The Effect of Art Training on Dementia

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Abstract

The present study is a pilot project investigating the effect of visual art training on the mood, behaviour, and cognition of persons with dementia (PWD). The study utilized a randomized control trial (RCT) design, with a usual activity waitlist control group, in order to investigate the effects of an eight-week visual art training program, designed specifically for this project, on PWD. Mood was assessed with the Visual Analogue Mood Scale's happiness, sadness, anger, tension, confusion, tiredness, and energy subscales. Behaviour was assessed with the Neuropsychiatric Inventory's agitation and aggression, depression and dysphoria, apathy and indifference, and anxiety subcategories. Cognition was assessed with the Backward Digit Span, measuring auditory working memory, the Body Part Pointing task, measuring visuospatial working memory, and the Rey Osterreith Complex Figure Task and Rey Auditory Verbal Learning Task, measuring visual and auditory episodic long-term memory, respectively. The results of the present study provide insights regarding the use of visual art training as a possible means of improving working memory while avoiding qualitative reports of problematic behaviour and mood disturbances. However, these results must be interpreted with caution as performance on most tasks did not reach significance. Furthermore, small sample size and task-related complications represent significant limitations, affecting the present study's generalizability. Nevertheless, the results of the present study are promising and encourage the need for additional research utilizing larger sample sizes.

Keywords: randomized control trial, visual arts, dementia, Alzheimer's disease, mood, behaviour, cognition

Dedication

My Master's thesis is dedicated to the individuals who participated in and facilitated the project. Without the recruited dementia centres and participants, I would not have my current perspective on dementia or the research and lifetime knowledge I gained throughout the project.

My first experience working with PWD occurred the day I started visiting the recruited dementia centres. The staff were kind enough to let me sit in on the activities of the day, starting with a musician coming in to sing and play guitar for the clients, and provided specific insights and information that I could not have gained any other way. As I sat and watched the clients sing and move to the music, I was fortunate enough to have one gentleman ask me to dance. We spoke while we danced, mostly regarding my rhythm-less moves, but also about his wife, my fiancé, and life in general. The clients and staff made me feel so welcome that all my initial feelings of nervousness were quickly forgotten.

As the musician left the centre, the staff moved on to a different activity. As I observed, I saw the staff maneuvering and responding in a way that could only be described as an intricate dance. The smoothness of their transitions between activities, the smiles on their faces, and the speed at which they could sooth clients was an experience that deserves to be witnessed. After some time, I was ready to leave and began walking towards the exit doors. Within that short walk, I became very aware of two things: I want to be a dementia researcher and I have so much to learn.

Once the project commenced, I began to instruct the first group of participants' visual art training program. Within weeks, I went from being a complete stranger to someone who they accepted as an instructor. They gave me a respect I could not have asked for and an experience I would never forfeit. The knowledge and experiences each participant shared with me is knowledge and experience that I will not only use for this thesis, but for the rest of my life.

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My family has provided me with unconditional love and encouragement throughout my life. Their insights and unwavering support have always pushed me forward and eased my fears and doubts. Without their guidance and care, I would not be the researcher or person I am today.

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The research team for this project was large, consisting of myself, Dr. Melody Wiseheart, Annalise D'Souza, twelve volunteers, three committee members, and multiple informants. The twelve volunteers who assisted with the research project, listed alphabetically, are: Amanda Nickerson, Anjali Wisnarama, Anthony Fallico, Avital Krikunetz, Hamze Sibai, Heather Carter-Simmons, Lauren Goldberg, Lysianne Buie, Negar Farzaghi, Orly Taub, Sydney Sheard, and Zunaira Amin. The committee members on the project are Dr. Shayna Rosenbaum, Dr. Susan Murtha, and external committee member Dr. Lauren Sergeo. Informants on the project include the Alzheimer's Society of York Region, York University's Cognitive Flexibility Lab, and experienced artist and arts instructor Sandi Wiseheart. Each part of the research team is appreciated for their support, guidance, and contributions.

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1. Introduction

Visual art training is easy to administer, inexpensive and flexible in difficulty and duration. Furthermore, unlike current pharmacological treatments for dementia, visual art training is noninvasive and enjoyable. With the dementia population steadily increasing, assessing potential treatment methods, such as visual art training, is necessary. Although evidence exists supporting the beneficial effects of visual art, slowing emotional, behavioural, and cognitive decline for persons with dementia (PWD; Chancellor, Duncan, & Chatterjee, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002; Rusted, 2006; Stewart, 2004; Takahashi & Hatakeyama, 2011; Young, 2014), more research is needed due to previous study limitations, incomplete published reports, and gaps in the related literature.

Although pharmacological treatments are currently the main approach in tackling dementia, they can have limited efficacy and negative side effects (Young, 2014). In contrast, visual art training offers a more enjoyable and less invasive mode of treatment. However, while non-pharmacological interventions, such as visual art training, have demonstrated remedial effects (Chancellor, Duncan, & Chatterjee, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002; Rusted, 2006; Stewart, 2004; Takahashi & Hatakeyama, 2011; Young, 2014), there is still a need for reliable experiments in order to establish efficacy (Vink, Bruinsma, & Schoten, 2011). Thus, visual art training interventions with reliable experimental designs are needed.

Multiple studies have assessed the effect of visual art, most commonly visual art therapy, on dementia patients' mood and behaviour. However, these studies have multiple limitations, most notably their non-robust designs and limited experimental control, as well as a common lack of methodological detail in published reports (Chancellor, Duncan, & Chatterjee, 2014; Rusted et al.,

2006; Vink et al., 2011, Young, 2014). Furthermore, few studies have assessed other constructs in regards to visual art and dementia, including the highly relevant effects on cognitive function (Vink et al., 2011; Locher, 2007; Young, 2014). These oversights have resulted in a large gap in the published visual art-dementia literature. With a robust randomized control trail (RCT) design and a thorough report, the present study aims to add to the existing mood and behaviour dementia-art literature and fill a gap in the literature regarding the effect of visual art training on cognition.

1.1 Dementia

Dementia is described as a clinical syndrome causing progressive cognitive decline and a loss of daily functioning, associated with a variety of symptoms affecting mood, cognition, and behaviour (Vink, Bruinsa, & Scolten, 2011). In regards to the commonality of dementia types, Alzheimer's disease (AD) is followed by Vascular Dementia, Dementia of the Lewy Bodies Type, and Frontotemporal Dementia (ADI, 2010 in Vink et al., 2011). Details regarding the effects of dementia and its variety of subtypes are available in Table 1, outlining the onset ages, prominent symptoms, prevalence rates, preserved abilities, and effects of dementia on the brain.

Table 1.

Dementia type comparisons

Dementia; Prevalence; Onset	Symptoms	Preserved Abilities	Effect on the Brain
Overall; Associated with over 60 conditions (Kahn-Denis, 1997); prevalence varies; onset varies	Memory (Fleischman & Gabrieli, 1999; Fornazzari, 2005; Huntley & Howard, 2009; Gretton, 2014; Rose Addis & Tippet, 2004; Sahlas, 2003; Stewart, 2004; Storandt, 2008) social and occupational disturbances (Stewart, 2004); loss of daily functioning, cognitive, behavioural and emotion disturbances (Vink et al., 2011)	Visual artistic creativity and abilities (Fornazzari, 2005; Mendez, 2004; Van Buren, Bromberger, Potts, Miller, & Chatterley, 2013)	Varies
AD: Familial (early onset) characterized by inherited parental genes, and sporadic (late onset) characterized by familial AD-related genetic factors (Alzheimer's society of Canada, 2012); most common form of dementia (ADI, 2010 in Vink et al., 2011); early onset at 30, late onset at 65 (Gazes et al., 2012)	Autobiographical memory decline (Fleischman & Gabrieli, 1999; Gretton, 2014; Rose Addis & Tippet, 2004); executive function, portions of working memory, organization dysfunction (Fornazzari, 2005); spatial and perceptual dysfunction (Leiner-Fisman & Lang, 2004); apraxia, aphasia, agnosia (Gretton, 2014; Storandt, 2008); later stage language, attention, reasoning and visuospatial dysfunction (Fleischman & Gabrieli, 1999)	Primary sensory and motor cortices (Van Buren et al., 2013); visuospatial, and visuomotor abilities (Fornazzari, 2005); early semantic memory (Fleischman & Gabrieli, 1999; Gretton, 2014)	Senile plaques, neurofibrillary tangles (Scarmeas &Stern, 2004); degeneration of the parietal lobes (Mendez, 2004), medial temporal lobes, sections of the cerebral cortex (Van Buren et al., 2013); hippocampal damage (Fleischman & Gabrieli, 1999); frontal lobe degeneration (Huntley & Howard, 2009)

Table 1.

(*Continued*)

Dementia; Prevalence; Onset	Symptoms	Preserved Abilities	Effect on the Brain
Vascular (formerly known as multi-infarct) Dementia; second most common form of dementia (ADI, 2010 in Vink et al., 2011); onset after stroke (Gretton, 2014)	Highly varies based on where lesions occur; attention, short-term and episodic memory deficits; visual impairment, motor weakness, and confusion (Gretton, 2014; Stewart, 2004)	Varies based on the distribution of the vascular disease; spontaneous artistic creativity. (Gretton, 2014)	Vascular lesions due to the blockage of arteries in the brain (Dudgeon, 2010; Gretton, 2014; Mille & Hou, 2004; Stewart, 2004)
Lewy Body Dementia; third most common form of dementia (ADI, 2010 in Vink et al., 2011); onset at 50 (Sahlas, 2003)	Hallucinations, tremors, rigidity, impaired visual perception, attention, and motor (Gretton, 2014); confusion (Guétin et al., 2009); later stage memory impairment (Sahlas, 2003)	Artistic personality and semantic memory (Gretton, 2014)	Impaired parietal-temporal and occipital lobes (Gretton, 2014); lewy bodies in the brain (Sahlas, 2003)
Fronto-temporal Dementia; fourth most common form of dementia (ADI, 2010 in Vink et al., 2011); onset at 50 (Mendez, 2004)	Deterioration of attention, executive function, and some forms of working memory (Fornazarri, 2005)	Visuo-constructive regions (Leiner-Fisman & Lang, 2004), episodic memory, planning, and complex thought (Mendez, 2004)	Deterioration of the frontal and/or anterior temporal regions of the brain (Leiner-Fisman & Lang, 2004)

In 1997, it was estimated that 1% of persons under 65 years and 25% of persons over 85 years had some form of dementia worldwide (Kahn-Denis, 1997). Since then, the number of persons with dementia appears to have increased, with new increases being documented annually. For example, by 2004 it was reported that 50% of the American population age 85 years and older had some form of dementia (Stewart, 2004). Economically, this increase in PWD is an enormous personal and societal issue, costing an annual $20,000 per person to receive care at home and up to $80,000 per person to receive care while living in a long-term care setting (Stewart, 2004).

A more local assessment of dementia-related cost was completed in 2010, when Canada was home to 103,728 people diagnosed with some form of dementia. That year, a reported $15 billion went towards dementia-related costs, with an average cost of $144,608.98 per person (Dudgeon, 2010). Furthermore, the number of persons with some form of dementia is projected to increase in Canada annually, reaching 1,125,200 by 2038. With the projected increase in PWD comes an expected increase in dementia-related costs, totaling an estimated annual $872 billion in 2038 (Dudgeon, 2010). Based on these numbers, it is clear that the number of PWD is increasing and is becoming more economically costly – both personally and societally. Thus, there is an understandable need for interventions that capitalize on preserving the abilities of PWD in order to prolong daily functioning and alleviate the personal and social costs of the disease.

1.2 The Preservation of Art Ability

Arts interventions are suitable for the dementia population as artistic abilities appear to be retained even in the face of dementia, with research showing that the ability to produce visual art post-diagnosis is well preserved even, at times, during the later stages of the disease (Fornazzari, 2005; Van Buren et al., 2013). For example, there have been cases where visual artists with dementia continue to create art by seemingly compensating for dementia-related art production

complications through the use of abstraction (Fornazarri, 2005; Leiner-Fisman & Lang, 2004; Mendez, 2004, Van Buren et al., 2013), such as the famous visual artist Willem de Kooning. Specifically, De Kooning, assumed to have AD (Sahlas, 2003), began utilizing abstraction techniques during his later years, which theorists believe may have been his way of coping with dementia-related visual art production complications (Fornazarri, 2005). Thus, even when abilities deteriorate with dementia, the preservation of artistic ability appears to compensate for other dementia-related deficits that may affect visual art production, supporting the flexibility of visual art as a means to appeal to different levels of ability.

The preservation of art experienced by PWD has been suggested to be due to multiple disease outcomes. During the early and moderate stages of dementia, visual abilities such as colour, space, and contour identification, as well as component grouping, are typically preserved (Chancellor et al., 2014). Furthermore, due to the preserved visual, sensory, motor, visuospatial, and visuomotor abilities experienced by persons during the early and moderate stages of dementia (Fornazzari, 2005; Van Buren et al., 2013), many are able to continue participating in visual art activities.

PWD have been known to take up visual art with success after their initial dementia diagnosis, especially those with frontotemporal dementia (Leiner-Fisman & Lang, 2004). Astoundingly, even those with Lewy Body dementia, who can experience profound motor disturbances and a frequent loss of attention, can experience moments of clarity and visual artistic productiveness (Sahlas, 2003). This sudden interest in visual art creation, as well as the commonality of preserved visual art abilities, suggests a general preservation of artistic ability for PWD. However, for some PWD, the preserved visual art ability may be enhanced by an individual's cognitive reserve, the theoretical notion that there are individual differences in the

way that the brain copes with neurological disease pathology (Scarmeas & Stern, 2004). Specifically, the cognitive reserve hypothesis suggests that certain early and mid-life activities, such as visual art classes, can increase the synaptic density in a person's neocortical association cortex, enabling efficient cognitive function by leaving unaffected neurons available to compensate for loss of function related to later life diseases like dementia (Scarmeas & Stern, 2004). Although the literature accepts the preservation of artistic ability for PWD, more studies utilizing rigorous methods are needed in order to assess the possible benefits of such abilities.

1.3 The Effect of Visual Art on Mood and Behaviour in Dementia

Multiple studies have assessed the value of visual art in regards to the mood and behaviour of dementia patients, with notable studies outlined and described in Table 2. For example, research has demonstrated that participating in a visual art intervention can improve dementia patients' mood and behaviour and decrease anxiety and depression scores (Chancellor, Duncan, & Chatterjee, 2014). These affective improvements correlate with outward changes, such as decreased problematic behaviours like agitation, anxiety, depression (Chancellor, Duncan, & Chatterley, 2014) and apathy (Hattori, Hattori, Hokao, Mizushima, & Mase, 2011). Furthermore, visual art participation has been shown to reduce feelings of social isolation and increase feelings of self-esteem, optimism, enthusiasm and compassion, while improving productivity, symptom coping, and overall affect (Bentes-Levy, 2012; Stewart, 2004; Young, 2014).

Qualitative research has supported the use of visual art as a means to improve the mood and behaviour of dementia patients. For example, Kahn-Denis (1997) utilized a case study design to assess three PWD who participated in a visual art therapy intervention for several years. The assessments were qualitative and based on an interview between the researcher and the participants. The results of the study supported the use of visual art therapy as a means to improve

mood and increase self awareness. Likewise, these qualitative results have been supported in similar research utilizing quantitative methods (Kinney & Rentz, 2005; Rentz, 2002; Rusted, Sheppard, & Waller, 2006).

Evidence from quantitative research has supported the benefits of visual art creation on PWD's mood and behaviour. For example, Kinney and Rentz (2005) and Rentz (2002) found program benefits when they quantitatively assessed the efficacy of the Alzheimer's Association's *Memories in the Making* visual art program. The *Memories in the Making* visual art program uses the creation of drawings and paintings in order to evoke memories, express stories, and create works of personal value for PWD. Specifically, Kinney and Rentz (2005) and Rentz (2002) used an in-session observational well-being measure to investigate if the *Memories in the Making* program could be beneficial to dementia patient's well-being, mood and behaviour. The results from both studies indicated a significant well-being benefit and an overall increase in participant pleasure, interest, and self-esteem. Rusted et al., (2006) further supported these claims when they assessed the efficacy of visual art therapy for PWD, utilizing multiple quantitative behaviour and mood measures. The researchers found an overall behaviour and mood improvement as a result of the visual art therapy, with a significant increase in participant calmness and sociability (Rusted et al., 2006).

Mood and behaviour improvements are pertinent when considering ways to improve dementia patient quality of life, especially when considering the enormity of problematic moods and behaviours within the dementia population. Both mood and behavioural disturbances are present at the onset of dementia (Vink, Bruinsa, & Scolten, 2011) and can vary across dementia types. For example, when considering AD, mood disorders such as depression are prominently

comorbid, and problematic behaviours, such as agitation, are estimated to affect up to 60% of patients (Poirier & Gauthier, 2011).

Although the art-mood and art-behaviour links have clearly been explored in the published dementia literature, the quality of research needs to be improved; with limitations such as small sample size, in-group dissimilarities, incomplete reports, lack of control group, and a need for randomization (Chancellor, Duncan, & Chatterjee, 2014; Rusted et al., 2006; Vink et al., 2011, Young, 2014). The present study aims to address these limitations as an exploratory pilot study, utilizing a strong methodological design with feasible replicability, in order to not only investigate the previously explored mood and behaviour effects of visual art training, but also the highly relevant potential working and episodic long-term memory effects of visual art training – an unexplored topic within the published literature.

Table 2.

Studies Investigating the Effect Visual Art Has on PWD's Mood and Behaviour

Author and Year	N	Dementia Type (Age)	Design (Intervention)	Task (Results)
Kahn-Denis (1997)	3	Mixed: AD, Multi-Infarct, NS (82, 83, 85)	Qualitative analysis (several years of art therapy)	Interview (positive mood and self-awareness)
Kinney & Rentz (2005)	12	Mixed: AD, Vascular, Pugilistic, Alcohol-related, confusion (65-85)	Program evaluation (five weeks of painting and drawing)	Observation of Well-Being (increased interest, pleasure, well-being, self-esteem)
Rentz (2002)	41	Mixed: NS (NS)	Pilot program evaluation (twelve weeks of painting and drawing)	Observation of Well-Being (enhanced well-being and pleasure)
Rusted (2006)	21	Mixed: AD, NS, Multi-Infract (67-92)	RCT: Active, Centre Activities, Control (40 Weeks of Art Therapy)	CSDD and MOSES (improved calmness and sociability)

Notes. CSDD (Cornell Scale for Depression in Dementia); MOSES (Multi-Observational Scale for the Elderly); NS (Not Specified)

Table 2.

