

The Effect of Art Training on Dementia

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Abstract

The present study explores the effect of visual art training on people with dementia (PWD), utilizing a randomized control trial (RCT) design, with a structured usual activity waitlist control group, in order to investigate the effects of an eight-week visual art training program on PWD's cognition, mood, and behaviour. Cognition was assessed with: The Backward Digit Span, measuring verbal working memory; the Body Part Pointing Test, measuring visuospatial working memory; and the Montreal Cognitive Assessment (MoCA), measuring overall cognitive function. Mood and behaviour were qualitatively assessed based on volunteer-completed observational reports. The results of the study indicate that while cognition is not significantly affected by an eight-week art training program, mood and behaviour are positively impacted.

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

Dedication

I'm occasionally advised that it is best to remain detached as a dementia researcher, especially while working directly with patients; to remain completely separate from that which I study as well as those who I study. Beyond the reasoning that this may in some way enhance my skills as a researcher, I believe the advice also comes from a place of kindness, with the advisor sharing this thought in an attempt to somehow protect my heart and my happiness; with the reasoning that, so long as I remain detached, I won't experience *personal* losses if a participant passes or moves on. To this advice I say a heartfelt, but unwavering, "no". I only know these individuals for a short time, but I am fortunate enough to have even the shortest of memories and experiences alongside them. Each participant, in any study, is a person first and foremost and the individuals whom I research are certainly no exception. My data may be treated rigorously, but my memories with the actual individuals who participate will forever remain as personal treasures. I've truly found my calling, as they say, and I remain an optimist regardless of the hurdles. As the saying goes: *dum spiro, spero*. Or, in other words: while I breathe, I hope.

My dissertation is indeed dedicated to the individuals who participated in the project, but it is also dedicated to the family that supported me throughout the journey. To talk about each individual would be a dissertation in itself, so instead I will be brief: It is in the eyes of my family from which I gain strength and courage, because in their eyes I see pride, compassion, and hope; it is in the hands of my family from which I gain momentum and wisdom, because in their hands I can never be steered wrong; and it is in the heart of my family from which I gain kindness and passion, because in their hearts there are no two things more prominent. You are all truly *awesome*.

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1. Introduction

1.1 Objectives

The present study explored the effects of visual art training on people with dementia. Two groups of people with dementia were considered: an experimental visual art training group and a structured usual-activity waitlist control group. Specifically, the effects of visual art training were compared to the waitlist control group's usual daily assisted living or dementia day program activities¹. Visual art training offers an ideal intervention for those with dementia as its supplies and materials are relatively inexpensive, its implementation is non-invasive, and its curriculum is flexible in difficulty and duration. Art training is an underused tool within clinical settings and offers a unique experience that welcomes those with varying backgrounds and conditions. As Bryne and MacKinlay (2012) explain: "The arts take humans across faith and cultural barriers to a place where we can connect as humans, in a broader sense of being" (p. 107).

1.2 Previous Research

1.2.1 Dementia. Dementia is a clinical syndrome associated with over 60 conditions (Kahn-Denis, 1997), and is characterized by a progressive decline in memory and cognitive functioning, severe enough to cause a loss of daily functioning (Stewart, 2004). Specifically, the main symptoms associated with dementia are memory deficiencies (Fleischman & Gabrieli, 1999; Fornazzari, 2005; Huntley & Howard, 2009; Gretton, 2014; Rose Addis & Tippet, 2004; Sahlas, 2003; Stewart, 2004; Storandt, 2008), social and occupational disfunction (Stewart, 2004), motor disturbances (Gretton, 2014), and overall cognitive, behavioural, and mood deficits

¹ Importantly, multiple locations were considered, which resulted in multiple different forms of waitlist programming, which unavoidably varied in their intensity and frequency.

(Vink et al., 2011). While Dementia of the Alzheimer's type (DAT) is the most common, other forms of the disease exist (Table 1).

Table 1.

Dementia Type Information (From Most to Least Prevalent)

Dementia	Onset	Symptoms	Preserved Abilities	Neurological Impact
Alzheimer's disease	Early-onset/familial (parental) at 30 years, and late-onset/ sporadic (familial) at 65 years ^{19,13}	Early memory impairments ²² ; dysfunctional autobiographical memory ^{2,5,6} , executive function ¹⁰ , working memory ^{21,22} , semantic memory ²² , spatial and perceptual awareness ¹⁴ ; apraxia, aphasia, agnosia ^{5,7} ; later-stage language ² , attention ^{2, 22} , reasoning ² , and visuospatial dysfunction ^{2, 22}	Visuospatial and visuomotor abilities ¹⁰ , early-stage semantic memory ^{2,5} , post-semantic speech production ²²	Preserved primary sensory and motor cortices ¹² ; neuro-fibrillary tangles which form plaques ^{15,23} ; degeneration of parietal ¹¹ , frontal ³ , and medial temporal lobes ¹² , as well as the cerebral cortex overall ¹² , hippocampal damage ²
Vascular or Multi-Infarct Dementia ²³	After stroke	Varies based on where stroke-related lesions occur; confusion and deficits related to attention, vision, motor, and memory can occur ^{5,8}	Varies based on where stroke-related lesions occur; artistic creativity ⁵	A series of small blockages prevent oxygenated blood from reaching a brain area, causing cell death and lesions ^{5,8,16,17, 23}
Lewy Body Dementia	50 years	Memory impairment ^{4,22} , early hallucinations ^{20, 22} , confusion ^{18, 22} , tremors and rigidity ^{20,22} , and impaired executive functions ^{20, 22} , working and semantic memory ²² , visual and spatial perception ²² , and attention ^{5, 22}	Artistic personality semantic memory ⁵ , and post-semantic speech production ²²	Impaired parietal-temporal and occipital lobes ⁵ , Lewy bodies (abnormal protein deposits) in the cerebral cortex in general, brain stem nuclei, and basal forebrain cholinergic system ^{20, 22, 4}
Fronto-temporal Dementia	50 years	Deterioration of attention, executive function, working memory ¹⁰ , and language ¹⁴	Visuo-constructive regions ¹⁴ , episodic memory, planning, complex thought ¹¹	Deterioration of the frontal and/or anterior-temporal regions ¹⁴

¹Kahn-Denis, 1997; ²Fleischman & Gabrieli, 1999; ³Huntley & Howard, 2009; ⁴Sahlas, 2003; ⁵Gretton, 2014; ⁶Rose Addis & Tippet, 2004; ⁷Storandt, 2008; ⁸Stewart, 2004; ⁹Vink et al., 2011; ¹⁰Fornazzari, 2005; ¹¹Mendez, 2004; ¹²Van Buren, Bromberger, Potts, Miller, & Chatterley, 2013; ¹³Gazes et al., 2012; ¹⁴Leiner-Fisman & Lang, 2004; ¹⁵Scarmeas & Stern, 2004; ¹⁶Dudgeon, 2010; ¹⁷Mille & Hou, 2004; ¹⁸Guétin et al., 2009; ¹⁹Alzheimer's Society of Canada, 2012; ²⁰Lewy Body Dementia Association, 2016; ²¹Stopford et al., 2012; ²²Ralph et al., 2001; ²³Carter, 2014.

Worldwide dementia prevalence is estimated at more than 44.3 million people, with cases of dementia expected to reach 1.25 billion by 2050 (Prince et al., 2013; Prince, Guerchet, & Prina, 2013) unless new interventions prevent or decrease the trajectory of dementia-related decline. The economic impact of dementia, including unpaid caregiving, is estimated at over \$600 billion worldwide, which is greater than the costs of other common chronic diseases, such as heart disease or cancer (Langa, 2015).

The question of how to cope with the social and economic effects of this debilitating disease is a persistent one for all involved – from federal governments to local households. Currently, the main treatment for dementia is pharmaceuticals, which include antipsychotics, anticonvulsants, antidepressants, and cholinesterase inhibitors. While certain medications have proven effective, pharmaceutical treatments can have a limited ability to target certain symptoms and can be accompanied by non-trivial side effects, such as confusion, delirium, cognitive deficits, and blurred vision (Hersch & Falzgraf, 2007). Due to these complications, as well as the support for non-pharmacological treatments in dementia care (Caulfield, 2011), it is increasingly suggested that pharmacological treatments for dementia be employed as a second-line or co-existing approach to non-pharmacological treatments (Camartin, 2015; Caulfield, 2011). In best practice, it is advised that the first treatment method be non-pharmacological alternatives such as behavioural interventions (Douglas, James, & Ballard, 2004; Sauer, Fopma-Loy, Kinney, & Lokon, 2014), including, for example, arts training programs.

1.2.2 Art Training versus Art Therapy. Currently the art and dementia literature largely consist of art therapy interventions. In contrast, the present study focuses on art training. Art therapy and art training differ based on their facilitator (art therapist versus art instructor, respectively) and objectives (targeting disorder-specific symptoms versus teaching skills through

learning art, respectively; Berking, Ebert, Cuijpers, & Hofmann, 2013; Ullman, 2001). Art training requires active involvement to acquire new art-related skills, while art therapy is not necessarily active, and is often considered passive.

1.2.3 Art Training and Dementia. Arts programs have been proven suitable for dementia samples, highlighting the prospect for resilience within the population (Windle et al., 2017). A key motivator for exploring art training as a dementia intervention is from the reported artistic potentials of dementia patients, from famous artists (e.g., Willem de Kooning; Fornazzari, 2005) to patients without formal art training who successfully began to produce art after diagnosis (Kleiner-Fisman, & Lang, 2004; Miller & Hou, 2004; Shinagawa & Miller, 2014). Indeed, individuals who develop dementia display a remarkable ability to produce and participate in arts activities, at times even until late in the course of the disease (Fornazzari, 2005; Kleiner-Fisman, & Lang, 2004; Mendez, 2004; Schneider, Hazel, Morgner, & Dening, 2018; Van Buren, Bromberger, Potts, Miller, & Chatterjee, 2013). These reports fit well within the known progression of dementia; typically, memory and executive function impairments occur first, while visuomotor and severe visuospatial deficits typically occur later in the disease (Camic, Tischler, & Pearman, 2014; Chancellor, Duncan, & Chatterjee, 2014; Ehresman, 2014; Perry & Hodges, 1999). This evolution may be due to the nature of artistic processes, which are associated with symbolic and abstract thinking. In contrast to language processes, artistic processes require skills and creativity that are linked to broad and diverse brain regions (Zaidel, 2010 as cited in Ullán et al., 2011). This may explain the apparent preservation of artistic functionality even in the presence of dementia-related decline (Ullán et al., 2011).

Despite a loss of functioning as the disease progresses, artists have been reported to adapt to the limitations of dementia – such as utilizing abstraction techniques – and maintain the ability

to create art with only trivial changes to artistic production (Fornazzari, 2005; Mendez, 2004; Seifert & Baker, 2003; Ullán et al., 2011; Van Buren, Bromberger, Potts, Miller, & Chatterjee, 2013). Further, research suggests that art making is not only possible for those with dementia, but also enjoyable (Flatt et al., 2015; Ullán et al., 2011; Windle et al., 2017). Although there are restraints on certain techniques, such as realistic or complex art, the essential visual and motor functions required for producing art appear to be maintained in dementia, with patients even being able to learn new motor, perceptual, and cognitive skills (Camic, Tischler, & Pearman, 2014). Importantly, there are cross-dementia differences in artistic production, which is unsurprising based on the symptomatic and progression differences between dementia-types, which makes the consideration of dementia type all the more imperative (Calderon et al., 2001; Liu, 2006). Overall, art is considered a specifically human activity that withstands many of the obstacles related to illness and disease (Ullán et al., 2011); it is extremely flexible, and can be adapted based on a participant's level of functioning (Basting, 2006; Cowl & Gaugler, 2014), making it an ideal intervention for those with dementia.

1.2.4 Art Training and a Person-Centered Approach. Discussed by Sabat and Harré (1992) as the “self¹” and self²”, and Kitwood and Bredin (1992) as “social malignity”, a person with dementia's social roles become affected by their condition and can create a sense of reserve or even suspicion in those around them (Schneider, Hazel, Morgner, & Dening, 2018). By maintaining their “self¹”, or their unchallengeable status as a human being, while largely changing in regards to their “self²”, or their recognizable persona, a person with dementia may be difficult to place within a set category by those around them, resulting in discomfort or distrust towards the individual with dementia (Schneider, Hazel, Morgner, & Dening, 2018). In order to circumvent these outcomes, Kitwood and Bredin (1992) suggest the facilitation of positive social

interactions, affirming essential values and social roles, by promoting self-esteem, agency, social confidence, and hope – objectives that match the approach of person-centered care (Schneider, Hazel, Morgner, & Dening, 2018). Visual art programs and activities fall well within this approach, highlighting individual personhood and empowerment, providing a sense of personal value and purpose (Bryne & MacKinlay, 2012; Windle et al., 2014). Further, while impaired memory is common for those with dementia, emotional memories may be relatively maintained regardless of the disease (Butler, Orrell, Ukoumunne & Bebbington, 2003), and art can provide a means of expressing these retained memories regardless of the type of emotion they elicit (Windle et al., 2014).

