dementia (Brooker & Duce, 2000). The Bingocize program is unique in that it incorporates an intergenerational component through the inclusion of university student participants. Camp (2010) found intergenerational interaction between older adults and children was shown to increase levels of engagement in older adults with dementia. There is limited research regarding the intergenerational effects of university students on individuals with dementia, but generalization of Camp's (2010) findings may be possible. The mere existence of group-based programs, however, does not ensure adequate or positive social engagement in participants which indicates the necessity for a reliable method of measuring social engagement in older adults.

The Fun and Social Engagement Scale (FUSE) was recently developed to measure social engagement in older adults during the intergenerational fitness program, Bingocize®, and was piloted in a 2019 study. While the FUSE offers great clinical potential, its reliability and validity have not yet been formally established. Without ascertaining the reliability of a measurement, it is difficult to know whether the reported results should be trusted, which greatly impacts generalization of results into clinical

practice. Reliability and validity measures of the FUSE are indispensable, as the ability to accurately determine levels of social engagement in older adults assists greatly in providing solid evidence for long-term care facilities to consider when selecting activities and programs for their facility. Provided with the necessary evidence, nursing homes will be able to promote social engagement and physical activity opportunities that will likely lead to the most health benefits for their residents.

The purpose of this study is to determine the level of social engagement displayed by CNF residents during Bingocize®, and to determine the reliability of the FUSE. This study seeks to answer the following questions:

1.) To what extent does the FUSE measure fun and social engagement of nursing home residents (i.e. validity of the observation measure)?
    - It is hypothesized that the FUSE will have similar content to another standardized measure of engagement.
2.) What is the degree of social engagement of nursing home residents during Bingocize® as measured by the FUSE?
    - It is hypothesized that the majority of residents will demonstrate social engagement during Bingocize®.
3.) During Bingocize® activity, do certified nursing facility (CNF) residents display increased positive social engagement when university students are present as compared to when university students are not present?
    - It is hypothesized CNF residents will display greater positive social engagement during Bingocize® sessions in which students are present.

4.) During Bingocize® activity, is there a relationship between the social engagement behaviors observed and the residents' self-report of happiness?

- It is hypothesized that residents who self-report they are happy will have higher observation scores on the FUSE.

5.) Does the FUSE provide adequate interobserver reliability?

- It is hypothesized the two trained observers will demonstrate greater than 0.75 interobserver reliability.

Literature Review

Aging Defined

With the evolution of medical practices and the improvement of public sanitation, housing, and nutritional standards, life expectancy for individuals living in the United States has dramatically increased (Stuart-Hamilton, 2013). According to the Centers for Disease Control (CDC, 2012), human life expectancy in the United States increased by 30 years from the beginning of the 20th century to 2011 (Topaz, Troutman-Jordan, & MacKenzie, 2014). While there are many different definitions of "old age," the National Institutes of Health define "older adult" as an individual who is 65 years of age or older (NIH Staff, 2018). Moreover, the current average age for retirement in the United States is 65 years old ("Benefits Planner," n.d.). For the purposes of this study, this age will serve as the minimum when defining the population "older adults." As the older adult population continues to grow and longevity of life becomes more common, the need for evidence-based practices regarding appropriate geriatric care becomes more evident.

Cognitive Impairment Defined

According to the Centers for Disease Control and Prevention (CDCP, 2011), a cognitive impairment (CI) is defined as mild to severe difficulty in "remembering, learning new things, concentrating, or making decisions that affect their everyday life" (pg. 1). With these deficits, older adults may experience a decrease in independence and require more assistance in completing typical activities of daily living (ADLs). The CDCP (2011) identifies age as the primary risk factor for CI among others such as family history, physical inactivity and chronic conditions. Gaugler et al. (2014) state two out of every three nursing home residents within the US will present with some manner of CI. As there is currently no cure for CI, it is vital that healthcare professionals seek to prevent, treat, and improve conditions that may lead to CI by utilizing evidence-based strategies.

Factors Contributing to Cognitive Impairment in Late-Life

Many factors that increase the risk of cardiovascular disease, such as smoking and diabetes, are also associated with a higher risk of cognitive impairment (Sabia, Fayosse, Dumurgier et al. 2019). Some researchers propose impaired glucose processing, a precursor to diabetes, may also result in an increased risk for cognitive impairment (Ravona-Springer & Schnaider-Beeri, 2011). Physical inactivity contributes to poor health and significantly to the onset and progression of cognitive impairment. While dementia is not entirely preventable, there is sufficiently strong evidence, from a population-based perspective, that regular physical activity and management of cardiovascular risk factors (especially diabetes, obesity, smoking and hypertension) is associated with reduced risk of cognitive impairment (Ahlskog, Geda, Graff-Radford, et al., 2011; Baumgart, Snyder, Carillo, et al. 2015, Livingston, et al. 2017, Tyndall et al.

2017). Residents in nursing homes also face social challenges. Older adults who reside in nursing homes have other residents in close proximity, but may not develop social ties (Kang, 2012). Nursing home workers may turn over frequently due to low wages. Family and friends visit infrequently, especially following the onset of dementia. Jansson et al. (2017) found that loneliness was associated with mortality during a 3.6-year follow-up. The risk for mortality was significantly higher among the "sometimes lonely" (HR 1.19; 95% CI 1.05-1.35) and the "always lonely" group (HR 1.28; 95% CI 1.06-1.55) than among the "not lonely" residents (p for linearity < 0.001 adjusted for age, sex and comorbidities). Exercise can reduce apathy in nursing home residents with dementia, and exercise was the only predictor for lower score on apathy after 12 weeks of intervention in one study conducted in Finland (Telenius, Engedal, and Bergland, 2015). While the control group maintained their level of apathy throughout the intervention period, the exercise group improved (reduced) their score and the difference between the groups was statistically significant. The researchers concluded that the act of exercising and using the body may reduce apathy. (Figure 1)

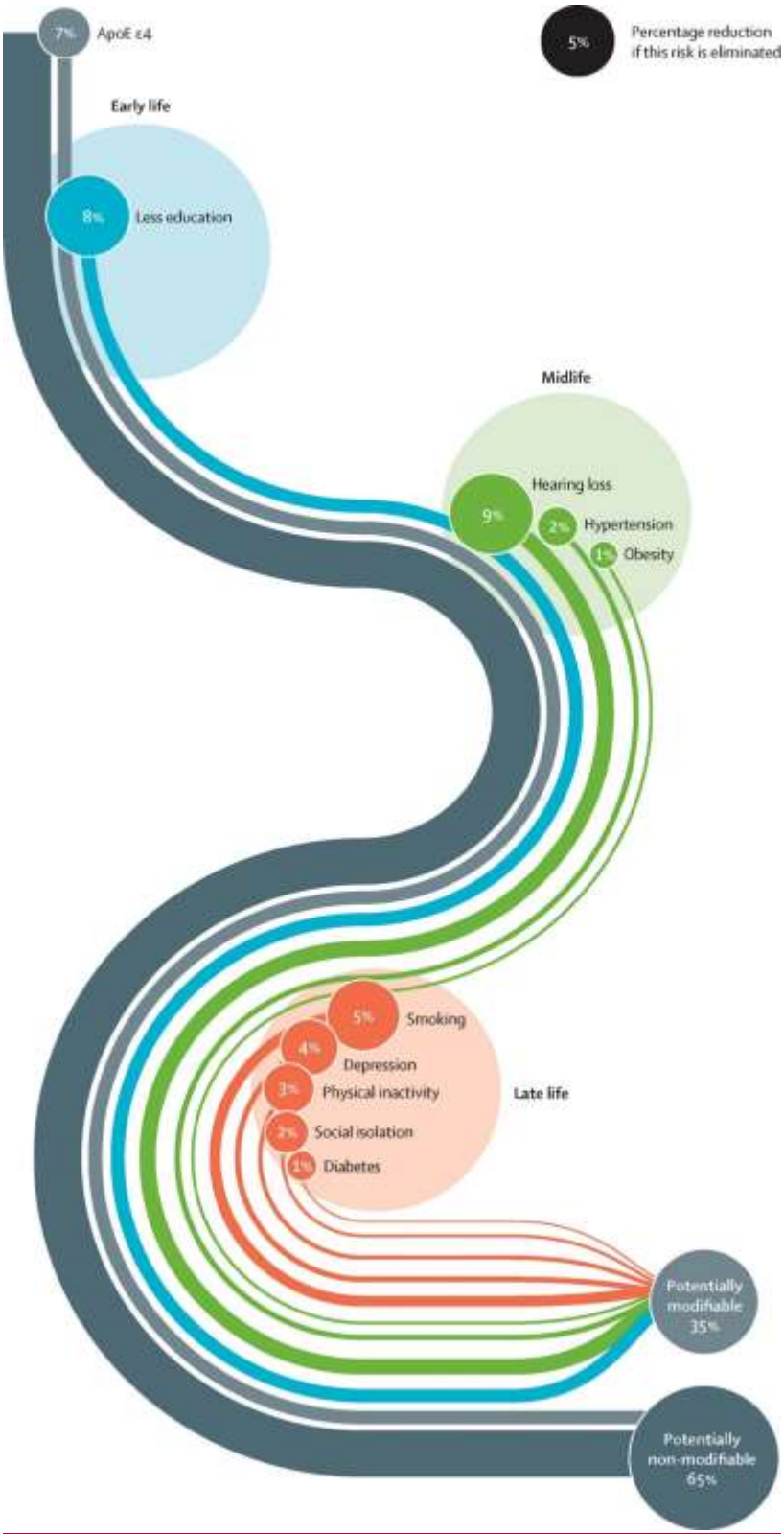

Figure 1: Life-Course Model of contribution of modifiable risk factors to dementia (Livingston et al., 2017)

Mild Cognitive Impairment

Some level of cognitive decline may be expected with older age, however, once it exceeds this level, it becomes a form of cognitive impairment. Mild cognitive impairment (MCI) describes a condition in which an individual's cognitive deficits are greater than typically expected, but do not negatively affect the individual's ability to complete ADLs (Petersen & Negash, 2008). Langa and Levine (2014) found 10-20% of adults 65 years and older have MCI. The study also found that MCI risk increases with age and is more prevalent in men than in women (Langa & Levine 2014). Petersen and Negash (2008) found MCI to be particularly significant as, depending on the subtype, it may be an antecedent to dementia. If detected early, appropriate treatment of MCI, such as aerobic exercise, mental activity and social engagement opportunities, can be provided and may possibly prevent further cognitive decline and improve prognosis in many individuals (Langa & Levine 2014).

Dementia

According to Gaugler et al. (2014), more than 50% of nursing home residents have dementia. Approximately 5.8 million Americans have Alzheimer's disease, the most common form of dementia ("Facts and Figures," 2019). According to the Alzheimer's Association (2019), there is projected to be a 27% increase from 2019 to 2025 in the number of older adults who have Alzheimer's disease (Figure 2).

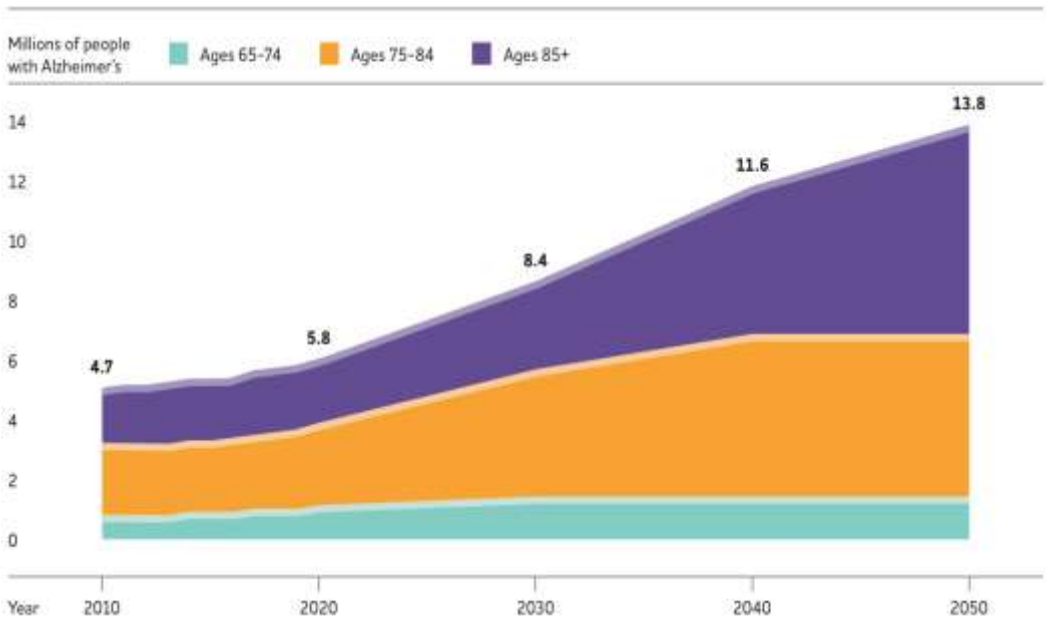

Figure 2: Projected number of older adults in the U.S. population with Alzheimer's dementia, 2010 to 2050 (adapted from Alzheimer's Association, 2019)

The American Speech-Language-Hearing Association (ASHA) defines dementia as a syndrome caused by acquired brain disease. ASHA further describes dementia as a progressive decline of memory and cognitive functioning to the degree that independent daily living is negatively affected ("Dementia," n.d.). It is vital that individuals experiencing cognitive changes seek medical assistance since many dementias are progressive in nature. Earlier detection and treatment may lead to better outcomes for the individual and caregivers involved ("What Is Dementia?," 2019). Prevention and treatment of dementia may include certain medications, diet changes, and the use of cognitive rehabilitation, physical activity and/or social engagement interventions (Livingston et al., 2017). Current literature regarding dementia treatment emphasizes the value and many benefits of physical activity and social engagement as interventions for individuals with dementia as well as those at risk for dementia (Ahlskog, Geda, Graff-Radford, & Petersen, 2011; Saczynski et al., 2006).