(Continued)

Author and Year	N	Dementia Type (Age)	Design (Intervention)	Task (Results)
Stewart (2004)	4	Mixed: NS (89, 90s, 94, NS)	Qualitative analysis (unspecified duration of mixed media art therapy)	Observation and interview (positive Affect)
Young (2014)	13	Mixed: NS (60-94)	Retrospective analysis (eight weeks of art viewing and art making)	Content analysis of audio recordings (increased emotional reactions to art and the group)
Hattori et al., (2011)	39	AD (65-85)	RCT: active, calculations, control (twelve weeks of colouring art therapy)	The quality of life short form, the geriatric depression scale, the apathy scale, the dementia behaviour disturbance scale (improvement related to apathy)

1.4 The Effect of Visual Art on the Overall Cognition of Dementia Patients

A defining characteristic of dementia, as well as its subtypes, is cognitive decline, especially in regards to memory. Although different aspects of memory decline with normal aging (Cepeda, Kramer, & Gonzalez de Sather, 2001), memory declines even more so during the development of dementia (Fleischman & Gabrieli, 1999; Fornazzari, 2005; Huntley & Howard, 2009; Gretton, 2014; Rose Addis & Tippet, 2004; Sahlas, 2003; Stewart, 2004; Storandt, 2008). Details regarding the effects of dementia and its subtypes on different types of memory can be seen in Table 1. These cognitive symptoms can be debilitating to those who suffer from them and, thus, interventions aiming to alleviate such symptoms while reducing rates of decline are important.

Previous dementia research supports that visual art training may encourage PWD to use and improve their specific existing cognitive skills (Young, 2014), however there is a lack of quantitative evidence to support that theory. There is evidence, however, that visual art training may improve the existing cognitive skills of non-clinical samples. For example, participating in visual art interventions has shown positive outcomes for normal aging older-adults, with results supporting an increase in curiosity and mental flexibility, creative thinking and problem solving, and the overall improvement of cognitive function (Bentes-Levy, 2012). More specifically, research has suggested a connection between visual art and memory, with evidence that supports a link between visual art and working and episodic long-term memory (Bentes-Levy, 2012). While there are multiple studies that have assessed the effect of visual art on PWD's cognition, as outlined in Table 3, I am unaware of any published research that has experimentally assessed the effect of visual art training on PWD's working and/or episodic long-term memory.

1.5 The Effect of Visual Art on Memory

1.5.1 Visual and Auditory Working Memory. Working memory, from a cognitive psychology standpoint, is defined as a process involved with the momentary storing, activating, monitoring, and manipulating of information (Baddeley & Hitch, 1974) – a process that appears to be enhanced by participating in visual art activities. Specifically, the portion of working memory responsible for mentally maintaining and manipulating visual imagery, an ability thought to be part of visuospatial working memory (Baddeley & Logie, 1999; Takahashi & Hatakeyama, 2011), has been suggested to be of exceptional relevance to visual artists' artistic ability (Perez-Fabello & Campos, 2007). In addition to visuospatial working memory, auditory working memory also appears to be highly relevant when considering visual art training. Specifically, the mental maintaining and manipulating of auditory visual art term definitions, activity instructions, and feedback seems intuitively entwined with participating in a visual art training program.

The importance of visuospatial and auditory working memory within a visual art training program has been supported by Young's (2014) dissertation discussing the effectiveness of visual art interventions for PWD. Young (2014) argued that since Baddeley's (1992) working memory model assumes that working memory is enhanced when auditory and visual modalities are combined, overall working memory should also be enhanced during visual art programs, where both modalities are entwined (Young, 2014).

1.5.2 Long-Term Memory. In addition to working memory, long-term memory has also been linked to participating in the visual arts. Explicit long-term memory consists of episodic and semantic memory. Episodic long-term memory is defined as an enduring source of memories pertaining to events within specific space and time relevant contexts, while semantic long-term memory is defined as an enduring source of memories without context, containing associations,

concepts, rules, and general world knowledge (Fleischman & Gabrieli, 1999). Although there are no published studies investigating the effect visual art training has on PWD's long-term memory, there is research assessing the use of visual art as a tool when attempting to enhance the long-term-memory of school children. In an arts integration literature review, Rinne and colleagues (2011) argued that classroom visual arts integration, the use of visual art in a curriculum as a tool for teaching, improves the retention of content and semantic long-term memories of students. By utilizing visual art integration in educational curricula, Rinne et al., (2011) argued that students can enhance their semantic program-related long-term memories with the visual rehearsal, elaboration, generation and representation of information or memories that occurs during the process of creating visual artwork, as well as the emotional arousal and interpretation that occurs while observing visual artwork. Although the article was aimed at kindergarten to grade 12 school children, the argument may extend to persons outside of elementary and high schools. Relevant to the present study, the effect of visual arts integration on long-term memory may also apply to visual art programs for the senior population, including visual art programs for PWD.

Although there is minimal research on the potential effect of visual art on long-term memory, there are documented qualitative reports supporting the positive effects of visual art participation for PWD's reminiscing. Specifically, qualitative research has suggested that visual art therapy may improve PWD's autobiographical memory, consisting of episodic memories and personal semantic memories (Rose Addis & Tippet, 2004). This suggestion has been supported by the documented observations of reminiscing for PWD participating in visual art therapy (Kahn-Denis, 1997; Stewart, 2004). However, these results must be interpreted with caution, as quantitative experimental research has shown contradictory effects, with insignificant findings related to memory (including auditory short-term memory, visual short-term memory, auditory

prospective memory, and auditory episodic short and long-term memory) for PWD participating in visual art therapy and colouring activities (Hattori et al., 2011; Rusted et al., 2006).

Table 3.

Studies Investigating the Effect Visual Art Has on PWD's Cognition

Author and Year	N	Dementia Type (Age)	Design (Intervention)	Task (Results)
Kahn-Denis (1997)	3	Mixed: AD, Multi-Infarct, NS (82, 83, 85)	Qualitative analysis (several years of art therapy)	Interview (observed reminiscing)
Kinney & Rentz (2005)	12	Mixed: AD, Vascular, Pugilistic, Alcohol-related, confusion (65-85)	Program evaluation (twelve weeks of painting and drawing)	Observation of Well-Being (increased sustained attention)
Rentz (2002)	41	Mixed: NS (NS)	Pilot program evaluation (twelve weeks of painting and drawing)	Observation of Well-Being (increased sustained attention)
Rusted (2006)	21	Mixed: AD, NS, Multi-Infract (67-92)	RCT: active, Centre activities, control (forty weeks of art therapy)	The Rivermead Behavioural Memory Test, Tests of Everyday Attention, Breton Fluency Task (no significant improvement)

Table 3.

(Continued)

Author and Year	N	Dementia Type (Age)	Design (Intervention)	Task (Results)
Stewart (2004)	4	Mixed: NS (89, 90s, 94, NS)	Qualitative analysis (unspecified duration of mixed media art therapy)	Observation and Interview (observed reminiscing)
Young (2014)	13	Mixed: NS (60-94)	Retrospective analysis (eight weeks of art viewing and art making)	Content Analysis of Audio Recordings (improved episodic and semantic memory)
Hattori et al., (2011)	39	AD (65-85)	RCT: active, calculations, control (twelve weeks of colouring art therapy)	Mini-Mental State Examination, Wechsler Memory Scale (no significant improvement)

1.6 Theoretical Direct and Indirect Effects of Visual Art Training on Memory.

Although the literature suggests that visual art enhances certain cognitive constructs, it remains unclear whether visual art training will directly or indirectly enhance those constructs, with indirect enhancements improving other constructs which can enable the utilization of novel strategies in order to bypass certain dementia-related deficits. Intuitively, it is conceivable that the momentary processing and manipulating of information involved in working memory tasks matches the demands of visual art training, where the momentary processing and manipulation of information (visuospatial and auditory) are required (Baddeley & Logie, 1999; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011; Young, 2014)[1]. Thus, without purposefully targeting it (i.e., not including additional curriculum components intended to enhance a specific construct), visual art training may still be able to directly enhance working memory. This theory has been suggested in the published literature (Takahashi & Hatakeyama, 2011; Young, 2014), however further research utilizing experimentally rigorous methods are necessary before any conclusive claims can be made.

Unlike working memory, it is less conceivable that other cognitive constructs, such as episodic long-term memory, are directly affected by visual art training unless they are purposefully targeted with methods such as arts integration (Rinne, 2011). Therefore, without purposeful episodic long-term memory enhancement, visual art training programs may not directly enhance episodic long-term memory, but may indirectly enhance it by enhancing other constructs in order to enable the utilization of novel strategies to by-pass dementia related episodic long-term memory decline. This may help explain the converse results in the published dementia literature, with

[1] Although a theoretical discussion of working memory would go beyond the scope of this thesis, it is important to note that working memory models and theories vary (for a highly recommended working memory model and theory resource, see Miyake & Shah 1999).

qualitative reports of observed episodic long-term memory retrieval within PWD's visual artworks (Kahn-Denis, 1997; Stewart, 2004), but no significant episodic long-term memory improvements on quantitative measures (Hattori et al., 2011). Thus, current findings may support the indirect effect visual art has on episodic long-term memory, resulting in acute effects documented with qualitative, but not quantitative, reports. These discrepancies support the need for additional research investigating the direct and indirect effects of visual art on episodic long-term memory.

For the purposes of the present study, the utilized curriculum has been developed without additional curriculum components intended to enhance any non-art related constructs (e.g., explicit working and episodic long-term memory enhancements), and will, therefore, not only provide commentary on the relationship visual art training has with cognition, mood and behaviour, but also provide further insights regarding the concepts that may be directly or indirectly related to visual art training. As working and episodic long-term memory decline with the development of dementia, and appear to be enhanced with visual art interventions (Baddeley & Logie, 1999; Kinney & Rentz, 2005; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011; Rentz, 2002; Rinne et al., 2011; Young, 2014), the potential link between these constructs and visual art training for PWD seems worthy of further investigation. Although the present study focuses on visual art training, the majority of visual art interventions utilize visual art therapy – with the two treatment methods possibly sharing certain theoretical benefits.

1.7 The Theoretical Effect of Art on Mood, Behaviour and Cognition.

The theoretical reasoning for the effect of visual art training on PWD's mood, behaviour, and cognition could be tied to the theoretical basis of art therapy (Bentes-Levy, 2012). The theory behind art therapy, as discussed by Bentes-Levy (2012), is twofold. The first theory supports the notion that art can be used as a *tool*, specifically for communication purposes (Peterson, 2006 in

Bentes-Levy, 2012). Thus, visual art can be used as an additional communicative medium, especially for persons who have trouble communicating verbally. The second theory behind art therapy is well implied by its title: Art as a *therapy,* as a means of treating or helping someone. The latter theory is based on the supported general therapeutic effects experienced by persons involved in visual art activities (Peterson, 2006 in Bentes-Levy, 2006). The communicative and therapeutic effects experienced by persons participating in visual art activities are understandable, especially when someone has difficulties with other communicative mediums, as art enables the imparting or exchanging of information which, at the same time, can also enable the release of emotions and exchange of helpful information. Visual art is a medium for self-expression and story telling, supporting outward communication and inward coping.

Other researchers have proposed additional theories related to the success of art therapy, as discussed by Chancellor, Duncan, & Chatterjee (2012). The first theory supports the notion that art can be used as a means of *expression*, specifically, emotional expression. Thus, like Bentes-Levy (2006), this theory proposes that art can be used as a non-verbal communicative medium for persons, especially persons who have trouble communicating verbally, and can facilitate the expression of personal emotions. The second theory proposes that arts engagement can induce *flow*. This theory proposes that art can help a person perform at their best and can even provide a sense of personhood. Such claims have been made previously by Rentz (2002), who documented that a participant expressed a sense of personhood during a *Memories in the Making* visual art program, and is important as a loss of self-identity has been documented in the dementia population – a loss associated with the decline in autobiographical memory (episodic memory and personal semantic memory; Rose Addis & Tippet, 2004) experienced by PWD. In summary, these two theories suggest that visual art may be used as a tool for emotional expression and as an inducer

of individual flow, two benefits that may not only produce positive mood and behaviour effects, caused by the enhanced feeling of personhood and emotional outlet access, but also potential cognitive effects as a result of the improved mood.

The mediating effect of mood on cognition has been supported in the related literature. Multiple studies have found mood and cognition effects for PWD after participating in a visual art intervention (Kinney & Rentz, 2005; Rentz, 2002; Stewart, 2004; Young, 2014), supporting the theories proposing an overall mediating effect of mood on cognition for the dementia population. Specifically, theorists propose that improved mood as a result of creating an artwork can effect a person's cognition in regards to the evoked memories the emotions illicit, while a person's cognitive ability effects their ability to communicate and socialize, with both factors affecting a person's mood and mood affecting both factors (Young, 2014). Thus, mood and cognition seem to be linked within the literature, both practically and theoretically.

1.8 The Present study

The present study is important for multiple reasons. First, it addresses an ongoing need for non-pharmacological dementia intervention options (Vink et al., 2011; Young, 2014). Second, with its strong experimental RCT design and robust methodology, it adds to the related published literature assessing the effect of visual art on PWD's mood and behaviour. Furthermore, the present study will provide a full report of the methods utilized and considers disease type and severity (as well as multiple other relevant baseline features) to enable future specific comparisons and feasible replications. Third, few published experimental studies investigate the relationship between visual art training and dementia (Vink et al., 2011; Locher, 2007) and, to date, there are no published RCT studies assessing the effect of visual art training on PWD's working or episodic long-term memory, two constructs heavily effected by dementia (Young, 2014). Thus, the present

study will be filling an important gap in the related literature. Lastly, the curriculum developed for the present study was thoughtfully designed based on the related published literature and psychologist, artist, and dementia expert feedback. The developed curriculum will be made available so that other researchers and/or dementia locations can utilize the – now tried and tested – visual art program.

The present study is a pilot project investigating the impact of visual art training on PWD. The hypotheses are as follows:

1. Visual art training will off-set the decline in working and episodic long-term memory (Baddeley & Logie, 1999; Kinney & Rentz, 2005; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011; Rentz, 2002; Rinne et al., 2011; Young, 2014).
2. Visual art training will improve mood and lessen problematic behaviour (Bentes-Levy, 2012; Chancellor, Duncan, & Chatterjee, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002; Rusted, 2006; Stewart, 2004; Young, 2014).
3. Mood will to some extent mediate cognitive changes (Kinney & Rentz, 2005; Rentz, 2002; Stewart, 2004; Young, 2014).

I predict that visual art training will offset dementia related cognitive decline, worsened mood, and problematic behaviour, when compared to the no-art waitlist control group. All hypothesized improvements are expected for the dementia samples in the experimental group, receiving visual art training before post-testing, in comparison to the dementia samples in the waitlist control group, receiving visual art training after post-testing. The primary aim of the present study is to investigate the effect of visual art training on dementia related symptomology, as outlined above.

To address the inconsistencies and methodological issues in the previously discussed literature, the present study has been designed with rigorous experimental control, using validated and reliable quantitative measures, randomization, a control group, assignment concealment, volunteer blinding, two data coders to determine interrater reliability, and complete reports (Chancellor, Duncan, & Chatterjee, 2014; Rusted et al., 2006; Vink et al., 2011).

2. Method

2.1 Project Timeline

The project began in April of 2014 with the commencement of a literature review. Among other events, the project consisted of early recruitment strategies, ethics approvals, expert consultations, the seeking of funds, curriculum development, measure selections, visual art programs, and testing. The details of the project's timeline can be seen in Appendix D.**2.2 Participants**

Consent was required from both the caregiver and participant. The participants' involvement in the study was completely voluntary and the participant, or their caregiver, was able to withdraw from participating at any time. Participants were recruited from dementia centres in the Greater Toronto Area. Participant recruitment was conducted by the recruited dementia day centre's staff, who sent out flyers and substitute consent forms to the caregivers of the centre's clients. Inclusion criteria for the distributed flyers and forms consisted of: English fluency, ability to manipulate a pencil or marker, availability (attending the center at least twice per week), and lack of known unsafe behaviour. The study was approved by the Ethics Committee at York University and, to enable transparency, the present study's methods and materials were pre-registered online prior to the onset of data collection.

Twenty-three participants were provided with substitute consent from their caregivers to participate in the present study. Four of those twenty-three participants did not provide written or verbal consent (one due to disinterest and three due to lack of verbalization or English comprehension) and therefore did not participate. Four more participants were excluded from analyses due to either disinterest, illness, vacation, or lack of attendance (less than 50% of classes). This resulted in a total of 15 PWD participating in the present study. All experimental group participants attended at least 50% of the visual art training program, with the average attendance being 13.22/16, or 83% of classes. Based on the average attendance, the average volunteer to participant ratio met the a priori volunteer to participant ratio, an expected 1:3, with a minimum ratio of 1:4 and a maximum ratio of 1:2. This ratio was based on the visual art programs' curriculum necessities, previous experiences with dementia patients, discussions with the recruited dementia centres, and suggestions in the related literature (Young, 2014).

2.2.1 Participant Baseline Characteristics. Requested baseline characteristics include: dementia type, art-related experience, age, gender, and education. Due to the immense heterogeneity within the dementia population, caution must be taken when interpreting research grouping PWD together. Therefore, classification of disease type is important and necessary. Art-related experience needs to be considered based on the artistic nature of the study. Age needs to be considered because dementia occurs predominantly in older adults and the onset times for different dementia subtypes varies (see table 1 for details). Sex is an important factor to consider as sex has been linked to the prevalence rates of dementia. For example, statistics demonstrate that women develop AD more than men: 59% to 41%, respectively (Poirier & Gauthier, 2011). Education needs to be considered when assessing PWD as education has been linked to the development of dementia. For example, there is evidence that education can be a protective factor

against dementia (Colombo et al., 2012; Gazes et al., 2012; Poirier & Gauthier, 2011; Scarmeas & Stern, 2004). These and other baseline characteristics (e.g., handedness, vision, comorbid diseases) were recorded using caregiver reports via background questionnaires developed by the present study's lead researchers (see appendix C for the background questionnaire). Details regarding the baseline characteristics of participants can be seen in Table 4.