A great positivity follows the use of arts participation for those with dementia, as these programs appear to go beyond simply “filling the time”, and instead provide a flexible and adaptable starting point for people to continue their learning journeys and find self-expression and esteem (Calufield, 2011; Camartin, 2015; Windle et al., 2017). Participants of arts education programs, as well as their caregivers, may even find themselves surprised by the participants learning potential, as well as their overall capabilities. This is emphasized in the Ullán and colleagues’ 2011 arts education and dementia study, with one participant exclaiming, “I didn’t think I could learn things like that at this point” (p. 12), with an involved facilitator coming to a similar epiphany: “They [the participants’ relatives] should know that they [the participants] can do it, perhaps they don’t know because not even we could have imagined it and we were with them every day.’ (p. 17). Arts programs can indeed provide an “even playing field”, where patients and their carers can learn and discuss something beyond their condition; using art as a vehicle for communication, bonding, and learning – suitable for trained artists and novices alike (Camic, Baker & Tischler, 2014; Matthews, 2016; Ullán et al., 2011, Windle, 2017). Further,

with a loss of communication by speech frequently affecting those with later stage dementia, a visual art program such as arts training could provide a new means of communication beyond speech, with visual art participation accommodating both verbal and non-verbal forms of expression (Schneider, Hazel, Morgner, & Dening, 2018). As Bryne and MacKinlay have said: “When art becomes a companion, a conversation unfolds,” (p. 117). Through arts programming, both the facilitators and participants may be surprised to learn how capable persons with dementia can be, and with a person-centered approach the program facilitator is free to embrace the individuality that will inevitably occur between participants. With the overgrown focus on loss during someone’s development of dementia, it is so easy to forget that there can be growth as well – especially through the malleable tool that visual art provides (Camic, Baker & Tischler, 2014).

1.2.5 Art Training and Mood and Behaviour. When considering the effects of dementia, mood and behaviour are immensely important areas to consider. Many individuals with dementia have comorbid mood and/or behavioural conditions to contend with, typically experiencing these comorbidities at the onset of their specific type of dementia (Vink, Bruinsa, & Scolten, 2011). While the behavioural and psychological symptoms of dementia are quite broad (depression, paranoia, delusions, apathy, hallucinations, agitation, etc.), each dementia-type has specific mood and behavioural effects (Camartin, 2015; Table 1). Nonetheless, similarities in mood and behaviour do exist across dementia types. For example, depression affects persons with varying forms of dementia and is one of the main factors associated with poor survival across dementia as a whole (Bryne & MacKinlay, 2012; Butler, Orrell, Ukoumunne & Bebbington, 2003).

Visual art participation has been shown to improve dementia patients' mood, decreasing the prevalence of common comorbid conditions such as depression, anxiety, and apathy (Caulfield, 2011; Chancellor, Duncan, & Chatterjee, 2014). With these affective improvements, improved behaviours are also common, such as reduced agitation and aggression (Caulfield, 2011; Chancellor, Duncan, & Chatterley, 2014; Hattori, Hattori, Hokao, Mizushima, & Mase, 2011). These affective and behavioural effects appear to improve other areas of daily living as well, such as instances of pleasure, socialization, self-esteem, optimism, enthusiasm, compassion, productivity, and symptom-coping, along with a general decrease in feeling socially isolated or sad (Bentes-Levy, 2012; Camic, Tischler, & Pearman, 2014; Camic, Baker & Tischler, 2014; Stewart, 2004; Windle et al., 2017; Young, 2014).

The research assessing the effect of visual art on those with dementia's mood and behaviour is largely qualitative, utilizing observational reports, testimonies, interviews, and video analyses. For example, through interviews, Kahn-Denis (1997) assessed the effects of art therapy on three participating individuals with dementia, finding an improvement in mood and self-awareness. The results of Kahn-Denis (1997) were later supported by other researchers finding similar positive mood and behaviour outcomes, such as Kinney & Rentz (2005) and Rentz (2006). Kinney & Rentz (2005) observed increased interest, pleasure, well-being, and self-esteem in twelve individuals with dementia who participated in a five-week painting and drawing program (Memories in the Making), while Rentz (2006) observed enhanced well-being and pleasure in forty-one individuals with dementia who participated in a twelve-week painting and drawing program (also Memories in the Making). Similarly, Hazzan et al., (2016) reported supportive findings while assessing the Artful Moments pilot program (inspired by New York's Meet Me at the MoMA Alzheimer's Project; see Rosenberg, 2008), with improvements related

to interest, engagement; expression, communication, and participation in participants, as well as an observed increase in participants' sense of value, appreciation, inclusion, and respect after multiple art viewing and making sessions over the course of eleven months. The Artful Moments pilot program also reported an improvement in caregiver-participant interactions, suggesting the value of arts programming for interpersonal relationship building and intrapersonal growth.

While the effects of visual art on those with dementias' mood and behaviour is largely qualitative, a few quantitative studies do exist. For example, although focusing on art therapy as opposed to arts training, Rusted, Sheppard, and Waller (2006) utilized a quantitative randomized control trial design to further investigate the mood and behaviour effects of a forty-week visual art intervention on less than twenty-one individuals with dementia (exact numbers per group were not provided; Rusted et al., 2006). Utilizing the Cornell Scale for Depression in Dementia and the Multi-Observational Scale for the Elderly, Rusted et al., (2006) found an overall behaviour and mood improvement, as well as more specific improvements in regards to calmness and sociability for those in the art therapy condition compared to those in the control group.

There are multiple theories behind the relationship between visual art and mood and behaviour. Notably, while art programs are not always art therapy programs, it has been suggested that simply participating in arts activities can be a therapeutic exercise, providing mood and behaviour benefits to those who participate (Bentes-Levy, 2012). Further, visual art is considered an ideal communicative tool, both to inspire conversation as well as facilitate it, which may enable a sense of wellness and socialization (Bentes-Levy, 2012; Chancellor, Duncan, & Chatterjee, 2012). Lastly, visual art programs provide a sense of personhood to those who participate and can even result in a sense of "flow": an enhanced state of work where one is both ideally challenged and knowledgeable while totally engaged (Chancellor, Duncan, &

Chatterjee, 2012; Rentz, 2002; Sauer et al., 2014). Beyond mood and behaviour effects, researchers have also investigated the ever-important cognitive impact of arts programming.

1.2.6 Art Training and Cognition. Very simply put, a work of art is something created with specific tools, materials and techniques (Hyman, 2010), and is considered to be “art” by at least one individual (the creator, the audience, or both). Further, art is something that has unique attributes; it can create new understandings and influence the creation of meaning (Schneider, Hazel, Morgner, & Denning, 2018)². From this definition, it’s clear how open and flexible art can be, providing an ideal mode of creation for those varying in ability, skill and interest. Indeed, not only is the process of *creating* art a cognitive activity, where one uses their thoughts and actions to form an artwork, but even *viewing* one’s artwork relies on cognition by requiring the reception and processing of outside information (Schneider, Hazel, Morgner, & Denning, 2018). Thus, the joint construction of knowledge that can occur between an arts facilitator and participant, as well as between fellow participants, appears to be an ideal environment for cognitive growth (Windle et al., 2014).

When considering art, cognition has largely been considered an interrelated component, and rightfully so. From the mere appreciation of art, which has been called an innate human behaviour (something that can continue to be refined with formal training much like any other skill), to the creation of art (resulting from the human brain’s processing, remembering, planning, manipulating, and revising of information within the “mind’s eye”), art is undoubtedly a mental exercise (Baddeley & Logie, 1999; Bhattacharya & Petsche, 2002; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011; Windle et al., 2017; Young, 2014).

² While the concept of defining art is scrutinized by some, the further analysis of the question is beyond the scope of the present study.

Since cognitive decline is a core feature of dementia, assessing the potential cognitive benefits of any dementia intervention is essential. Although evidence is limited within the currently published dementia literature, indications of improved cognition from art training have been demonstrated in non-clinical populations. For example, participating in art interventions resulted in positive cognitive outcomes for a normal aging older-adult sample, including increased curiosity, mental flexibility, creative thinking, problem solving, and overall cognitive function (Bentes-Levy, 2012). Similarly, it has been suggested that classroom art integration – the integration of arts activities into non-art classroom subjects – may enhance the semantic long-term-memory of school children (Rinne, Gregory, Yarmolinskaya, & Hardiman, 2011).

Similar to non-dementia samples, qualitative dementia case studies have reported improved cognition after arts interventions, such as sustained attention, concentration, improved reminiscing, memory enhancement, verbal fluency, and learning for those who participated in art making and/or viewing programs (Camic, Tischler, & Pearman, 2014; Cowl & Gaugler, 2014; Kahn-Denis, 1997; Peisah, Lawrence, & Reutens, 2011; Peisah, Lawrence, & Reutens, 2011; Parsa, Humble, & Gerber, 2010; Sauer, Fopma-Loy, Kinney, & Lokon, 2014; Windle et al., 2017; Young et al., 2015). Furthermore, initial trials of a structured art program for individuals with early dementia reported observations of improved sustained attention during art making (Kinney & Reitz, 2005; Rents, 2002).

Although the results of the related literature are promising, many of these results must be interpreted with caution, as art research utilizing randomized controlled trials has shown no cognitive improvement in individuals with dementia who partook in art therapy or colouring activities when compared to an active control group (Hattori et al., 2011; Rusted, Sheppard, & Waller, 2006). Overall, there is a stark contrast between observational and qualitative reports,

which are mostly positive, and experimental and quantitative reports, which are largely inconclusive (Windle et al., 2014). Nevertheless, while there is a lack of systematic causal evidence, qualitative reports do suggest the potential for cognitive change after participating and/or during an art intervention (Camic, Baker & Tischler, 2014; Eekelaar, Camic, & Springham, 2012; Kahn-Denis, 1997; McFadden, & Basting, 2010; Parsa, Humble, & Gerber, 2010; Sauer, Fopma-Loy, Kinney, & Lokon, 2014; Stewart, 2004; Young et al., 2015). Details regarding the experimental studies that investigate the effect visual art has on individuals with dementia can be found in Table 2.

Table 2.

Studies investigating the effect of visual art on persons with dementia

Author & Year	N	Dementia & Age	Intervention Design	Task(s)	Results
Kahn-Denis (1997)	3	Mixed (82-85)	Qualitative analysis (several years of art therapy)	Interview	Positive mood and self-awareness; observed reminiscing
Rentz (2002)	41	Mixed (NS)	Pilot program evaluation (12 weeks of painting and drawing)	Observation	Enhanced well-being and pleasure; increased sustained attention
Stewart (2004)	4	Mixed (NS)	Qualitative analysis (unspecified duration of art therapy)	Interview & observation	Positive affect; observed reminiscing
Kinney & Rentz (2005)	12	Mixed (65-85)	Program evaluation (5 weeks of painting and drawing)	GCCWBOT	Increased interest, pleasure, well-being, self-esteem; increased sustained attention
Rusted (2006)	21	Mixed (67-92)	Randomized Control Trial (40 weeks of art therapy; day center activity control)	CSDD, MOSES, RBMT, TEA, BFT	Improved calmness, physical competency, sociability and mental acuity; no quantitative improvement
Hattori et al., (2011)	39	AD (65-85)	Randomized control trial (12 weeks of colouring; math drill control)	Qol-sf, GDS, AS, DBDS, MMSE, WMS	Improved apathy; no cognitive improvement
Young (2014)	13	Mixed (60-94)	Retrospective analysis (8 weeks of art viewing and making)	Audio recording content analysis	Increased emotional reactions to art and the group; improved episodic and semantic memory

GCCWBOT: Greater Cincinnati Chapter Well-Being Observation Tool; CSDD: Cornell Scale for Depression in Dementia; MOSES: Multi-Observational Scale for the Elderly; RBMT: Rivermead Behavioural Memory Test; TEA: Test of Everyday attention; BFT: Breton Fluency Task; Qol-sf: Quality of Life Short Form; GDS: Geriatric Depression Scale; AS: Apathy Scale; DBDS: Dementia Behaviour Disturbance Scale; MMSE: Mini-Mental State examination; WMS: Wechsler Memory Scale; NS: not specified

Table 2. (Cont.)

Studies investigating the effect of visual art on persons with dementia

Author & Year	N	Dementia & Age	Intervention Design	Task(s)	Results
Camic, Tischler, & Pearman, (2014)	24	Mixed (NS)	Mixed methods (8 week art viewing and making program)	DEMQOL-4, carer ZBI, carer BADLS, interview thematic analysis	No quantitatively significant results, positive social effects; increased cognitive encouragement, learning; enhanced memory, empowerment
Windle et al. (2017)	10	NS (NS)	Mixed-methods (4 12-week art viewing and art making programs; unstructured active control)	Adapted GCCWBOT; DEMQOL; DEMQOL-proxy; HCS; Session evaluations;	Reported stimulation, enjoyment, pleasure; carer-perceived quality of life improvement, improved interest, attention, pleasure, self-esteem; decreased negative affect, sadness
Camic, Baker, & Tischler (2014)	12	NS (58-94)	Gallery intervention (8 week art viewing and making program)	Interviews and field notes	Reported intellectual and social stimulation, learning, competency, engagement, interaction, positive affect, mixed reception to art.
Sauer, Fopma-Loy, Kinney, Lokon (2014)	38	NS (NS)	Opening Mind through Art (OMA; 1 hr, 12 wk art-making activities; active traditional arts and crafts control)	Adapted GCCWBOT	Higher levels of engagement and pleasure compared to controls; similar levels of social interest, disengagement, negative affect, sadness, and confusion during OMA and control
Schneider et al., (2018)	1	NS (NS)	Art Viewing	Videoanalysis	Higher alertness; meaningful interaction

DEMQOL: Dementia Quality of Life questionnaire; ZBI: Zarit Burden Interview; BADLS: Bristol Activities of Daily Living; HCS: Holden Communication Scale

Table 2. (Cont.)