Successful Aging

While some might argue successful aging is largely subjective (Griffith, Cornish, Bergner, Bruce, & Beech, 2018), many researchers over the years have attempted to provide a comprehensive definition that is applicable to all. The definition of aging has evolved over time from "inevitable disengagement" and "decreasing functional ability" in the 1950s and 1960s (Cumming & Henry, 1961), to the postmodernism view of "no absolute truth," and finally to the more multifactorial understandings still respected today that include combined aspects of physical, spiritual, social, and mental wellbeing (Kleineidam et al., 2019; Li et al., 2014; Stephens, Breheny, & Mansvelt, 2015; Topaz et al., 2014). Researchers Rowe and Kahn (1997) provided one of the most widely respected theories which describes successful aging as involving three components: reduced risk of disease/disability, high cognitive and physical function, and active engagement with life (Figure 3).

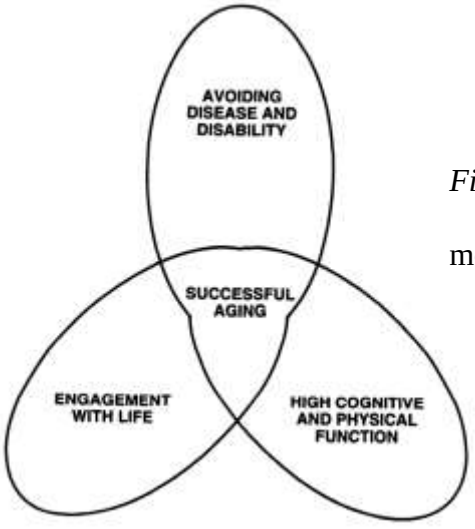

Figure 3: Rowe and Kahn's (1997) model of successful aging.

In keeping with the multidimensional view held by Rowe and Kahn, researcher Toutman (nee Flood) developed a middle-range theory of successful aging which

encompasses the many physical, mental, and spiritual changes experienced during the aging process. As seen below in Figure 4, successful aging may be comprised of various "coping processes" which include functional performance mechanisms (i.e. physical health), intrapsychic factors (i.e. self-control), spirituality (i.e. religiosity), and gerotranscendence (i.e. decreased anxiety, greater social engagement, wisdom). The first coping process, functional performance mechanisms, is described as what an individual might do to actively cope with aging, such as attend a health promotion program or take part in physical activity. Intrapsychic factors are unique, innate features present in every individual such as creativity and affectivity levels, and spirituality acknowledges a power greater than self. Since this theory takes individual variation into account (intrapsychic factors), an individual may achieve the more mature and existential gerotranscendence process -which leads to successful aging- if a favorable combination of coping factors aligns. (Flood 2005)

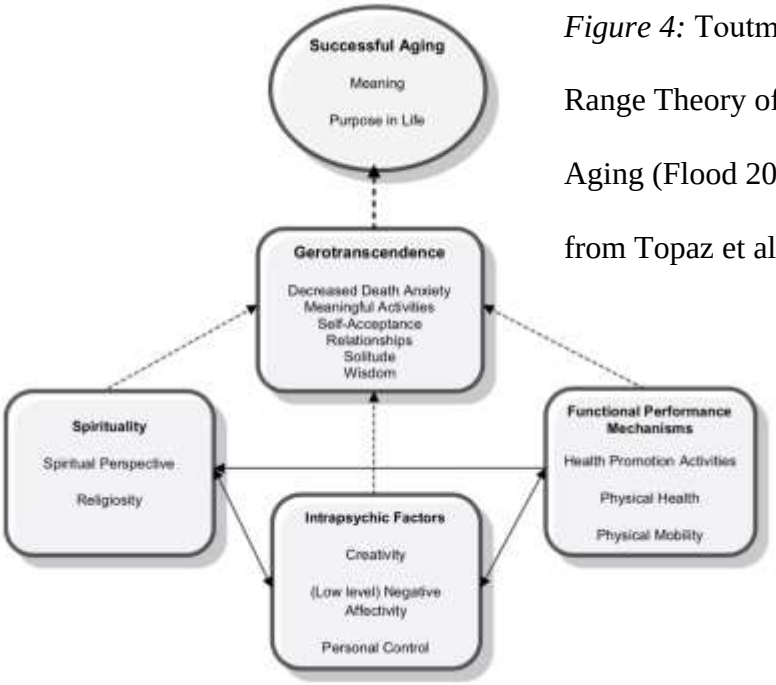

Figure 4: Toutman's Middle-Range Theory of Successful Aging (Flood 2005). Adapted from Topaz et al., (2014).

As evidenced by the models provided by Rowe and Kahn (1997) and Toutman (Flood 2005), individuals' daily choices do significantly impact their ability to achieve successful aging. As such, it should be of the utmost importance to caretakers and healthcare providers for older adults to support the development of skills and attributes required to advance along the continuum of successful aging. Therefore, greater focus should be placed on developing appropriate health promotion programs that support increased physical activity and social engagement levels in older adults.

Quality of Life

Quality of life (QOL) has long been an ambiguous concept that challenges researchers of all academic backgrounds to produce an applicable and quantifiable definition suitable for their given context (Logsdon, Gibbons, McCurry, & Teri, 2002). Academic interest in QOL became more significant following World War II due to medical advancements and increased concern for the protection of human rights (Pinto, Fumincelli, Mazzo, Caldeira, & Martins, 2017). According to most researchers, QOL may be determined through review of various subjective and objective factors such as educational achievement, income, physical/mental health, social functioning, personal values/perceptions, and individual experiences (Bowling & Iliffe, 2011; Lawton, Winter, Kleban, & Ruckdeschel, 1999). Pinto et al. (2017) categorized these factors into four realms: physical, social, mental and spiritual. In keeping with this multifactorial approach, the World Health Organization (WHO) defines QOL as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (n.d.). Researchers Coverdill, Lopez, and Petrie (2011) detail three commonly accepted

principles regarding the subjectivity of QOL. The first is that QOL is multidimensional (Coverdill et al., 2011; Lawton et al., 1999). The second is that individuals have been shown to reliably report their own state of well-being and the third principle is that an individual's QOL is dependent on current conditions or circumstances (Coverdill et al., 2011; Frey & Stutzer, 2002). In Lawton's (1991) multidimensional view demonstrating the interconnectedness of QOL aspects, he determined the inclusion of four distinct sectors (Psychological Well-Being, Perceived Quality of Life, Behavioral Competence, and Objective Environment) and the following dimensions necessary: biological health, functional health, cognition, time use, and social behavior (Figure 5).

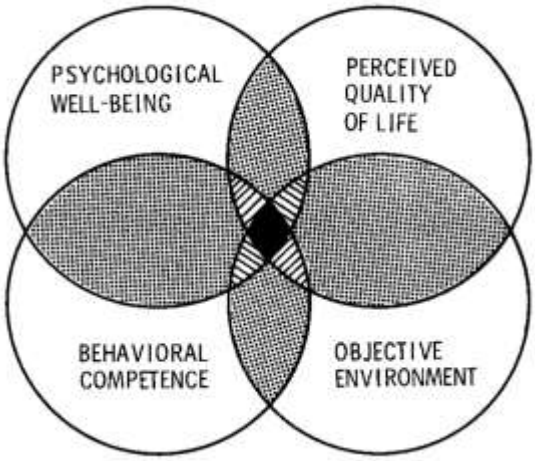

Figure 5: Lawton's (1991) four sectors of QOL

Given the multifactorial, subjective and objective nature of QOL, some factors affecting QOL may be positively influenced by the promotion of beneficial health, fitness, and social engagement programs and practices. This is supported in a recent study by Groessl et al. (2019) who found that decreased QOL in older adults was associated with reduced physical performance indicating that physical activity's beneficial and protective nature may limit future decreases in QOL. Residents in nursing homes have

particularly limited opportunity for physical activity in the broadest sense, including self-care (grooming), instrumental activities and care of the environment (cleaning), and activities for pleasure (walking). Completing "productive activities," such as physical activities, social participation activities, and self-care/daily activities has been found to be highly beneficial for improving older adults' health-related QOL (Yen & Lin, 2018). Therefore, in order to maximally support older adults in achieving high QOL, it is essential that researchers, caregivers, and healthcare professionals prioritize the development of and participation in health promotion activities that include physical exercise and social engagement opportunities.

Social Engagement Defined

Current literature demonstrates little consistency in the definition of social engagement. The meaning of social engagement is largely influenced by the context in which it is used and by the population for whom it is intended. For the purposes of this study, social engagement will be examined within the context of long-term care in relation to the older adult population. Researchers Cohen-Mansfield, Dakheel-Ali, and Marx (2009), define engagement as "the act of being occupied or involved with an external stimulus" and proposed the Comprehensive Process Model of Engagement (Figure 6) to describe factors contributing to engagement levels in persons with dementia (PwD). This model displays the interactions between environmental, personal and stimulus attributes which converge to create engagement level. This engagement level results in a change in affect, which influences behavior. (Cohen-Mansfield et al., 2009)

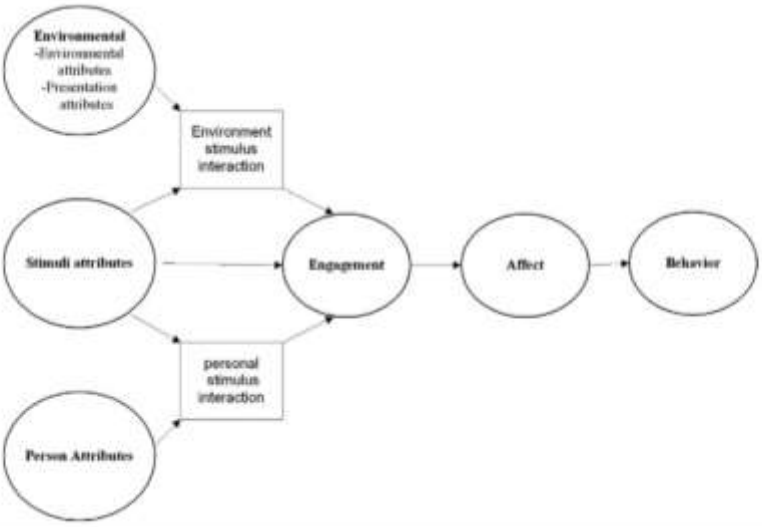

Figure 6: The Comprehensive Process Model of Engagement of Persons with Dementia (Cohen-Mansfield et al., 2009)

Humphrey and colleagues (2017) adapted the model proposed by Cohen-Mansfield et al. (2009) by suggesting that PwD can become engaged if three pillars are established: 1) a dementia-friendly environment, 2) supportive communication strategies, and 3) a well-planned activity (Figure 7).

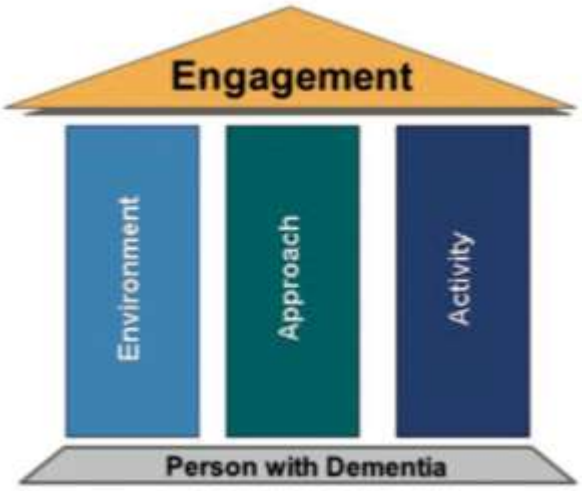

Figure 7: Pillars of Successful Engagement (Humphrey et al., 2017)

The *International Classification of Functioning, Disability and Health* (ICF) further supports the multifaceted approach to health by listing activities and participation

as influential components which interact with other aspects to encompass an individual's overall health (American Speech-Language-Hearing Association, n.d.; Figure 8).

Figure 8: ICF Health Model (American Speech-Language-Hearing Association, n.d.)

As shown in Figure 8, the topic of this master's thesis is on "Environmental and Personal Factors", with an emphasis on physical and social factors. Social engagement has proven to be highly beneficial for all individuals, including those with dementia. Increased levels of social engagement can lead to greater well-being and more meaning to life (Jones, Sung, & Moyle, 2018). Social engagement provides a sense of belonging and value to participants as well as companionship and sociability (Berkman, Glass, Brissette, & Seeman, 2000; Jones et al., 2018). Combined with other forms of engagement, significant research supports the relationship between social engagement in

PwD and improved overall health (Berkman et al., 2000; Chen, Putnam, Lee, & Morrow-Howell, 2019; Rowe & Kahn, 1997), quality of life (Rosso et al., 2013; Tak, Kedia, Tongumpun, & Hong, 2015) and reduced risk of death and disease (Kiely et al., 2000; Sampson, Bulpitt, & Fletcher, 2009). As Tak et al. (2015) states, "The more cognitively and functionally dependent elders are, the more activities become critical to their lives." In view of this substantial support, reliable and valid measurements of social engagement in PwD are essential to the development and evaluation of appropriate activities and programs to support older adults (Jones et al., 2018).