Five males and four females participated in the visual art training experimental group (n=9) and three males and three females participated in the no-art waitlist control group (n=6). Participants had normal (or corrected to normal) vision and hearing, were fluent in English, and were diagnosed with some form of dementia based on caregiver testimony. The age range for participants was 53 to 93 years, with the average age being 81.89 years. The experimental group consisted of two persons with vascular dementia, two persons with mixed dementia (late-onset AD and vascular dementia), and five persons with AD (all late-onset), while the waitlist control group consisted of one person with an unspecified form of dementia, and five persons with AD (two persons with early-onset and three persons with late-onset).

The average number of years the experimental group attended school was 12.4, and the average number of years the waitlist control group attended school was 12.6. Four of the experimental group and one of the waitlist control group attended elementary school (with the person in the waitlist control group also attending high school without graduating), one of the experimental group and three of the waitlist control group graduated high school, and four of the experimental group and two of the waitlist control group graduated college or university. Two persons in the experimental and waitlist control group had previous art-related experience of some kind, consisting of mostly music experience with the exception of one unspecified art form. Handedness was mixed within the experimental and waitlist control group, with the majority of

participants being right handed (four in the experimental and three in the control), few being left handed (one in the experimental and one in the control), and six unspecified. All participants were able to hold and manipulate the required visual art materials (e.g., pencils, markers, paper).

2.2.2 Disease Severity. Disease severity was assessed with the Montreal Cognitive Assessment (MoCA), which provides a single score pertaining to overall cognitive function (Smith, Gilded, & Holmes, 2007). Specifically, the MoCA assesses visuospatial ability, naming, memory, attention, language, abstract thinking, and orientation. The MoCA was adapted slightly, based on dementia centre feedback, with all visual stimuli grouped by task, enlarged, and shown one at a time, in the original order of the MoCA. The results of the MoCA were assessed and interpreted by Victoria Smith, lab manager and research assistant at York University's Cognitive Neuroscience Lab, run by Dr. Shayna Rosenbaum.

Eight experimental and six waitlist control group participants attempted to complete the MoCA, with scores ranging from zero to sixteen. One experimental participant did not attend the MoCA assessment and details regarding said participant's severity were not documented in their respective background questionnaire. Therefore, one experimental participant has not been included in the following severity analyses. The experimental group averaged a score of 9.88 (SD = 6.85) and the waitlist control group averaged a score of 8.17 (SD = 6.97). Based on these results, five participants in the experimental group and two participants in the waitlist control group had a moderate form of dementia, and three participants in the experimental group and four participants in the waitlist control group had a severe form of dementia (Nasreddine, 2016). However, one person in the experimental group and one person in the waitlist control group fell outside the validated age range for the MoCA (55-85 years) and therefore their scores must be interpreted with caution. Details regarding the severity of participants can be seen in Table 4.

Table 4

Participant Baseline Characteristics

Group	Age	Dementia Type	Severity	Participants with Art Experience
Experimental Group	Range: 63-93 Mean: 81.89 Median: 85 Mode: 85	Late AD: 5 Early AD: 0 Mixed Dementia: 2 Vascular Dementia: 2 Not Specified: 0	Moderate: 5 Severe: 3 Not Specified: 1	2
Waitlist Control Group	Range: 53-82 Mean: 73.17 Median: 78.5 Mode: NA	Late AD: 3 Early AD: 2 Mixed Dementia: 0 Vascular Dementia: 0 Not Specified: 1	Moderate: 2 Severe: 4	2

*Late stage AD and Vascular dementia

Table 4

(Continued)

Group	Highest Level of Education	Montreal Cognitive Assessment Score*	Sex
Experimental Group	Elementary School: 4 High School: 1 College or University: 4	Range: 0-16 Mean: 9.88 Median: 11.5 Mode: 16	Male: 5 Female: 4
Waitlist Control Group	Elementary School: 1 High School: 3 College or University: 2	Range: 0-16 Mean: 8.17 Median: 8 Mode: 16	Male: 3 Female: 3

*Not including one experimental participant due to lack of MoCA scores and lack of documented severity on the background questionnaire. In addition, one person in the experimental group and one person in the waitlist control group fell outside the validated age range for the MoCA (55-85 years). and therefore their scores must be interpreted with caution.

2.3 Design

The present study used an experimental RCT design to assess the efficacy of visual art training on PWD's mood, behaviour, and cognition. Two groups of dementia patients were assessed: a visual art training experimental group and a no-art, usual activity, waitlist control group, a control strategy used previously within the related literature (Rusted, 2006). The visual art training experimental group participated in an eight-week visual art program while the no-art waitlist control group participated in their usual daily activities, as suggested by Young (2014). The waitlist control group received the visual art training program as soon as the study's post-testing was complete.

2.4 Materials

2.4.1 Task Selection. Mood, behaviour and cognition measures were selected based on their reliability, validity, and suitability for the dementia population (Baddeley, 2001; Fernandez-Duque & Black, 2007; Hornberger et al., 2010; Kasai et al., 2006; Cummings, 2009 in Vink et al., 2011; Rankin et al., 2007; Smith, Gilded, & Holmes, 2007; Stopford et al., 2010; Temple et al., 2004). Tasks were chosen in order to proactively eliminate complications before they arose. Tasks were predominantly non-verbal, and selected for their user-friendly and simple instructions. As PWD were noted to be sensitive to unfamiliar situations based on dementia centre visits, a range of task techniques were utilized, such as pointing to scales, drawing on blank paper, and repeating numbers and words. All tasks were pencil and paper based to ensure the greatest comfort for participants and caregivers.

Auditory and visuospatial working memory were assessed with the Backward Digit Span and Body Part Pointing task, respectively, episodic long-term memory was assessed with the Rey-Osterreith Complex Figure and Rey Auditory Verbal Learning Test (RAVLT), overall mood was

assessed with the Visual Analog Mood Scale, and problematic behaviour was assessed with the Neuropsychiatric Inventory. Additional tasks were used to measure overall cognition, task switching, dual task performance, and visuospatial ability, and are reported as a part of a separate study (D'Souza et al., in preparation). It is noteworthy that one individual (age 93) in the experimental group fell slightly outside the specified age range for the Backward Digit Span (90) and Rey (89) measures. See Appendix E for normal aging Backward Digit Span and Rey measure standardized scores.

2.4.2 Mood. Mood was assessed with the Visual Analog Mood Scale (VAMS; Temple et al., 2004). The specific moods being assessed were happiness, energy, sadness, anger, confusion, tiredness, and tenseness. Fear is another emotion included in the VAMS but was not assessed as part of the present study because previous literature suggests that this measure may not accurately represent the emotion of fear in the dementia population (Temple et al., 2004), and it was considered unlikely that fear would be affected by the visual art program. The VAMS consisted of a tester showing eight images of a vertical emotional continuum to a participant, each image having its own respective page and emotion. Pages/emotions were shown one at a time. At the top of the continuum was a drawn face representing neutrality, at the bottom of the continuum was a drawn face representing an emotion, and between the two faces was a 100mm straight line. The tester would both read aloud and emote the respective emotion (e.g., the tester would say "sadness," and make a sad face), and ask the participant to place a mark on the continuum to identify how they feel at that moment in regard to the respective emotion (e.g., for sadness, if a participant was feeling 0% sad they would place a mark at the top of the continuum, if the participant was feeling 100% sad they would place a mark at the bottom of the continuum, if the participant was feeling 50% sad they would place a mark in the middle of the continuum, etc.). The participants' score on

the VAMS was assessed per emotion and was based on where they placed a mark on each continuum – a ruler was used to measure the exact placement of the mark on the continuum, with zero being at the top of the continuum (neutral) and 100 being at the bottom of the continuum (emotion).

2.4.3 Problematic Behaviour. Problematic behaviour was assessed with select Neuropsychiatric Inventory (NPI) subcategories (Cummings, 2009, in Vink et al., 2011). The NPI is an observational questionnaire that was provided and filled out by the respective recruited centres' staff. The selected subcategories were agitation and aggression, depression and dysphoria, apathy and indifference, and anxiety. Selecting those four subcategories was based on the related literature (Chancellor et al., 2014; Hattori et al., 2011; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002), as well as feedback from the recruitment locations. The NPI consisted of the observer being asked if the behaviour was present in general and, if it was, a more detailed account of the specific behaviours, including types of behaviours that occur, their frequency, severity, and the amount of distress caused by the behaviour to the rater.

2.4.4 Working Memory. Visuospatial working memory was assessed with the Body Part Pointing task (Stopford et al., 2012). The Body Part Pointing task consisted of a practice trial and a test trial. For the practice trial, the tester would ask the participant to point to five body parts, one at a time (e.g., for a correct trial, a tester would say "please touch your nose," and a participant would touch their nose, "please touch your chin," and a participant would touch their chin, etc.). If the participant was able to complete the practice trial successfully, the tester would move onto the test trial in which the participant was asked to point to four body parts in sequence (e.g., for a correct trial, a tester would say "please touch your nose, chin, etc." and the participant would sequentially touch their nose, chin, etc.,). The Body Part Pointing task was scored with a participant

being given a correct (all items in the test trial completed correctly and in order) or incorrect (additional items were added, any item in the test trial was completed incorrectly or out of order) score.

Verbal working memory was assessed with the WAIS-IV Backward Digit Span task (Fernandez-Duque & Black, 2007; Huntley & Howard, 2009; Rankin et al., 2007). The Backward Digit Span consisted of a forward trial and a backward trial. Both trials consisted of blocks of numbers, starting at a block of two numbers and ending at a maximum block of nine numbers. Each block consisted of two sets of numbers (e.g., block three has two sets of three numbers, such as 2-4-8 and 3-8-7, and block five has two sets of five numbers, such as 4-6-8-2-0 and 1-8-2-4-6). Each set was recited by the tester one at a time (e.g., the tester would recite 2-4-8 and wait for the participant's response before reciting 3-8-7). Participants needed to correctly recite the numbers of at least one set of numbers per block to continue with the task. For the forward trial, testers would recite sets of numbers and then ask participants to recite the numbers back to them (e.g., for a correct response, the tester would recite "2-4-8," and the participant would respond "2-4-8."). If a participant successfully completed the forward trial, they moved on to the backward trial. For the backward trial, testers would ask the participant to complete the same task as the forward trial, only in reverse (e.g., for a correct response, the tester would recite "2-4-8" and a participant would respond "8-4-2,"). The participant was given a score on the backward trial based on the number of sets they could complete correctly (e.g., a score of 4 means the participant completed 4 sets correctly).

2.4.5 Episodic Long-Term Memory. Visual episodic long-term memory was assessed with the ROCF (Hornberger et al., 2010; Fernandez-Duque & Black, 2007; Kasai et al., 2006). The ROCF consisted of a copy trial, immediate recall trial, and delayed recall trial. The copy trial

consisted of a tester showing a participant a complex figure image and asking the participant to copy the image onto a blank piece of paper. The complex figure image was available for the duration of the copy trial, with a maximum task duration of five minutes. Three minutes after the completion of the copy trial, the tester provided the participant with a blank piece of paper and asked the participant to draw the complex figure image again, only this time the participant was not given the complex figure image, for a maximum task duration of five minutes. Thirty minutes after the completion of the copy trial, the tester again asked the participant to draw the complex figure image without the complex figure image present, for a maximum task duration of five minutes. The ROCF was scored with the Developmental Scoring System for the ROCF (DSS-ROCF). Scores were provided based on the accuracy of presence, completion, and placement of elements in the drawn image, with 18 potential correct presence/completion points and 18 potential correct placement points for each trial. Episodic long-term memory was assessed with the ROCF's immediate and delayed recall trials.

Verbal episodic long-term memory was assessed with the RAVLT (Hornberger et al., 2010; Kasai et al., 2006). The RAVLT consisted of a learning trial, interference trial, immediate recall trial, and delayed recall trial. The learning trial consisted of five parts. For each part, the tester would recite the same list of fifteen words to a participant and ask the participant to recite the list back in whatever order they choose. All five parts of the learning trial had a maximum duration of five minutes. Immediately after the learning trial was the interference trial, which consisted of the tester reciting a list of fifteen new words to the participant and asking the participant to recite the list back in whatever order they choose, with a maximum task duration of two minutes. Immediately after the interference trial was the immediate recall trial, which consisted of the tester asking the participant to recite the original learning trial list of words in whatever order they

choose, with a maximum task duration of two minutes. Thirty minutes after the completion of the learning trial, the tester asked the participant to recite the original learning trial list of words in whatever order they choose again, with a maximum task duration of five minutes. Scores were provided based on the number of correctly recalled words. Episodic long-term memory was assessed with the RAVLT's immediate and delayed recall trials.

2.5 Procedure

Tester, teaching assistant, and data entry volunteers were blinded to group allocation and study hypotheses. All volunteers were York University psychology undergraduates. All volunteers were selected based on thorough interviews and were trained before beginning their roles. In addition, each volunteer visited a recruited dementia centre prior to the project's start in order to observe and interact with the centre's clients and staff.

Two dementia centres agreed to participate and host the visual art training programs and assessment sessions. The visual arts interventions and assessment sessions were completed at the participant's respective care facilities due to the trained on-site staff, the familiarity of the location for participants, and the pre-existing regular attendance to the location by participants. Dementia Centre One (C1) consisted of part one of the experimental group, and Dementia Centre Two (C2) consisted of part two of the experimental group and all of the waitlist control group. C1 was not randomized into an experimental and waitlist control group as only four persons signed up to participate at that location. Splitting C1's sample into two groups would have jeopardized the a priori set volunteer to participant ratio, a minimum of 1:4, an average of 1:3, respectively. Based on this, splitting the four recruited participants at C1 into experimental and control participants would have resulted in the data being incomparable to C2's groups. In order to maximize the

recruited sample size, while still ensuring group comparison compatibility, all discussed tasks have been assessed alongside the assessment of C1 and C2's experimental group compatibility (i.e., that C1 and C2's experimental groups did not significantly differ at pre-testing). On all accounts, C1's and C2's experimental pre-testing scores yielded an insignificant difference between the two groups ($p > .07$). Previously published studies have implemented similar approaches, with the multi-centre trial approach utilized to ensure generalizability of results and larger sample sizes (Rusted et al., 2006).

Dementia, and its variety of sub-types, is not a homogenous disease. Based on this, unlike previous research, the present study distinguishes between dementia types in order to examine the influence of the disease on any reported significant cognitive, mood, and/or behavioural effects. In addition, severity level was documented for each group in order to better understand the nature of the disease. The attention paid to dementia type and severity may allow for future analyses as part of a research database when larger sample sizes are obtained. Importantly, by documenting the dementia sub-types, future assessments of dementia sub-types may be possible.

Psychologists, experienced artists, and dementia researchers guided the present study's design in order to deliver a powerful and controlled program. To ensure safety, all materials and procedures used during the visual art programs and assessment sessions were non-toxic and non-hazardous. To ensure reliability and applicability, the visual art training intervention has been designed and reported so that future researchers and practitioners will be able to replicate the program.

2.5.1 Curriculum. The present study uses visual art training or, as it is often referred to in the dementia literature, visual art education, as an intervention method, which focuses on the development of artists and their cognitive abilities while teaching them visual art terms and

techniques (Bentes-Levy, 2012). The visual art training program occurred over an eight-week period for one hour per day, two days per week, with fifteen minutes before and after the classes for set-up and take-down. The time-line for the intervention was based on previous studies of a similar nature (Bentes-Levy, 2012; Kinney & Rentz, 2005; Rentz, 2002; Rusted et al., 2006; Young, 2014). The experimental group's visual art training and waitlist control group's usual activities took place at the participants' respective centre at the same time. The visual art training program took place in an area separate from the waitlist participants and uninvolved clients.

Attention had been taken to prevent attrition. Such preventative methods include the involvement of caregivers and centre staff, as well as the tailoring of classes and assessment sessions based on participants' needs and abilities. Furthermore, by nature, visual art interventions may produce high adherence to treatment and low attrition rates due to the enjoyment and positive experiences produced by the intervention (Bentes-Levy, 2012; Chancellor, Duncan, & Chatterjee, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002; Rusted, 2006; Stewart, 2004; Young, 2014).

Due to the limited methodology sections in the related published literature, the present study needed to create its own visual art training curriculum. The visual art training program was designed as a drawing program, focusing on basic visual art concepts. The concepts focused on were the elements (space, colour, texture, line, shape, form, and value) and principles (emphasis, variety, harmony, movement, rhythm, proportion, balance, and gradation) of design (Foster, 2006). Each week had a different activity and a different focus (one activity per week that focused on one element and principle of design). See Appendix A for element and principle of design definitions and weekly activity descriptions.

Each class began with set up, which consisted of covering the activity table in a plastic table cloth, distributing activity materials across the table, placing any activity cues or props in view of participants, and displaying a poster with visual examples and definitions of each element and principle of design. Such examples have been recommended in the literature (Bentes-Levy, 2012) and provide both a visual and verbal cue for participants. Class would begin with the instructor stating which two key terms (one element and one principle of design) would be the topic of that week's classes (e.g., space/element and emphasis/principle) along with their respective definitions. Following the term definitions, the instructor would describe the activity for that week with clear and concise instructions (as recommended by Bentes-Levy, 2012). Fifteen minutes before the end of each class, the instructor would ask participants if they would like to show their work to the class. In the event that a participant said yes, the instructor would show the participant's work to the group while relating it back to the week's terms and activity. Showing participants' work has been suggested in the literature in order to improve participants' overall experiences of the visual art program (Bentes-Levy, 2012; Young, 2014).

Different kinds of materials were chosen for each class, including fabrics, paper shapes, and black cardstock. The use of fabrics and other texture-relevant materials in visual art classes has been suggested for normal-aging older adult visual art classes (Bentes-Levy, 2012) and enabled another modality to the art classes, where participants could see, hear, and feel art-related materials. A list and detailed budget of art program materials can be seen in Appendix B.

Each class focused on providing group and individual support to participants. The typical class included the instructor and teaching assistant volunteer(s) providing answers to participants' questions while working on projects and engaging in class-related conversations. Classes were lightly structured with projects that were open to interpretation and creativity, catering to each

participant's abilities and skill-level, while avoiding expression limitations. Specifically, each activity was open to both a single and multi-step approach. To consider the differences between these two approaches, consider the first week's activity ("Object Still Life" in Appendix A). An example of a participant choosing the single step approach during week one would consist of a volunteer handing a participant a white pencil and piece of black cardstock while instructing the participant to draw on the black cardstock, followed by the participant beginning to draw on the black cardstock with the provided white pencil. This approach can be repeated multiple times, so that the participant only needs to follow one instruction or fulfil one goal at a time. An example of the second approach, the multi-step approach, would consist of the instructor stating the activity of the week and a participant choosing a white pencil and a shape to trace, followed by the participant tracing the shape onto an available piece of black cardstock before selecting another shape to trace and repeating the process. The openness of the activities and the flexible program structure were intended to enable individually appropriate stimulation and group discussion, an occurrence seen in studies of a similar nature (Bentes-Levy, 2012; Young, 2014). All classes were structured in the same way to reduce any potential confusion and improve participant comfort.