Studies investigating the effect of visual art on persons with dementia

Author & Year	N	Dementia & Age	Intervention Design	Task(s)	Results
Ullán et al., (2011)	21	NS (67-93)	Audiovisual Arts Education & Cyanotype Creation (5 workshops, with 1-2 sessions each, for 1-1.5 hrs over 4 months)	Participant observation; Educator assessment; video recordings of participant focus groups; audio recordings of caregiver focus groups	Commitment; interest; support; expression; attention; learning; satisfaction; humour; laughter; enjoyment; relaxation; self-esteem; communication; positivity; creativity; affective relationship formation
Flatt et al., (2015)	10	Mixed (NS)	Andy Warhol-focused art viewing & making (1 3-hr session)	Satisfaction survey and focus group interview	Enjoyment, pride, cognitive stimulation, social connection, improved self-esteem, and remembered techniques
Hazzan et al., (2016)	8	5 AD, 2 Frontotem poral, and 1 vascular (63-91)	Art viewing & making (27 2-hr sessions over 11 months)	Affect and Engagement Rating Scale (Modified Philadelphia Affect Rating Scale); fieldwork notes; carer questionnaires (family and staff)	Interest and engagement; expression, communication, and participation; increased sense of value, appreciation, inclusion, and respect; caregiver-participant interaction improvement
Bryne & MacKinlay (2012)	11	NS (NS)	Art making (1 hr per week for 18 weeks)	Audio recordings and journals, facilitator reflection; participant emotion self-report; 3-month follow-up	Engagement and expression; anxiety, fear and stress alleviation; improved mood, relationships and self-esteem and identity, support, humour, joy, communication, energy, meaning-making

Table 2. (Cont.)

Studies investigating the effect of visual art on persons with dementia

Author & Year	N	Dementia & Age	Intervention Design	Task(s)	Results
Eekelaar, Camic, & Springham (2012)	6	NS (68-91)	Art viewing & making (3 90-minute sessions, once per week)	Audio recordings and participant pre- post-interview content analysis and family caregiver pre- and post- interviews thematic analysis	Enhanced episodic memory, improved mood and confidence; reduced isolation

1.3 The Pilot Project

Before beginning the present study, a pilot study, utilizing the same curriculum and similar design, was created and implemented (Matthews, 2016). The pilot study assessed the mood, behaviour and cognition of two groups of people with dementia: an experimental art training group (n = 9), who participated in an eight-week visual art training course, and a waitlist control group (n = 6), who participated in the same eight-week visual art training course after post-testing was complete. The pilot study provided information in regards to the effectiveness and feasibility of future larger-scale art training projects. For example, the pilot provided insights regarding expected costs and budgeting, suitable volunteer to participant ratios, feasible curriculum and testing durations, appropriate task materials, and a better understanding of location and participant recruitment. Furthermore, during the pilot project, a professional relationship was formed between the researchers and a group of local dementia centers and retirement residences. The results of the pilot study suggested a possible relationship between art training and the working memory of people with dementia, as well as a possible, but inconclusive, improvement in mood and behaviour following art training – connections the

present study further investigates with improved task selection, appropriate testing durations, and a larger sample size.

1.4. Working Memory

Working memory, from a cognitive psychology standpoint, is defined as a process involved with the momentary and temporary storing, activating, maintaining, monitoring, and manipulating of information (Baddeley & Hitch; Miyake & Shah, 1999). It is important to note that there are varying theories, approaches and models of working memory (Miyake & Shah, 1999), however our utilized definition of working memory appears to fit well within the consistencies of multiple theoretical frameworks.

The present study only considered two categories of working memory's most prevalently considered subcategories: visuospatial and verbal working memory. This choice was made due to the theoretical relationships between visuospatial and verbal working memory and visual art programming. Specifically, it's been proposed that visuospatial working memory's mental maintenance and manipulation of visual imagery is of exceptional relevance to visual artists' artistic abilities and productions (Baddeley & Logie, 1999; Perez-Fabello & Campos, 2007; Takahashi & Hatakeyama, 2011), while verbal working memory's mental maintenance and manipulation of verbal visual art term definitions, creation instructions, and related feedback is intuitively equally entwined with participating in a visual art training program. The utilization of working memory within a visual art training program has been supported by Young's (2014) dissertation discussing the effectiveness of visual art interventions for those with dementia. Young (2014) argued that since Baddeley's (1992) working memory model assumes that working memory is enhanced when verbal and visual modalities are combined, overall working

memory should also be enhanced during visual art programs, where both modalities are clearly entwined (Young, 2014).

The relationship between working memory and dementia is highly relevant to potential treatments for dementia due to the large and wide impact of different dementia types on working memory (see Table 1; Ralph et al., 2001; Stopford et al., 2012; Fornazzari, 2005). This relationship is understandable due to working memory's neurologically wide-spread utilization of varying brain regions (e.g., the prefrontal cortex, frontal lobe, parietal lobe, hippocampus, motor cortexes, and varying perceptual cortexes such as the visual cortex [found within the occipital lobe]; Carter, 2014; Miyake & Shah, 1999) along with dementia's wide-spread degeneration of varying brain regions – with many areas overlapping (e.g., Table 1). With varying subtypes of dementia being affected by working memory deficits, as well as varying other symptoms, it is important to consider what methods or mediums in which working memory should be tested within the research setting. For example, patients with Lewy Body Dementia and Alzheimer's disease typically display working memory deficits, however those with Lewy Body Dementia have more prominent visuospatial deficits than those with Alzheimer's disease, resulting in potentially lower visuospatial working memory scores compared to those with Alzheimer's disease (Ralph et al., 2001). To accommodate for this potential confound, the present study incorporates both verbal and visuospatial measures of working memory.

1.5 Hypotheses and Goals

In 1948, on December 10th, the United Nations' General Assembly proclaimed and adopted the Universal Declaration of Human Rights. In it, the 27th article states: “everyone has the right freely to participate in the cultural life of the community, to enjoy the arts and to share in scientific advancement and its benefits”. This statement covers the overarching goal of the

present study; from the involvement of community locales, to the scientific study of artistic programming, no statement covers the objectives of the present study better.

The study's hypotheses were as follows:

1. Visual art training will improve cognition to a greater extent than the waitlist control group activities (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 and the waitlist control group activities will improve mood and lessen problematic behaviour (e.g., agitation, aggression, and indifference), with the experimental group improving to a greater extent (Bentes-Levy, 2012; Chancellor, Duncan, & Chatterjee, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Poirier & Gauthier, 2011; Rentz, 2002; Rusted, 2006; Stewart, 2004; Young, 2014).

2. Methodology

2.1 Participants

A randomized controlled trial design was utilized to assess two groups of dementia patients: an art training experimental group and a waitlist control group. Participants were randomized into either group with a random number generator. Participants were excluded from analyses if they did not have dementia, were enrolled in the program after randomization had occurred, and/or could not participate in the art training program due to physical or cognitive limitations. The majority of participants were above 65 years, with some exceptions for those with early-onset dementia (Table 4). Both male and female participants were recruited and all participants did not report previous formal art training³. All participants were hearing and seeing individuals from across the Greater Toronto Area and were English-speaking of varying fluencies. In addition to being used for exclusion/inclusion purposes, as a supplemental dementia screening tool, the Mini Mental State Exam (MMSE) was also utilized to provide insight regarding dementia stage, as it has been supported throughout the literature for its validity and reliability while assessing cognitive function in those with dementia, has provided normative data for even the oldest-old (i.e., 90+; Malek-Ahmadi et al., 2015), and has been supported as a surrogate for the Clinical Dementia Rating tool for classifying the stages of dementia when using the following cut-offs: 30 for likely no dementia, 26-29 questionable dementia, 21–25 mild dementia, 11–20 moderate dementia, 0–10 severe dementia (Pernecky et al., 2006)⁴.

³ While the majority of participant caregivers provided feedback in this regard, roughly 30% did not respond.

⁴ The visual stimuli of the MMSE were enlarged and shown one at a time based on population and location requirements. In addition, because the study was conducted in Canada in non-hospital locales, the orientation section was adjusted accordingly.

Ninety individuals with dementia were suggested for inclusion by the dementia locations, with sixty-nine able to be included as research participants at pre-testing⁵. Of those sixty-nine participants, fifty-nine completed the study. Attrition during the study was caused by multiple factors: one individual was moved to respite care, two individuals were moved to long-term care, one individual was unwell, four individuals were hospitalized, one individual was placed in respiratory isolation, and one individual was discharged from their location. Of the fifty-nine individuals who completed the study, fifty-three were eligible for analysis (Figure 1)⁶. Power analyses indicated that 40 participants were needed in order to reach a criterion of 80% power, based on a medium effect size, according to the related intervention-dementia literature, including research utilizing RCT designs and artistic programming⁷.

⁵ Exclusions: nine due to lack of caregiver response, one due to family wishes, four due to lack of assent, one due to availability, and six due to participating in the project's pilot study.

⁶ One individual was removed due to lack of acceptable attendance and five were removed due to incomplete task sessions. Attendance on average was 12.6/16 classes. While the majority of participants participated in 50% or more of the total classes, four participants fell below 50%, with two individuals participating in seven classes, one individual participating in 6 classes, and one individual participating in 5 classes. However, based on review, each of these individuals participated in at least 4/8 weekly lessons (i.e., because the 16 total classes occur over eight weeks with each week consisting of two classes focusing on the same topics and activity). Thus, their inclusion was deemed acceptable.

⁷ Power analysis information was guided and contributed by A. D'Souza.

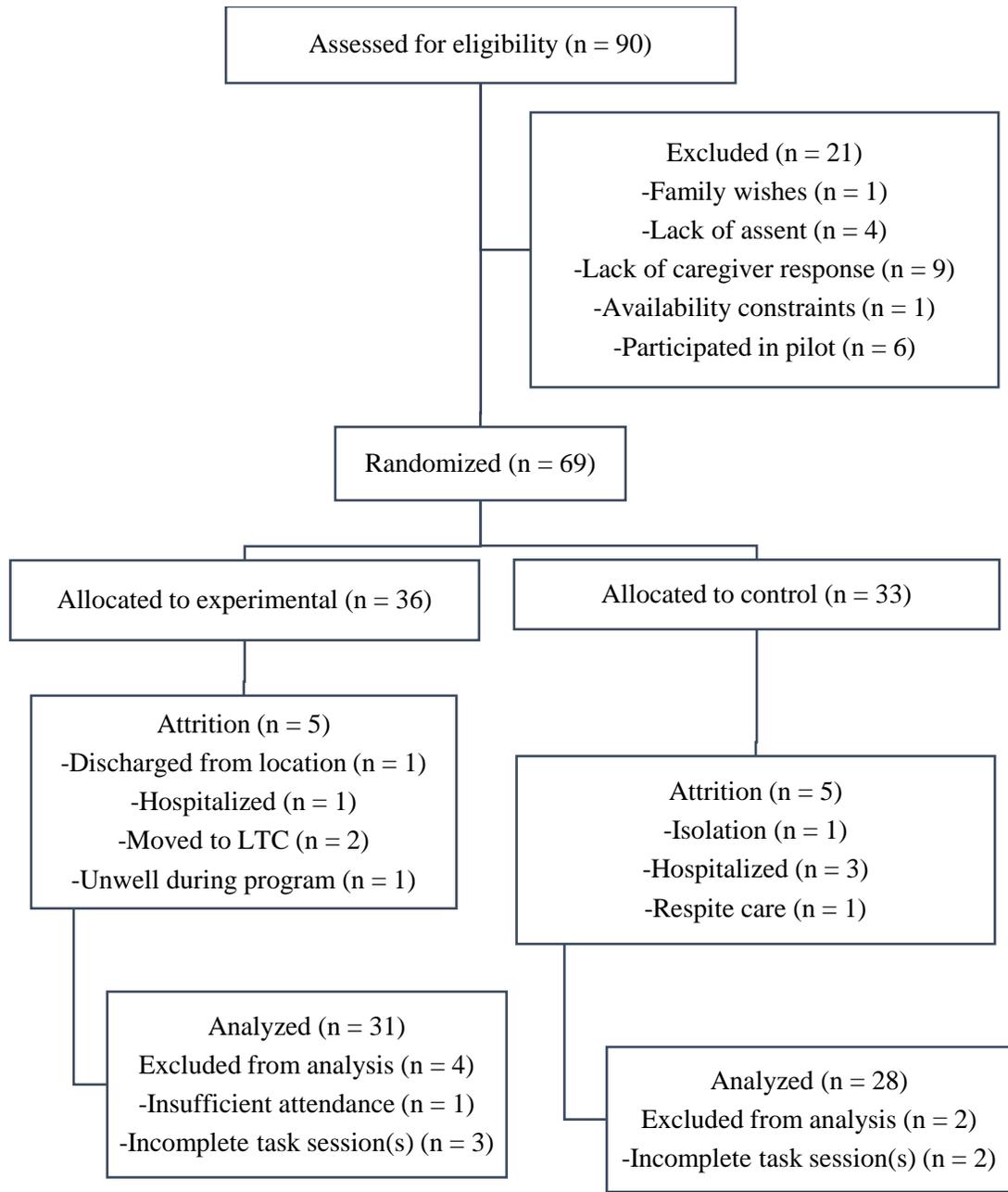


Figure 1. Randomization and attrition flow-chart. This chart shows the sample size of the project and varying stages, as well as the amount and reason for attrition.