Positive vs. Negative Social Engagement

When examining social engagement in older adults, it is important to differentiate and recognize both positive and negative forms of social engagement. Identification of these different types of engagement may lead to greater understanding of which programs and activities are most beneficial for PwD. Camp (2010) defined engagement as "connectedness with the social and physical environment" that may be sorted into one of four categories: constructive engagement (CE); passive engagement (PE); self-engagement (SE); and non-engagement (NE). CE involves direct interaction of PwD with the given activity such as verbalizations or physical participation. PE describes when PwD watch and observe an activity without actively partaking. SE indicates behaviors such as talking to oneself and becoming preoccupied with one's clothes or self. NE can be defined as a lack of participation, such as falling asleep or staring into space. SE and NE represent negative forms of engagement, while CE and PE signify positive forms of engagement. PE is included as a form of positive social engagement because PwD occasionally benefit from first observing an activity to build the confidence to eventually

engage more directly. To measure these various manners of engagement in PwD, Camp developed the Menorah Park Engagement Scale (MPES; Appendix 2). Camp's definition, scale, and forms of engagement build upon previously mentioned engagement models and provide greater specificity in regard to recognizing and categorizing engagement behaviors in PwD. (Camp 2010)

Positive and negative forms of engagement have been recognized as significant in a variety of academic contexts. Researchers Humphrey et al. (2017) utilized Camp's (2010) four forms of engagement to determine whether an arts-based program in Ontario, Canada elicited positive engagement in PwD. Humphrey et al. (2017) identified observable behaviors that demonstrate positive engagement, including speaking to the program facilitator, commenting to others, smiling, laughing, and maintaining attention to the activity. Similar positive behaviors, such as initiating interactions and reacting positively to interactions initiated by others, are measured using the revised version of the Index of Social Engagement (RISE) used in long-term care settings (Gerritsen et al., 2008). A 2014 study seeking to determine levels of positive engagement in nursing home residents during group-based sensory activities employed Camp's MPES (2010) to discover increased levels of CE demonstrated throughout the session (Materne, Luszcz, & Goodwin-Smith, 2014). The Engagement of a Person with Dementia Scale (EPWDS) was developed in 2018 to determine if activities are meaningful to PwD based upon level of engagement demonstrated (Jones et al., 2018). The five areas of engagement measured by the EPWDS are affect, visual, verbal, behavioral, and social (Jones et al., 2018). Each of these areas includes measures of both positive engagement (e.g. smiling, laughing, maintaining eye contact, participating, interacting with others, etc.) and negative

engagement (e.g. displaying anger, anxiety, disinterest, being inattentive, refusing to participate, etc.) (Jones et al., 2018). Therefore, reliable identification and measurement of both positive and negative forms of engagement are necessary to determine whether activities and programs within the long-term care setting are beneficial to residents' well-being and quality of life.

Social Engagement and Physical Activity in Older Adults

Similar to social engagement, physical activity is another aspect proven to improve QOL and decrease risk of disease and mortality in the older adult population. According to WHO, physical inactivity is currently the fourth highest risk factor for global mortality ("WHO | Physical Activity," n.d.). Several studies suggest regular physical activity plays a protective role in the prevention of disability, mortality, and cognitive impairments such as dementia (Ahlskog et al., 2011; Lautenschlager, Cox, & Cyarto, 2012; Livingston et al., 2017). Livingston et al. (2017) list exercise during midlife as a primary preventative strategy for dementia (Figure 9) and state, "older adults who exercise are more likely to maintain cognition than those who do not exercise."

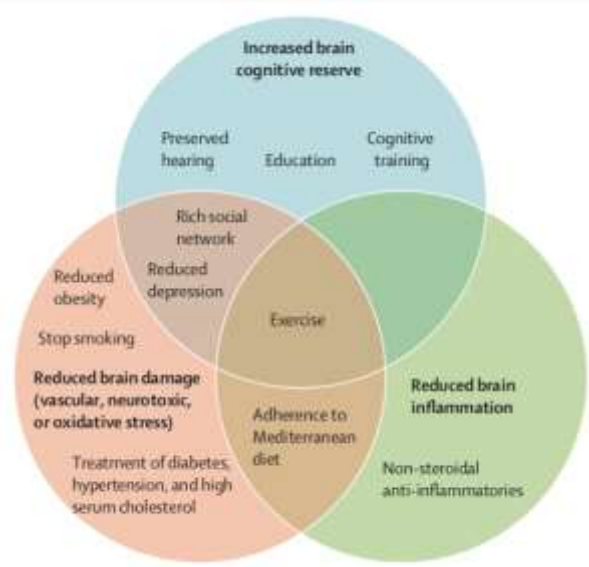

Figure 9: Potential brain mechanisms for preventative strategies in dementia (Livingston et al., 2017)

Livingston et al. (2017) and Schreiner et al. (2005) noted other benefits of exercise in older adults without dementia such as improved balance, better mood and reduced fall risk. Schreiner et al.'s 2005 study indicated a "seven-fold increase in 'Happiness' during recreation" in its nursing home resident participants. A 2012 survey revealed that only 7% of females and 13% of males in the older adult population met recommended physical activity guidelines (Scholes & Mindell, 2013). Given the numerous benefits and acknowledging the unfortunate reduced rates of physical activity in older adults, it is important that long-term care facilities provide and encourage participation in programs that offer opportunities for physical activity.

In the search for how to most effectively encourage greater inclusion of physical activity in older adults, it was discovered that social support plays a fundamental role. A 2002 study evaluating the relationship between social support and exercise behaviors in older adults living in residential settings found that social friend support demonstrated a statistically significant relationship with exercise behaviors (Resnick, Orwig, Magaziner, & Wynne, 2002). These results may, in part, be due to older adults' greater exposure and interaction with friends within long-term care facilities compared to family (Resnick et al., 2002). Rhodes et al. (1999) state combining social interactions with physical activity is the most effective means of simultaneously increasing both aspects in older adults. An Australian study of factors associated with physical activity in older adults found, "Having a partner who was physically active and having friends who were physically active were both significantly associated with physical activity participation" (Booth, Owen, Bauman, Clavisi, & Leslie, 2000). A 2017 systematic review revealed the most commonly reported motivators for older adults participating in resistance training

activities include social support and engagement (Burton et al., 2017). One participant of a 2010 study investigating factors associated with exercise program adherence in older adults stated, “The group exercise programme helps because suffering the whole thing together builds a relationship” (Stathi et al., 2010). In a 2016 systematic review, Devereux-Fitzgerald et al. (2016) found the promotion of fun and social interaction during physical activity interventions led to greater enjoyment and engagement in participants. Therefore, it is recommended that long-term care facilities provide opportunities for social engagement and physical activity because of the relationships between social support and physical activity and their positive effects on QOL in older adults.

Defining and Measuring Fun

Due to the dauntingly subjective nature of fun, this term has been largely neglected by academic research. As such, a concrete definition has not yet been established. The concept of fun is often related to and used interchangeably with terms such as happiness, leisure, enjoyment, and pleasure, although their meanings may not be identical (Podilchak, 1991). Podilchak (1991) stated, “Fun is fundamentally an emotionally exciting constructed activity,” and, “Fun always points to the social world and its reconstruction,” (p. 137). Due to the enhancing support provided by family, friends, and professionals during physical activities, social support is positively associated with enjoyment (Chogahara, 1999). These statements verify the interrelated nature of fun and social engagement, which are often observed in the same contexts. For example, a systematic review of physical activity in older adults found “fun and enjoyment of social interaction” is a high motivator for older adults to participate

regularly in physical activity (Devereux-Fitzgerald, Powell, Dewhurst, & French, 2016). Two studies investigating engagement factors of older adults regarding exercise programs found both anticipated and actual enjoyment of social interaction were powerful motivators for physical activity adherence in older adult participants (Hildebrand & Neufeld, 2009; Stathi, Mckenna, & Fox, 2010). Furthermore, Stathi et al. (2010) found "group-based exercise and social network building were important elements of enjoyment" and also led to greater adherence to the exercise program. Therefore, fun and enjoyment levels are significant factors influencing the success of and adherence to physical exercise programs that may lead to greater quality of life and healthy aging in older adults.

Given the importance and interconnectedness of fun and the quality of life of older adults, reliable and valid measurement of fun is essential. Due to the lack of research in this area, there is an absence of evidence-based measurements quantifying fun in older adults during a physical activity program. In response to this deficit, measurements of related concepts, such as enjoyment and positive affect, will be analyzed.

The most commonly used measure of enjoyment is the Physical Activity Enjoyment Scale (PACES; Figure 10). The PACES is an 18-item scale utilizing a 7-point Likert scale that has been modified for use in populations such as young children, adolescents, young adults, and adults. A 2011 study sought to modify the PACES for use in the older adult population in relation to a yearlong exercise program and to establish the validity of the PACES. As seen in Figure 10 below, the PACES includes aspects such as happiness, fun, and enjoyment in a participant-reported format. Figure 11 below

displays the PACES-8, which is the revised and simplified version intended for use in the older adult population. The success of the PACES-8 in measuring enjoyment in older adults indicates that simplification of questions and demands on participants may lead to more reliable results in the older adult population. (Mullen et al., 2011)

#	Item
1	I enjoy it; I hate it
2	I feel bored; I feel interested
3	I dislike it; I like it
4	I find it pleasurable; I find it unpleasurable
5	I am very absorbed in this activity; I am not at all absorbed in this activity
6	It's no fun at all; It's a lot of fun
7	I find it energizing; I find it tiring
8	It makes me depressed; It makes me happy
9	It's very pleasant; It's very unpleasant
10	I feel good physically while doing it; I feel bad physically while doing it
11	It's very invigorating; It's not at all invigorating
12	I am very frustrated by it; I am not at all frustrated by it
13	It's very gratifying; It's not at all gratifying
14	It's very exhilarating; It's not at all exhilarating
15	It's not at all stimulating; It's very stimulating
16	It gives me a strong sense of accomplishment; It does not give me any sense of accomplishment
17	It's very refreshing; It's not at all refreshing
18	I felt as though I would rather be doing something else; I felt as though there was nothing else I would rather be doing

Figure 10: The 18-item Physical Activity Enjoyment Scale (PACES) (Mullen et al., 2011)

Items
I find it pleasurable
It's a lot of fun†
It's very pleasant
It's very invigorating
It's very gratifying
It's very exhilarating
It's very stimulating†
It's very refreshing

Figure 11: PACES-8 (Mullen et al., 2011)

The Philadelphia Geriatric Center Affect Rating Scale (PGCARS) is a 6-item scale used to assess positive affect (pleasure, interest, and contentment) and negative

affect (sadness, anxiety, and anger) in older adults with dementia (Lawton, Van Haitsma, & Klapper, 1996). Administration of the PGCARS includes a 10-minute observation of the participant, in which the researcher records the relative amount of time the subject exhibits each affect state. Lawton et al. (1996) reports that each affect scale was found highly reliable, indicating a true depiction of affect states in PwD. Figure 12 below provides observable cues indicating each affect state. This scale includes concepts related to fun such as pleasure, interest, and contentment, and it provides the basis for the development of a more specialized measurement of fun including observational procedures.

Pleasure
Signs: Smile, laugh, stroking, touching with ''approach'' manner, nodding, singing, arm or hand outreach, open-arm gesture, eye crinkled

Anger
Signs: Clench teeth, grimace, shout, curse, berate, push, physical aggression or implied aggression, like fist shaking, pursed lips, eyes narrowed, knit brows/lowered

Anxiety/Fear
Signs: Furrowed brow, motoric restlessness, repeated or agitated motions, facial expression of fear or worry, sigh, withdraw from other, tremor, tight facial muscles, calls repetitively, hand wringing, leg jiggling, eyes wide

Sadness
Signs: Cry, tears, moan, mouth turned down at corners, eyes/head down turned and face expressionless, wiping eyes, horse-shoe on forehead

Interest
Signs: Eyes follow object, intent fixation on object or person, visual scanning, facial, motoric or verbal feedback to other, eye contact maintained, body or vocal response to music, wide angle subtended by gaze, turn body or move toward person or object

Contentment (less intense than pleasure)
Signs: Comfortable posture, sitting or lying down, smooth facial muscles, lack of tension in limbs, neck, slow movements

Figure 12: The Philadelphia Geriatric Center Affect Rating Scale (PGCARS; Lawton et al., 1996)

Castle & Engberg (2004) studied older adults' preferences regarding common survey forms such as Likert scales and Chernoff faces. Chernoff faces (Figure 13) are 2D line drawings of faces that may be provided alongside Likert scales (Castle & Engberg, 2004). While it may be beneficial to provide visual aids for older adults (Garcia-Retamero & Cokely, 2013), measurements of fun which include more realistic, less abstract images may prove more beneficial for this population due to declining cognition and vision.

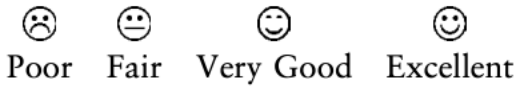

Figure 13: Chernoff Faces (as adapted from Castle & Engberg, 2004)

The Fun and Social Engagement Scale (FUSE) was developed and utilized in a pilot study by Lauren Stephens (2019) to investigate fun and social engagement in older adults during an intergenerational fitness program. The FUSE includes many of the beneficial aforementioned qualities of measurement such as observation of behaviors and a simple self-report question, including a non-abstract visual aid, to indicate positive or negative affect (Stephens 2019). As a novel measurement of fun and social engagement, there is need to establish the reliability and validity of the FUSE in order to provide accurate ratings and results. For the purposes of this study, the FUSE will be utilized to measure levels of fun and social engagement demonstrated by older adults during the intergenerational fitness program, Bingocize®.

Bingocize®

Chen et al. (2019) found "older adults across most activity patterns may experience better health outcomes if the activities involve physical, cognitive, and social

aspects." According to Tak et al. (2015), nursing home residents desire activities that are meaningful, interesting, social, and/or physical in nature. Consequently, nursing home and other long-term care staff find themselves in need of activities that meet the numerous wants and needs of their residents that will also provide indispensable health benefits. Considering the strong need for innovative health promotion programs targeting physical activity and social engagement in older adults, K. Jason Crandall created Bingocize®, an evidence-based intergenerational fitness and health program for older adults combining the traditional game of bingo with simple exercises. The goals of the Bingocize® program include improving and/or maintaining mobility, independence, and social engagement in older adults through increased physical fitness, cognitive functioning, and social interaction. (About Bingocize®, n.d.).

A typical Bingocize® session is led by a Lead Facilitator (LF) who has completed standardized online training to direct the program at their site and begins with a warmup involving easy aerobic movements. Next, the LF calls out three bingo numbers, mimicking the traditional game of Bingo. After three numbers have been called, the LF leads the group in performing exercises which may fall into one of the following categories: cardiovascular, strength, balance, or hand. The LF continues alternating between calling bingo numbers and performing exercises with the group for approximately 45 minutes. The session is completed with a calming cool-down. Figure 14 below displays a sample Bingocize® exercise program.