The visual art programs were instructed by myself (Katherine Matthews) and a minimum of one teaching assistant volunteer. I am a trained visual artist, with a bachelor of arts honours degree specializing in visual arts. I have more than ten years of experience as a practicing artist (eight of which coincide with training, four at the secondary school level and four at the post-secondary school level).

The study consisted of three visual art training programs (two experimental programs and one waitlist control program) and cost an estimated total of $279.30. See Appendix B for details regarding the visual art program materials and budget. All materials, time and travel costs

associated with the programs were volunteered, made or donated by the volunteers and/or instructor.

The curriculum was created by myself (Katherine Matthews) and further developed with the assistance of the supervisor of the present study, Dr. Melody Wiseheart, the graduate researcher on the project, Annalise D'Souza (MA), and artist and experienced arts instructor Sandi Wiseheart. Furthermore, the curriculum was continuously updated throughout the first art training program based on participant, volunteer, and centre feedback. Details regarding the curriculum will be made publicly available so that researchers can attempt to replicate and test the generalizability of the present study's reported findings, as well as provide access to our curriculum for persons or companies wishing to try the program on their own (such as additional dementia centres or long-term care locations).

2.5.2 The Assessment. Before and after the visual art training program, the participants (waitlist control group included) completed cognitive and mood assessment tasks while the centre staff completed observational behavioural assessments of participants. Background questionnaires and signed substitute consent forms were provided by caregivers before testing began. The pre-testing occurred up to five weeks before the beginning of the visual art training program, and the post-testing occurred up to three weeks after the completion of the visual art training program. Due to the location of testing (the participant's respective care location) scheduling needed to be booked according to not only participant availability but also location availability. Testing occurred over a two-day period, one hour per day, in order to accommodate participant attention and cognitive load. Participants were given a break halfway through each testing session as well as whenever needed.

Testers would provide help with comprehension on tasks (e.g., rephrasing or repeating the task's instructions) but not on the task itself (i.e., no hints or feedback). Testers were trained not only with thorough task instructions but also with insights regarding the dementia population, both from the lead researchers and the dementia centre staff. Testers were provided with full access to the lead researchers via the phone during task sessions in the event that questions or concerns arose. Additionally, centre staff were on site during task sessions and provided insights and feedback when possible.

2.6 Analyses

All cognitive results were computed using the data processing software package SPSS 23. Most tasks were analyzed with an independent samples t-test, assessing the differences between the experimental and waitlist control group by comparing the groups' difference score means (post – pre), with all reported t-tests meeting the assumption of homogeneity of variance, normality, and independence. Furthermore, t-test assessments were completed to ensure that both groups were comparable. An independent t-test was chosen due to its ability to compare group means and its suitability for small samples. Furthermore, the compatibility between the experimental and waitlist control group's pre-testing scores were assessed, yielding an insignificant difference between the two groups ($p > .3$). Homogeneity of variance was assessed with the Levene's Test for Equality of Variances and normality was assessed with skewness and kurtosis descriptive statistics. Skewness was never larger than +/- 2 and kurtosis was never larger than +/- 7. Data from the RAVLT's delayed recall and the ROCF's delayed recall trials will not be included in the following analyses as both tasks hit floor. For the purposes of the present study, a task is considered to have "hit floor" if 66% or more of the sample scored zero. Scores of zero were provided when an answer was not attempted or the given answer was completely incorrect or irrelevant.

The only task that was assessed without the independent t-test was the Body Part Pointing task, which uses categorical data and, therefore, could not be assessed with the independent t-test. Instead, a two sample McNamar Test was utilized to assess the difference between the experimental and waitlist control group, by comparing the group's dichotomous pre-testing and post-testing results and reporting the two-way Fisher's Exact Test to accommodate for the study's small sample sizes (Adedokun & Burgess, 2012). Specifically, all participants who had a correct response or attempted to answer the question at pre-testing but had an incorrect response or did not make an attempt to answer at post-testing received a score of zero. Participants who had an incorrect response or did not make an attempt to answer at pre-testing but had a correct response or attempted to answer at post-testing received a score of one. Both the independent t-test and Fisher's Exact Test are suitable when comparing two groups' pre-testing and post-testing scores even when there is a small sample size. Furthermore, as both groups pre-testing scores were the exact same, both groups were comparable.

Dementia type comparisons were only made for tasks that reached significance. Due to small sample size, only a late onset AD versus non late-onset AD dementia comparison could be made. All discussed tasks have an inter-rater reliability of 80% or higher, with an average reliability of 96% and a mode of 100%. All tasks which did not reach 100% were investigated. Discrepancies for tasks that were objective (i.e., the Body Part Pointing task, Backward Digit Span task, and Rey-Osterreith Immediate Verbal Recall task) were examined and adjusted according to actual participant response, while subjective tasks (i.e., the ROCF Immediate Recall task) were averaged across both raters' responses.

3. Results

3.1 Working Memory

3.1.1 The Backward Digit Span. Seven participants from the art training experimental group and six participants from the waitlist control group participated in the Backward Digit Span. Overall, the difference scores of participants in the art training experimental group (M = 1.29, SE = 0.64) were significantly higher than the scores of participants in the waitlist control group (M = -0.33, SE = 0.21), t (11) = 2.23, p = .048, with a very large effect size, d = 1.28. Although these results are promising, it needs to be acknowledged that these findings are, at best, preliminary due to the small sample size of the study. The Backward Digit Span raw score means for the experimental group at pre- (M = 2.29, SE =0.57) and post-testing (M = 3.57, SE = 0.89), and the waitlist control group at pre- (M = 1.83, SE = 1.5) and post-testing (M = 1.5, SE = 0.56) are displayed in Figure 1.

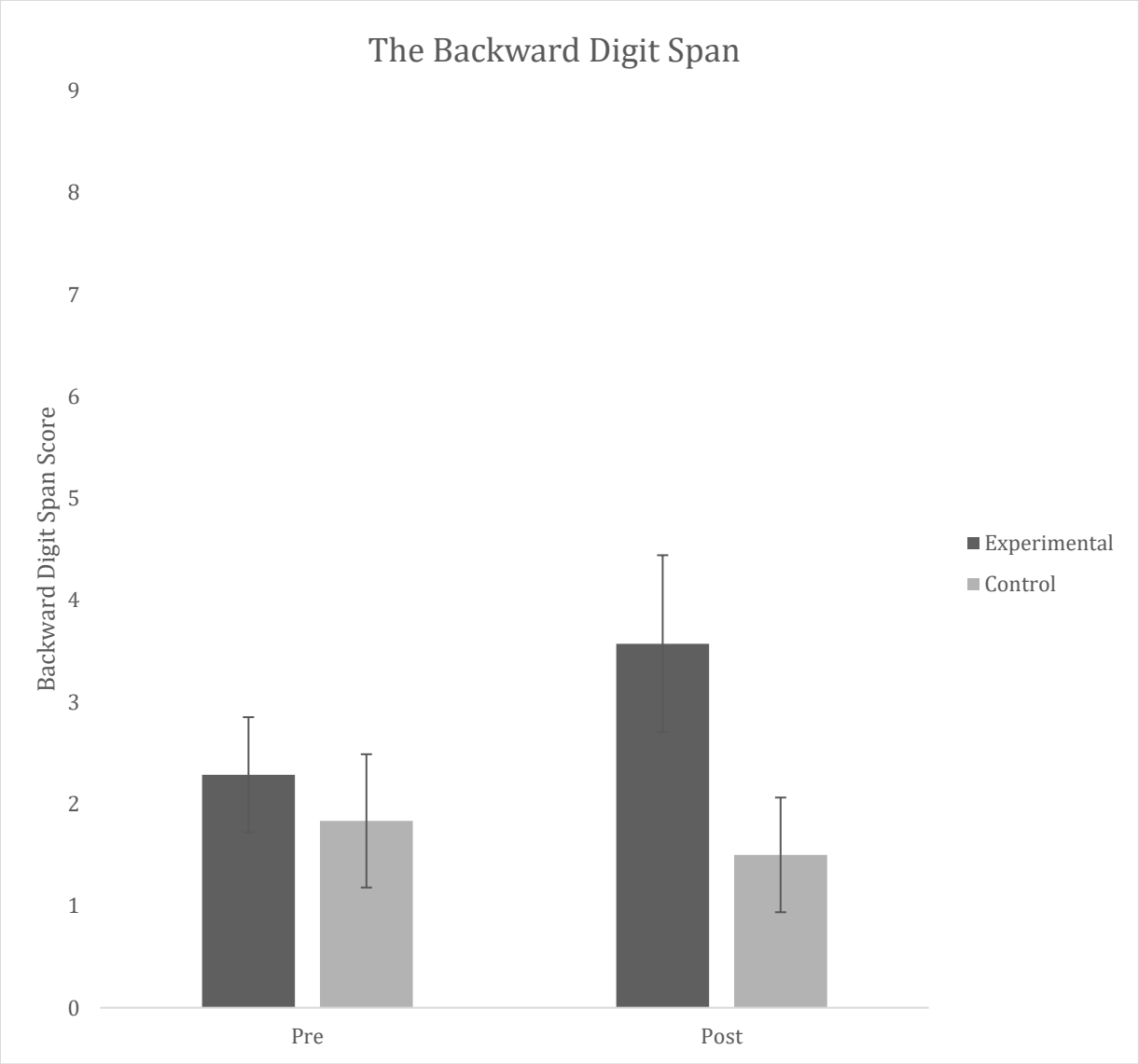

Figure 1. Backward Digit Span. This figure illustrates the pre and post Backward Digit Span raw score means for the experimental group and the waitlist control group at pre- and post-testing.

3.1.2 Dementia Type Cognitive Comparison: The Backward Digit Span. For the Backward Digit Span, four participants had late onset AD and three participants had a different form of dementia in the art training experimental group, while three participants had late-onset AD and two participants had a different form of dementia in the waitlist control group. One participant who participated in the Backward Digit Span, and was therefore included in the original Backward Digit Span analyses, could not be included in the dementia type comparison analysis because their

specific type of dementia was not provided. Overall, in the art training experimental group, participants with late-onset AD (M = 1.5, SE = 0.87) did not significantly differ from the participants with a non late-onset AD form of dementia (M = 1, SE = 1.16), t (5) = 3.55, p = .737. Similarly, in the waitlist control group, participants with late-onset AD (M = -0.67, SE = 0.33) did not significantly differ from participants with a non late-onset AD form of dementia (M = 0, SE = 0), t (3) = -1.55, p = .219. The Backward Digit Span raw score means for those with AD in the experimental group at pre- (M = 4, SE =0.85) and post-testing (M = 3.25, SE = 1.18), those with AD in the waitlist control group at pre- (M = 2.67, SE = 0.67) and post-testing (M = 2, SE = 0.58), those with a non-late onset AD form of dementia in the experimental group at pre- (M = 3, SE =0.58) and post-testing (M = 4, SE = 1.53), and those with a non-late onset AD form of dementia in the waitlist control group at pre- (M = 0, SE = 0) and post-testing (M = 0, SE = 0) are displayed in Figure 2.

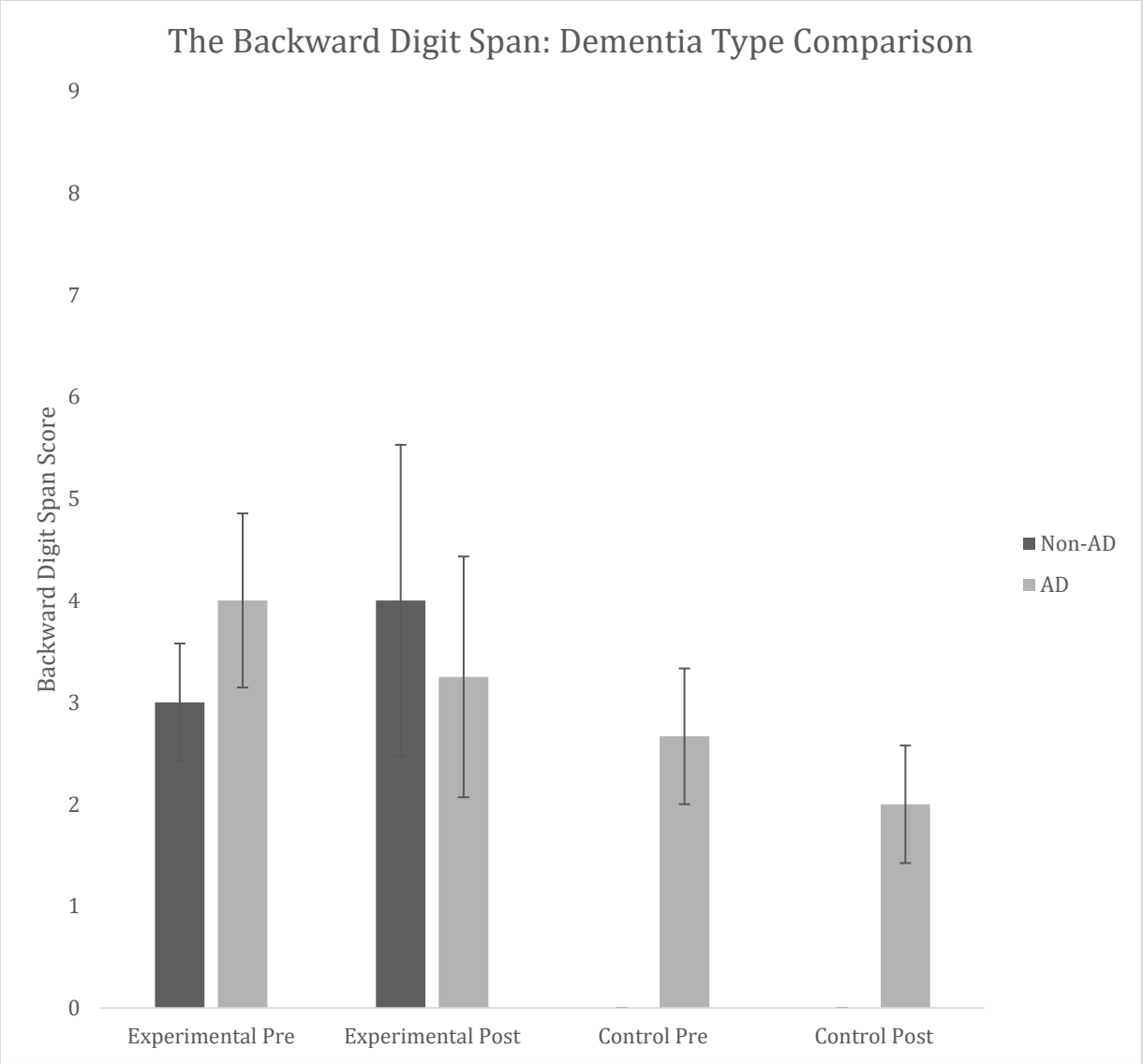

Figure 2. Backward Digit Span: Dementia Type Comparisons. This figure illustrates the pre and post Backward Digit Span raw score means for those with late onset AD and those with a non-late onset AD form of dementia in the experimental and waitlist control group.

3.1.3 The Body Part Pointing Task. Seven participants from the art training experimental group and six participants from the waitlist control group participated in the Body Part Pointing Task. Overall, the results of the Fisher's exact test indicated a non-significant association between group and general improvement on the Body Part Pointing Task (p=1.0). The Body Part Pointing Task's chi-square table can be seen in Table 5, while the frequency of 1s received by the

experimental group at pre- (M = 5, SE =0.18) and post-testing (M = 6, SE = 0.14), and the waitlist control group at pre- (M = 4, SE = 0.21) and post-testing (M = 4, SE = 0.21) are displayed in Figure 3.

Table 5.

Body Part Pointing Task Chi-Square Table

			Pre-Post Discordant Pairs		
			0	1	Total
Group	Experimental Group	Count	1	2	3
		Expected Count	1.2	1.8	3
		Standardized Residuals	-0.2	0.1	
	Waitlist Control Group	Count	1	1	2
		Expected Count	0.8	1.2	2
		Standardized Residuals	0.2	-0.2	
	Total	Count	2	3	5
		Expected Count	2	3	5

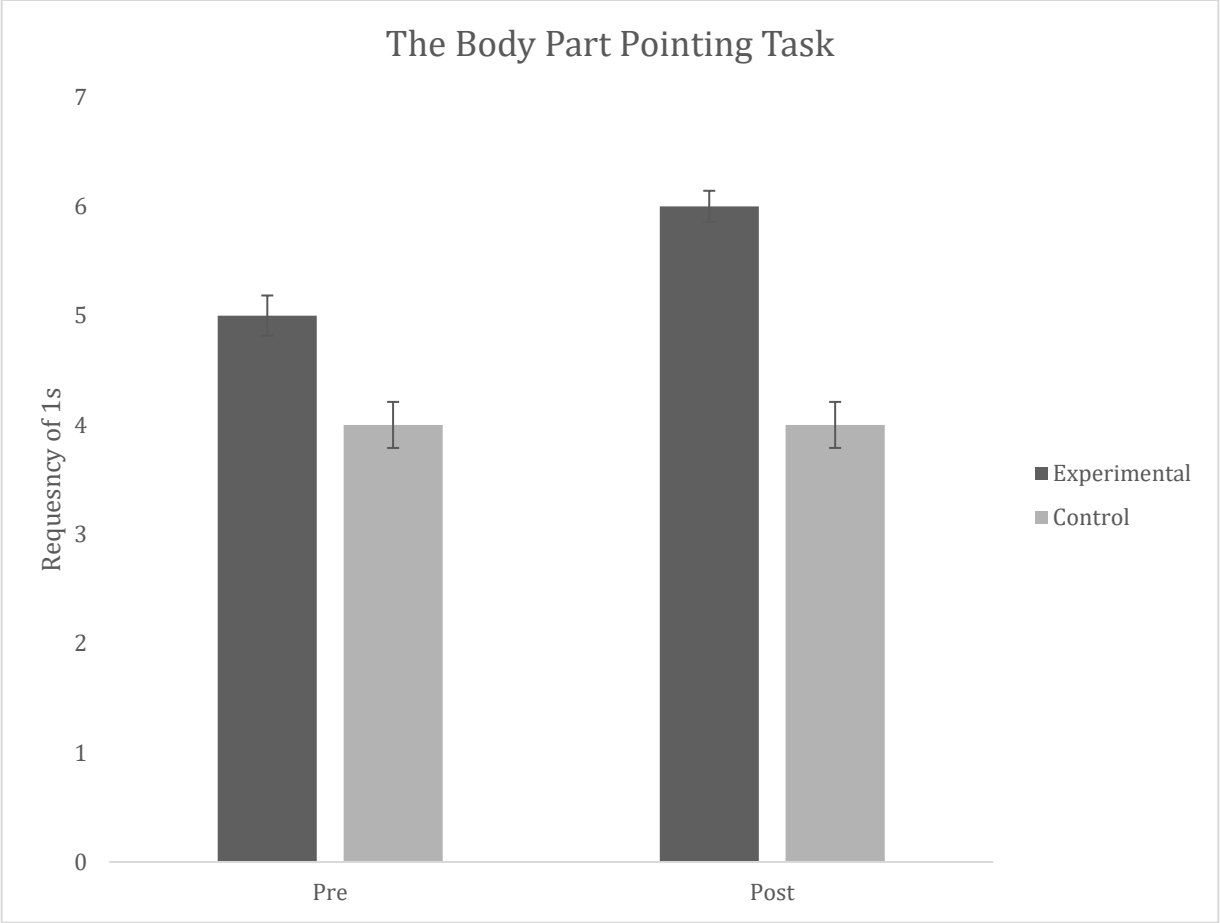

Figure 3. Body Part Pointing Task. This figure illustrates the frequency of 1s received at pre- and post-testing on the Body Part Pointing task by the experimental and waitlist control group.