Patients with dementia were identified through recruitment locations according to patient records and were verified via MMSE screening and background questionnaires. A total of three

dementia day programs, three assisted living retirement residences, and one assisted living memory care retirement residence was recruited for the present study. Varying locations were recruited in order to understand the generalizability of the studied program, in line with suggestions in the related literature (Windle et al., 2014). Locations were recruited through existing and new professional relationships with the locations' directors and/or leaders of programs and/or life enrichment managers. Informative flyers and questionnaires were provided to each recruited location for distribution to participant families and caregivers. Before a participant could participate in the research project, their respective care facility needed to provide written consent for the project and a list of approved individuals who may participate. Lastly, each potential participant was given an explanation of the study via a verbal assent script and was required to provide verbal assent before participating. Caregivers did not participate in the task sessions or arts programs unless assistance was required. In the event a participant spoke English but was not completely fluent, and the testing volunteer did not speak the participant's native language, a translator was requested and provided if possible, fitting suggested guidelines (King, Goeman, & Koch, 2015). This research project was approved by the York University Ethics Review Board.

2.2 Procedure

The experimental group participated in an eight-week visual art training program, while the waitlist control group participated in their usual structured activities, including optional arts or related activities, following suggested guidelines (Young, 2014) and practice (Rusted et al., 2006). The waitlist control group received the art training program once post-testing was complete. The visual art training program was scheduled for one hour per day, two days per week (a timeline based on pilot data and studies of a similar nature; Bentes-Levy, 2012; Kinney

& Reitz, 2005; Rents, 2002; Rusted, Sheppard, & Waller, 2006; Sauer et al., 2014; Young et al., 2015)⁸. Participants were tested before and after the experimental group's art program and were each observed during their respective art programs. The art training program took place at each participant's respective location in an area separate from waitlist control participants and uninvolved clients. With the inclusion of new volunteers, a separate space for activities, and materials designed to transform the space (e.g., table coverings, term board, new artistic materials and/or props), the environmental conditions of the program were selected to provide as much of a museum or gallery impression as possible, while still occurring in a safe and pre-existing drop-off location (Ullan et al., 2013; Windle et al., 2017). The choice of location was selected to ensure replicability, participant comfort, and the availability of trained dementia personnel and caregivers, who were familiar with the participants (Hazzan et al., 2016; Schneider, Hazel, Morgner, & Dening, 2018). Further, relocation has been shown to lead to greater mortality in people with dementia and, while the relocation for the purposes of the present study would be brief, this unnecessary stress for participants was actively avoided (Butler, Orrell, Ukoumunne & Bebbington, 2004). Although museum-based art and dementia programs are becoming more popular, the selection of an in-house art program (located where a participant already attends and/or lives) was selected as a means of alleviating possible transportation and/or timing concerns or complications for caregivers and participants, as well as avoiding participation bias (see Flatt et al., 2015).

2.3 Volunteers

⁸ Art programs took place twice per week over eight weeks unless holidays, location-specific closures, location-specific program holds (e.g., due to illness outbreaks), or unavoidable and unexpected instructor absences (e.g., instructors becoming ill and substitute instructors being unavailable) occurred. All programs consisted of sixteen classes (i.e., eight weeks of two classes per week) regardless of the required shifts and spanned across no more than ten weeks.

Volunteers were York University students or alumni and were blind to participant condition and study hypotheses. Furthermore, volunteers who participated as testers and observers were not stationed at the same location for both tasks (i.e., if a volunteer tested at one location, they were not able to observe at the same location) to ensure even greater blinding across volunteers. Participant codes were used on testing and observing documents to ensure greater confidentiality.

All full-time volunteers were interviewed, reference-checked, vulnerable sector checked, tuberculosis tested, and were carefully trained with multiple training sessions⁹. The art class instructors and assistants were trained by V. Foot, whom has a Master's degree in psychology, is completing her dissertation in the same field, and is a registered occasional teacher for the York District School Board. V. Foot was asked to teach the curriculum to the art class instructors and assistants in order to provide feedback to the present study's lead researchers so that an electronic instructional package for interested care facilities could be created (i.e., so that interested care facilities' staff and/or volunteers could become trained and utilize the curriculum accordingly). The testers and observers were trained by K. Johnson (formerly Matthews), whom has previous experience with observational methods as well as cognitive task training. All full-time volunteers participating in the experimental art program were provided with a dementia orientation by an expert in the field before beginning their volunteership. Along with full-time volunteers, substitute volunteers were also recruited in order to maintain a timely completion of the intervention regardless of unavoidable volunteer absences (e.g., illness). All substitute volunteers were interviewed, reference-checked, vulnerable sector checked, tuberculosis tested, carefully trained,

⁹ Tester and instructor, full-time and substitute, volunteers were also required to attend knowledge assessment sessions before beginning to volunteer so that their understanding of the tasks and curriculum could be confirmed beforehand.

and provided with a visit/tour of a assisted-living care building. A total of twenty-six volunteers were recruited for the present study.

2.4 Curriculum

The art training program focused on drawing, collage, and basic visual art concepts. The concepts that were focused on were the conceptual building blocks of visual art: 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 focused on one specific activity, as suggested by the literature (Sauer et al., 2014), focusing on one element and one principle of design, with each element and principle focused on at least once during the eight-week program. Each class consisted of an introduction (where terms and activities were explained), art-making (where participants engaged in the week's activity), and interactive discussion (where willing participants would have their artwork shown to the group and relayed back to the week's terms and activities) as suggested by the related literature (Flatt et al., 2015). Art programs were structured to capture the many factors involved in artistic activities: from the factors related to the physical artwork (e.g., balance, colour, proportion) to the relation of the physical artwork to artistic trajectories and personal and social contexts during group interaction and discussions (Ullán et al., 2011). Each art program occurred one hour per day, two days per week, for eight weeks. Artworks were offered back to the participant and/or participants' respective locations at the end of the program, following protocols in the related literature (Sauer, Fopma-Loy, Kinney, & Lokon, 2014; Ullán et al., 2011)

All art programs were free for participants. The materials were supplied by the project's lead researchers and all time was volunteered: one art instructor volunteer, one art class assistant volunteer, and one art class observer volunteer (similar to the structure of identical studies;

Bryne & MacKinlay, 2012). When each experimental art program began, a maximum size of eight participants per program was set. However, group sizes did fluctuate throughout the research project due to temporary unavailability of particular participants (e.g., being ill, being away, etc.) and attrition. Nonetheless, the volunteer to participant ratio was never lower than 1:4. Group size was thoughtfully considered, based on both discussions with dementia programming experts, the project's pilot study, and the related literature (Caulfield, 2011; Camic, Baker, & Tischler, 2016; Flatt et al., 2015; Hazzan et al., 2016; Ullán et al., 2011; Windle et al., 2018). Further, the focus of the volunteers was to encourage and engage the participants, not their fellow volunteers, in order to avoid complications noted in similar studies (Bryne & MacKinlay, 2012).

The curriculum was carefully created to support the learning of new skills and understanding, while still stimulating and engaging in order to trigger potential cognitive, mood and behaviour mechanisms, with input provided by a collaborative group of artists, psychologists, and dementia experts: artist and instructor S. Wiseheart; artist, professor, and experimental psychologist M. Wiseheart; arts researcher and instructor A. D'Souza; dementia expert A. Ubell; and artist, instructor, and arts and dementia researcher K. Johnson (Windle et al., 2014). Each element is introduced in an intentional order; from the use of space, to using colour and texture to fill that space, to introducing lines into that space, to using lines to create shapes, to using shapes to create forms, to using value to fill those forms. Similarly, the Principles are introduced in an intentional order: from emphasizing a single element, to emphasizing a variety of elements, to using the variety of similar elements to create harmony, to using the harmonious elements to create movement, to turning that movement into rhythm, to considering the proportions, balance, and gradation of the overall image. Further, each element and principle were paired together to

emphasize and illustrate each other in a coherent and understandable way: using space to create emphasis, using a variety of colours, creating harmony with texture, creating movement with lines, creating rhythm with repeated shapes, creating proportion with different sized forms, creating balance with forms, and creating a gradual change in value from black to white. For a detailed breakdown of the study's curriculum, see Appendix A.

In tune with art's advantageous flexibility, programs were created in order to foster creativity and enable participation malleability. A key aspect of the project's intervention was its suitability for those at varying stages of dementia, as well as with varying artistic backgrounds. While participants were guided and instructed regarding each week's activity, novel creativity was never halted, it was encouraged and adapted into the program instead. The way volunteers were trained to undergo this adaptation was to bring the participant's attention to either their own artwork's use of the week's key terms, whether they were used intentionally or not, offering to assist them with the activity, or showing off their drawings or examples when permitted. This is in line with the related literature, with a focus on supporting participant growth, success, individuality, and personhood; highlighting their active contributions and strengths as opposed to emphasizing their limitations (Flatt et al., 2015; Hazzan et al., 2016; Sauer et al., 2014; Schneider, Hazel, Morgner, & Dening, 2018; Ullán et al., 2011).

Materials were carefully selected: provided markers, pencil crayons, stickers, and glue sticks were all non-toxic; material sizes were considered and small objects were avoided to ensure a safe program; Bristol board was used instead of standard paper for collage activities to provide more stability for the artworks; and mazes were used to illustrate the terms "movement" and "line", with tape used to create the lines on the page for a textual cue. If an instructor requested more materials, they were provided to them before their next class.

2.5 Testing

Before, during and after the art programs and/or control activities, participants were observed and completed assessments. Observations were made throughout the study (i.e., during testing and the intervention period), while assessments were completed by participants during pre- and post-testing only (i.e., before and after the intervention period). Tester and observer volunteers were York University students or alumni who were blind to participant condition and study hypotheses. Further, testers and/or observers were separate from the persons analyzing the results. In order to accommodate for participant attention and cognitive load, assessments were expected to take less than an hour to complete. To ensure the greatest comfort for participants, all tasks were pencil and paper-based and predominantly non-verbal with simple instructions and familiar techniques. The Backward Digit Span and Body Part Pointing Test were selected to measure working memory, and the Montreal Cognitive Assessment (MoCA) was selected to measure overall cognitive function. Observational reports of mood and behaviour were utilized to assess a range of moods and behaviours. These assessments and observations have been selected based on extensive literature reviews, expert suggestions, and the results of the present study's pilot project. Further, although infrequent, if a participant was unavailable or uninterested in completing a task session one day, their session was rebooked for a different time and attempted again.

2.5.1 Cognitive Screening. The Mini-Mental State Examination (MMSE) was used as a supplemental dementia screening tool for inclusion/exclusion purposes as well as to provide dementia stage information (Folstein, Folstein, & McHugh, 1975). The MMSE consists of five subsections measuring participant orientation, registration, attention and calculation, recall, and language. The MMSE is a valid and reliable measure of cognitive function in those with

dementia and has data for even the oldest old in normative samples (i.e., 90+; Malek-Ahmadi et al., 2015). Further, research has supported the MMSE as a surrogate for the Clinical Dementia Rating tool for classifying the stages of dementia, making it highly valuable for dementia stage classification.

2.5.2 Visuospatial Working Memory. Visuospatial working memory was assessed with the Body Part Pointing Test (Stopford et al., 2012). The Body Part Pointing Test 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 x,” and a participant would touch their x, “please touch your y,” and a participant would touch their y, 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 x, y, etc.” and the participant would sequentially touch their x, y, etc.). The Body Part Pointing Test 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. Further, in order to increase the task’s ability to detect variations in responses, testers were also instructed to record the participant’s response if a response was provided. For example, if the participant pointed to one body part but no other body parts, that one body part would be recorded. The Body Part Pointing Test is a suitable measure of working memory for individuals with dementia (Stopford et al., 2012).

2.5.3 Verbal Working Memory. Verbal working memory was assessed with the WAIS-IV Digit Span task (Fernandez-Duque & Black, 2007; Huntley & Howard, 2009; Rankin et al.,

2007). The 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 1-2-3 and 4-5-6, and block five has two sets of five numbers, such as 1-2-3-4-5 and 6-7-8-9-1). Each set was recited by the tester one at a time (e.g., the tester would recite 1-2-3 and wait for the participant's response before reciting 4-5-6). Participants needed to correctly recite at least one set of numbers per block to continue with the task. First was the forward trial, where testers would recite sets of numbers and then ask participants to recite the numbers back to them in the same order. Second was the backward trial, where testers would ask the participant to complete the same task as the forward trial but in reverse. The participant was scored based on the number of sets they could complete correctly (e.g., a score of 4 means the participant completed 4 sets correctly). The Backward Digit Span is a suitable measure of working memory for individuals with dementia and has been validated for those who are ninety years of age and under (Ralph et al., 2001; Rankin et al., 2007; Wisdom, Mignogna & Collins, 2012)¹⁰.

2.5.4 Montreal Cognitive Assessment (MOCA; Nasreddine et al., 2005). The MOCA is a measure of overall cognitive ability and includes eight subsections: a visuospatial, naming, recall, attention, language, abstraction, delayed recall, and orientation section. The MoCA has a minimum score of zero and a maximum score of thirty, is suitable for assessing those with dementia, is validated for individuals 55-85 years of age with a sensitivity of 94% (Smith et al., 2012), and has normative scores for individuals as old as 99 years (Malek-Ahmadi et al., 2015). The visual stimuli of the MoCA were enlarged and shown one at a time based on population and

¹⁰ At least three of our assessed individuals fall outside this range. However, research using earlier versions of the test have assessed the base rates of older adults between ninety and one-hundred years of age (Ryan, Lopez & Paolo, 1996).

location requirements. The overall MoCA task as well as its long-term episodic and semantic subsection (the delayed recall subsection and the naming and orientation subsections, respectively) were investigated, however only the overall MoCA yielded interpretable results¹¹.