Program component	Exercises
Warm-up	Walking in place
Flexibility	Single arm crossover
	Tricep stretch
	Head turns
	Head half-circles
	Calf-stretch w/ chair
Cardiovascular fitness	Walking in place
	Walking in facility
Lower body strengthening	Heel raises on balance pad w/one hand on chair
	Leg extension
	Hip adduction/abduction
	Ankle flex while standing
Upper body strengthening	Bicep curl
	Chest flies
	Chest press
	Lateral raises
	Reverse chest flies
	Body pumps
	Triceps extensions
Balance exercises	Side step on balance pad
	Walking in place on balance pad
	Staggered Stance
	Grapevine
	Static balance (single leg stance)
	Step ups on balance pad
Cool-down	See flexibility exercises

Figure 14: Sample Bingocize® program (Crandall, Fairman, & Anderson, 2015)

During a 10-week investigation of the Bingocize® program, Crandall et al. (2015) discovered twice per week participation in a group of older adult women produced increased measures of functional fitness and significantly greater upper and lower body flexibility. The addition of the game of bingo to the standard exercise program provided greater likelihood of participant retention since they reported enjoyment of the game and appreciation for the social support provided by other participants and university students (Crandall et al., 2015). In a similar 10-week study, older adults participated in Bingocize® twice per week in two independent living facility settings (Crandall & Steenbergen,

2015). This study demonstrates the potential of the Bingocize® program "to improve measures of functional performance, body weight, BMI, and resting diastolic BP," thereby decreasing risk of chronic disease in older adult participants (Crandall & Steenbergen, 2015). These studies contribute to knowledge of physical effects associated with Bingocize® and suggest the need for future research to quantify effects of social engagement in Bingocize® participants.

Individuals are now living longer, which increases the prevalence of age-related cognitive impairments such as Alzheimer's Disease. As demonstrated in Figure 15 below, the vast majority of individuals with Alzheimer's Disease are 65 years and older, which classifies them in the older adult population (Alzheimer's Association, 2019).

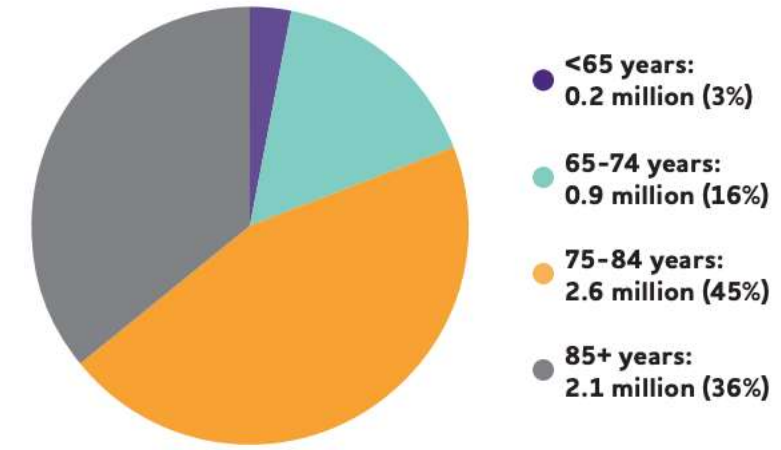

Figure 15: Ages of People with Alzheimer's Dementia, 2019 (adapted from Alzheimer's Association, 2019)

Therefore, health promotion programs targeting the older adult population such as Bingocize® must be accessible and adaptable to suit the needs of individuals with cognitive decline such as dementia, as well as those without cognitive decline. Another exercise program targeting older adults with dementia called Preventing Loss of

Independence Through Exercise (PLIÉ) utilizes procedural memory for training functional movements and encourages body awareness and social interaction (Barnes et al., 2015). This program may attribute its ability to positively affect the physical performance, cognitive function, and QOL of PwD, as demonstrated in its pilot study, to its seven guiding principles (Barnes et al., 2015). As seen below in Figure 16, PLIÉ includes principles such as repetitive class structure, functional movements, modeling, instruction, social interaction and a welcoming environment (Barnes et al., 2015).

Guiding Principles	Rationale	Exercise Approaches Integrated*
1. Repetition with variation	The same basic sequence of events is repeated in each class, providing a structure that becomes familiar over time and is designed to promote procedural learning. Specific movements are varied to maintain engagement based on moment-to-moment participant responses and to include variations introduced by participants.	Physical therapy, occupational therapy, yoga, tai chi, dance movement therapy
2. Progressive, functional movements	Specific movement sequences are selected to be related to important daily functional activities such as standing safely from a seated position. Simpler movements build slowly toward more complexity.	Physical therapy, occupational therapy, Feldenkrais, Rosen
3. Slow pace and step-by-step instructions.	Movements are performed slowly to enable participants to fully process instructions. Step-by-step instruction and modeling are utilized to minimize the cognitive demands and promote procedural learning.	Occupational therapy, yoga, tai chi, Feldenkrais, Rosen, dance movement therapy
4. Participant-centered goal orientation.	A goals assessment is performed before beginning the program. Participants are motivated by relating movements to personal interests and goals.	Physical therapy, occupational therapy
5. Body awareness, mindfulness, and breathing	Periods of rest are included between movements. Participants are encouraged to breathe deeply; notice how their bodies feel aided by sensory stimulation such as tapping, touching and naming body parts; and share their observations with the group.	Yoga, tai chi, Feldenkrais, Rosen
6. Social interaction	Participants sit in a circle, and many movements involve reaching across the circle to touch hands or elbows, or standing in a circle holding hands and moving together to facilitate social connection.	Dance movement therapy, occupational therapy, Rosen
7. Positive emotions	The program promotes positive emotions by creating a warm, loving, non-judgmental, non-coercive environment in which participants are encouraged to move in ways that feel good to them. Brief musical selections are used to enhance positive emotions.	Occupational therapy, yoga, tai chi, Feldenkrais, Rosen method, dance movement therapy

Figure 16: PLIÉ Guiding Principles (Barnes et al., 2015)

Comparatively, the Bingocize® program provides many of those same accommodations such as repetitive and predictable session schedules, functional exercises, modeling of exercise movements by the LF, a welcoming environment, and the opportunity for social interaction which may collectively lead to greater overall engagement of PwD. Both PLIÉ and Bingocize® include exercises that promote socialization and interaction with others. In PLIÉ, holding hands and touching hands or elbows is incorporated. In Bingocize®, the training program includes tips for optimal communication and exercises that promote social interaction such as high five's and

pretend boxing. Tak et al., 2015 also supports the provision of demonstrations of games, activities, and movements for PwD, especially those who are severely impaired. For these reasons, Bingocize® may be an appropriate and beneficial program for PwD as well as those without cognitive decline. Participants of Crandall et al.'s (2015) study of Bingocize® noted improvements in health-related QOL, self-esteem, and mood. While Bingocize® is still a relatively young program, the above review of literature demonstrates the tremendous potential of the Bingocize® program to improve aspects of functional fitness, cognition and social features in older adults both with and without dementia. Further research regarding the Bingocize® program is needed to quantify levels of social engagement experienced by participants.

Intergenerational Programming

The Bingocize® program contains an intergenerational component in that it partners with nearby universities to allow students to participate and interact with residents during Bingocize® sessions at Certified Nursing Facilities (CNF). Figure 17 below displays the ten university partners of Bingocize® across Kentucky. The program also promotes interprofessional development by incorporating students from both communication sciences and disorders (CSD) departments and exercise science (EXSCI) departments. A 2019 study on fall prevention found that the inclusion of university students, particularly those conducting research, led to greater rates of older adult participation in fall prevention efforts due to the older adults perceiving their participation with the students as positively impacting society (Vincenzo & Patton, 2019). A 2018 study found the inclusion of college students in an intergenerational learning course, which incorporated participation in the Bingocize® program, led to more

positive perceptions of the older adult population in undergraduate students (Neils-Strunjas et al., 2018). These are two examples of ways the young adult and older adult populations might exhibit a positive influence on each other through intergenerational interactions.

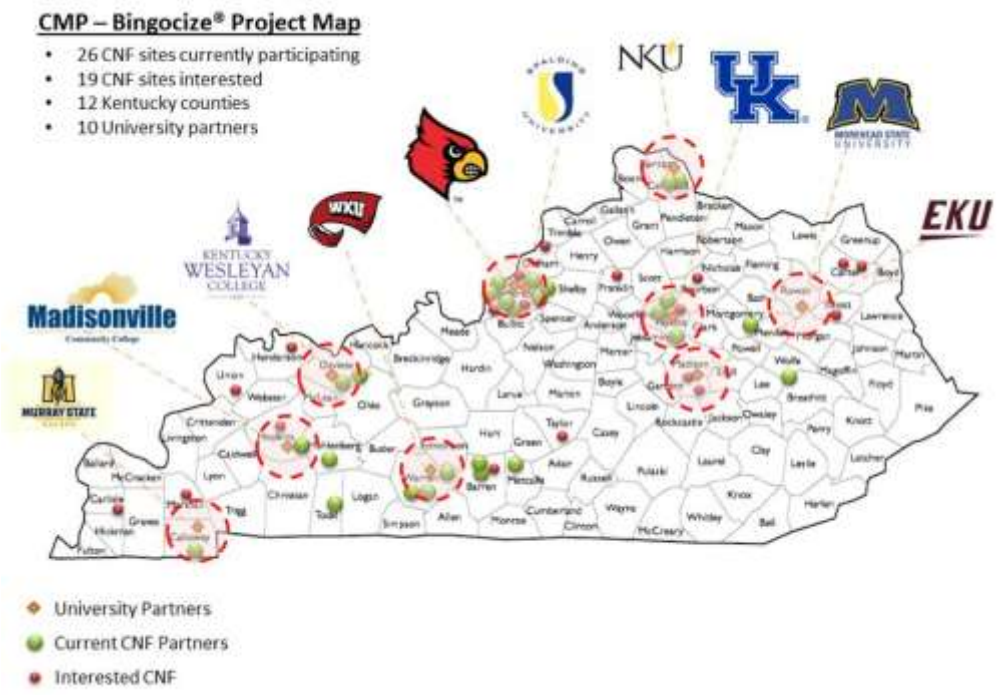

Figure 17: Bingocize® University Partners in Kentucky (Miller, 2018)

Nyman & Szymczynska (2016) define intergenerational activities as "designed for people of different generations to interact with each other" and including "any activity shared by people with dementia and children or younger adults." The majority of research on intergenerational programming focuses on the interaction of children and older adults. For example, Camp (2010) found increased levels of positive engagement in PwD during intergenerational programming in which participants served as mentors for children. There is even an Intergenerational School in Ohio that provides education, learning and mentorship opportunities to 200 elementary students and many older adults, some of

whom have dementia (Whitehouse, 2013). Whitehouse (2013) reports PwD are able to actively participate in the workings of the school and often serve as weekly reading mentors for the children in the school's signature intergenerational reading program. A 2011 study by George and Singer examined whether an intergenerational intervention involving elementary students would contribute to overall QOL in PwD. They concluded that a significant decrease in stress was exhibited by the older adults in the intervention group which may positively contribute to QOL (George & Singer, 2011). Despite these individual reports of success, there is unfortunately "no existing review of available evidence of the effectiveness of intergenerational activities" (Nyman & Szymczynska, 2016), especially regarding the inclusion of young adults.

Generativity, a term originally coined by Erikson (1950), is a type of altruism that strives to guide, contribute and invest in the lives of younger generations (Nyman & Szymczynska, 2016). As such, it is uniquely intertwined with the concept of intergenerational programming. Tabuchi, Nakagawa, Miura, & Gondo (2015) found that positive intergenerational contact may lead to better psychological well-being in older adults and Gruenewald, Liao, & Seeman (2012) discovered greater generativity in older adults may be associated with better physical functioning and longevity. Therefore, intergenerational activities serve not only as fun social opportunities, but also as chances for growth in the process of generativity which may lead to psychological, physical and social benefits in older adults (Nyman & Szymczynska, 2016). As another factor that may improve QOL in older adults, the intergenerational component of Bingocize® provides further evidence for the suggested benefits that may be experienced from participation in this program. Further research is needed to evaluate the intergenerational

effects of young adults on older adult participants during exercise programs such as Bingocize®.

Need for Reliability Testing

Determining the reliability of measurements is an integral part of producing trustworthy and evidence-based research. Reliability of a measurement is broadly defined as "the degree to which we can depend on a measure" (Orlikoff, Schiavetti, & Metz 2014; p. 228). Reliable measures should be precise; that is, scores should remain stable if study procedures are repeated with the same participant (Orlikoff et al., 2014). Measurements should be accurate with as few random measurement errors as possible (Orlikoff et al., 2014). Lyman (1978) determined measurement errors may fall into one of the following categories: 1) examinee characteristics, 2) examiner behavior, 3) test content aspects, 4) time factors, or 5) situation factors (as cited by Orlikoff et al., 2014). The more errors found within a measurement, the less reliable it will be. There are numerous methods for calculating reliability. However, the method selected will largely depend on the specific characteristics of the measure and study (i.e. observation, self-report, qualitative, quantitative etc.). Without establishing the reliability of a measurement, it is difficult to know whether the reported results should be trusted, which greatly impacts the ability for researchers to generalize results into clinical practice.

A 2018 study seeking to determine the reliability and validity of the Engagement of a Person with Dementia Scale (EPWDS) assessed internal consistency, inter-rater reliability and construct and content validity (Jones et al., 2018). The results of their appraisal led to beneficial modifications made to the scale. Provided the necessary alterations, the EPWDS was determined a valid and reliable resource which may be

applied by clinicians and other researchers to measure engagement in PwD (Jones et al., 2018). Without this evaluation of reliability, the EPWDS might not be utilized in clinical practice or in other research to determine and promote meaningful activities for PwD, which could negatively impact their well-being. Therefore, determining the reliability of measurements like the EPWDS may positively impact target populations and provide greater confidence in results provided by these measurements.