3.2 Episodic Long-Term Memory

3.2.1 The Rey Auditory Verbal Learning Task. Six participants from the art training experimental group and six participants from the waitlist control group participated in the RAVLT's immediate recall task. Overall, participants in the art training experimental group (M = -0.33, SE = 0.33) did not significantly differ from the participants in the waitlist control group (M = -0.67, SE = 0.49), t (10) = 2.24, p = .558. The RAVLT's Immediate Recall Task raw score means for the experimental group at pre- (M = 0.83, SE =0.31) and post-testing (M = 0.5, SE = 0.22), and the waitlist control group at pre- (M = 1, SE = 0.52) and post-testing (M = 0.33, SE = 0.21) are displayed in Figure 4.

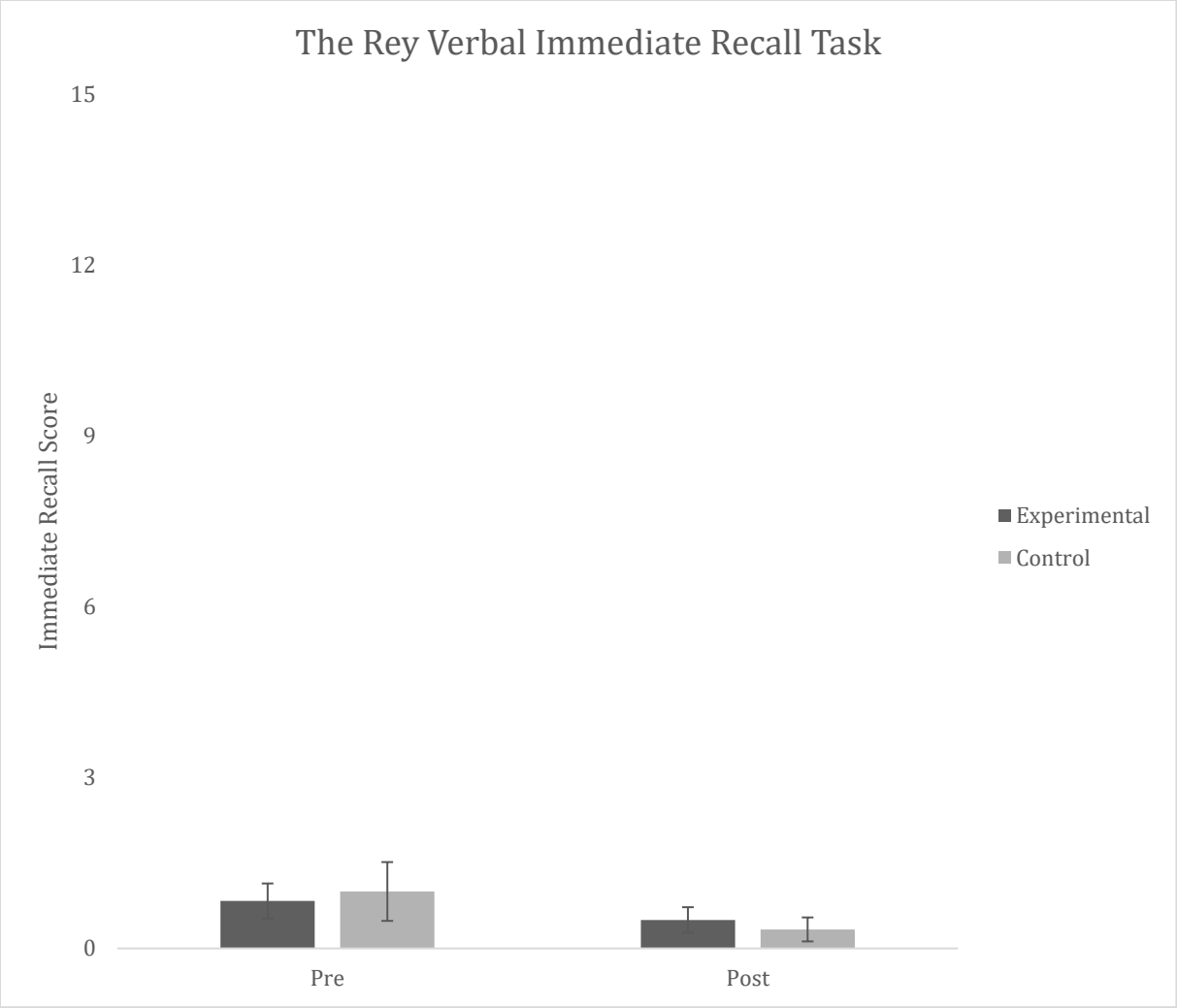

Figure 4. RAVLT's Immediate Recall Task. This figure illustrates the pre and post RAVLT's Immediate Recall Task raw score means for the experimental and waitlist control group.

The difference scores between the RAVLT's learning trial one (baseline) and immediate recall task were calculated (immediate recall – learning trial one). Overall, based on the difference scores, the waitlist control group (M = -0.33, SE = 0.62) did not significantly differ from the art training experimental group on the immediate recall scores (M = 0.5, SE = 1.03), t (10) = 0.56, *p* = .501. The RAVLT Learning Trail One raw score means for the experimental group at pre- (M = 2.5, SE =0.96) and post-testing (M = 1.67, SE = 0.49), the waitlist control group at pre- (M = 1, SE = 0.52) and post-testing (M = 0.67, SE = 0.42), subtracted from the Immediate Recall Task raw

score means for the experimental group at pre- (M = 0.83, SE =0.31) and post-testing (M = 0.5, SE = 0.22), and the waitlist control group at pre- (M = 1, SE = 0.52) and post-testing (M = 0.33, SE = 0.21), are displayed in Figure 5.

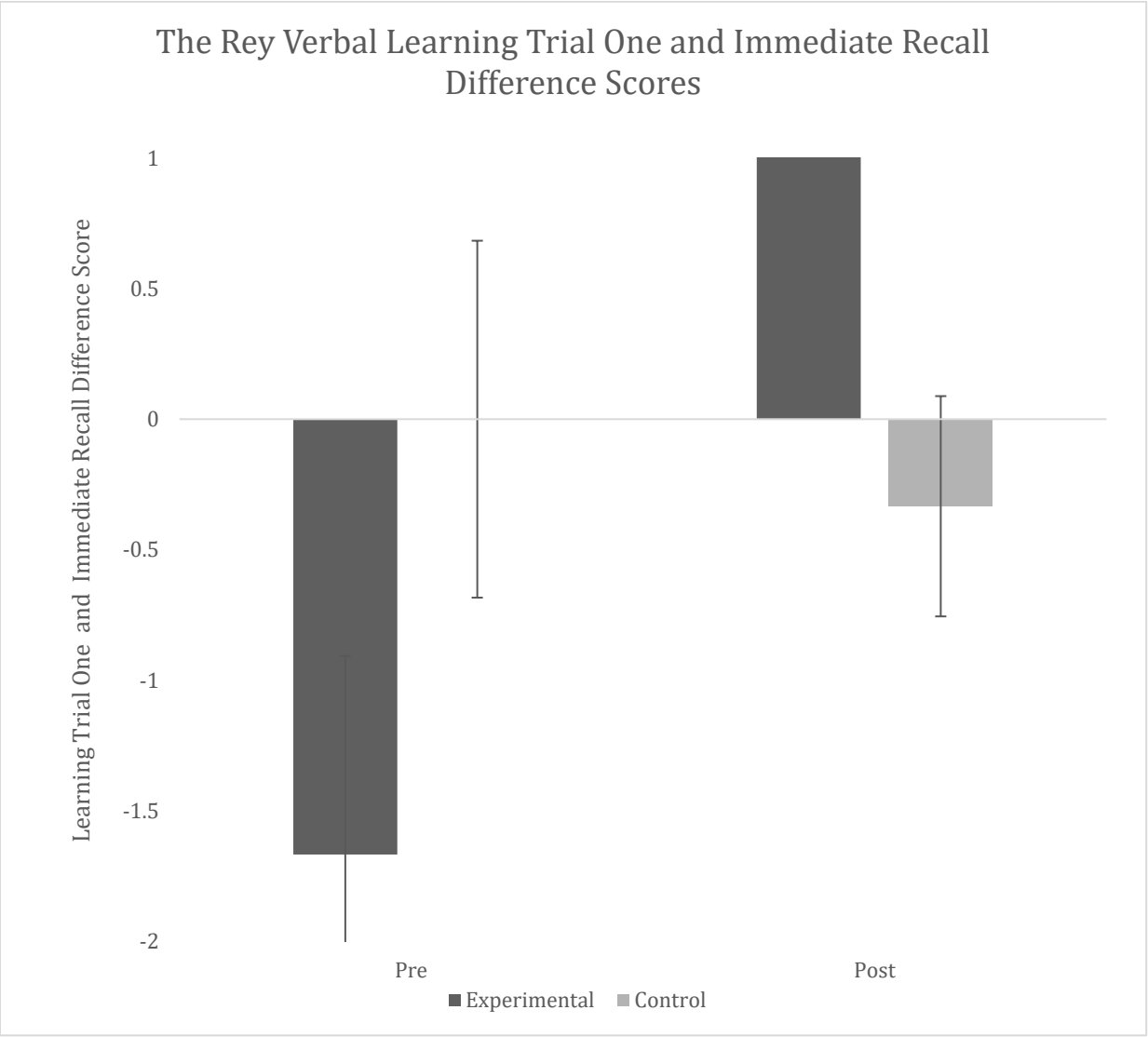

Figure 5. RAVLT's Learning Trial One and Immediate Recall Task Difference Scores. This figure illustrates the pre-post difference scores between the RAVLT's Learning Trail One raw score means and the Immediate Recall Task raw score means for the experimental and waitlist control group, with the Rehearsal One scores being subtracted from the Immediate Recall scores.

3.2.2 The Rey-Osterreith Complex Figure Task. Seven participants from the art training experimental group and six participants from the waitlist control group participated in the ROCF immediate recall task. Notably, the experimental (M = 15.14, SE =4.52) and waitlist control group (M = 20.17, SE = 5.94) did not significantly differ at pre-testing on the ROCF Copy trial (*p* - .57), supporting the notion that both groups started with the similar copying abilities. Overall, participants in the art training experimental group (M = -0.46, SE = 0.8) did not significantly differ from the participants in the waitlist control group (M = -0.68, SE = 1.01), t (11) = 0.17, *p* = .865. The ROCF raw score means for the experimental group at pre- (M = 2.43, SE =1.07) and post-testing (M = 1.97, SE = 1.11), and the waitlist control group at pre- (M = 2.92, SE = 1.75) and post-testing (M = 2.24, SE = 1.77) are displayed in Figure 6.

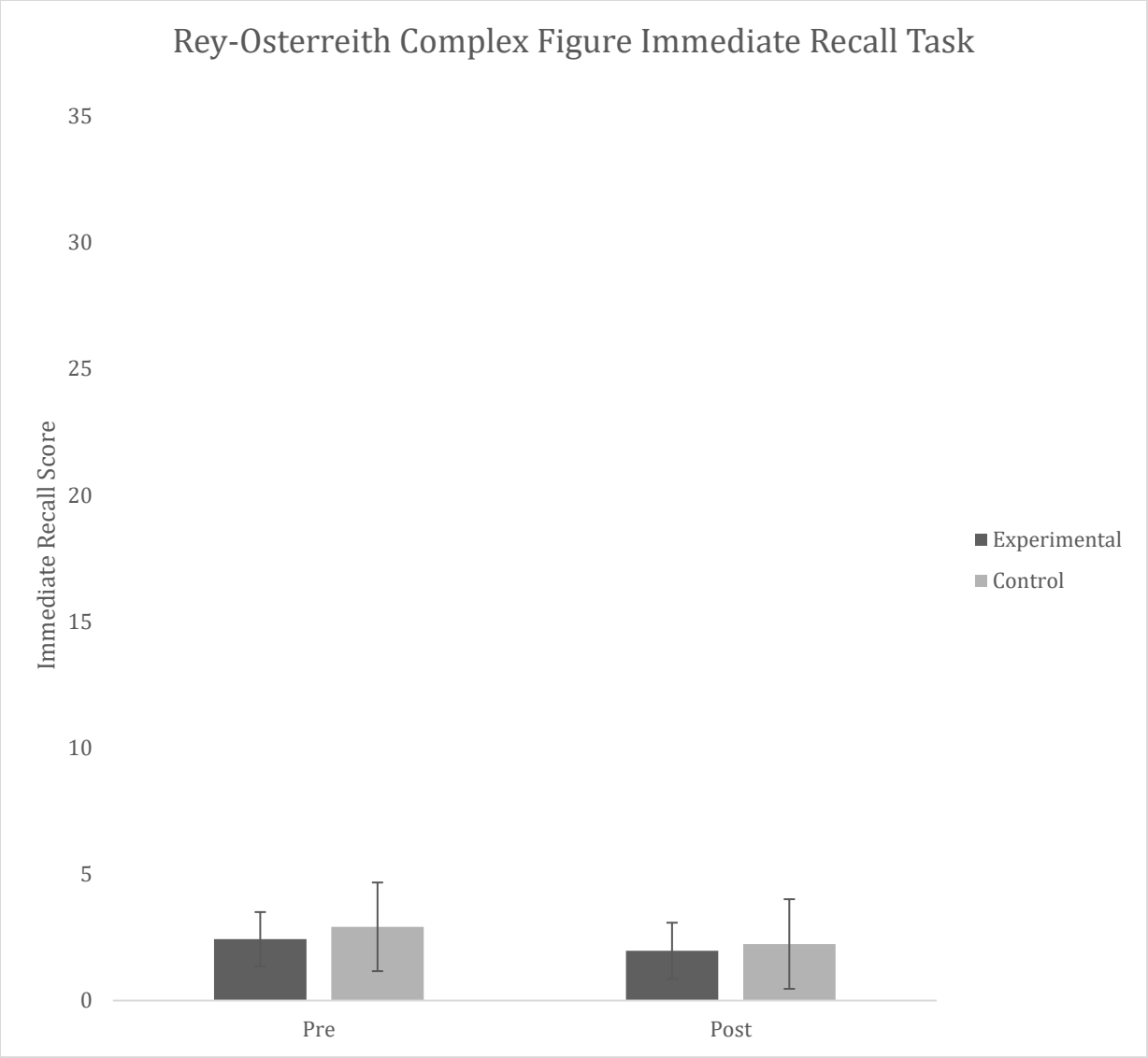

Figure 6. ROCF Immediate Recall Task. This figure illustrates the ROCF immediate recall raw score means for the experimental and waitlist control group.

The difference scores between the ROCF Copy trial (baseline) and immediate recall trial were calculated (immediate recall – copy). Overall, based on the difference scores, the waitlist control group (M = 4.02, SE = 1.91), did not significantly differ from the art training experimental group (M = -0.28, SE = 2.24), t (11) = -1.44, p = .179. The pre and post ROCF Copy trial raw score means for the experimental group at pre- (M = 15.14, SE =4.52) and post-testing (M = 14.96, SE = 5.31), and the waitlist control group at pre- (M = 20.17, SE = 5.94) and post-testing (M =

15.46, SE = 5.32), subtracted from the Immediate Recall trial raw score means for the experimental group at pre- (M = 2.43, SE =1.07) and post-testing (M = 1.97, SE = 1.11), and the waitlist control group at pre- (M = 2.92, SE = 1.75) and post-testing (M = 2.24, SE = 1.77) are displayed in Figure 7.