2.5.5 Observations. Observations were completed after testing sessions and during experimental interventions by volunteers via organized written field records, or memos (Polkinghorne, 2005). Based on the findings of the pilot study¹², including the fruitful unstructured qualitative instructor memos, and the suggestions of the related literature (Braun & Clarke, 2006; Hazzan et al., 2016; Kinney & Rentz, 2005; Polkinghorne, 2005; Sauer et al., 2014; Strauss & Corbin, 1990; Ullán et al., 2011), the present study's observational methods were designed to be research-relevant, time-conscious, and open-ended.

All testing volunteers were also trained as observers. Observers were instructed to be descriptive and detailed in their observations, focusing on participant mood and behaviour, with examples and conceptual considerations provided. Specifically, observers were instructed to consider and report on: participant positive mood (e.g., smiling facial expressions), negative mood (e.g., apparent distress), constructive behaviour (e.g., participating/engaging in the art program), and/or problematic behaviour (e.g., appearing withdrawn); whether the observation was verbal (for which observers were instructed to consider verbal content and tone) or nonverbal (for which observers were instructed to consider stance, movement, appearance, gestures, use of objects, position); and the duration (short versus long), intensity (less versus

¹¹ All investigated subsections hit floor and could therefore not be meaningfully interpreted.

¹² Behaviour was assessed by professional caregivers via the Neuropsychiatric Inventory (NPI) for the present study's pilot project. However, the results were not useable due to more than 66% of the returned measures hitting ceiling across all investigated subcategories (i.e., were given a "Not Applicable" response to the specific behaviour). Further, like the NPI, the pilot project's structured mood measure was also unusable due to poor inter-rater reliability and task delivery complications (i.e., participants providing a binary response as opposed to the requested continuum indication).

more), and frequency (never versus often) of each observation (Braun & Clarke, 2006; Graneheim & Lundman, 2004; Strauss & Corbin, 1990).

Immediately after each testing session, as well as during portions of the session, the designated testing volunteer would complete the participant's testing session observations (Polkinghorne, 2005). For the experimental intervention, a designated observer was instructed to sit in the area where the art program was being completed, away from the participants, in order to take specific notes regarding each participant's mood and behaviours. This occurred at each of a program's sixteen classes in order to capture fuller and richer observations of participants as they became more accustomed to the program (Polkinghorne, 2005). After class concluded, the instructor's observations of the class were requested, where instructors would note participant interactions and comments (Bryne & MacKinlay, 2012; Ullán et al., 2011). In the event an observer was unavailable, a substitute observer was sent in their place. If a substitute observer was also unavailable, the program's instructor would be asked to call the lead researcher (K. Johnson) and recite their observations as usual, followed by K. Johnson recording them accordingly. For the waitlist art programs, instructor and/or assistant notes were recorded for program evaluation and attendance purposes. During the experimental art programs, the waitlist participants could not be observed during their structured usual-activities because these activities occur with other individuals not taking part in the study. To avoid an ethical issue (i.e., observing those who did not provide consent to be observed), observations were not completed. Further, the waitlist control group's mood and behaviour observations were documented along with the experimental group's mood and behaviour during pre- and post-testing.

2.6 Schedule

The study began with participant recruitment in the fall of 2017 and the first interventions began October, 2017. Pre-tests occurred the week of and the week before each respective art program began and post-tests occurred the week of and the week after each respective art program ended.

2.7 Analysis.

Statistical analyses were completed using the freeware data analysis software R, using the JASP interface (JASP Team, 2018). In regards to observational data, thematic analysis was completed. The study has been preregistered at [clinicaltrials.gov: NCT03175822](https://clinicaltrials.gov/ct2/show/study/NCT03175822).

2.7.1 Quantitative Analysis. The results of the MoCA, Digit Span and MMSE were analyzed with an independent sample t-test, or Mann-Whitney U test where appropriate, 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 (for those assessed via the independent t-test, rather than the Mann Whitney U test), and independence. T-test assessments of pre-test data were also completed to ensure that both groups were comparable at baseline, with all three tasks meeting this requirement. Difference score t-test assessments were selected due to the robustness of the assessment when considering sample size, the test's ability to compare group means, the ease of understanding the results (difference score means provide a clear indicator of improvement or decline), and to match the present study's pilot project.

The Body Part Pointing Test was broken down into two components for analysis, the recall score and order score. Recall scores were calculated based on the number of correctly *recalled* single items while order was calculated based on the number of correctly *ordered* single items. For example, as the test requests that the participant points to four body parts, if the participant pointed

to three of those four body parts, but with only two in the right order, they would receive three points for recall (as they recalled three single items correctly) and two points for their order (as they recalled two single items in the correct order). The Body Part Pointing Test's order assessment was analyzed with the Mann-Whitney U test, as its data violated normality but met all required assumptions for the test (homogeneity of variance, independence, and comparable pre-test data), but the Body Part Pointing Test's recall assessment did not meet all requirements (it was not comparable at baseline). Thus, it was instead assessed with a mixed design Analysis of Variance (ANOVA) [between subjects factor: group (experimental or control); within subjects factor: testing session (pre or post intervention)].

For all tasks assessed with an independent t-test, homogeneity of variance was deemed acceptable via the Levene's Test for Equality of Variances, while normality was violated based on the Shapiro-Wilk test for all tasks but the MoCA. Thus, the Mann-Whitney U test, a nonparametric test comparable to the independent t-test and suitable for non-normal samples, was utilized to assess tasks where normality was violated (i.e., the MMSE, Digit Span, and Body Part Pointing Test's recall assessment). For the Body Part Pointing Test's recall assessment's mixed ANOVA, sphericity was met as the repeated measures variable only had two levels, equality of variance was met according to the Levene's test, and normality was acceptable according to the skewness and kurtosis measures (which were never larger than +/- 1.92). In addition to traditional null hypothesis statistical tests (NHST), the present study also considers Bayesian statistics using the same methods (i.e., t-testing, Mann-Whitney U testing, and Mixed ANOVA).

2.7.2 Qualitative Analysis. Observations were assessed via line-by-line theoretical thematic analysis, utilizing an essentialist (or manifest) semantic approach, inspired by the art and dementia observational research conducted by Sauer et al.'s (2014) and Kinney & Rentz (2005),

as well as the coding methods described by Strauss & Corbin (1990), Braun & Clarke (2006), and Polkinghorne (2005). First, all observations were recorded as independent memos by a volunteer data recorder. Observational memos were hand-written on location, resulting in the occasional writing error. These errors were dealt with in a systematic and consistent manner:

1. Redundancies (e.g., repeated words, phrases, sentences or task scores) were removed (e.g., “the participant participant was happy” → “the participant was happy”).
Additionally, the statement “The participant participated.” was removed throughout.
2. Spelling and grammar errors were corrected (e.g., “the particiants hand” → “the participant’s hand”);
3. Identifiers (e.g., pronouns, locations) were removed and replaced with non-identifying synonyms (e.g., “she” → “they”). When used repeatedly within the same observation, “the participant” was changed to “they”.
4. All errors that were not obvious were recorded verbatim. Error correction strategies were discussed between the research team before the relevant adjustments were made.

Second, the observations were collated according to time and line-by-line analysis commenced across the entire data set (Graneheim & Lundman, 2004; Strauss & Corbin, 1990). Third, open-coding began (i.e., the memos were read and labeled based on the important concepts that emerged; Flatt et al., 2015; Strauss & Corbin, 1990)¹³. Both new and existing codes from the related literature were utilized (Sauer et al., 2014). Fourth, the codes were organized into potential themes and sub-themes, which were then reviewed, defined and named (Flatt et al., 2015). Fifth, each theme was closely investigated, considering the meaning and implication of each theme, the potential causes, the assumptions made, and how the themes contribute to the

¹³ Notes regarding specific art creation were not investigated for this analysis (e.g., “the participant placed shapes on the page and glued them.”)

overall research question. Lastly, aco-researcher, A. D’Souza, reviewed one third of the observations and themes produced to provide feedback and solidify the final analysis (Graneheim & Lundman, 2004).

Guiding the thematic analysis, the theoretical basis for the themes produced was founded in the art and dementia observational research conducted by Sauer et al.’s (2014) and Kinney and Rentz (2005) on well-being (i.e., positive/constructive) and ill-being (i.e., negative/problematic) domains (Table 3). While these theoretically-based domains were initially the only themes thought to be especially relevant to the research undertaken, several more themes were considered throughout analysis: *Miscellaneous* and *Task Preference*.

Table 3.

The Well- and Ill- Being Domains of Sauer et al (2014) and Kinny & Rentz (2005)

Type	Domain	Examples
Well-Being	Social Interest	Eye contact, supportive interactions, approval seeking, social conversation
	Engagement	Sustained attention, verbal prompting, seeks task support, on-task conversation
	Pleasure	Smiling, laughing, enjoyment, pride, satisfaction, relaxed body language
Ill-Being	Disengagement	Not engaged in activity, passivity, sleeping, staring off, leaving
	Negative Affect	Anger, physical agitation, anxiety, frustration
	Sadness	Verbal/non-verbally expressed sadness
	Confusion	Verbal/non-verbally expressed confusion

3. Results

3.1 Baseline Characteristics: The Background Questionnaire.

Sex and dementia severity are reported for all participants, while dementia-type, education, nationality, and age are reported where provided. See Appendix B for the background questionnaire. As a supplemental dementia screening tool, baseline Mini Mental State Exam (MMSE) scores were utilized to provide insight regarding participant cognitive functioning and for exclusion/inclusion purposes: those within the normal range (27-30) were excluded from analysis, while others were classified according to their surrogate Clinical Dementia Rating: 26-29 questionable dementia, 21–25 mild dementia, 11–20 moderate dementia, 0–10 severe dementia (Pernecky et al., 2006). Any individual falling within the “questionable dementia” designators was cross-referenced with their questionnaire data to confirm diagnosis. The experimental group ($M = 13.59$; $SD = 7.06$) and waitlist control group ($M = 13.29$; $SD = 6.63$) were deemed comparable based on their MMSE scores, $U = 354.5$, $p = 0.957$. Further analysis with Bayesian statistics confirmed that the results of the MMSE provided moderate evidence for the null hypothesis ($BF_{10} = 0.265$).

Table 4.

Participant Demographic Information

	N	Sex	Severity	Type	Age ⁴	Education
Experimental	27 ¹	F: 16	M:13.59	Unprovided: 7	M: 80 SD: 8.9	Unprovided: 7
	AL:12	M: 11	SD: 7.06	AD: 6	Range: 54-90	Elementary: 4
	DP:15		Questionable: 1 ³	Unspecified:14		Highschool: 9
			Mild: 6			University: 6
		Moderate: 8			Graduate: 1	
		Severe: 12				
Control	26 ²	F: 22	M:13.29	Unprovided: 10	M: 82 SD: 8.4	Unprovided: 9
	AL:8	M: 4	SD: 6.63	AD: 7	Range: 66-96	Elementary: 2
	DP:18		Questionable: 1 ³	AD & Vascular 3: 1		Highschool: 11
			Mild: 3	Vascular 4: 1		University: 4
		Moderate: 13	Unspecified: 7			
		Severe: 9				

¹Two participants did not complete the Body Part Pointing Test.

²One participant did not complete the Digit Span or Body Part Pointing Test, and three participants did not complete the Body Part Pointing Test.

³ Each of the included participants with “questionable dementia” were verified as having some form of dementia based on their background questionnaire data.

⁴ 7 experimental participants and 9 control participants did not provide age information

Notes: AL: Assisted-Living Retirement; DP: Day Program; M: Male; F: Female; AD: Alzheimer’s Disease

3.2 Quantitative Results

For the quantitative task pre- and post- means and standard deviations for each group, see Appendix C.

3.2.1 Overall Cognition: The MoCA. Overall cognition did not significantly differ between the experimental ($M = 0.37$; $SD = 2.71$) and waitlist control groups ($M = 0.23$; $SD = 3.22$), $t(51) = 0.171$, $p = 0.865$. Further analysis with Bayesian statistics confirmed that the results of the MoCA provided moderate evidence for the null hypothesis ($BF_{10} = 0.280$). Thus, both groups performed identically on the MoCA, which resulted in a statistically insignificant difference

between the groups, indicating that overall cognition is not affected by eight weeks of visual art training.

3.2.2 Verbal Working Memory: The Digit Span. For the forward portion of the digit span task, the experimental group ($M = 0.13$; $SD = 1.99$) did not significantly differ from the waitlist control group ($M = -0.44$; $SD = 2.74$), $U = 392.5$, $p = 0.310$. For the backwards portion of the digit span task, the experimental group ($M = -0.04$; $SD = 1.31$) did not significantly differ from the waitlist control group ($M = 0.04$; $SD = 1.79$), $U = 306.5$, $p = 0.562$. For the normal aging Backward Digit Span standardized scores, see Appendix D. Further analysis with Bayesian statistics confirmed that the results of the digit span tasks provided moderate evidence for the null hypothesis for the backward component ($BF_{10} = 0.302$) and anecdotal evidence for the forward component ($BF_{10} = 0.549$). Thus, while the experimental group did perform better than controls on the forward digit span, this difference was not enough to be statistically significant. Further, both groups performed identically on the backward digit span, which resulted in a statistically insignificant difference between the groups, indicating that verbal working memory is not affected by eight weeks of visual art training.