The reliability of the measurement used in the present study, the FUSE, has yet to be evaluated. As the FUSE is largely observational, it would be beneficial to examine rates of interobserver agreement to ensure scores are not affected by different examiners and to confirm consistency among raters. A relatively high percentage of interobserver agreement (above 85%) allows the researcher to provide more accurate statements regarding the measured behavior (Huck, Cormier, & Bounds, 2014). If observer reliability is low, the researcher may not be able to determine if the measured effects are due to the independent variable or the variations in observer scoring (Huck et al., 2014). According to Orlikoff et al. (2014), interobserver agreement is calculated by taking the "number of agreements between the raters, divided by the sum total of the number of agreements and disagreements," (p. 232). Calculating interobserver reliability is an essential initial step in determining reliability. However, further research is needed to establish overall reliability of this measure. Determining reliability may lead to more clinical applications of the FUSE and the development of more CNF programs targeting meaningful engagement in PwD.

Method

Procedure

CNF and Participant Recruitment. This study was approved under the Western Kentucky University IRB (IRB # 17-457). The three participating CNFs were recruited based on their inclusion in the CMP grant and by the convenience of their location. Each CNF was contacted by the lead investigator in order to explain the purpose and requirements of the study and to obtain a written agreement of participation. All three CNFs utilized in the present study were located in Bowling Green, Kentucky. The original research study completed by Stevens included two CNFs in Bowling Green and one CNF in Murray, Kentucky (Stevens, n.d.).

A convenience sample was recruited from selected CNFs through the combined efforts of the LF and lead investigator. Selections were made based on the likelihood of future consistent attendance at Bingocize® sessions. Involving participants who have the greatest probability of future attendance serves to augment data collection, which provides more reliable results. REDCap™, a software used by the Bingocize Implementation® Team, was utilized to determine each participant's individualized identification (ID) code and age. ID codes are assigned to every individual who participates in the Bingocize® program. In the present study, ID codes were used in lieu of names in order to maintain confidentiality and remove bias. Residents were informed of the requirements and purposes of this study and, upon agreement to the terms, asked to sign the Informed Consent Document to indicate willingness to participate fully in the study (see Appendix C). Verbal and tactile assistance was provided as needed by the LF and lead investigator.

Student Recruitment and Assistance. The Bingocize® program is made intergenerational through the recruitment and assistance of students from universities all over the Kentucky. Each recruited CNF is given a designated Bingocize® university faculty partner who facilitates the involvement of students from their respective university in the Bingocize® program at their assigned CNF. These students are recruited to assist and engage participating residents and to aid LFs in the implementation of the program. Both LFs and participating university students are trained in how to conduct and engage in Bingocize® through the completion of an online certification module. The online training also includes suggestions for communicating with older adults and increasing socialization. The present study observed Bingocize® sessions both with these students present and without students present. These students participated in Bingocize® and the present study as part of a university course requirement as designed by their university faculty partner. All three CNFs and the student volunteers involved in this study were associated with Western Kentucky University.

Five undergraduate research assistants (URA) were recruited from Western Kentucky University to assist in the administration of the FUSE protocol at each CNF location. URAs were selected based on university faculty partner recommendation. All URAs completed an in-person training led by the lead investigator which covered the purpose of this study and procedures required for FUSE administration. Each URA received a data collection folder which included blank FUSE protocols, male and female happy/sad photographs, and a resident ID code log to provide the URA a record of which participants they should observe during sessions.

FUSE Administration. FUSE administration procedures were identical across all locations. For reliability purposes, each URA was assigned a location and four participants to observe across all four sessions. Assigning a URA greater than four participants to observe during a session was found to decrease reliability by researchers of the previous study (Stevens, 2019). When unexpected URA absences occurred, a designated procedure for all locations was implemented. URAs assigned to the same location collected FUSE data for the absent URA's assigned participants, therefore preventing gaps in data.

At each CNF location, FUSE data were collected across four sessions. Two of these sessions were completed with university students present and two of these sessions were without students present. Two extra sessions were completed at one facility in Bowling Green, KY to gauge reliability of the FUSE. Interobserver reliability was measured by having two trained observers complete the FUSE for the same four individuals during a session. These data were collected by the same two observers over two sessions involving eight total resident participants. Scheduling of FUSE data collection sessions at each CNF location was completed by the lead investigator based upon site and URA availability.

As active participants of the Bingocize® program, each CNF location assigns ID numbers to each of their resident participants. These ID numbers were utilized in the present study to protect participant confidentiality. In order to aid URAs in data collection, non-obtrusive labels with participant ID codes were placed on the backs of participant chairs during the session. URAs then observed their assigned participants for the duration of the session, which lasted approximately 45 minutes. URAs were trained to

collect FUSE data in a manner that did not affect the session or participants in any way. The FUSE provides a list of behaviors for the URAs to watch for in participants throughout the session. If any of these behaviors were observed, no matter how many times, the behavior was checked on the FUSE protocol. Approximately 20 minutes into the session, the URAs asked each participant, "Do you feel happy or sad?" using gender-appropriate visuals. Both verbal and nonverbal responses were accepted. If a participant provided an inconclusive response, the URAs selected "other" on the FUSE protocol.

FUSE Data Analysis. FUSE data was collected during the Spring 2019 semester and combined with data collected by a previous researcher in the Spring 2018 semester. Responses were entered into a Microsoft Excel document and transferred to the Statistical Package for the Social Sciences (SPSS) for further investigation. Scores were analyzed via paired t-tests to compare the performance of the same participants across sessions. To determine the relationship between observed social engagement behaviors and participant-reported happiness, the Mann-Whitney U Test was used.

FUSE Reliability Analysis. FUSE reliability data was collected during the Spring 2019 semester. FUSE responses were recorded in a Microsoft Excel document to compute interobserver percent agreement. Interobserver reliability data were analyzed for percent agreement at individual item-level and with total scores of the FUSE. The Cohen's Kappa statistic was calculated for the observation portion only of the FUSE to measure interobserver agreement and account for chance agreement between observers.

Participants

The participants of this study included individuals residing in CNFs located in the state of Kentucky actively enrolled in the Bingocize® program, which operates under the

Civil Monetary Penalty (CMP) grant funded by the Centers for Medicare and Medicaid Services (CMS). Inclusionary and exclusionary criteria are detailed below.

Inclusion Criteria. Apart from residing in a Kentucky CNF with an active Bingocize® program, participants were required to possess sufficient receptive and expressive language skills in order to understand and provide an accurate response to the self-report question on the FUSE. Participants were also required to be physically able to participate in the game of Bingo and to complete regular or modified versions of Bingocize® exercises. Participant language skills and physical ability were determined by the Lead Facilitator's (LF) judgment. Standardized assessments were not completed. A LF is a trained and certified leader of Bingocize® in his or her CNF. Participants of any age, race, ethnicity, and socioeconomic status were included in this study.

Exclusion Criteria. Only Kentucky CNFs and their residents were permitted to participate in this study because the CMP grant only funds the Bingocize® program in CNFs located within the state of Kentucky. To produce the most accurate statistical evaluation, participants who were unable to participate in one session with students present and one session with students not present were excluded from the analyses.

Participant Characteristics. In the present study, a convenience sample of 24 CNF residents was collected. Combined with the previous researcher's 38 participants, a total of 62 participants were recruited (Stevens, 2019). After excluding participants who did not attend the minimum number of sessions, 53 participants were included in the analysis of the first and second research questions. These participants ranged in age from 46-99 with a mean age of 83. In the present study, there were 19 females and 5 males

included. Combined with the previous researcher's participants there was a total of 52 female and 10 male participants in the study.

Measures

The Fun and Social Engagement evaluation (FUSE) was employed in the present study to measure levels of social engagement in CNF residents during Bingocize® sessions (Appendix A). To remedy the lack of evidence-based evaluations which measure social engagement of CNF residents during intergenerational exercise programs, such as Bingocize®, the FUSE was developed by researchers Stevens, Neils-Strunjas and Crandall (Stevens, 2019). The FUSE was designed to include both observational measures and self-report measures to capture a comprehensive account of individuals' social engagement during Bingocize®.

Included in the FUSE are designated sections to report the date of session observed, the participant's identification number, and the number of students present at the session, if applicable. Observational portions of the FUSE, which include positive and negative signs of engagement, were originally derived from the Menorah Park Engagement Scale (MPES) as a measure of construct validity (Camp, 2010; Appendix B). For the self-report section of the FUSE, participants were presented with two pictures, one depicting a smiling, happy person and one a somber, sad person and asked, "Do you feel happy or sad? Point to the picture." The images presented corresponded with the participant's gender. For example, female participants were shown pictures of happy and sad women and male participants were shown images of happy and sad men. Both verbal and nonverbal responses, such as pointing, were allowed. If the participant did not clearly indicate whether they were happy or sad, "other" was circled on the form.

A selection of "other" indicated the participant either did not understand the question, refused to respond, provided another response, left the session, or was sleeping during the session.

An overall FUSE score was obtained by first totaling the scores from the observational and the self-report measures separately, then adding them together. The observational section yielded scores that fell within the range of -8 to 8 while the self-report section produced scores from -2 to 2. The addition of the two scores could yield a score from -10 to 10. To remove the possibility of negative scores and to aid statistical analyses, the researcher added 10 to each total to obtain the overall, weighted FUSE score. Overall FUSE scores could range from 0 to 20. Social engagement and FUSE scores exhibit a direct relationship in that higher FUSE scores indicate greater social engagement and lower FUSE scores signify decreased levels of social engagement.

Results

Paired samples t-tests were used to determine the impact of student presence on social engagement levels of Bingocize® participants. A Mann-Whitney test provided information regarding the relationship between observed engagement levels and self-reported happiness on the FUSE. Interobserver reliability and Cohen's Kappa were calculated to assess the reliability of the FUSE. Data analysis was completed via the Statistical Package for the Social Sciences (SPSS, version 23.0). Significance for all results analyzed was $p<0.05$.

Table 1 below provides the demographic information (age, gender, and BIMS score) for participants at each facility as determined by descriptive statistics.

Table 1

Descriptive Statistics

Sample		Frequency	%	*M*	SD	Min	Max
CNF 1		13	21%				
	Age			78.2		46	98
	Male	2					
	Female	11					
	BIMS			10.3	4.3	3	15
CNF 2		7	11%				
	Age			87		84	91
	Male	2					
	Female	5					
	BIMS			7.6	4.1	3	13
CNF 3		18	29%				
	Age			81.9		46	97
	Male	1					
	Female	17					
	BIMS			11.3	3.8	3	15
CNF 4		8	13%				
	Age			82.1		73	98
	Male						
	Female	8					
	BIMS			9.6	3.2	5	13
CNF 5		8	13%				
	Age			88.6		79	96
	Male	4					
	Female	4					
	BIMS			8.5	3.7	3	13
CNF 6		8	13%				
	Age			81.6		66	99
	Male	1					
	Female	7					
	BIMS			10.1	5.5	0	15

Out of 57 total participants, 5 participant genders and 2 participant ages were not reported. All 5 missing genders were from CNF 2. There was one missing participant's age from CNF 1 and one missing age from CNF 3. Using a one-way ANOVA, mean

FUSE scores were compared across all facilities and found not significant (>0.5). Therefore, collected data from all facilities could be merged and analyzed together.

FUSE Engagement

The first research question, *To what extent does the FUSE measure fun and social engagement of nursing home residents (i.e. validity of the observation measure)?* was evaluated through comparison of the FUSE and a similar measure of engagement in PwD, the EPWDS. Many of the engagement factors included in the EPWDS are very similar to the positive and negative engagement behaviors included in the FUSE (Table 2 & 3). The similarities noted between these two scales may support the validity of the FUSE as a measurement of engagement in PwD. This confirms the hypothesis that the FUSE has similar content to another standardized measure of engagement.

Table 2

Comparison of FUSE and EPWDS Positive Items

FUSE	EPWDS
Participated in Bingo, Participated in exercise	Responds to an activity by approaching, reaching out, touching, holding or handling the activity, the material used, or the person/s involved.
Laughed, Smiled	Displays positive affect such as pleasure, contentment or excitement (e.g., smiling, laughing, delight, joy, interest and/or enthusiasm).
Helped out another resident, Talked to another resident, Talked to a student, Talked to a staff member	Uses the activity or the material/s to encourage others to interact, or as a communication channel to interact and talk with others (e.g., staff and other residents).

Table 3

Comparison of FUSE and EPWDS Negative Items

FUSE	EPWDS
Made negative comments, Asked or attempted to leave	Refuses to participate in the activity or in a conversation related to the activity by verbalizing e.g. “no”, “stop”, etc. OR verbalizes negative comment, complaint, and sound (e.g., groaning, or cursing, or swearing) in response to or related to the activity, or the materials used, or the person/s involved.
Pushing away activity materials	Responds to an activity by avoiding, shoving away, pulling back from, hitting, or mishandling the activity, the material used, or the person/s involved.
Frowned, Yelled, Cried	Displays negative affect such as apathy, anger, anxiety, fear, or sadness (e.g., disinterest, distressed, restlessness, repetitive rubbing of limbs or torso, repeated movement, frowning, crying, moaning, and/or yelling).
Did or attended to things other than targeted activity (ex. Fidgeting), Sleeping	Appears inattentive, has an unfocused stare or turns head/eyes away from the activity, materials used, or the person/s involved.

To address our second research question, *What is the degree of social engagement of nursing home residents during Bingocize as measured by the FUSE?*, FUSE scores with students present (FUSE With) and scores without students present (FUSE Without) were analyzed. (Table 4) It is hypothesized that the majority of residents will demonstrate social engagement during Bingocize®.