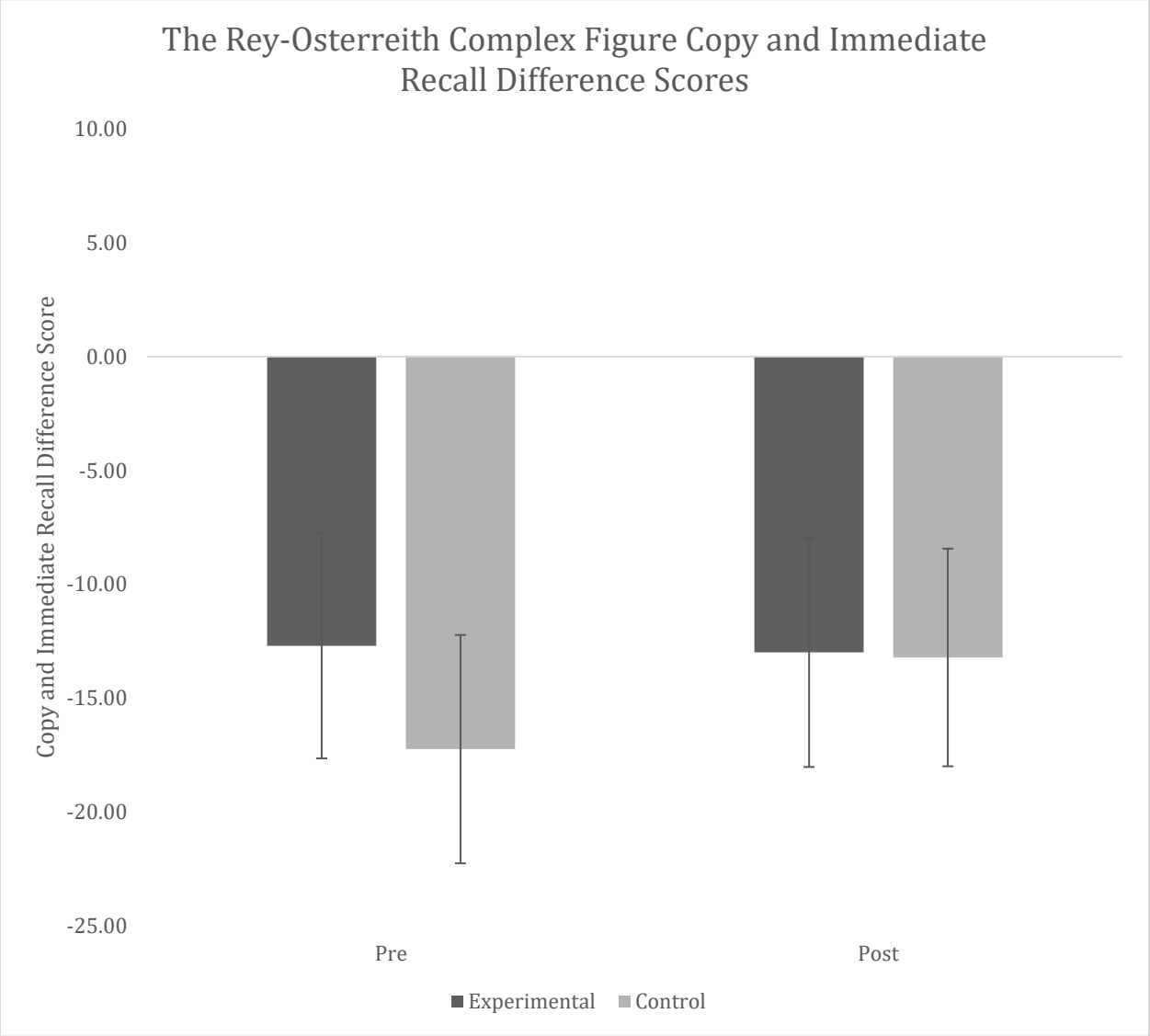

Figure 7. ROCF Copy and Immediate Recall Task Difference Scores. This figure illustrates the pre-post difference scores between the ROCF Copy trial raw score means for the experimental and waitlist control group, and the Immediate Recall trial raw score means for the experimental and waitlist control group, with the copy scores being subtracted from the immediate recall scores.

3.3 Mood and Behaviour

3.3.1 Overall Mood. The results from the VAMS were not useable due to poor inter-rater reliability and task delivery complications. Inter-rater reliability was affected by certain data being entered at the incorrect stimuli size (recorded on a 90mm continuum instead of the intended 100mm continuum). Additionally, even after continuum size was corrected for, inter-rater reliability still fell below 40% for one emotion. Furthermore, task delivery complications arose when participants would not indicate how they felt on the continuum provided (from neutral to 100% emotion). Instead, many participants provided a binary "yes" or "no" answer. Therefore, the effect of visual art training on mood and the mediating effect of mood on cognition could not be quantitatively assessed.

3.3.2 Problematic Behaviour. Similar to the VAMS, data from the NPI was not useable due to more than 66% of the returned measures hitting ceiling across all subcategories (i.e., were given a "Not Applicable" response to the specific behaviour). Therefore, the effect of visual art training on PWD's problematic behaviour could not be quantitatively assessed.

3.3.3 Mood and Behaviour Qualitative Feedback. Although the quantitative assessments of mood and behaviour were not useable, qualitative reports supported a lack of negative behaviour and outward notions of positive mood for those participating in the visual art training program, as well as the general enthusiasm and drive of the participants who participated in the programs. Examples of qualitative participant mood and behaviour reports have been outlined in Table 6.

Table 6.

Qualitative Participant Feedback

Types of Feedback	Cognition Comments	Mood Comments	Behaviour Comments	Overall Comments
Comments	The importance of visual art; (rarely) stating terms from previous weeks; adding captions or titles to artworks; drawing family or previous life experiences (e.g., trips abroad)	Helping with depression; uplifting effects; enjoyment; awake and responsive	Wanting to bring artwork home for their family members; laughing about their artwork; providing feedback to other participant's artworks	The class was fun; appreciation and compliments towards the volunteers and instructor; requesting to participate in future programs
Reasons for attrition (per participant)		Disinterest		Vacation; timing conflicts; illness
Suggestions			Requesting additional materials (e.g., additional pencil colors)	Future program ideas; different offered mediums

4. Discussion

4.1 Summary of Results

The present study is a pilot project assessing the effect visual art training has on PWD. Utilizing an RCT design, with a usual activity waitlist control group, the present study investigated the effect of an eight-week drawing-focused visual art training program on PWD's mood, behaviour, and cognition. Specifically, the mood constructs that were assessed were happiness, sadness, anger, tension, confusion, tiredness, and energy; the behavioural constructs that were assessed were agitation and aggression, depression and dysphoria, apathy and indifference, and anxiety; and the cognitive constructs that were assessed were working and episodic long-term memory. The present study's results demonstrate a promising area of research in need of further exploration and supports the suitability of visual art interventions for the dementia population, with visual artistic abilities appearing to be retained even in the face of dementia (Fornazarri, 2005; Mendez, 2004, Van Buren et al., 2013; Leiner-Fisman & Lang, 2004; Sahlas, 2003; Scarmeas & Stern, 2004).

The Backward Digit Span results, indicating a significant improvement in auditory working memory scores for the experimental group, supports the first hypothesis of the present study: visual art training will offset decline in working memory for PWD. Furthermore, instead of only offsetting the decline of working memory, the results indicate that working memory scores actually improved after the eight-week visual art training program when compared to the waitlist control group, who were randomly allocated to a waitlist visual art training program. However, although these results are promising, due to the present study's small sample size it needs to be acknowledged that these are, at best, preliminary findings.

Although practice effects could have affected the difference between Backward Digit Span pre-testing and post-testing scores, they are not considered to be a probable cause of these findings. Two groups, the experimental and waitlist control, completed the same task at pre and post-testing with converse results; when the art training experimental group was compared to the waitlist control group, there was a significant difference between the experimental and control group's difference scores – with the experimental group scoring higher at post-testing than pre-testing. Furthermore, the Backward Digit Span, utilized to measure auditory working memory, has been shown to be robust in regards to practice effects for younger and older adults (Drevenstedt & Bellezza, 1993) and, although subject factors can affect practice effects, the use of randomization should reduce or eliminate the effect of participant characteristics on potential practice effects (Gross et al., 2014). Nonetheless, practice effects still need to be considered for future research as there are mixed results within the literature related to the sensitivity of PWD to practice effects (Gross et al., 2014).

The results of the present study may provide insights into which cognitive constructs are directly affected by visual arts training. Although working memory was not purposefully enhanced, the present study is the first visual art training study to demonstrate improved auditory working memory performance for dementia patients. This finding may indicate the potential direct effect visual art training has on the processes involved in working memory tasks, such as the Backward Digit Span. Specifically, it is conceivable that the momentary processing and manipulating of information involved in the Backward Digit Span matches the demands of coordinating similar processes when participating in visual art training classes; while participating in visual art training, the present processing and manipulating of visuospatial imagery and auditory terms, instructions and feedback are necessary. Nevertheless, due to the present study's small

sample size, additional research assessing larger samples is necessary before conclusions can be drawn. However, it is important to note that the results of the present study are consistent with previous research indicating that working memory is necessary and intrinsic when creating visual art and, therefore, may not need to be purposefully enhanced during visual art training for an enhancement to occur (Baddeley & Logie, 1999; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011).

The visuospatial working memory task, the Body Part Pointing task, did not yield significant results. This is consistent for all other tasks and hypotheses. The significant difference between the experimental and waitlist control group's auditory working memory scores, versus the insignificant difference between their visuospatial working memory scores, may indicate that, if it indeed exists, the direct effect of visual art training on working memory is limited to only auditory working memory. However, this is not supported by the literature (Baddeley & Logie, 1999; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011), and is not what the present study hypothesized. It is possible that the present study's limitations, such as sample size, may have affected the detection of a significant visuospatial working memory effect, however task-related limitations may have affected the visuospatial working memory results even more, specifically due to the lack of variability in the Body Part Pointing Task's binary scoring options (i.e., only a correct or incorrect response was recorded; see section 4.2.2. for details).

Episodic long-term memory, as assessed by the ROCF's and RAVLT's immediate recall tasks, was not significantly offset for either group. These findings are consistent with the findings of studies of a similar nature (Hattori et al., 2011), and may indicate that visual art training does not have an effect, direct or indirect, on episodic long-term memory. Unlike the possible direct connection between visual art training and working memory, the same cannot be

as easily assumed for visual art training and episodic long-term memory, which may require purposeful enhancement strategies within visual art training in order to directly improve performance. The present study supports these claims as episodic long-term memory, like working memory, was not purposefully enhanced with the developed visual art training curriculum, avoiding purposeful enhancement tools such as visual art integration (Rinne et al., 2011). However, in regards to the present study, limitations such as small sample size may have affected the detection of a significant episodic long-term memory effect. Specifically, the effect of visual art training on episodic long-term memory may be lesser than the effect of visual art training on auditory working memory, especially if visual art training indirectly effects episodic long-term memory while directly effecting auditory working memory. Supporting this theory, similar to the related literature, the present study found no quantitative evidence of an episodic long-term memory benefit, but did document qualitative cases of reminiscing (Hattori et al., 2011; Young, 2014), supporting the notion that visual art may have an indirect effect on episodic long-term memory, resulting in acute effects documented with qualitative, but not quantitative, reports. Thus, aside from task-related complications (see section 4.2.3. for details), the hypothesized offsetting of episodic long-term memory decline may not have been detected due to study limitations, but may be detected in future studies utilizing larger samples.

Due to the inability to properly assess the present study's behaviour and mood measures, the NPI and VAMS, the final hypotheses regarding improved mood and behaviour due to visual art training, as well as the mediating effect of mood on cognition and vice versa, could not be determined with the quantitative data collected. However, it is important to note that the present study's qualitative mood and behaviour data does indicate an overall enjoyment of the program, a lack of problematic behaviour, and general positive mood; reports that are consistent with previous

research (Bentes-Levy, 2012; Chancellor, Duncan, & Chatterjee, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002; Rusted, 2006; Stewart, 2004; Young, 2014) and the present study's hypotheses. Furthermore, the documented comments and behaviours support the potential similarities between art therapy's and art training's theoretical benefits. Specifically, the art program appears to have helped participants perform, with participants engaging and participating in the activity instead of being stagnant, and expressing themselves while appearing to use visual art as a communicative tool, especially while drawing loved ones or past vacations (Bentes-Levy, 2006; Chancellor, Duncan, & Chatterjee, 2012). Nevertheless, additional research with larger samples and adjusted or alternative mood and behaviour measures is needed in order to investigate how relevant these reports are. Details regarding mood and behaviour task-related limitations can be found in section 4.2.4.

It is important to acknowledge the limitations of the present study. Most notably, the findings of the present study must be interpreted as strictly preliminary due to the limited sample size of the study. Although the findings appear promising, and provide insight into a previously unexplored area of research, additional research is still necessary. Further, not all quantitative tasks could be assessed, or were assessed but resulted in a lack of significance, suggesting the potential need for adjusted or alternative measures.

4.2 Limitations

4.2.1 The Sample. The sample size of the project is a significant empirical limitation. Due to the sample size, the present study should be interpreted as an initial first step for future research; the methods and results reported here remain relevant and informative, but need to be interpreted with caution due to the study's small sample. Thus, future research recruiting larger samples of PWD are needed.

Due the present study's small sample size, comparisons across disease type and severity were not feasible, and one location's experimental group (C1) could not be randomly assigned. The present study compensated for these limitations by considering disease type and severity and assessing late-onset AD versus non late-onset AD differences on the significant working memory task, however the late-onset AD and non late-onset AD comparisons need to be interpreted with caution due to the even smaller sample sizes being compared. Furthermore, the lack of randomization at C1 was heavily investigated and non-significant differences between C1 and C2 were found. Future research can avoid these complications by assessing larger samples.

Although sample size is a limitation of the present study, and the study's sample was mostly heterogeneous in regards to disease type, the sample remained mostly homogeneous in terms of severity. This is important because severity levels can influence artistic ability (Chancellor et al., 2014). Specifically, persons with mild dementia are able to work independently on art-related tasks while persons with later stage dementia need more support throughout art interventions and added structure to curriculum designs (Chancellor et al., 2014). By hosting the project's assessments and interventions at the participants' respective care centres, the lead researchers were able to be regularly updated regarding the location of the participants (i.e., attending the dementia centre as opposed to living in long-term care). Furthermore, each participant was regularly evaluated by centre staff and social workers to determine whether they needed to be moved to the long-term care setting. The importance of the centre's monitoring of the participants is that each of the present study's participants were, therefore, deemed as suitable to live at home.

4.2.2. Testing Complications: Visuospatial Working Memory Assessment. The present study's results may indicate that, if it indeed exists, the direct effect of visual art training on

working memory is limited to auditory working memory performance alone – independent of visuospatial working memory. However, this is not consistent with the related literature (Baddeley & Logie, 1999; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011), and does not align with the present study's hypothesis. Beyond the small sample size of the project, limiting power to detect change, the lack of significant effect in regards to the visuospatial working memory task, the Body Part Pointing Task, may be due to the method utilized to collect the task's data (i.e., a correct or incorrect score). The Body Part Pointing Task was scored as either correct or incorrect, with a participant given a correct score if they recalled each item in the exact order in which the items were recited, and with an incorrect score given if any item was missed, additional items were included, or items were recalled in the wrong order. This limits the amount of variation that can be detected between groups of participants, with the variation between participant responses being condensed to a binary response. Therefore, the amount of lost variation (e.g., a participant who recalls all the correct items with the last two items reversed, a participant who recalls only three items but in the correct order, and a participant who recalls only incorrect items) may have limited the power of the analysis to detect a significant difference between groups. Based on this, as well as the small sample size of the project, it is still hypothesized that visuospatial working memory, along with auditory working memory, may be directly enhanced by visual art training. However, future research is necessary before conclusions can be drawn.

4.2.3 Testing complications: Episodic Long-Term Memory Assessments. The lack of significant effects found with the episodic long-term memory measures may be due to a number of factors, such as sample size related confounds. However, these results may have also been effected by the extent to which episodic long-term memory is impaired in the dementia population (Fleischman & Gabrieli, 1999; Gretton, 2014; Rose Addis & Tippet, 2004; Stewart, 2004), as

reflected by the results of similar quantitative studies (Hattori et al., 2011). These results may indicate the need for additional long-term memory tasks, such as those assessing semantic long-term memory.

Unlike episodic long-term memory, semantic long-term memory appears to be preserved during the early stages of dementia (Fleischman & Gabrieli, 1999; Gretton, 2014), and may be able to show improvement beyond what is seen with measures assessing the early impaired episodic long-term memory of PWD – especially with the present study's episodic long-term memory measures largely hitting floor across both groups. Furthermore, the visual art training curriculum will intuitively have a semantic long-term memory component as training attempts to teach participants visual art-related terms and definitions, which appears to be supported by comments made by some of the present study's participants (i.e., the rare recall of the visual art program's key terms). Therefore, the implementation of a semantic long-term memory measure may not only be a more suitable for PWD, it may also provide insights regarding the direct and indirect effects of visual art training on memory, as semantic long-term memory may not need to be purposefully enhanced with visual art training in order to produce direct effects.

4.2.4 Testing Complications: Mood and Behaviour Assessments. Unusable quantitative mood and behaviour data is a limitation of the present study. Due to task delivery complications, discrepancies between types of participant responses, and poor inter-rater reliability, the data from the VAMS measure could not be interpreted. Similarly, due to the behavioural questionnaires hitting ceiling across all constructs, the behavioural data was also uninterpretable. The present study did compensate for these limitations by reporting qualitative participant responses in order to document participant mood and behaviour throughout the art program, however the lack of pre-post behaviour and mood data raises the question of whether a *difference* in these constructs

occurred. By reconsidering mood and behaviour measures, future research may be able to better investigate the mood and behaviour effects of visual art training for PWD.

Adjusted methods for measuring mood are advised for future research. Utilizing different mood measures is an option, such as using the frequently implemented interview method, or observational method, which have provided usable results for similar studies (Kahn-Denis, 1997; Kinney & Rentz, 2005; Rentz, 2002; Stewart, 2004; Young, 2014). However, research favors the presently used self-report method to measure mood, as a means to elicit mood states directly from the participant and avoid the confounds associated with interviews and observational reports, such as language impairments, physical inability to form certain affective facial expressions, and individual prosody constraints (Temple, 2004). Thus, perhaps instead of implementing a new type of mood measure, a revision to the current measure is preferable. Two common complications that arose while using the VAMS were lengthy instructions (compared to the present study's other tasks) and participant confusion; with the two complications likely being intertwined. By being more concise when reciting the VAMS instructions, which in turn allows more time for clarifications, the measure may become better suited for future research building on the present study. As the VAMS has been validated as an appropriate measure of mood for the dementia population (Temple, 2004), perhaps this slight restructuring of the task would eliminate or lessen the complications experienced during the present study.

Similar to mood, adjusted behaviour measures are advised for future research. For example, future research may wish to implement the Multi-Observational Scale for the Elderly or the behavioural Apathy Scale as both measures have been used in similar studies and yielded usable results (Hattori et al., 2011; Rusted, 2006). On the other hand, the NPI may not need to be removed from the task battery at all, as it is possible that it was not the behavioural measure itself that caused

the unusable quantitative behavioural data, but the method for delivering the measure. Specifically, perhaps additional volunteers should be recruited to fulfil the role of filling out the behavioural scale before and after the visual arts intervention (or at additional intervals, including mid-way through the intervention as suggested in previous studies supporting the short-term effects of visual art training; Rusted et al., 2006). This method would allow for a more controlled assessment of behaviour, with the option of training the volunteers who have only one role to focus on and who have no previous connections to the participants.