3.2.3 Visuospatial Working Memory: The Body Part Pointing Test. A mixed design ANOVA revealed no significant main effects or interactions on the recall component of the Body Part Pointing Test for the experimental [pre ($M = 1.96$; $SD = 1.7$) vs. post ($M = 2.1$; $SD = 1.85$)] or control group [pre ($M = 2.89$; $SD = 1.68$) vs. post ($M = 2.46$; $SD = 1.56$)], all $F \leq 2.565$, $p \geq 0.116$. For the order component of the Body Part Pointing Test, the experimental group ($M = 0.22$; $SD = 2.1$) again did not significantly differ from the waitlist control group ($M = -0.36$; $SD = 1.95$), $U = 312.5$, $p = 0.408$. Further analysis with Bayesian statistics confirmed that the results of the Body Part Pointing Test ranged from anecdotal to strong evidence for the null hypothesis for the

recall component [Condition ($BF_{10} = 0.763$); Time ($BF_{10} = 0.233$); Time + Condition ($BF_{10} = 0.181$); and Time + Condition + Time x Condition $BF_{10} = 0.078$], while the order component fell within the anecdotal range ($BF_{10} = 0.420$). These insignificant results may be due to the bimodal distribution of the data, with the majority of participants scoring either perfectly (i.e., 4/4 for one or both tasks) or completely incorrect (i.e., 0/4 for one or both tasks). Thus, while the experimental group appears to have performed better than controls on the Body Part Pointing Test, this difference was not robust enough to be statistically significant. Therefore, visuospatial working memory is likely not affected by eight weeks of visual art training.

3.3 Qualitative Results

Qualitative observations of mood and behaviour were considered at pre-testing, post-testing, and the experimental group's first, ninth, and sixteenth art class. If a report for a specific timepoint (e.g., the ninth class) was unavailable, the next closest class was considered instead (e.g., the eighth or tenth class; with no more than a seven-day deviation). On two occasions observations were not included due to participant availability. A total of 1,177 qualitative reports were recorded during data analysis. Qualitative reports were assessed via line-by-line theoretical thematic analysis, utilizing an essentialist semantic approach. Qualitative methodology was completed with the assistance of qualitative researcher Dr. Karen Fergus (York University).

3.3.1 Observations of the Experimental Art Program. The qualitative review of the art program is encouraging. While cognitive improvements were not detected via quantitative tasks, positive and productive mood and behaviours were detected via qualitative analysis. Further, few occurrences of long-term memory (e.g., remembering the previous class) and dual tasking (e.g., participating in the activity while engaging with others) were reported¹⁴. What was largely

¹⁴ Although, in regards to long-term memory, an incidence of not remembering was also reported (Table 5).

impactful with the art program's qualitative analysis were the multiple time points considered: while the program was underway, new sub-themes emerged while others disappeared. For example, while requests for keeping artwork and additional materials occurred during the beginning of the program, this didn't continue later in the program (Table 5). This change is understandable: while the program unfolded, requests were met where possible and a better understanding of the program would have occurred (i.e., learning that artworks were returned to participants). Likewise, multiple negative and/or unproductive incidences were no longer reported by the final class. These disappearing incidences included: Not participating in the class; aggression towards others; interrupting and/or disruptive behaviour; neutral expressions; hesitation, anxiety and/or worry; anger and/or hostility, and indications of boredom. Contrasting this decrease in reported negative and/or unproductive incidences, an increase in positive and/or constructive incidences were reported. Specifically, the occurrence of assisting other participants, engaging in group discussions, observing the program, and responding in a quick, eager, and/or early fashion were reported at mid-program and, in the case of the two latter observations, at the end of the program as well. This change over-time may be an indication of progress, or even improvement, in participant mood and behaviour throughout art training participation.

For the qualitative program analysis, miscellaneous memos were also reported. Within the miscellaneous memos, reports of mild language barriers and vision difficulties were present at the beginning of the program, but were not noted during the middle or end of the program. This is not to say that the participants' language or vision improved, but that these reports were no longer considered noteworthy after the initial observation. This is likely because they did not interfere with the program in general or were resolved at the later timepoints (e.g., glasses worn, translator present, etc.). Interestingly, by the middle of the program, incidences of original artworks being

created and humorous interactions were mentioned, and by the end of the program incidences of individuals requesting to stay late were recorded.

Art programs are valuable in regards to their flexibility, cost, and non-invasive nature; they bring together a group of individuals with varying personalities, conditions, and experiences. These individual differences were documented throughout the program: individuals with a quiet or shy disposition, those who are commonly drowsy or sleepy, those who may not enjoy or be interested in art, those who are often distracted or withdrawn, and even one incidence of an individual who tended to mutter under their breath were all noted throughout the program. Further, consistent throughout the program, few individuals did appear to have a difficult time understanding instruction or were generally confused on occasion. Importantly, many of these occurrences may be a result of condition as opposed to personality or intervention (see Table 1). Beyond these individual differences, other more positive consistencies were found throughout the program: singing, dancing, smiling, and laughing; apparent happiness and enjoyment; engagement with others, including volunteers; social discussions and joking; admiration or encouragement of others; art and artwork discussions; looking to others for direction; seeking approval; friendly, pleasant and cooperative behaviour; alert, aware, or attentive dispositions; independent, active, constructive or diligent participation; requesting and/or requiring assistance or encouragement; and focus or engagement. All results of the experimental art program's qualitative assessment can be found in Table 5. Because sadness was not considered founded as a theme in itself, based on the observations reported, it was included as a sub-theme under *Negative Affect* instead (Kinny & Rentz, 2005; Sauer et al, 2014).

Table 5.

Qualitative Analysis of Experimental Art Program Observational Memos

Theme	Summarized Sub-Themes			Illustrative Quotes
	Beginning	Middle	End	
Social Interest	-Engaging with others -Social discussion and/or joking -Looking to others for direction -Admiring or encouraging others -Seeking approval -Discussing art or artwork -Friendly, pleasant or cooperative behaviour	-Engaging with others -Social discussion and/or joking -Looked to others for direction -Admiring or encouraging others -Seeking approval -Discussing art or artwork -Friendly, pleasant or cooperative behaviour <u>-Group discussion</u> <u>-Assisting others</u> <u>-Observed program</u>	-Engaging with others -Social discussion and/or joking -Looked to others for direction -Admiring or encouraging others -Seeking approval -Discussing art or artwork -Friendly, pleasant or cooperative behaviour <u>-Observed program</u>	“[A participant in encouraging one of the participants to draw and helping them when they appeared confused or unable to complete it.”
Engagement	-Alert, aware, or attentive disposition -Active, constructive, or diligent participation - Requesting or requiring assistance ¹ -Required encouragement -Focus & engagement -Independent participation <u>-Requesting materials</u> -Participating with volunteer -Curious and/or asking questions -Apparent Interest	-Alert, aware, or attentive disposition - Active, constructive, or diligent participation - Requesting or requiring assistance ² -Required encouragement -Focus & engagement -Independent participation <u>-Requesting materials</u> -Participating with volunteer -Curious and/or asking questions -Apparent Interest <u>-Quick, eager, and/or early</u>	-Alert, aware, or attentive disposition - Active, constructive, or diligent participation - Requesting or requiring assistance -Required encouragement -Focus & engagement -Independent participation -Participating with volunteer -Curious and/or asking questions -Apparent Interest <u>-Quick, eager, and/or early</u>	“[The participant is conversing with others and engaging in [the] activity with enthusiasm.”
Pleasure	-Smiling and/or laughing -Apparent happiness and/or enjoyment -Singing or dancing -Calm and/or comfortable (e.g., remaining seated) <u>-Pride: wanted to keep artwork</u>	-Smiling and/or laughing -Apparent happiness and/or enjoyment -Singing or dancing	-Smiling and/or laughing -Apparent happiness and/or enjoyment -Singing or dancing	“[The participant has a very positive affect, smiling and laughing frequently.”

Note: ¹5/12 individuals needed assistance specifically with tracing. ² 2/8 individuals needed assistance specifically with gluing.

Table 5. (Cont.)

Qualitative Analysis of Experimental Art Program Observational Memos

Theme	Summarized Sub-Themes			Illustrative Quotes
	Beginning	Middle	End	
Confusion	-Apparent confusion -Misunderstood instruction	-Apparent confusion -Misunderstood instruction	-Apparent confusion -Misunderstood instruction	“[The participant a]ppeared confused by the lesson as they often asked for clarification on the shading technique.”
Disengagement	-Disinterest and/or disengagement -Withdrawn and/or distracted -Leaving and/or preparing to ¹ <u>-Not participating in activity or class – sitting at activity table</u>	-Disinterest and/or disengagement -Withdrawn and/or distracted -Leaving and/or preparing to ² <u>-Participating in class but not the activity</u> <u>-Not participating in activity or class – sitting at activity table</u>	-Disinterest and/or disengagement -Withdrawn and/or distracted -Leaving ³ <u>-Participating in class but not the activity</u>	“[A]fter completing the activity, [the participant] left the group to listen to the music therapy session in the other room.”
Negative Affect	-Muttering -Drowsy and/or sleeping -Unenjoyment or sadness -Agitation <u>-Boredom</u> <u>-Aggression towards others</u> <u>-Interrupting/disrupting</u> <u>-Neutral expression</u> <u>-Hesitation, anxiety, and/or worry</u> <u>-Anger and/or hostility</u>	-Muttering -Drowsy and/or sleeping -Unenjoyment or sadness <u>-Boredom</u> <u>-Aggression towards others</u> <u>-Interrupting/disrupting</u> <u>-Neutral expression</u> <u>-Hesitation, anxiety, and/or worry</u>	-Muttering -Drowsy and/or sleeping -Unenjoyment -Agitation	“Mood was very inconsistent- one minute [the participant] was laughing the next minute [they were] crying, the next minute angry and displaying frustration.”
Miscellaneous	-Quiet or shy disposition -Dual task: talking/drawing -Late to class -Mild language barrier -Memory difficulties -Vision difficulties	-Quiet or shy disposition -Writes on art -Late to class -Humorous -Original artwork -Standing up/down -No notes -Asked to be with friends -Asked volunteer to do activity	-Quiet or shy disposition -Dual task: talking/drawing -Late to class -Remembered previous class -Memory difficulties -Wanting to stay late	“[The participant d]id make some comments in Italian. Very friendly. No problem with the tasks – seemed to be enjoying themselves despite minor language barrier.”

Note:¹ 1 individual began to leave after finishing their work, 1 individual left at first but returned, and one individual left and did not return.

² 1 individual left and returned, 1 individual left to join the music program occurring in the adjacent room, 1 individual left to use the restroom, and 1 individual left, or was waiting to leave, to see their family; ³ 2 individuals did not wish to participate, 1 individual came and left multiple times throughout the session, and 2 individuals left early to join the music program occurring in the adjacent room.

3.3.2 Observations of the Experimental Pre-Post Task Sessions. During the experimental pre-post task sessions, multiple themes and sub-themes were observed. In addition to the themes of the art program analysis, *Task Preferences* were also included based on the related memos in order to better guide future research. As was expected, there were a mix of responses to the task sessions: certain participants were actively engaged, interested, focused, active, and constructive, while others were disengaged, disinterested, distracted, inactive, and withdrawn. Additionally, certain participants were nervous or hesitant, asked about leaving, were upset with their performance, and/or engaged in self-criticism. These findings are not atypical, as nervousness or uneasiness can occur when an individual knows they are being tested. Because of this, volunteers were trained to note and mediate accordingly. For example, participation was completely voluntary, and while volunteers were trained to request or encourage continued participation or provide explanation if requested (e.g., how much longer will this take?), participants were never forced to participate (e.g., five individuals were removed from analysis because their sessions were left incomplete)¹⁵. Interestingly, while some were upset by their performance or displeased with their abilities, many others laughed at their apparent limitations; remaining aware of their abilities and/or laughing at the outcomes as opposed to expressing disappointment.

Similar to the art program assessments, occurrences of engaging in social discussions and maintaining a pleasant or friendly demeanor were common throughout testing. Further, there were also incidents of confusion and misunderstood instructions during testing, which were mediated by volunteers by providing louder, repeated, and/or paraphrased instructions when necessary.

¹⁵ The attrition accounted for by unwillingness to participate in testing was anticipated and is not uncommon nor completely avoidable. To maintain ethics, attrition is a small price to pay.

Lastly, symptomatic occurrences such as shaking, stuttering, and speech difficulties were also reported.

Task-related consistencies also occurred pre- to post-testing. Specifically, the MoCA's visuospatial tasks (e.g., trail making, clock drawing, cube copying) were often highlighted for their difficulty and/or the participant's disinterest in completing them. However, certain individuals preferred these tasks (Table 6 and 7). In addition, calculation tasks such as the MMSE's serial 7 task and the MMSE and MoCA's orientation sections were also noted to be difficult or uninteresting for participants.

Table 6.