Table 4

Comparison of FUSE With and FUSE Without

	Mean	Median	Mode	SD
FUSE Scores With Students Present	16.05	16.00	16.00	2.3
FUSE Scores Without Students Present	15.68	16.00	17.00	2.5

In support of the hypothesis, all participants were observed to participate in Bingo, and none were observed to cry or push activity materials away, regardless of student presence. Out of all FUSE administrations, both with and without students, the majority of participants (81.02%) self-reported being happy. Some participants did not select "happy" or "sad." In these cases, "other" was selected and the participant's specific response was recorded on the FUSE protocol. Some examples of these "other" responses include, the individual did not understand the question, the individual refused to answer the question, the resident left the session early, and the participant said, "neither one" or "right in between."

To address our third research question, *During Bingocize® activity, do CNF residents display increased positive social engagement when university students are present as compared to when university students are not present?*, data were analyzed using paired t-tests. Paired t-tests compared participants' FUSE scores from a session with university students present to a session without students present. It is hypothesized that CNF residents will display greater positive social engagement during Bingocize® sessions in which students are present. Four FUSE sessions were completed at each CNF

including two sessions with university students and two sessions without student presence. For reference as to which sessions included student presence, see Table 5 below.

Table 5

FUSE data collection sessions with and without university students present

STUDENTS PRESENT	STUDENTS NOT PRESENT
FUSE 1	FUSE 2
FUSE 3	FUSE 4

This study involved 57 total participants; however, participant attendance was not mandatory and therefore varied at each session due to uncontrollable factors such as illness, medical appointments, other prior engagements, etc. Out of the 57 total participants, 28 attended all four sessions. Each FUSE administration yields a score ranging from 0-20, providing continuous, interval data. All possible comparisons of FUSE sessions with students present and sessions without students present were analyzed (Table 6 and 7). Although average FUSE scores were always slightly higher with students present, none of these comparisons yielded significant findings. Therefore, the null hypothesis could not be rejected.

Table 6

Average FUSE Scores Across Sessions With and Without Students

Compared Session		N	M	SD
Fuse 1 to Fuse 2				
	Fuse 1	41	15.93	2.563
	Fuse 2	41	15.34	2.816
Fuse 3 to Fuse 4				
	Fuse 3	37	16.51	1.909
	Fuse 4	37	16.35	1.874
Fuse 1 and Fuse 4				
	Fuse 1	35	16.06	2.496
	Fuse 4	35	15.89	2.410
Fuse 2 and Fuse 3				
	Fuse 3	46	16.24	2.162
	Fuse 2	46	15.59	2.473

Table 7

Paired Differences of FUSE Scores Across Sessions With and Without Students

Compared Session	M	SD	Sig. (2-tailed)
Fuse 1 to Fuse 2	0.585	2.702	0.173
Fuse 3 to Fuse 4	0.162	2.279	0.668
Fuse 1 and Fuse 4	0.171	2.854	0.725
Fuse 2 and Fuse 3	-0.652	2.532	0.087

To answer our fourth research question, *During Bingocize® activity, is there a relationship between the social engagement behaviors observed and the residents' self-report of happiness?,* the Mann-Whitney U Test was analyzed. It is hypothesized that residents who self-report they are happy will have higher observation scores on the FUSE. The nonparametric Mann-Whitney U Test was selected because the observational and self-report portions of the FUSE are independent of each other, yield different ranges of scores, and are not normally distributed. Observation scores were compiled from all sessions, both with and without students. To yield results with the greatest statistical power, the two groups, "happy" and "not happy" (consisting of both "sad" and "other" responses) were analyzed.

Of the 54 administrations of the FUSE during Bingocize®, 42 of them reported they were happy, 7 reported they were sad and 5 were categorized as "other" since they did not indicate happy or sad. Observation scores could range from -8 to 8. The mean observation score for "happy" participants was 4.63 (SD=1.70), while the mean observation score for "not happy" participants was 3.43 (SD=2.34). Results of the Mann-Whitney U Test were found to be statistically significant with a z-score of 2.98 and a p-value of 0.00328 (the result is significant at $p<.05$). This result indicates a direct positive relationship between observations of social engagement and participant-reported levels of happiness. Therefore, the null hypothesis for this question was rejected.

FUSE Reliability

To answer our fifth research question, *Does the FUSE provide adequate interobserver reliability?* interobserver reliability and Cohen's Kappa were calculated. It is hypothesized that the two trained observers will demonstrate greater than 0.75

interobserver reliability. Interobserver reliability of the FUSE was calculated between two trained observers across two sessions with a total of eight subjects and was found to be between 68%-100% agreement for each participant (Table 8). The total average percent agreement was 80.9%, thus supporting the hypothesis for this question. To account for chance agreement between the observers, the Cohen's Kappa statistic was calculated (k=0.66) indicating substantial agreement between the two observers (McHugh, 2012).

Table 8

Interobserver Reliability Agreement Per Session

Percent Agreement Per Session	
Session 1 Participant 1	**100%**
Session 1 Participant 2	**79%**
Session 1 Participant 3	**68%**
Session 1 Participant 4	**79%**
Session 2 Participant 5	**74%**
Session 2 Participant 6	**74%**
Session 2 Participant 7	**89%**
Session 2 Participant 8	**84%**

Discussion

The purpose of this study is to determine the level of social engagement displayed by CNF residents during Bingocize®, and to determine the reliability of the FUSE.

FUSE Engagement

Concerning the first research question, comparison of the FUSE to the EPWDS revealed similar items across the two observation measures, thus supporting the content validity of the FUSE. For the second research question, the vast majority of our resident participants self-reported happiness during Bingocize® (81.02%) and the total FUSE

score averages, medians and modes for sessions both with and without students fall in or near the top 25% range of possible FUSE scores. This indicates that, according to the FUSE, participants overall exhibited high levels of engagement during Bingocize®. To further support this result, it was found that correlation between participant BIMS scores and FUSE scores was not statistically significant indicating that individuals of any mental capability may participate in the FUSE. These results align with a study of engagement in PWD during a memory-bingo activity (Clare & Woods 2001). In congruence with the current study, Clare & Woods (2001) found that the majority of their resident participants displayed both positive social engagement and happiness during the activity.

Regarding the third research question, none of the FUSE session comparisons reached statistical significance therefore demonstrating no relationship between university student presence and level of social engagement in older adult participants. Despite not finding statistically significant results, average FUSE scores for each session were highest and most positive when students were present compared to sessions when students were not present. Camp (2010) found that PwD responded more positively to activities involving intergenerational programming than activities that did not incorporate other generations. While the current study did not find statistically significant higher scores, average scores were higher during sessions in which students were present. One primary dissimilarity between these studies is that Camp (2010) included young children only in his study, while the current study used university students. This may account partially for the observed difference in results.

Another factor that may contribute to the lack of statistical significance for the third research question is the variability of CNF resident attendance. Attendance was not

mandatory for any Bingocize® sessions and the overall absent rate of 21.4%. CNF residents often experience cognitive and physical decline which can cause health-related issues that may influence their ability to attend sessions. Moreover, other factors such as doctor's appointments, family visits and other facility activities may have impacted the current study's attendance rates. Participant absences are inevitable in research and create a smaller sample size which can impact statistical results. Student-to-participant ratio at each CNF location may also be a factor contributing to these results not reaching statistical significance. For example, in larger facilities that may have 20-30 participants, 5 students present may not be sufficient to make an impact because some residents may not have the opportunity to interact with a student at all during the session if the room is large and tables are spread out. If this student-to-participant ratio were corrected, more accurate measurements of student impact on older adult engagement could be completed.

In our fourth research question, the comparison of FUSE scores in participants who reported happiness and those who did not report happiness (sad or other) was found to be statistically significant. Therefore, this result indicates a direct positive relationship between observations of social engagement and reported happiness levels in older adults during Bingocize®. The average "happy" score was 4.63 and the average "not happy" score was 3.43. The average "happy" observation score was significantly higher than the average "not happy" score indicating, on average, more positive engagement behaviors observed in those who self-reported happiness than those who did not. Social isolation, anxiety and depression can be common in many nursing home residents and can contribute to an individual's decline in quality of life and happiness in general (Prieto-Flores et al., 2011). Depression rate in nursing home residents is three to four times

higher than community-dwelling older adults (Haugan, Innstrand, & Moksnes, 2013). Therefore, the nursing home population may be less likely to self-report happiness. However, in the current study, participants self-reported happiness in 81.02% of FUSE administrations. This result may indicate that the opportunities for social engagement and physical activity provided by Bingocize® could facilitate some level of happiness in CNF residents.

FUSE Reliability

For the fifth research question, total average interobserver reliability of the FUSE was found to be 80.9%. To account for chance agreement between the observers, the Cohen's Kappa statistic was calculated (k=0.66) indicating substantial agreement between the two observers (McHugh, 2012). Interobserver agreement on the FUSE is very important to determine since the FUSE is largely observational and, therefore, depends greatly on the accuracy of the observer. Results from both interobserver agreement and Cohen's Kappa indicate that URAs who have completed FUSE administration training are likely to score participants similarly on the FUSE. These results suggest substantial interobserver reliability for the FUSE.

Limitations

There are several potential limitations of this study. First, while sample size was improved from the original pilot study, the sample size for this study still remained relatively small. This small sample size may have negatively affected reliability analyses such as Cronbach's alpha. For example, some behaviors on the FUSE such as crying were never observed in our participants, but given a larger sample size, these behaviors may be more likely to be observed. An increase in sample size would likely yield more

reliable results and would add greater statistical power. Moreover, with a greater sample size, internal validity measures such as Cronbach's alpha could be completed and analyzed. An obstacle for any study involving the nursing home population is the increased likelihood of participant absences due to inevitable doctor's appointments, visiting family and/or personal illness. There was a 21.4% absent rate with 53 recorded absences out of 248 total FUSE administrations. These absences are uncontrollable but can impact total sample sizes. Second, this study utilized a convenience sample of CNF facilities located nearby geographically and participants based on LF recommendation. Since CNFs and participants were not randomly selected, this could represent bias in the study's results, and therefore, these results may not be applicable to other geographic locations and populations.

Third, this study did not include the use of a control group thereby making it difficult to determine whether the increased levels of social engagement measured and observed by the FUSE were due to Bingocize®, group-based activity, student presence, or other factors entirely. Fourth, while the gender and age of participants were gathered, other demographics such as race, marital status, education level, and socioeconomic status (SES) were not collected. Hasselgren et al. (2018) suggest that individuals with a lower SES may be at a greater risk for diseases such as old-age dementia. Since many participants of the current study present with dementia, it may be important to also consider participants' SES as well to determine how their social engagement may be affected. Fifth, the order of sessions with and without students differed across each CNF location due to difficulty coordinating CNF and URA schedules. Days between sessions also differed by each location. This lack of standardized session scheduling may have

impacted participant affect and other results. For example, one CNF location may have completed two sessions in a row with students present creating a compounding positive effect that may not have occurred if the sessions had been alternating sessions with students and without students.

Future Research Implications

Future research could further examine the degree of social engagement in older adults during Bingocize® by utilizing a control group in which residents are either not participating in an activity or they are participating in an activity other than Bingocize®. Due to the variability of the nursing home population, the participant should serve as their own control, i.e. observe the same individual during Bingocize® and at a different time of day. This could provide an interesting comparison of Bingocize® vs. other CNF activities vs. non-activities to reveal the true effects of Bingocize® and other promoted activities within CNFs. Future research could focus on increasing sample size and reevaluating reliability and validity of the FUSE with measures such as Cronbach's alpha. After completing analyses with a sufficient sample size, the researcher could determine whether observation items on the FUSE should be adjusted or removed to improve internal consistency. After increasing sample size, future researchers could examine outlier scores and standard deviations to develop a rating scale of engagement or cut-off scores indicating the presence or lack of engagement in participants. For example, researchers might determine FUSE score ranges which demonstrate high, moderate and low levels of engagement. To gain more accurate understanding of the impact of student presence on older adult engagement levels, future researchers could compare FUSE scores of individuals who were observed to interact with a student to those who were not.

Average FUSE scores for each group could be compared and analyzed. In the present study, 31 out of 80 participants were observed to interact with a student during a session. To determine the validity of the FUSE, future research could compare the FUSE with the EPWDS, a similar scale of engagement in older adults (Jones et al., 2018). This could be done by administering both scales to the same participant during the same session. This comparison could provide valuable information regarding the validity and effectiveness of the FUSE as a measurement of fun and social engagement in older adults.

Conclusion

In conclusion, participation in Bingocize®, an intergenerational health and fitness program, provides older adult CNF residents with the opportunity for social engagement and physical activity which may lead to improved quality of life and other health benefits. As a novel assessment of social engagement in older adults, the Fun and Social Engagement evaluation (FUSE) demonstrates substantial interobserver agreement and requires further evaluation to determine internal validity. While this study does not indicate a relationship between student presence and social engagement, the majority of Bingocize® participants self-reported happiness and demonstrated mostly positive social engagement behaviors.

References

About Bingocize®. (n.d.) Retrieved August 22, 2019, from https://www.wku.edu/bingocize/about_bingocize/

Ahlskog, J. E., Geda, Y. E., Graff-Radford, N. R., & Petersen, R. C. (2011). Physical exercise as a preventive or disease-modifying treatment of dementia and brain aging. *Mayo Clinic Proceedings*, *86*(9), 876–884. https://doi.org/10.4065/mcp.2011.0252

Alzheimer's Association. (2019). 2019 Alzheimers disease facts and figures. *Alzheimers & Dementia*, *15*(3), 321–387. doi: 10.1016/j.jalz.2019.01.010

American Speech-Language-Hearing Association (n.d.). Person-centered focus on function: Speech sound disorder. Retrieved from https://www.asha.org/uploadedFiles/ICF-Speech-Sound-Disorder.pdf

Barnes, D. E., Mehling, W., Wu, E., Beristianos, M., Yaffe, K., Skultety, K., & Chesney, M. A. (2015). Preventing Loss of Independence through Exercise (PLIÉ): A pilot clinical trial in older adults with dementia. *PLOS ONE*, *10*(2), e0113367. https://doi.org/10.1371/journal.pone.0113367

Baumgart, M., Snyder, H. M., Carrillo, M. C., Fazio, S., Kim, H., & Johns, H. (2015). Summary of the evidence on modifiable risk factors for cognitive decline and dementia: A population-based perspective. Alzheimers & Dementia, 11(6), 718–726. doi: 10.1016/j.jalz.2015.05.016

Benefits Planner: Retirement | Social Security Administration. (n.d.). Retrieved August 6, 2019, from https://www.ssa.gov/planners/retire/index.html

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium p. *Social Science*, 15.