4.3 Future Research

Multiple insights were gained from the present study and may provide useful information for future research. As suggested by the literature, as well as art instructor and dementia centre feedback, the present study utilized small group sizes throughout the project (average 1:3 volunteer to participant ratio, respectively). Small group sizes are ideal for dementia patients attending visual art classes (Rusted, 2006; Young, 2014), improving focus on individual participants, enabling the showing of each participant's artwork, and increasing the ease of answering each participant's questions. Additionally, participants' material requests can easily be heard and all feasible requests can be fulfilled. With this knowledge, it is recommended that future research utilize a similar approach, limiting group size to ensure a better environment for participant learning and comfort. However, when utilizing the small group approach, more instructors are necessary in order to make a large sample size possible. As there was only one instructor for the present pilot study, a small sample size was highly likely in order to run small group programs within the necessary time-span (two years). However, now that there is additional preliminary support for future research utilizing the developed curriculum, larger samples need to be obtained.

With the need for more instructors, future research needs to consider the cost of such a study, as cost is one of the, if not the, primary reasons for visual art programs to be cancelled at the senior level (Bentes-Levy, 2012). The cost of such an intervention may create a large enough barrier that the locations that want to implement these interventions may not find it feasible to do so. This raises a key concern regarding the merits of the present study: If visual art training is to be helpful, it must also be practical and cost-effective. The personal and societal costs of dementia are already at an all time high (Dudgeon, 2010; Stewart, 2004), making cost-effective interventions a necessity. Cost is a large barrier for visual art interventions, but it may be possible to alleviate a large portion of costs with the recruitment of volunteer instructors.

Bentes-Levy (2012) suggested the recruitment of university and high school volunteers for non-clinical senior visual art classes. Specifically, these students would be recruited as either volunteer instructors or volunteer teaching assistants. A similar approach, with the addition of dementia-relevant training, may be possible for visual art training classes for PWD. Visual art majors at local universities, many of whom also co-major in education, may be a perfect resource for voluntary visual art instructor positions. The student's gain practical experience, build connections, and add to their resumes, while the dementia care locations are provided with free services and knowledgeable arts instructors. Furthermore, visual art teaching assistant volunteers could be, as with the present study, psychology undergraduate students who are looking for practical and clinical experience. Other similar groups of university students, or even high school students attempting to complete their volunteer hour requirements, may also wish to apply for such a position. This is not to say that other art activities should use this strategy (e.g., art therapy will still need to be provided by a trained and licensed art therapist). Instead, this is to suggest that visual art training may be able to utilize volunteers as a means to keep costs associated with visual

art training programs down. This would provide a cost effective activity for dementia locations and enable more money to be spent elsewhere.

Research assessing the generalizability of the effect of visual art training should be assessed. If there is evidence that visual art training may help PWD, visual art training may also help normal aging samples or samples with other age-related conditions, such as Parkinson's and Mild Cognitive Impairment (MCI). Furthermore, comparisons between a normal aging sample and a dementia sample would be useful when considering the differences and similarities between the two groups in regards to the effects of visual art training. Therefore, not only should larger sample sizes be obtained in order to assess dementia type and severity differences, larger sample sizes should also be obtained to assess cross-population differences (Young, 2014).

Importantly, the present study represents the first step towards experimentally assessing the effect visual art training has on the working and episodic long-term memory of PWD. The present study used a rigorous methodology to investigate these effects while providing a complete methodological report and documenting relevant subject variables such as dementia type. Furthermore, a heavily researched and developed visual art training curriculum was created and put into practice, providing a new intervention method for future implementation that attempts to capitalize on the preserved abilities of PWD. Although the present study has significant limitations, it, as a pilot project, provides important information and resources for future research to use and implement – enabling the effect of visual art training on PWD to be better understood.

4.4 Final Thoughts

The powerfulness of the act of creating has been noted in the literature (Bentes-Levy, 2012; Rentz, 2002), and maintained a strong presence throughout the present study. To be able to create something, call it yours, even if you are only aware of that fact for a short period of time, is

rewarding and appears to create a sort of hope that cannot be measured or validated. During the visual art training program, the pride, humour, and happiness that participants exhibited many times following their creating something was a force I and my fellow volunteers were privileged enough to witness. Observing the power of creation is not robust scientific evidence, but it is a theme that runs through the present study and deserves to be stated. Our society so often forgets the abilities of our aging population, more notably those with any sort of cognitive decline, but this is a plea for you to not forget that they are here and able in their own individual way. A person with dementia is still a person, regardless of their diagnosis. Fifteen people completed the present study, all with varying impairments and abilities, and each day of class they gave me a new procuring hope produced by the blessing of watching and being with them as they created something. This hope is their gift to me, and my appreciation will never fade, but now I wish to share this gift with you. If you take anything away from this paper, let it be that there is and needs to be hope.

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Appendix A: Visual Art Training Curriculum

Table 7.

Visual Art Training Intervention: Terms and Activities

Week	Element and Principle	Activity
One	Space and emphasis.	Object Still Life: Teachers will bring in a bin of medium flat wooden basic objects. Participants will be asked to choose objects of their liking. Sheets of cardstock black paper will already be placed in front of each participant's seats – both medium and large sheets will be available. The teacher will then instruct the participants to trace their respective objects onto the black paper, and make a scene of their choosing. Participants will work independently as well as in partnership with the volunteers and teacher.
Two	Colour and variety.	Object Colouring: Teachers will bring in a bin of white basic objects. Once seated, participants will be asked to choose an object they like – both medium and small objects will be available. The participants will be given coloured pencils and teachers will instruct the participants to colour in their objects, one area of the object at a time, and pass it on to the next participant, and the next participant, and so on. Along with this activity, participants will be encouraged to colour their own objects. Participants will work independently as well as in partnership with the volunteers and teacher.

Table 7.

(Continued)

Week	Element and Principle	Activity
Three	Texture and harmony.	Texture Drawings: Teachers will bring in a bin of textured materials (fabric and non-toxic glue sticks). Participants will then be asked to choose materials they like so that they can make an image with them – both medium and large white cardstock paper will be available. Once participants have chosen their materials, they will be asked to use pencils (coloured and charcoal) and the texture materials draw their picture. Participants will work independently as well as in partnership with the volunteers and teacher.
Four	Line and movement.	Tape Directions: Before class, teachers will create multiple tape line segment paths on paper placemats with varying types of lines (e.g., curved, angled, straight, etc.). The varying lines will be in different colours (e.g., curved lines will be yellow and angled lines with be blue, etc.). As participants enter the class, they will be asked to sit at the table wherever they'd like. Once at their seats, participants will be asked to move their finger or a pencil/marker through the pathway (like a labyrinth or maze), followed by creating line drawings Participants will work independently as well as in partnership with the volunteers and teacher.

Table 7.

(Continued)

Week	Element and Principle	Activity
Five	Shape and rhythm.	Making shapes with shapes: Teachers will bring in a bin of flat paper shapes (such as squares, triangles, and circles) and non-toxic glue sticks. Bins will be placed in the middle of the drawing tables and participants will be asked to use the shapes to create images (such as houses, butterflies, etc.) on white cardstock paper - both medium and large sheets will be available. Participants will work independently as well as in partnership with the volunteers and teacher.
Six	Form and proportion.	People Proportion: Teachers will ask for two volunteers to stand in front of the group. Once two volunteers have been chosen, the teachers will ask the volunteers to stand beside, and behind each other. Other volunteers can also participate. The inclusion of props will be included (an assortment of foam forms such as butterflies, flowers, ducks, etc.).). After the activity, participants will be asked to draw their favorite scenes on white paper (props will be available as a cue). Participants will be encouraged to draw and trace the props. Participants will work independently as well as in partnership with the volunteers and teacher.

Table 7.

(*Continued*)

Week	Element and Principle	Activity
Seven	Form and balance.	Flat Image Team Organization: Teachers will bring in bins of three-dimensional form stickers and one large white Bristol board. A black line down the middle of the Bristol board will split it into two halves – with tape at the centre as a tactile cue. The teachers will then split participants into two groups, based on where they are seated at the activity table. Then, teachers will instruct participants to take turns placing the stickers on the board to "balance" it (if group A places a pink large flower on their side, group B places a pink large flower on their side). Groups will match the other group's sticker choice based on colour or shape and then choose their own. The sticker balancing activity will go on until the board is filled. Participants will then be given paper and pencils and asked to draw similar "balanced" images on white paper. Participants will work independently as well as in partnership with the volunteers and teacher.

Table 7.

(*Continued*)

Week	Element and Principle	Activity
Eight	Value and gradation.	Lighting & People: Participants will be given white paper with shape examples of value gradation (a square and circle that transitions from black to white) and teachers will provide participants with pencils and white paper with blank shape examples. Teachers will then ask participants to draw the example shape (transitioning from black to white) on the blank shape. Participants will work independently as well as in partnership with the volunteers and teacher.

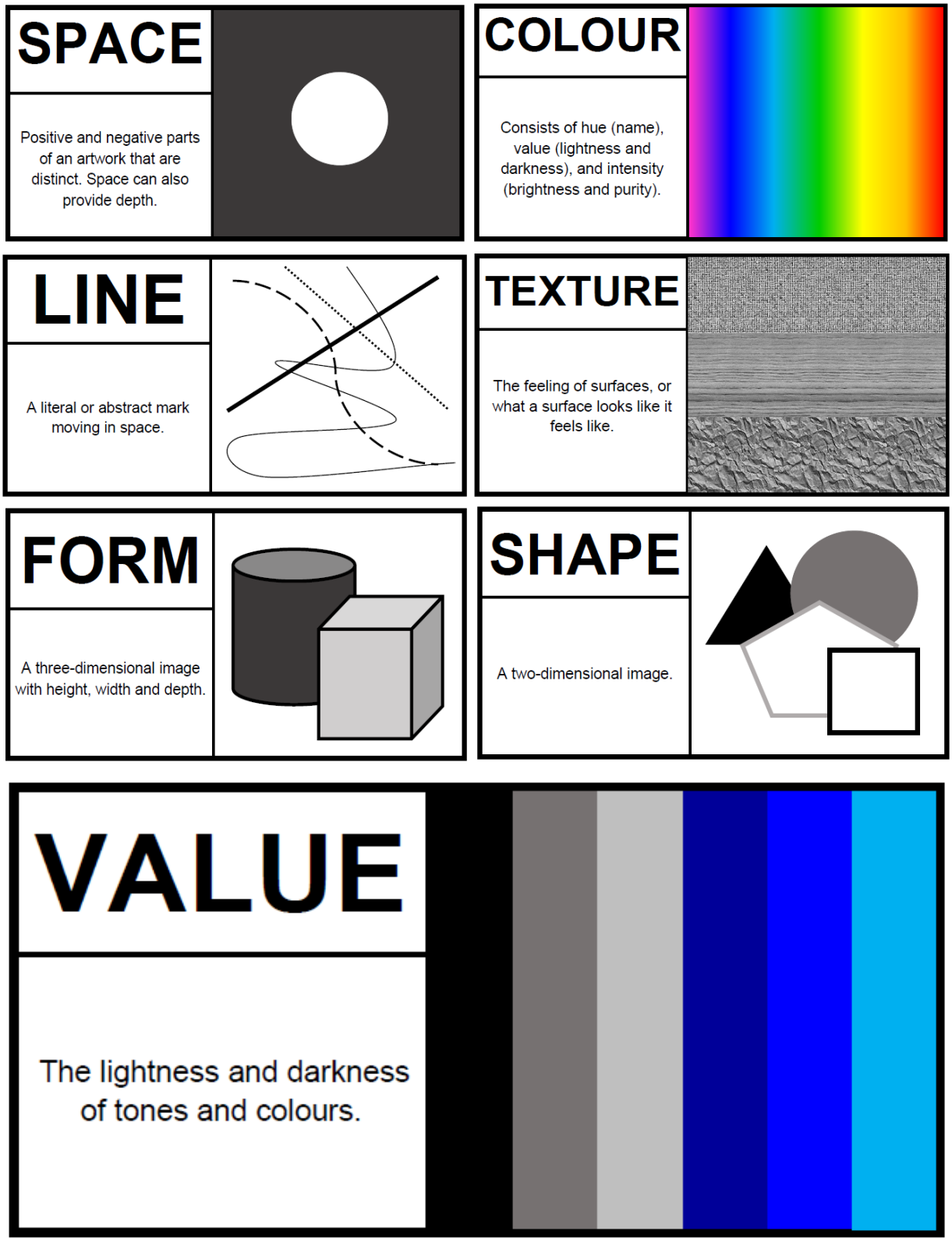

Figure 8. Visual Art Intervention Elements of Design Visual and Written Descriptions (Foster, 2006).

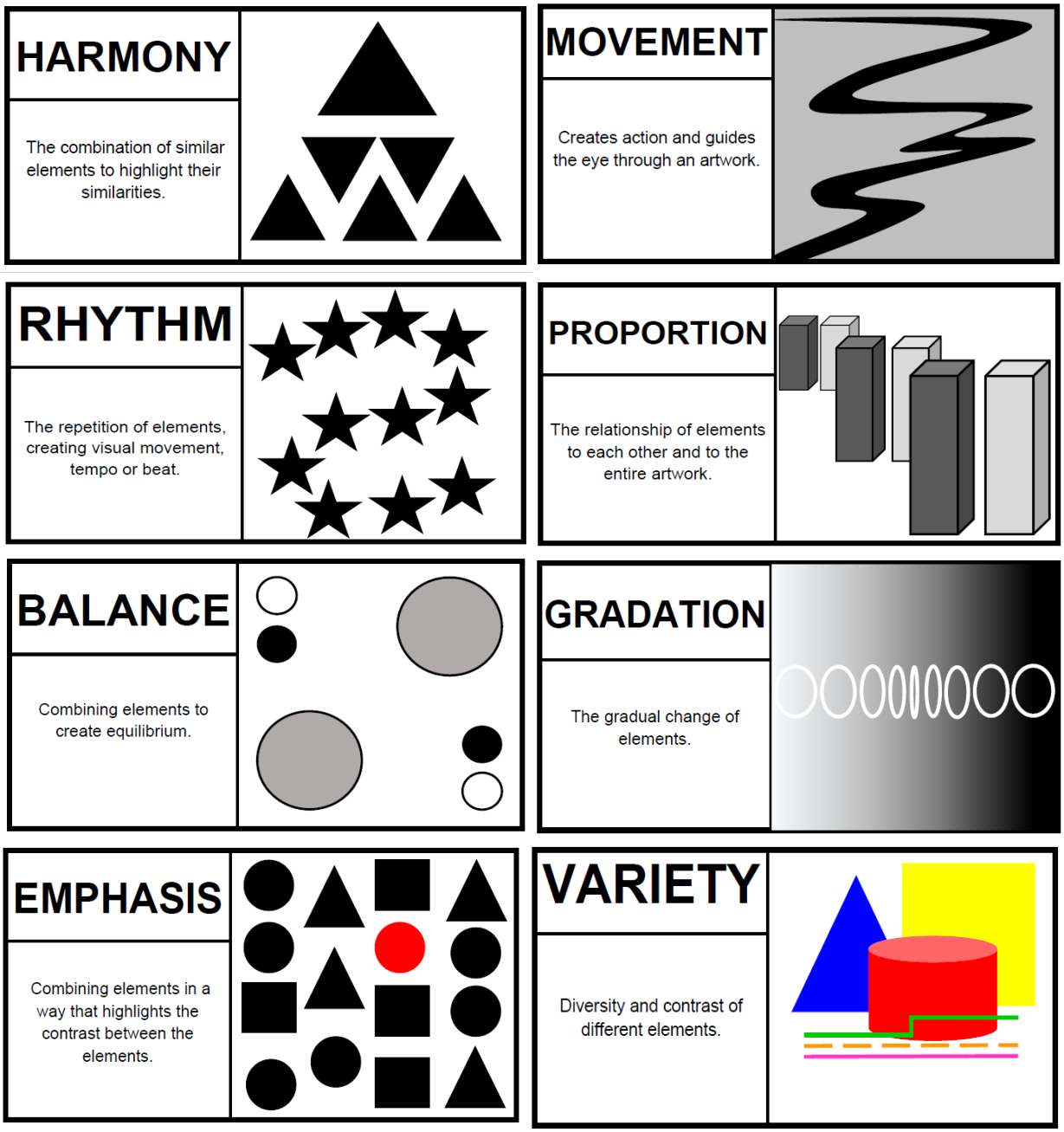

Figure 9. Visual Art Intervention Principles of Design Visual and Written Descriptions (Foster, 2006).

Appendix B: Visual Art Training Inventory and Cost

Table 8.

Visual Art Training Material and Supply Inventory and Costs

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
Bristol Board	22x28 inch, White	$0.50	28	$14.00	33 1/4 Sheets; 40 1/2 Sheets	0
Bristol Board	22x28 inch, Black	$0.50	11	$5.50	11 1/4 Sheets; 5 1/2 Sheets	6
Foam Board	20x30 inch	$1.00	2	$2.00	1	0
Rulers	12 Inch (Blue, Pink, Purple)	$1.00	3	$3.00	3	0
Pencil Crayons	12-Pack Crayola Assorted, Non-Toxic	$2.00	10	$20.00	10	0

Note. Crossed out materials and supplies were bought but not used during the intervention.

Table 8.

(Continued)

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
Pencil Crayons	12-Pack No Name Assorted, Non-Toxic	$1.00	10	$10.00	10	0
Pencil Crayons	24-Pack Crayola Assorted, Non-Toxic	$2.00	5	$10.00	5	0
Pencil Crayons	8-Pack Crayola Metallic, Non-Toxic	$5.00	1	$5.00	1	0
Markers	8-Pack Crayola Thin Tip, Non-Toxic, Washable	$3.00	4	$12.00	4	0

Table 8.

(Continued)

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
Markers	20-Pack Crayola Thick/Thin Tip, Non-Toxic, Washable	$6.00	2	$12.00	2	0
Erasers	6-Pack No Name	$0.17	6	$1.00	6	0
Erasers	2-Pack Bic	$1.00	4	$4.00	4	0
~~Sharpeners~~	~~Green No Name~~	~~$1.00~~	~~1~~	~~$1.00~~		
~~Sharpeners~~	~~4 Pack No Name~~	~~$2.00~~	~~1~~	~~$2.00~~		
Sharpeners	With Product (24-Pack Crayola Assorted)	$0.00	5	$0.00	5	0

Table 8.