Qualitative Analysis of Experimental Pre-Testing Observational Memos

Theme	Sub-Themes	Illustrative Quotes	
Social Interest	-Social discussion: Family -Social discussion: Interests -Social discussion: Programs -Social discussion: Location -Social discussion: Health & Condition	-Social discussion: Their day -Social discussion -Eye contact -Friendly or pleasant	“This participant often talked about their family and interests.”
Engagement	-Focus and engagement -Focus: Closing eyes and answering -Alert and/or aware disposition -Active/constructive participation -Required encouragement/prompts -Receptive to instruction	-Apparent interest -Asking questions -Asked about performance -Writing thoughts down -Understood instruction	“[The p]articipant was very positive and engaging about the experience.”
Pleasure	-Happiness and/or enjoyment -Smiling and/or laughing -Affectionate statements -Laughing at limitations	-Not nervous or distressed -Seated comfortably -Calm or content disposition	“[The participant] was in a happy mood laughing and smiling.”
Confusion	-Possible hallucination -Misunderstanding instructions	-Expressed confusion -Apparent confusion	“[The participant d]id not speak much unless spoken to, often had to repeat instru[c]tions.”
Disengagement	-Disengaged and/or disinterested -Inactive participation -Distracted or withdrawn	-Changed sitting positions -Looking away occasionally -Asked about leaving ³	“[The p]articipant often seemed [to be] zoning in and out.”
Negative Affect	-Nervousness or hesitation -Upset with performance -Apparent sadness	-Neutral expression -Stupor state -Drowsy, bored or sleeping	“[The p]articipant seem[ed] a little nervous when [they] came in”
Miscellaneous	-Translator and/or language barrier ¹ -Trouble finishing statements -Shaking hands -Lack of gesturing -Stuttering or slurred speech -Aware of limitations -Asked volunteer to do task -Laughed at naming task	-Delayed speech -Eating noises -Quiet or shy disposition -Muttering or mumbling -Hearing difficulties ² -Uninterested in certain tasks -Preference: Drawing tasks	“[The participant] frequently laugh[s] after [they’re] given new tasks to perform, especially tasks they find hard to do, such as drawing a cube in [the] MoCA.”
Task Preferences: Difficulty and/or Disinterest in a task	-Sentence repetition & writing -Naming -Math & calculation -Clock Drawing	-Cube Copying -Orientation -Serial 7s -Trail Making	“[The participant] refused to draw the cube claiming it was too hard.”

Note: ¹All participants were required to speak and understand English. When a language barrier occurred, volunteers would repeat and/or paraphrase instructions when necessary. If helpful, translators were requested. ² Hearing difficulties would be accommodated by written instruction and/or louder verbal instruction. ³ 1 individual got up and asked if there is anything more to do.

Table 7.

Qualitative Analysis of Experimental Post-Testing Observational Memos

Theme	Sub-Themes		Illustrative Quotes
Social Interest	-Social discussion: Childhood -Social discussion: Past events -Social discussion: The weather -Social discussion: Their location	-Social discussion: Questions -Friendly or pleasant -Social discussion and/or joking	“[The participant was in a v]ery positive mood, humourous, funny and engaged in conversation with me.”
Engagement	-Focus: Closing eyes and answering -Required encouragement/prompt -Alert and/or aware disposition -Active/constructive participation -Asked questions	-Asked about performance -Focus and engagement -Apparent interest -Asked for assistance	“When the participant was asked to do tasks, they seemed to be engaged and did not talk about other conversation.”
Pleasure	-Happiness and/or enjoyment -Smiling and/or laughing -Laughing at limitations	-Seated comfortably -Appropriate mood	“[The participant] seemed to be in a happy mood as they would occasionally display a smile.”
Confusion	-Misunderstanding instruction	-Apparent confusion	“The participant c]ould not understand many instructions, [I] had to repeat most of them at least twice.”
Disengagement	-Disengaged or disinterested -Distracted or withdrawn -Asked about leaving ¹	-Lack of eye contact -Drowsy, bored or sleeping	“In the beginning of the session, they seemed distracted.”
Negative Affect	-Nervousness or hesitation -Neutral expression and/or tone -Irritability and/or annoyance -Apparent sadness	-Apparent discomfort -Upset with performance -Self-criticism	“[...the participant] became hesitant and withdrawn when questions were asked, but agreed to complete them for further explanation of the task.”
Miscellaneous	-Translator and/or language barrier -Quiet and/or shy disposition -Limited words and/or movements -Stuttering or delayed speech -Aware of limitations -Memory or Hearing difficulties -Standing when answering -Preference: Drawing tasks -Asked volunteer to do task	-Shaking or possible paralysis -Steady hands -Effective communication -Recognizing the volunteer -Sighing and/or self-talk -Eating noises -Humourous -Session attempted twice ² -Use of gestures	“One of the translators helped the participant understand the tasks.”
Task Preferences: Difficulty and/or Disinterest in a task	-Trail Making -Clock Drawing -Drawing Tasks -Writing Tasks	-Cube Copying -Orientation -Serial 7s	“[The participant s]miled and laughed when given questions they had a hard time answering, such as the date on the MoCA.”

Note: ¹1 individual got up when they thought the session was over, but sat back down once they were informed that the session was almost done, 1 individual asked when the session will be done and how they can leave the room, and 1 individual required a washroom break – which was not included in this count. ²When a session was attempted twice, the first session was typically cancelled due to participant unwillingness, unwellness, or unavailability. The second encounter is what is documented here.

3.3.3 Observations of the Waitlist Pre-Post Task Sessions. During the waitlist control's pre-post task sessions, multiple themes and sub-themes were observed. Similar to the experimental pre-post observations, *Task Preferences* were also included here. Identical to the experimental group, there were a mix of responses to the task sessions: certain participants were actively engaged, interested, focused, active, and constructive, while others were disengaged, disinterested, distracted, and withdrawn. Further, certain participants were nervous or hesitant, asked about leaving, were upset with their performance, and/or engaged in self-criticism. However, aligning with the experimental group, while certain participants were disappointed by their performance, many others laughed at their outcomes instead. Furthermore, identical to the experimental group's findings, individuals would often engage in social discussions and maintained a pleasant or friendly demeanor throughout testing. There were also incidents of confusion and misunderstood instructions, identical to the experimental analyses, as well as symptomatic occurrences such as shaking and speech difficulties.

Task-related consistencies are apparent. Specifically, visuomotor tasks (e.g., the MoCA's trail making task) were often highlighted for their difficulty and/or the participant's disinterest in completing them. However, certain individuals preferred these tasks (Table 8 and 9). In addition, calculation tasks such as the MMSE's serial 7 task, the MoCA's naming task, and the MMSE and MoCA's delayed recall tasks were also noted to be difficult or uninteresting for participants.

Table 8.

Qualitative Analysis of Waitlist Control Pre-Testing Observational Memos

Theme	Sub-Themes		Illustrative Quotes
Social Interest	-Social discussion: Childhood -Social discussion: Past events -Social discussion: Their location -Social discussion and/or joking	-Social discussion: Travel -Social discussion: Family -Friendly and/or pleasant -Eye contact	“[The participant was i]n a joyful mood and was willing to share their [stories] and have a conversation.”
Engagement	-Focus and/or engagement -Alert and/or aware disposition -Required encouragement/prompts -Active/attentive participation	-Quick and/or eager -Apparent interest -Asked questions -Engaging with materials	“Throughout the session, [the participant] was smiling, had a positive tone in their voice and was very engaged with the task.”
Pleasure	-Smiling and/or laughing -Happiness/enjoyment -Calm or content disposition	-Not frustrated -Seated comfortably -Laughing at limitations	“[The p]articipant appeared to be in a happy state, smiling often with a friendly tone.”
Confusion	-Misunderstood instruction	-Apparent confusion	“[The participant was] unsure of how to answer the questions according to their tone of voice and lack of eye contact when answering.”
Disengagement	-Distracted or withdrawn -Disengaged or disinterested -Asked about leaving or leaving ¹	-Lack of eye contact -Inactive participation	“The participant seemed to be withdrawn during the tasks including calculation.”
Negative Affect	-Nervousness or hesitation -Apparent sadness -Irritability and/or annoyance -Self-criticism	-Apparent discomfort -Drowsy, bored or sleeping -Upset with performance	“[The participant was n]ot comfortable with numbers.”
Miscellaneous	-Session attempted twice -Translator and/or language barrier -Aware of limitations -Hurrying responses when annoyed -Preference: Drawing Tasks -Uninterested in certain tasks	-Trouble with full sentences -Use of gestures -Shaky hands -Hearing difficulties -Focused: Visual/tactile tasks	“Trail making section had instructions repeated once. [The p]articipant became frustrated at this point and answered [the] questions in a [h]urry.”
Task Preferences:	-Writing tasks	-Naming	“[The participant was] very
Difficulty and/or	-Calculation Tasks	-Orientation	enthusiastic and smiling
Disinterest in a	-Forward Digit Span	-Trail Making	when asked to [perform] each
Task	-Abstraction -Serial 7s	-Delayed Recall	drawing task.”

Note: ¹ 1 individual began leaving multiple times but returned and continued each time, 1 individual asked if it was time to go home, and 1 individual left but returned and completed the session.

Table 9.

Qualitative Analysis of Waitlist Control Post-Testing Observational Memos

Theme	Sub-Themes		Illustrative Quotes
Social Interest	-Social Discussion: Childhood -Social Discussion: People -Social Discussion: Their location -Social discussion and/or joking	-Humorous -Friendly and/or pleasant -Eye contact	“[The participant] smiled while having a conversation. The participant talked about some people in their lives.”
Engagement	-Focused and/or engaged -Required encouragement/prompts -Alert and/or aware disposition -Active/constructive participation -Understood instruction -Apparent interest	-Asked for assistance -Asked about performance -Asked questions -Sought approval -Quick and/or eager	“The participant seemed focused throughout the session.”
Pleasure	-Happiness/Enjoyment -Smiling and/or laughing -Seated comfortably -Laughing at limitations	-Affectionate contact -Appropriate mood -Calm or content disposition	“Overall positive and happy disposition and mood. Smiling and positive gestures, very friendly and verbally communicative.”
Confusion	-Apparent confusion -Possible hallucination	-Misunderstanding instruction	“[The p]articipant was very focused on each task and would ask for reassurance on what they were doing, but they had trouble understanding what to do.”
Disengagement	-Distracted or withdrawn -Disengaged or disinterested	-Asked about leaving or leaving ¹	“It was challenging to complete all the tasks as the participant wasn't engaged.”
Negative Affect	-Upset with performance -Apparent sadness -Neutral expression and/or tone -Self-criticism	-Irritability and/or annoyance -Drowsy, bored or sleeping	“The participant seemed stressed while drawing the clock and mentioned that they will need another as it will not be enough”
Miscellaneous	-Translator and/or language barrier -Memory and Visual difficulties -Aware of limitations -Effective/frequent communication -Wobbling and/or fidgeting -Remembered previous session -Drooling -Asked volunteer to do task -Preference: Drawing Tasks	-Use of gestures -Shaky hand(s) or voice -Humming -Hearing difficulties -Wanted to write answers -Immediately fixed error -Feet tapping -Hear noises	“[The participant w]as very fidgety but completed [the] t[asks] quickly and understood instruction.”
Task Preferences: Difficulty and/or Disinterest in a Task	-Naming -Clock Drawing -Delayed Recall	-Serial 7s -Sentence repetition -Trail Making	“[The p]articipant was in a happy mood, smiling and laughing at [s]ome of the tasks they had a difficult time doing, such as memory and recall.”

Note: ¹ 1 individual occasionally asked when they could leave, 1 individual left and returned to the session multiple times, and 1 individual misunderstood instruction and instead left the session but returned.

4. Discussion

4.1 Summary of Findings

The findings from the present study can be summarized with four words:

1. Suitability: Visual art training is suitable for those with varying forms of dementia, within varying dementia care-types and geographic locations.
2. Effect: While visual art training does not significantly affect working memory or overall cognition after eight weeks of exposure, it does appear to facilitate supportive, engaging, and pleasurable experiences for those with dementia, and may even improve mood and behaviour overtime.
3. Community: Visual art training provides an environment that thrives off community, bringing youthful volunteers together with older individuals with dementia, creating a bridge between education and dementia settings.
4. Capability: Persons with dementia vary widely in their abilities and limitations, but remain capable of more than the stereotype would allow.

4.2 Relating to the Literature

4.2.1 Mood and Behaviour. The present study provides further validation of visual art participation's positive impact on mood and behaviour, with decreases in negative and/or problematic incidents such as aggression, anxiety, and disruptive behaviour, and increases in positive and/or constructive incidents such as engagement and socialization. This is in line with the related literature, which has provided evidence for visual art participation increasing positive mood and behaviour instances, such as indications of pleasure, socialization, and engagement, while decreasing the prevalence of negatively impactful conditions such as depression, anxiety, apathy, agitation, and aggression (Bentes-Levy, 2012; Camic, Tischler, & Pearman, 2014;

Camic, Baker & Tischler, 2014; Caulfield, 2011; Chancellor, Duncan, & Chatterjee, 2014; Hattori, Hattori, Hokao, Mizushima, & Mase, 2011; Hazzan et al., 2016; Kahn-Denis, 1997; Kinney & Rentz, 2005; Rentz, 2006; Rusted et al., 2006; Stewart, 2004; Windle et al., 2017; Young, 2014).

Each of these mood and behaviour findings may be due to some or all of the theoretical foundations for art participation's positive impact: the therapeutic nature of visual art participation; the usefulness of art as a communicative tool; and/or art participation's provided sense of personhood and/or "flow" (Bentes-Levy, 2012; Chancellor, Duncan, & Chatterjee, 2012; Rentz, 2002; Sauer et al., 2014). All the beneficial effects observed, regardless of their reason, combined with the high comorbidity of negative or problematic mood and behaviour occurrences that are common in dementia (Bryne & MacKinlay, 2012; Butler, Orrell, Ukoumunne & Bebbington, 2003), further indicate that visual art programming may be a useful tool in combatting dementia-related mood and/or behaviour disturbances. However, these observations were not apparent at post-testing, indicating that art training may better provide in-the-moment benefits rather than long-term changes.