Booth, M. L., Owen, N., Bauman, A., Clavisi, O., & Leslie, E. (2000). Social–cognitive and perceived environment influences associated with physical activity in older Australians. *Preventive Medicine, 31*(1), 15–22. https://doi.org/10.1006/pmed.2000.0661

Bowling, A., & Iliffe, S. (2011). Psychological approach to successful ageing predicts future quality of life in older adults. *Health and Quality of Life Outcomes, 9*(1), 13. https://doi.org/10.1186/1477-7525-9-13

Brooker D, & Duce L. (2000). Wellbeing and activity in dementia: A comparison of group reminiscence therapy, structured goal-directed group activity and unstructured time. *Aging & Mental Health, 4*(4), 354–358.

Burton, E., Farrier, K., Lewin, G., Pettigrew, S., Hill, A.-M., Airey, P., … Hill, K. D. (2017). Motivators and barriers for older people participating in resistance training: a systematic review. *Journal of Aging and Physical Activity, 25*(2), 311–324. https://doi.org/10.1123/japa.2015-0289

Camp, C. J. (2010). Origins of Montessori programming for dementia. *Non- Pharmacological Therapies in Dementia, 1*(2), 163–174.

Castle, N. G., & Engberg, J. (2004). Response Formats and Satisfaction Surveys for Elders. *The Gerontologist, 44*(3), 358–367. https://doi.org/10.1093/geront/44.3.358

Centers for Disease Control and Prevention. (2011) Cognitive impairment: A call for action, now. Retrieved from http://www.cdc.gov/aging/healthybrain/index.htm

Chen, Y.-C., Putnam, M., Lee, Y. S., & Morrow-Howell, N. (2019). Activity patterns and health outcomes in later life: the role of nature of engagement. *The Gerontologist, 59*(4), 698–708. https://doi.org/10.1093/geront/gny023

Chogahara, M. (1999). A multidimensional scale for assessing positive and negative social influences on physical activity in older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 54B*(6), S356–S367. https://doi.org/10.1093/geronb/54B.6.S356

Clare, L., & Woods, R. T. (2001). *Cognitive Rehabilitation in Dementia*. Psychology Press.

Cohen-Mansfield, J., Dakheel-Ali, M., & Marx, M. S. (2009). Engagement in persons with dementia: the concept and its measurement. *The American Journal of Geriatric Psychiatry*, *17*(4), 299–307. https://doi.org/10.1097/JGP.0b013e31818f3a52

Crandall, K. J., Fairman, C., & Anderson, J. (2015). Functional performance in older adults after a combination multicomponent exercise program and bingo game. *International Journal of Exercise Science, 8*(1), 38-48.

Crandall, K. J., & Steenbergen, K. I. (2015). Older adults' functional performance and health knowledge after a combination exercise, health education, and bingo game. *Gerontology and Geriatric Medicine*, *1*, 233372141561320. https://doi.org/10.1177/2333721415613201

Cress, M. E., Buchner, D. M., Prohaska, T., Rimmer, J., Brown, M., Macera, C., … Chodzko-Zajko, W. (2006). Best practices for physical activity programs and behavior counseling in older adult populations. *European Review of Aging and Physical Activity*, *3*(1), 34–42. https://doi.org/10.1007/s11556-006-0003-9

Cumming, E., & Henry, W.E. (1961). *Growing old: The process of disengagement.* New York: Basic Books.

Dementia: Overview. (n.d.). Retrieved August 14, 2019, from American Speech-Language-Hearing Association website: https://www.asha.org/Practice-Portal/Clinical-Topics/Dementia/

Devereux-Fitzgerald, A., Powell, R., Dewhurst, A., & French, D. P. (2016). The acceptability of physical activity interventions to older adults: A systematic review and meta-synthesis. *Social Science & Medicine*, *158*, 14–23. https://doi.org/10.1016/j.socscimed.2016.04.006

Erikson, E. H. (1950). *Childhood and society* (1st ed.). New York: W. W. Norton & Company, Inc.

Facts and Figures. (2019). Retrieved August 14, 2019, from Alzheimer's Disease and Dementia website: https://alz.org/alzheimers-dementia/facts-figures

Flood, M. (2005). A mid-range nursing theory of successful aging. *The Journal of Theory Construction & Testing*, *9*(2), 35–39.

Frey, Bruno S., and Alois Stutzer. 2002. *Happiness and economics: How the economy and institutions affect well-being*. Princeton University Press.

Garcia-Retamero, R., & Cokely, E. T. (2013). Communicating health risks with visual aids. *Current Directions in Psychological Science,* 22(5), 392-399.

Gaugler, J. E., Yu, F., Davila, H. W., & Shippee, T. (2014). Alzheimer's disease and nursing homes. *Health Affairs (Project Hope)*, *33*(4), 650–657. https://doi.org/10.1377/hlthaff.2013.1268

George, D. R., & Singer, M. E. (2011). Intergenerational volunteering and quality of life for persons with mild to moderate dementia: Results from a 5-month intervention study in the united states. *The American Journal of Geriatric Psychiatry*, *19*(4), 392–396. https://doi.org/10.1097/JGP.0b013e3181f17f20

Gerritsen D.L., Steverink N., Frijters D.H.M., Hirdes J.P., Ooms M.E., & Ribbe M.W. (2008). A revised index for social engagement for long-term care. *Journal of Gerontological Nursing*, *34*(4), 40–48. https://doi.org/10.3928/00989134-20080401-04

Griffith, D. M., Cornish, E. K., Bergner, E. M., Bruce, M. A., & Beech, B. M. (2018). "Health is the ability to manage yourself without help": How older african american men define health and successful aging. *The Journals of Gerontology: Series B*, *73*(2), 240–247. https://doi.org/10.1093/geronb/gbx075

Gruenewald, T. L., Liao, D. H., & Seeman, T. E. (2012). Contributing to others, contributing to oneself: Perceptions of generativity and health in later life. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *67*(6), 660–665. https://doi.org/10.1093/geronb/gbs034

Hasselgren, C., Dellve, L., Ekbrand, H., Zettergren, A., Zetterberg, H., Blennow, K., ... Halleröd, B. (2018). Socioeconomic status, gender and dementia: the influence of work environment exposures and their interactions with APOE ε4. *SSM - Population Health*, *5*, 171–179. https://doi.org/10.1016/j.ssmph.2018.06.009

Haugan, G., Innstrand, S. T., & Moksnes, U. K. (2013). The effect of nurse–patient interaction on anxiety and depression in cognitively intact nursing home patients. *Journal of Clinical Nursing*, *22*(15–16), 2192–2205. https://doi.org/10.1111/jocn.12072

Hildebrand, M., & Neufeld, P. (2009). Recruiting older adults into a physical activity promotion program: Active living every day offered in a naturally occurring retirement community. *The Gerontologist*, *49*(5), 702–710. https://doi.org/10.1093/geront/gnp072

Huck, S. W., Cormier, W. H., & Bounds, W. G., Jr. (2014). *Reading statistics and research*. Harlow, United Kingdom: Pearson.

Humphrey, J., Montemuro, M., Coker, E., Kilgour-Walsh, L., Moros, K., Murray, C., & Stanners, S. (2017). Artful moments: A framework for successful engagement in an arts-based programme for persons in the middle to late stages of dementia. *Dementia*, 147130121774402. https://doi.org/10.1177/1471301217744025

Ice, G. (2002). Daily life in a nursing home: Has it changed in 25 years?. Journal of Aging Studies. 113. 345-359.

Jansson, A.H., Muurinen, S., Savikko N., Soini, H., Suominen, M.M., Kautiainen, H., Pitkälä, K.H. (2017) Loneliness in nursing homes and assisted living facilities: Prevalence, associated factors, and prognosis. Journal of Nursing Home Research. 2017;3:43-49.http://dx.doi.org/10.14283/jnhrs.2017.7

Jones, C., Sung, B., & Moyle, W. (2018). Engagement of a Person with dementia scale: establishing content validity and psychometric properties. *Journal of Advanced Nursing*, *74*(9), 2227–2240. https://doi.org/10.1111/jan.13717

Kang, H. et al. (2012). Correlates of social engagement in nursing home residents with dementia. Asian Nursing Research, 6, 75-81. doi: 10.1016/j.anr.2012.05.006. Retrieved from https://www.asian-nursingresearch.com/article/S1976-1317(12)00023-0/abstract.

Kiely, D. K., Simon, S. E., Jones, R. N., & Morris, J. N. (2000). The protective effect of social engagement on mortality in long-term care. *Journal of the American Geriatrics Society*, *48*(11), 1367–1372. https://doi.org/10.1111/j.1532-5415.2000.tb02624.x

Kleineidam, L., Thoma, M. V., Maercker, A., Bickel, H., Mösch, E., Hajek, A., … Wagner, M. (2019). What is successful aging? A psychometric validation study of different construct definitions. *The Gerontologist*, *59*(4), 738–748. https://doi.org/10.1093/geront/gny083

Langa, K. M., & Levine, D. A. (2014). The diagnosis and management of mild cognitive impairment: A clinical review. *JAMA*, *312*(23), 2551–2561. https://doi.org/10.1001/jama.2014.13806

Lautenschlager, N. T., Cox, K., & Cyarto, E. V. (2012). The influence of exercise on brain aging and dementia. *Biochimica et Biophysica Acta (BBA) - Molecular Basis of Disease*, *1822*(3), 474–481. https://doi.org/10.1016/j.bbadis.2011.07.010

Lawton, M. P. (1991). A multidimensional view of quality of life in frail elders. In Birren, J.E., Lubben, J.E., Rowe J.C., & Deutchman D.E. (Eds.), *The concept and measurement of quality of life in the frail elderly* (pp. 3-27). San Diego, CA, US: Academic Press. http://dx.doi.org/10.1016/B978-0-12-101275-5.50005-3

Lawton, M. P., Van Haitsma, K., & Klapper, J. (1996). Observed affect in nursing home residents with Alzheimer's disease. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, *51B*(1), 3–14. https://doi.org/10.1093/geronb/51B.1.P3

Lawton, M. P., Winter, L., Kleban, M. H., & Ruckdeschel, K. (1999). Affect and quality of life: Objective and subjective., *Journal of Aging and Health 11*(2), 169–198. https://doi.org/10.1177/089826439901100203

Leon, A. C., Davis, L. L., & Kraemer, H. C. (2011). The Role and Interpretation of Pilot Studies in Clinical Research. *Journal of Psychiatric Research*, *45*(5), 626–629. https://doi.org/10.1016/j.jpsychires.2010.10.008

Li, C.-I., Lin, C.-H., Lin, W.-Y., Liu, C.-S., Chang, C.-K., Meng, N.-H., … Lin, C.-C. (2014). Successful aging defined by health-related quality of life and its determinants in community-dwelling elders. *BMC Public Health*, *14*(1), 1013. https://doi.org/10.1186/1471-2458-14-1013

Livingston, G., Sommerlad, A., Orgeta, V., Costafreda, S. G., Huntley, J., Ames, D., … Mukadam, N. (2017). Dementia prevention, intervention, and care. *The Lancet*, *390*(10113), 2673–2734. https://doi.org/10.1016/S0140-6736(17)31363-6

Logsdon, R. G., Gibbons, L. E., McCurry, S. M., & Teri, L. (2002). Assessing quality of life in older adults with cognitive impairment: *Psychosomatic Medicine*, *64*(3), 510–519. https://doi.org/10.1097/00006842-200205000-00016

Materne, C. J., Luszcz, M. A., & Goodwin-Smith, I. (2014). Increasing constructive engagement and positive affect for residents with severe and very severe dementia through group-based activities. *Australasian Journal on Ageing*, *33*(1), 7–10. https://doi.org/10.1111/ajag.12127

McHugh, M. L. (2012). Interrater reliability: The kappa statistic. *Biochemia Medica*, *22*(3), 276–282.

Miller, R. (2018) 'Bingocize' created by wku professor approved to help address major problem of aging. Retrieved from https://www.wkyufm.org/post/bingocize-created-wku-professor-approved-help-address-major-problem-aging#stream/0

Mullen, S. P., Olson, E. A., Phillips, S. M., Szabo, A. N., Wójcicki, T. R., Mailey, E. L., … McAuley, E. (2011). Measuring enjoyment of physical activity in older adults: Invariance of the Physical Activity Enjoyment Scale (PACES) across groups and time. *International Journal of Behavioral Nutrition and Physical Activity*, *8*(1), 103. https://doi.org/10.1186/1479-5868-8-103

Neils-Strunjas, J., Crandall, K. J., Shackelford, J., Dispennette, K., Stevens, L. R., & Glascock, A. (2018). Students report more positive attitudes toward older adults

following an interprofessional service-learning course. *Gerontology & Geriatrics Education*, 1–11. https://doi.org/10.1080/02701960.2018.1479262

N. I. H. Staff (2018, August 7). Looking for the Latest Definition for Terms Relating to Human Subjects and Clinical Trials? *NIH Extramural Nexus*. https://nexus.od.nih.gov/all/2018/08/07/human-subjects-and-clinical-trial-glossary-updates/

Nyman, S. R., & Szymczynska, P. (2016). Meaningful activities for improving the wellbeing of people with dementia: Beyond mere pleasure to meeting fundamental psychological needs. *Perspectives in Public Health*, *136*(2), 99–107. https://doi.org/10.1177/1757913915626193

Orlikoff, R. F., Schiavetti, N., & Metz, D. E. (2014). *Evaluating research in communication disorders* (7th ed.). PEARSON.