(Continued)

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
~~Cups~~	~~Solid, Blue~~	~~$0.25~~	~~2~~	~~$0.50~~		
~~Cups~~	~~Mesh, Black~~	~~$2.00~~	~~2~~	~~$4.00~~		
~~Tablecloths~~	~~White (With Line Labyrinths)~~	~~$1.00~~	~~1~~	~~$1.00~~		
~~Tablecloths~~	~~White~~	~~$1.00~~	~~1~~	~~$1.00~~		
Tablecloths	Clear	$3.00	2	$6.00	2	0
Scissors	Green, Comfort Grip, Blunt Tip	$1.50	2	$3.00	2	0
~~Scissors~~	~~Purple and Pink, Fabric Scissors~~	~~$3.00~~	~~2~~	~~$6.00~~		

Table 8.

(Continued)

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
Glue Sticks	18-Pack, Elmers, Non-Toxic, Washable	$0.17	18	$2.99	7	0
Tape	4-Pack (Green, Red, Blue, Yellow)	$2.00	7	$14.00	6.75	0
2D Shapes	100-Pc, Multi-Colour Paper Pad	$0.00	100	$0.00	50	0
Foam Stickers	100-Pc, Multi-Colour	$3.50	3	$10.50	1	0
Gradient Sheets	Circle and Square, Black to White	$0.00	16	$0.00	10	0

Table 8.

(Continued)

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
Gradient Sheets	Circle and Square	$0.00	16	$0.00	12	10
Gradient Swatches	Black to White	$0.00	8	$0.00	7	0
Wooden Shapes	Small Assorted (Dinosaurs, Butterflies, Flowers)	$0.07	90	$5.99	28	0
Wooden Shapes	Medium Assorted (Cats, Suns, Horses, Flip-Flops, Moons, Bumblebees, Dragonflies, Butterflies)	$1.60	20	$32.00	2	7

Table 8.

(Continued)

Name	Description	Price	Original Quantity	Original Value	Quantity Post-Program 1 and 2	Reorder for Program 3
Fabric	Rolled Fabric	$1.50	7	$10.50	7	0
Fabric	Odds & Ends	$0.50	6	$3.00	2 Scrap; 11 Pieces	0
Foam Shapes	Rectangles, Flowers, Butterflies, and Ducks (Blue, Green, Red, Purple, Yellow, Orange)	$1.25	12	$15.00	12	0
Black Duct Tape	Small Roll	$1.00	2	$2.00	1	0
Black Permanent Markers	Sharpie Large Point	$2.00	1	$2.00	1	0

Background Questionnaire

Task Information

Date: _____

Time: _____

Personal Information

Name: _____

Date of Birth: _____

Participant Information

Name: _____

Gender: _____

Date of birth: _____

Handedness: _____

Why we are asking you to fill in a background questionnaire:

We are interested in general information about the participant, including education, basic medical history, and hobbies. This information will help us understand how these characteristics affect the participant in regards to task response and classroom participation. Filling out this questionnaire is completely voluntary. The decision to not fill out the questionnaire or not answer particular questions will not affect your relationship with the researchers, York University, or any other group associated with this project. All information you provide will be kept confidential and will be saved in an anonymous format.

Please complete the questionnaire as per the following instructions:

Please fill out this questionnaire to the best of your ability. If you do not wish to answer any question, or the question is not applicable, please leave the answer box blank. If at any time you have questions, please feel free to contact Annalise D'Souza and Katherine Matthews, either by telephone at 416-736-2100 (44037) or by e-mail (ArtsForDementiaYork@gmail.ca).

Section I: Personal Information

1. How are you related to the participant (e.g. family, friend, occupation)?
   _____

2. What percentage of the participant's caregiving are you responsible for?
   _____

3. A) Does the participant have other caregivers?
   _____
   B) If yes, how often are you in touch with the other caregivers (on a scale of 0 to 10)?
   _____

Section II: Participant Information

1. A) Does the participant speak English? If so, for how many years?
   _____
   B) If applicable, how fluent is the participant in English on a scale of 0 to 10?
   _____

2. Does the participant speak any language(s) other than English fluently? If so, what language(s) does the participant speak, and for how long have they been speaking it? *Example response: French (first language); Italian (25 years).*
   _____

3. A) Where was the participant born?
   _____
   B) If the participant was not born in Canada, what year did they arrive?
   _____

4. A) How many years of schooling does the participant have? *Note: High school is 12-13 years*.
   _____
   B) What is the highest level of education the participant has?
   _____

Section III: Health Information

1. A) What type of dementia does the participant have (e.g. Alzheimer's, Lewy body, vascular)
   _____
   B) At what age was the participant diagnosed?
   _____
   C) What stage or severity is the dementia currently?
   _____

2. Does the participant have hearing impairments (e.g. Tinnitus, muffled words)? If so, please list.

_____
_____
____

3. A) Does the participant wear hearing aids?
   _____
   B) If yes, is the participants hearing corrected to normal with the aid?
   _____

4. Does the participant have vision impairments (e.g. glaucoma, cataracts)? If so, please list.
   _____
   _____
   ____

5. Is the participant colour blind?
   _____

6. A) Does the participant wear vision aids (contacts or glasses)?
   _____
   B) If yes, is the participant's vision corrected to normal with the aids?
   _____

7. Does the participant have any other known neurological impairments (e.g. epilepsy, brain injury, epilepsy)? If so, please list.
   _____
   _____
   ____

8. Does the participant have any other known medical conditions (e.g. depression, diabetes)? If so, please list.
   _____
   _____
   ____

9. Does the participant have any physiological impairments (e.g. difficulty walking or eating)? If so, please list.
   _____
   _____
   ____

10. Does the participant have any other health concerns that may prevent them from functioning on a daily basis? If so, please list.
    _____
    _____
    ____

11. Does the participant take any medication (including over-the-counter or prescription)? If so, please list with dosage and frequency.
    Example response: Aspirin (81 mg, daily); Advil (200 mg, weekly).

    _____
    _____
    ____

Section IV: Art Experience

1. Does, or has, the participant created or participated in art (e.g. paintings, theater, music)? If so, please list art form(s) with duration(s).
   Example response: "Painting (weekly, 4 months); musical theater (monthly, 2 years)."

   _____
   _____
   ____

2. Does the participant have any formal art training (e.g. private art lessons, high school art lessons, extra-curricular activities)? If so, please list with duration?
   Example response: "private photo lessons (daily, 2 years); theater club (daily, 6 years)."

   _____
   _____
   ____

Section V: Other Experience

1. Does, or has, the participant participated in lifestyle activities, hobbies, physical activities, and/or enrichment activities (e.g. chess, knitting, reading, frequenting the gym, golf, travelling, social clubs, educational programs)? If so, for what duration?
   Example response: "Curling club (weekly, 4 months); reading (daily, 40 years)."

   _____
   _____
   ____

We thank you for your participation

We appreciate the time and effort you have put into filling out this questionnaire. If you have questions about this questionnaire, the research in general, or about your role in the study, please feel free to contact Annalise D'Souza and Katherine Matthews, either by telephone at 416-736-2100 (44037) or by e-mail (ArtsForDementiaYork@gmail.ca).

Appendix D: Project Timeline

Table 9.

Project timeline

Year	Month	Event
2014	April	• Began literature review
		• First grant submission: Minor Research Grant
	June	• Independent study student, focusing on dementia and art, accepted
		• First volunteer recruited
	July	• Began searching for a dementia co-principle investigator
		• Ethics approved
		• Began emailing and calling potential recruitment locations
		• Began discussion with first and second retirement home
	August	• Began discussion with first dementia centre
		• Approval from first retirement home
	September	• Dementia co-principal investigator confirmed
		• First scholarship submission: LaMarsh Research
		• Approval from first dementia centre
		• Began discussion with second dementia centre
	October	• Second grant submission: Brightfocus
		• Third grant submission: SSHRC small grant
	November	• Began creating the visual art curriculum
		• Began recruiting additional volunteers
		• Began selecting measures
		• Approval from second retirement home – pending board approval
		• First graduate researcher dementia centre visit
		• First volunteer dementia centre visit
	December	• Fourth grant submission: ASRP
		• Declined from first and second retirement homes
		• Attempt to restore approval from homes via graduate investigators
2015	January	• Ethics Amendment Approved
		• Approval from second dementia centre
		• Attempt to restore approval from homes via thesis supervisor
		• Attempt to restore approval from homes via York University's director of strategic research partnerships (Andrea England) and associate vice president of teaching and learning (Will Gage)
	February	• Initial visual art curriculum version completed
		• Created participant recruitment email account
		• Began creating participant background questionnaires
		• Began creating participant recruitment flyers
	March	• Fifth grant submission: SSHRC small grant
		• Deans representative confirmed
		• Background questionnaire complete

Table 9.

(Continued)

Year	Month	Event
2015	April	• Measures finalized • Approval from centre one to begin recruiting participants • Second ethics amendment approved • Registered at clinicaltrials.gov • First volunteer testing session run-throughs completed • Recruitment flyers completed
	May	• Second volunteer testing session run-throughs completed • Second committee member confirmed • Thesis proposal submitted to second committee member • Final volunteer dementia centre visits • Approval from center two to begin recruiting participants
	June	• Permission to begin testing sessions at both centres • Presented Master's methodology at the 2015 LaMarsh Symposium • Presented Master's methodology at the YU-CARE Launch event
	July	• Thesis proposal submitted • Final number of recruited participants at centres one and two provided • Began the visual art program at centre one and two
	August	• Thesis proposal approved
	September	• Data collection completed • Second scholarship submission: LaMarsh Leadership
	November	• Data entry completed • Began data analysis
	December	• Approval to acknowledge the Alzheimer's Society of York Region
2016	January	• External committee member confirmed • Submission of final thesis draft to supervisor
	February	• Submission of final thesis draft to second committee member
	March	• Presented Master's results at the Neuroscience Association of York's Student Symposium • Practice Master's thesis defense completed

Appendix E: Normal Aging Standardized Scores

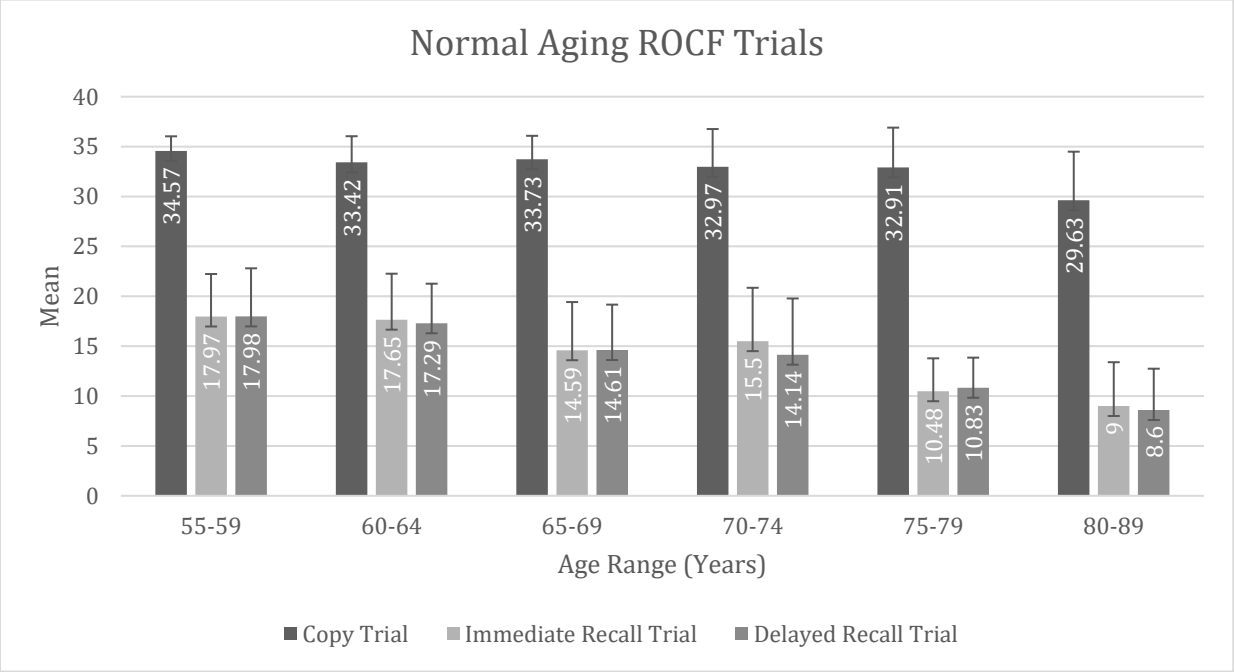

Figure 10. Normal Aging ROCF Trials Means and Standard Deviations. ROCF means and standard deviations from Meyers & Meyers (1995).

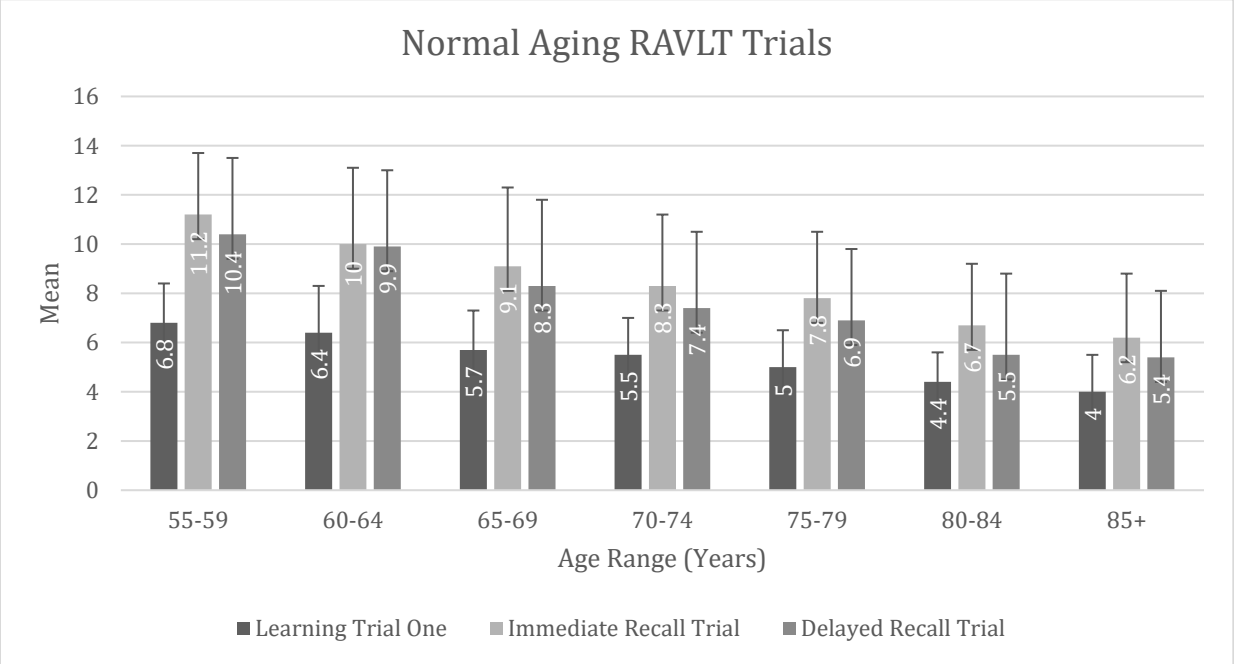

Figure 11. Normal Aging RAVLT Trials Means and Standard Deviations. RAVLT means and standard deviations from Fabry (1996) and Ivnik, et al., (1990).

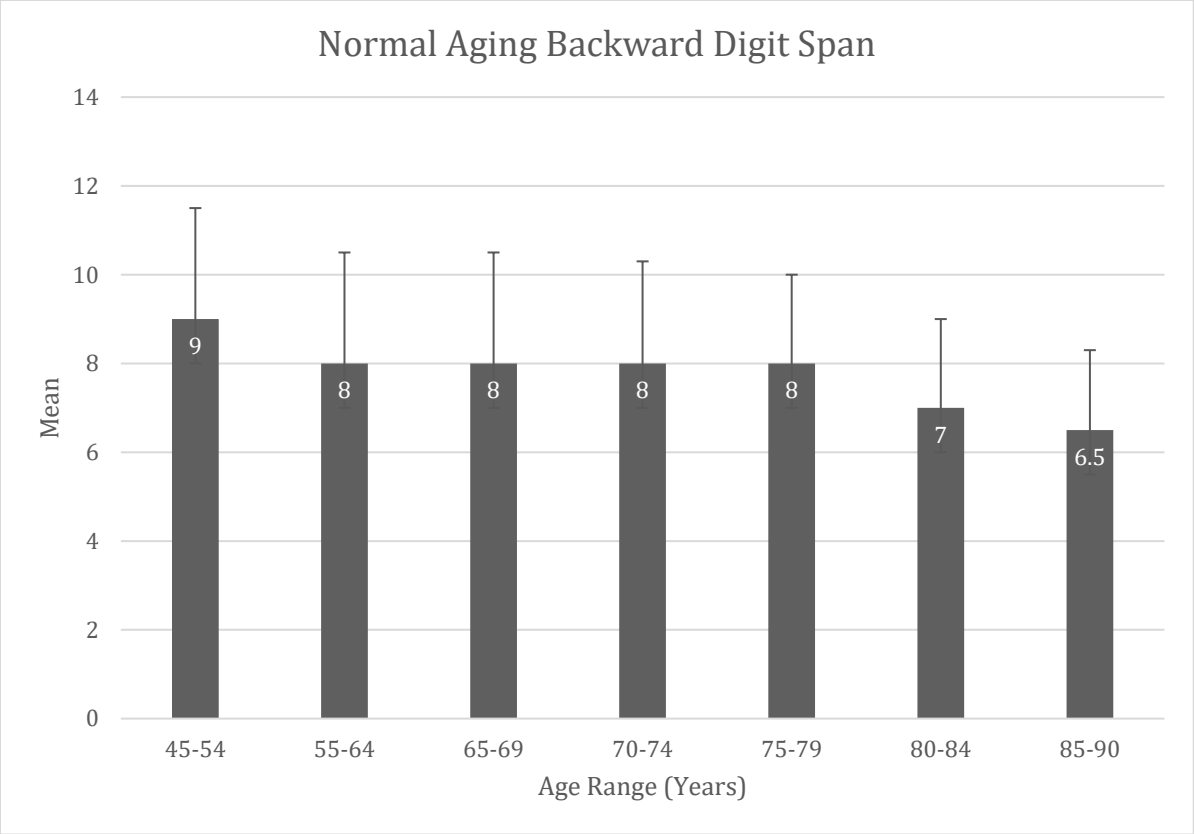

Figure 12. Estimated Normal Aging Backward Digit Span Means and Standard Deviations. Estimated Backward Digit Span means and standard deviations from Wisdom, Mignogna & Collins (2012).