Petersen, R. C., & Negash, S. (2008). Mild cognitive impairment: An overview. *CNS Spectrums*, *13*(1), 45–53. https://doi.org/10.1017/S1092852900016151

Pinto, S., Fumincelli, L., Mazzo, A., Caldeira, S., & Martins, J. C. (2017). Comfort, well-being and quality of life: Discussion of the differences and similarities among the concepts. *Porto Biomedical Journal*, *2*(1), 6–12. https://doi.org/10.1016/j.pbj.2016.11.003

Podilchak, W. (1991). Distinctions of fun, enjoyment and leisure. *Leisure Studies*, *10*(2), 133–148. https://doi.org/10.1080/02614369100390131

Prieto-Flores, M.-E., Forjaz, M. J., Fernandez-Mayoralas, G., Rojo-Perez, F., & Martinez-Martin, P. (2011). Factors associated with loneliness of noninstitutionalized and

institutionalized older adults. *Journal of Aging and Health*, *23*(1), 177–194. https://doi.org/10.1177/0898264310382658

Ravona-Springer, R., & Schnaider-Beeri, M. (2011). The association of diabetes and dementia and possible implications for nondiabetic populations. Expert review of neurotherapeutics, 11(11), 1609–1617. doi:10.1586/ern.11.152

Resnick, B., Orwig, D., Magaziner, J., & Wynne, C. (2002). The effect of social support on exercise behavior in older adults. *Clinical Nursing Research*, *11*(1), 52-70.

Rhodes, R. E., Martin, A. D., Taunton, J. E., Rhodes, E. C., Donnelly, M., & Elliot, J. (1999). Factors associated with exercise adherence among older adults: An individual perspective. *Sports Medicine*, *28*(6), 397–411. https://doi.org/10.2165/00007256-199928060-00003

Rosso, A. L., Taylor, J. A., Tabb, L. P., & Michael, Y. L. (2013). Mobility, disability, and social engagement in older adults. *Journal of Aging and Health*, *25*(4), 617–637. https://doi.org/10.1177/0898264313482489

Rowe, J. W., & Kahn, R. L. (1997). Successful aging. *The Gerontologist*, *37*(4), 433–440.

Sabia, S., Fayosse, A., Dumurgier, J., Schnitzler, A., Empana, J., Ebmeier,K.P., Dugravot, A., Kivimäki, M., Singh-Manoux, A., Association of ideal cardiovascular health at age 50 with incidence of dementia: 25 year follow-up of Whitehall II cohort study. BMJ, 2019; l4414 DOI: 10.1136/bmj.l4414

Saczynski, J. S., Pfeifer, L. A., Masaki, K., Korf, E. S. C., Laurin, D., White, L., & Launer, L. J. (2006). The effect of social engagement on incident dementia. *American Journal of Epidemiology*, *163*(5), 433–440. https://doi.org/10.1093/aje/kwj061

Sampson, E. L., Bulpitt, C. J., & Fletcher, A. E. (2009). Survival of community-dwelling older people: The effect of cognitive impairment and social engagement: Cognitive impairment and survival. *Journal of the American Geriatrics Society*, *57*(6), 985–991. https://doi.org/10.1111/j.1532-5415.2009.02265.x

Scholes, S., Mindell, J. (2013). Physical activity in adults. *Health Survey for England 2012, 1*(2). 1-49.

Schreiner, A.S., Yamamoto, E., & Shiotani, H. (2005). Positive affect among nursing home residents with Alzheimer's dementia: The effect of recreational activity. *Aging & Mental Health*, *9*(2), 129–134.

Stathi, A., Mckenna, J., & Fox, K. R. (2010). Processes associated with participation and adherence to a 12-month exercise programme for adults aged 70 and older. *Journal of Health Psychology*, *15*(6), 838–847. https://doi.org/10.1177/1359105309357090

Stephanie. (2014, December 9). *Cronbach's Alpha: Simple Definition, Use and Interpretation*. Statistics How To. https://www.statisticshowto.datasciencecentral.com/cronbachs-alpha-spss/

Stephens, C., Breheny, M., & Mansvelt, J. (2015). Healthy ageing from the perspective of older people: A capability approach to resilience. *Psychology & Health*, *30*(6), 715–731. https://doi.org/10.1080/08870446.2014.904862

Stevens, L. R. (2019). *Observation and Self-Report of Fun and Social Engagement of Nursing Home Residents During* Bingocize®. 71.

Stuart-Hamilton, I. (2013). *Why we live longer these days, and why you should worry.* Retrieved August 6, 2019, from http://www.psychologytoday.com/blog/the-gift-aging/201301/why-we-live-longer-these-days-and-why-you-should-worry

Tabuchi, M., Nakagawa, T., Miura, A., & Gondo, Y. (2015). Generativity and interaction between the old and young: The role of perceived respect and perceived rejection. *The Gerontologist*, *55*(4), 537–547. https://doi.org/10.1093/geront/gnt135

Tak, S. H., Kedia, S., Tongumpun, T. M., & Hong, S. H. (2015). Activity engagement: Perspectives from nursing home residents with dementia. *Educational Gerontology*, *41*(3), 182–192. https://doi.org/10.1080/03601277.2014.937217

Telenius, E.W., Engedal, K., Bergland, A., (2015) Effect of a high-intensity exercise program on physical function and mental health in nursing home residents with dementia: An assessor blinded randomized controlled trial. *PLoS ONE* 10(5): e0126102. https://doi.org/10.1371/journal.pone.0126102

Topaz, M., Troutman-Jordan, M., & MacKenzie, M. (2014). Construction, deconstruction, and reconstruction: The roots of successful aging theories. *Nursing Science Quarterly*, *27*(3), 226–233. https://doi.org/10.1177/0894318414534484

Tyndall, A.V., Clark C.M., Anderson T.J., Hogan D.B., Hill M.D., Longman, R.S., & Poulin, M.J. (2018). Protective effects of exercise on cognition and brain health in older adults. *Exercise and Sports Science Review*, 46(4): 215-223.

Vincenzo, J. L., & Patton, S. K. (2019). Older adults' experience with fall prevention recommendations derived from the STEADI. *Health Promotion Practice*, 152483991986196. https://doi.org/10.1177/1524839919861967

What is dementia? (2019). Retrieved August 14, 2019, from Alzheimer's Disease and Dementia website: https://alz.org/alzheimers-dementia/what-is-dementia

What is reliability? | Simply Psychology. (n.d.). Retrieved August 26, 2019, from https://www.simplypsychology.org/reliability.html

Whitehouse, P. (2013). The challenges of cognitive aging: Integrating approaches from science to intergenerational relationships. *Journal of Alzheimer's Disease*, *36*(2), 225–232. https://doi.org/10.3233/JAD-130116

World Health Organization | Life expectancy. (n.d.). Retrieved August 25, 2019, from WHO website: http://www.who.int/gho/mortality_burden_disease/life_tables/situation_trends_text/en/

World Health Organization | Physical Activity. (n.d.). Retrieved August 20, 2019, from WHO website: http://www.who.int/dietphysicalactivity/pa/en/

World Health Organization | WHOQOL: Measuring Quality of Life. (n.d.). Retrieved August 17, 2019, from WHO website: https://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/

Yen, H.-Y., & Lin, L.-J. (2018). Quality of life in older adults: Benefits from the productive engagement in physical activity. *Journal of Exercise Science & Fitness*, *16*(2), 49–54. https://doi.org/10.1016/j.jesf.2018.06.001

Appendix A

Fun and Social Engagement Evaluation (FUSE)™

Date _____ Facility _____ Participant ID _____

1. Were students present during this Bingocize® session? Yes No
How many? _____

2. Please circle one based on who administered the FUSE to this participant:

Student

Staff member

Faculty

3. *Please check the boxes below that you observe at least one time during the Bingocize® session.*

☐ Participated in Bingo ☐ Participated in exercise ☐ Laughed ☐ Smiled ☐ Helped out another resident ☐ Talked to another resident ☐ Talked to student ☐ Talked to staff member **Total # of positive boxes checked _____ /8** Other:	☐ Made negative comments ☐ Pushed away activity materials ☐ Frowned ☐ Yelled ☐ Cried ☐ Did or attended to things other than targeted activity (ex. Fidgeting) ☐ Asked or attempted to leave ☐ Sleeping **Total # of negative boxes checked _____ /-8** Other:

***PLEASE ADMINISTER #4 *20 MINUTES* AFTER THE BINGOCIZE® SESSION BEGINS.**

4. Show the participant the male or female faces according to the same gender as the resident participant. Ask the participant: *"Do you feel happy or sad? Point to the picture."* Circle the correct choice based on the participant's response:

(1) Happy (+2)

(2) Sad (-2)

(3) Other (0)

If other, please circle or write the specific response:
-Sleeping or Eyes Closed
-Refused
-Left Session
-Did not understand the question
-Provided other response (e.g. tired)
_____

For researcher use ONLY; #3 Total _____ + #4 Total _____ = _____ + 10 = FUSE Score: _____

Menorah Park Engagement Scale (MPES)

Observation # _____ Activity ID #: _____ Date: _____

Participant's ID # _____ Facilitator: _____

Name of activity: _____

ID # of person filling out form: _____

Type of observation: 1 = Baseline 2 = Treatment

Time of day: 1 = A.M. or 2 = P.M. (circle one) Observation length (minutes): _____

1. Participated in target activity (either constructively or passively)

Did he/she take part in the activity?

0 = No (chart engagement on items 6 and 7) 1 = Yes (chart engagement on items 4, 5, 6, and 7)

2. Tried to leave on own (do not include staff who removed the client)

Did he/she try to leave the activity?

0 = No 1 = Yes

3. Left activity on own or with staff

Did he/she actually leave the activity?

0 = No 1 = Yes

Code no more than one "2" for items 4, 5, 6, and 7.

4. Did the target activity and/or commented on the activity.

How long did he/she participate in the activity by making comments, answering questions, talking about memories, discussing ideas, making gestures in response to the activity, or physically manipulating the materials? (Do not include looking and listening.)

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

5. Listened to and/or watched target activity (code after 3 seconds, but do not code if sleeping)

How long did the participant remain generally alert and spend time listening to and watching the target activity?

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

6. Did or attended to things other than target activity (code after 3 seconds, but do not code if sleeping)

How long did he/she attend to something beside the target activity? Include listening, watching, commenting, gesturing, talking, or physically manipulating any item not associated with the activity. Include self-engagement activities, such as toe- or finger-tapping, pointless manipulation of clothing or other belongings, etc. If the client is listening to or watching the target activity while manipulating an item not associated with the activity (e.g., a walker, bag, or shirt sleeve), code for listened to/watched target activity.

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

7. Slept/kept eyes closed/stared into space (code after 3 seconds)

How long did the participant sleep or keep his/her eyes closed during the observation?

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

Code no more than one "2" for items 8 and 9.

8. Pleasure

How long did he/she express pleasure (laugh or smile) during the observation?

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

9. Anxiety/sadness

How long did he/she display anxiety or sadness during the observation? Include obvious displays of sadness through tearfulness, conversation, or clearly observable depressed affect. Anxiety should be coded for items such as hand-wringing, rocking, anxious vocalizations, or other psychomotor activity if seen in combination with an anxious facial display.

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

10. Helped others

How long did he/she help another player during the observation? Include behaviors such as pointing out answers on another player's card, assisting with the covering mechanism of the card-holder, giving clues to another player ("you have the word MOON"), helping the player read his/her card, etc.

0 = Not at all 1 = Up to half of the observation 2= More than half of the observation

Frequency: 0 = 0 1 = 1–2 2 = 3+

11. Acted inappropriately

How long did he/she say or do something inappropriate, disruptive, or aggressive during the observation?

0 = Not at all 1 = Up to half of the observation 2 = More than half of the observation

Appendix C

INFORMED CONSENT DOCUMENT
Resident Participants

Project Title: Bingocize®: An evidence-based health promotion program to improve the quality of life of Kentucky certified nursing facility residents

Investigator: Dr. Jason Crandall, School of Kinesiology, Recreation, and Sport, 270-745-2077_or Jason.crandall@wku.edu

You are being asked to participate in a project conducted through Western Kentucky University; The University requires that you give your signed agreement to participate in this project.
You must be 18 years old or older to participate in this research study.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

If you then decide to participate in the project, please sign this form in the presence of the person who explained the project to you. You should be given a copy of this form to keep.

1. **Nature and Purpose of the Project:**
The purpose of this project is to determine the effectiveness of a health promotion program called Bingocize. We hope you will increase your mobility and reduce your risk of falls. You will participate twice per week for the duration of this project.

2. **Explanation of Procedures:**
You will be asked to complete a short survey at the end of each Bingocize session. The survey will only take about 5 minutes to complete.

3. **Discomfort and Risks:**
Emotional stress may occur due to not being able to complete exercises. Physical injury is possible with any type of physical exercise/exertion--although every effort will be made to use proper progressions and exercises. All staff involved in the physical activities will be trained beforehand and you are encouraged to take breaks if necessary.

4. **Benefits:**
The potential direct benefits to you are that you should improve fitness level, including improved cardiorespiratory fitness, muscular strength, balance, and flexibility. In addition, there are social benefits from participating.

WKU IRB# 17-457
Approval - 1/29/2019
End Date - 1/29/2020
Expedited
Original - 5/30/2017

5. **Confidentiality:**
The answers you provide on the survey are confidential, which means that your responses/results will only be known by the team of investigators. Your identity as a participant in this research study will be kept confidential in any publication of the results of this study. The information obtained during this research (research records) will be kept confidential to the extent permitted by law. However, this research record may be reviewed by government agencies, individuals who are authorized to monitor and audit this research, or the Institutional Review Board (the committee that oversees all research in human subjects at Western Kentucky University) if required by applicable laws or regulations.

6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

_____ _____
Signature of Participant Date

_____ _____
Witness Date

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Paul Mooney, Human Protections Administrator
TELEPHONE: (270) 745-2129

WKU IRB# 17-457
Approval - 1/29/2019
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