4.2.2 Cognition. Aligning with the related literature, our observational data indicates that learning, concentration/focus, dual-tasking, and few (albeit minimal) moments of long-term memory retrieval occurred during the art training programs (Camic, Tischler, & Pearman, 2014; Cowl & Gaugler, 2014; Kahn-Denis, 1997; Kinney & Rentz, 2005; Rents, 2002 Peisah, Lawrence, & Reutens, 2011; Peisah, Lawrence, & Reutens, 2011; Parsa, Humble, & Gerber, 2010; Sauer, Fopma-Loy, Kinney, & Lokon, 2014; Ullán e al., 2011; Windle et al., 2017; Young et al., 2015), while our quantitative data yielded insignificant results on all accounts (Hattori et al., 2011; Rusted, Sheppard, & Waller, 2006). Thus, like other randomized controlled trials

investigating dementia and arts programming, we did not find a significant quantitative cognitive effect due to art training. These results indicate one of two things: while cognitive effects may indeed be *observed* during art programming, they may not be robust enough to be detected quantitatively, or, alternatively, cognition is simply unaffected by art programming altogether.

4.3 Importance and Relevance

The present study does not simply ask participants to look backwards, focusing solely on the reminiscing benefits of an intervention; it actively encourages participants to push forward via the opportunity to learn new terms and skills. With this consistently positive undertone, the present study strives to represent the greater potential of persons with dementia; this study's aim is not to cover-up symptoms, but to enhance each individual who partakes regardless of their symptoms. The Ullán and colleagues' (2011) arts education and dementia study shared a quote by one particular participant that emphasizes the immense importance of arts programs such as this: "I [the participant] think that when I come to the center... it's as if they thought I was... crazy, by losing my memory... it took a great effort and tears to come to the center. I've read a lot and I thought they wanted to lock me up...Now they say, 'you see, mama?' I go around telling everyone that I'm very happy...they're teaching us to paint" (p. 16). In providing novel and beneficial programming for dementia locations, we can change the way in which both the locations and the participants themselves are viewed and – even more importantly – improve the experiences of the staff and clients of each dementia facility.

Previous studies have supported the possible benefits of art training on dementia patients. However, these studies have notable limitations, including lack of control groups, poorly reported art programming, inadequate methodological detail, small sample sizes, and minimal experimental evidence (Chancellor, Duncan, & Chatterjee, 2014; Locker, 2007; Matthews, 2016;

Rusted, Sheppard, & Waller, 2006; Windle et al., 2014; Windle et al., 2017; Sauer, Fopma-Loy, Kinney, & Lokon, 2014; Young et al., 2015). To address these methodological issues, the present study was designed with a control group, randomization, a relatively large sample size, fully reported methods and procedures, rigorous experimental control, assignment concealment, and volunteer blinding. Additionally, following suggested guidelines and approaches, the present study utilizes validated and reliable quantitative measures in conjunction with qualitative observational reports (Windle et al., 2017; Twining, Heller, Nussbaum, M & Tsai, 2016).

The positive outcomes associated with combining elderly individuals who have dementia with younger student volunteers has been exhibited elsewhere (Windle et al., 2017), and was exemplified again in the present study. Projects such as these facilitate the community by bringing different age groups together, providing experience to the volunteers as well as the older adults.

4.4 Limitations

The present study has multiple limitations. First, the observer-effect may be problematic when utilizing observational methods, resulting in an adjusted behaviour among participants when they are in the presence of observers (Hazzan et al., 2016). However, this effect would be minimized due to the position of the observers (off to the side and unobtrusively entering the program space) and the nature of the recruitment locations (where many individuals, including staff, volunteers, and patients, come and go frequently).

A second limitation of the study is the lack of dementia-type information. Although dementia-type was requested, multiple reports were unreturned or answered with a general dementia diagnosis (i.e., not a specific condition such as “vascular dementia”, but a general condition of “dementia”). Thus, between-dementia type comparisons could not be made. This is

relevant because of the discrepancies between the many types of dementia. Nonetheless, this study does represent the typical situation within a dementia care environment, where different individuals, of varying backgrounds, capabilities, and dementia-types, join together to be cared for, stimulated, entertained, and (with certain locations) take up residence alongside each other. This limitation is one often seen throughout the literature as well: with dementia being a condition where location is important (i.e., accessible and convenient for caregivers), time is fleeting (i.e., attrition associated with time is typically staggering compared to normal-aging populations), diagnoses are not always known (i.e., due to the nature of their diagnosis, dementia patients may not remember their specific condition), diagnoses are not always shared (i.e., a diagnosis is very personal and an individual may not wish to share the exact nature of the patient's condition), and medical reports can be costly (i.e., documents may not be free or readily available), obtaining exact diagnosis information for all participants can be largely troublesome. Furthermore, dementia care locations may not know the *exact* diagnosis for each client and instead only know their general diagnosis of "dementia". This overarching limitation may be mediated in the future by recruiting from hospital participant pools, where diagnosis would be recorded upon entry, or with better research infiltration into other dementia locations. For example, if dementia locations with an interest in research had potential participants screened upon their entry to their programs or residence (i.e., asking if they are interested in research and, if so, asking for their specific diagnosis and for the best way for researchers to contact the caregiver) their diagnosis and interest would already be known to researchers at the start of a project. As research becomes more desired and imbedded into dementia locales, better quality and understanding will undoubtedly arise.

A third limitation of the present study relates to the tasks used. While all selected tasks have been used previously with dementia samples and investigate the constructs of interest, more appropriate tasks may exist. For example, based on the low score outcomes of the MoCA, interpretation is limited. A more appropriate test of cognition in a dementia sample such as this, with varying levels of dementia severity, may have provided more meaningful results (e.g., the Severe Impairment Battery; Saxon, McGonigle, Swihart & Boller, 1993). Similarly, the binary results of the Body Part Pointing Test may have also been affected by the sample's varying severity level: with many participants either not being able to complete the task at all or being able to complete the entire task successfully, a different visuospatial working memory task may provide more meaningful results for similar research completed in the future (e.g., the Corsi Block-Tapping test; Corsi, 1972). Lastly, additional measures of function and learning may have provided more depth regarding the success of the art training program (e.g., curriculum term learning) and should be pursued in the future.

4.5 Future Research

Future research may wish to explore art training in settings beyond the clinical domain; instead of in-house art programs at retirement and/or day centers, future research could explore the feasibility and value of non-clinical settings for art training (Camic, Baker, & Tischler, 2014). In non-clinical settings, such as art galleries, persons with dementia participating in arts activities have been cited as feeling welcome and freed from their normal routine and settings (Camic, Baker, & Tischler, 2014). However, while non-clinical settings (e.g., an art gallery) can provide a new environment where persons with dementia, as well as their carers, can be stimulated and inspired, there is also the extra apprehension of traveling to “unnecessary”

locations (e.g., transportation and time requirements, health risks; Butler et al., 2004; Camic, Baker, & Tischler, 2014).

Future use of these types of arts training programs may be best provided directly to dementia locations, with the programs being housed and controlled in-house. This type of research strategy should improve the sample size of future research, the feasibility of running such large-scale projects, and bring future researchers one step closer to the ultimate goal of this kind of research: direct implementation and utilization within care facilities, with less and less need for researcher direction. Training for this sort of research proposal would require widespread curriculum teaching resources, accessible and easily understandable to a group with mixed experiential and educational backgrounds. Such training has been suggested for arts education research before and seems realistic based on the results of the present study and the current dementia care climate (Ullán et al., 2011).

4.6 Conclusions

A diagnosis of dementia will unavoidably be accompanied by questions and concerns, but it doesn't have to be considered "the end". People with dementia do not regress back to childhood, as so many choose to believe, and they do not simply become their diagnosis; these individuals are much more than their medical records—they are our elders, distinguished members within our society, and do not need to be treated with stigma, stereotyping, or negative connotations (Sauer, Fopma-Loy, Kinney, & Lokon, 2014; Windle et al., 2014). When a person develops the symptoms of dementia, loss is inevitable, but that does not mean that loss is all there is: people with dementia often wish to participate in activities, to be a part of something and feel valued, and this wish is not an impossibility (Camic, Baker, & Tischler, 2014; Windle et al., 2014). While the present study did not find quantitative cognitive effects, it did support the

feasibility and value of art training for individuals with dementia: striving off community, with a viable volunteer-based implementation and flexible curriculum, art training activities are not only possible for those with dementia, but also impactful according to mood and behaviour qualitative data.

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Appendix A: Intervention Curriculum

Table 10.

Visual Art Intervention Curriculum

Week	Term Explanation	Activity
<i>One</i>	<p>Space: Positive and negative parts of an artwork are distinct. Space can also provide depth in an artwork.</p> <p>Emphasis: Combining elements in a way that highlights the contrast between the elements.</p>	<p>White on Black Tracing: Instructors will bring in flat wooden objects, white and light-coloured pencil crayons and a stack of black paper. The paper will be placed in front of each participant's seat, and the objects will be placed in the middle of the table. First, participants will be asked to choose an object that they like, then the instructor will instruct the participants to trace their respective objects onto the black paper and make a scene of their choosing with their traced shapes.</p>
Two	<p>Colour: Consists of hue (name), value (lightness or darkness of the hue), and intensity (brightness and purity of the hue)</p> <p>Variety: Diversity and contrast of different elements.</p>	<p>Flat Object Colouring: Instructors will bring in flat wooden objects, markers and pencil crayons. The objects, markers and pencil crayons will be placed in the middle of the table. First, participants will be asked to choose an object that they like, then the instructor will instruct the participants to colour in their objects. At the same time, participants will be encouraged to pass along an additional object, with each participant colouring in one area of the object at a time before passing it on to the next participant, and the next participant, and so on.</p>
Three	<p>Texture: The feeling of surfaces, or what a surface looks like it feels like.</p> <p>Harmony: The combination of similar elements within an artwork to highlight their similarities.</p>	<p>Fabric Collage: Instructors will bring in fabric, scissors, glue sticks, white paper, markers and pencil crayons. The white paper will be placed in front of each participant's seat, and the fabric, glue sticks, markers and pencil crayons will be placed in the middle of the table. First, participants will be asked to choose fabrics they like, then the instructor will instruct the participant to make a picture with their selected fabric on their paper. Using markers and pencil crayons is also encouraged.</p>
Four	<p>Line: A mark moving in space. Lines can be literal or abstract.</p> <p>Movement: Creates action within an artwork and guides the art-viewer's eyes through an artwork.</p>	<p>Tape Maze: Instructors will bring in line mazes, white paper, markers and pencil crayons. The mazes will be placed in front of each participant's seat, and the white paper, markers and pencil crayons will be placed in the middle of the table. First, participants will be asked to move their finger or a pencil/marker through the maze, then instructors will instruct the participants to create their own line drawings on the separate pieces of blank paper. Continuing to draw on the maze is also acceptable.</p>

Table 10 (Continued)

Visual Art Intervention Curriculum

Week	Term Explanation	Activity
<i>Five</i>	<p>Shape: A two-dimensional image.</p> <p>Rhythm: Repetition of elements in an artwork that creates visual movement, tempo, or beat.</p>	<p>Making shapes with Shapes: Instructors will bring in flat paper shapes, glue sticks, white paper, and markers and pencil crayons. The white paper will be placed in front of each participant, and the paper shapes, glue sticks, markers and pencil crayons will be placed in the middle of the table. Participants will be asked to use the shapes to create images (such as houses, butterflies, etc.) on the white paper.</p>
<i>Six</i>	<p>Form: A three-dimensional image which includes height, width and depth.</p> <p>Proportion: The relationship of elements to the entire artwork and to each other.</p>	<p>Object and People Proportion: Instructors will bring in white paper, foam props, markers and pencil crayons. The white paper will be placed in front of each participant's seat, and the foam props, markers and pencil crayons will be placed in the middle of the table. To discuss proportion, the instructor and their class volunteer will stand together in front of the group. Once there, the instructor will ask the volunteer to stand behind them, then in front of them. The instructor will then use the foam props to show the same principle. Then, instructors will ask participants to draw proportion-related scenes on white paper. Foam props may be used for tracing.</p>
<i>Seven</i>	<p>Form: A three-dimensional image which includes height, width and depth.</p> <p>Balance: Combining elements to create equilibrium in an artwork.</p>	<p>Flat Image Team Organization: Instructors will bring in white paper, one large Bristol board, form stickers, markers and pencil crayons. All items, except the white paper, will be placed in the middle of the table. A black line down the middle will split the Bristol board into two halves. The instructors will then ask each half of the table (one half on one side of the board, the other on the other side) to take turns using the form stickers to "balance" the board (e.g., if the right-side places a large pink sticker on their side, the left-side places a large pink sticker on their side). Participants will match the other group's sticker choice (based on colour, shape or size) before choosing their own. The sticker balancing activity will go on until the board is filled. Participants will then be given paper and asked to draw similar "balanced" images on the white paper.</p>
<i>Eight</i>	<p>Value: The lightness and darkness of tones and colours.</p> <p>Gradation: The gradual change of elements.</p>	<p>Example Copying: Instructors will bring in markers, pencil crayons, white paper, and white paper with shapes on them; half with examples of value gradation (a square and circle that transitions from black to white) and half with empty shapes (an empty square and circle). The white paper with shapes will be placed in front of each participant, and the white paper, markers and pencil crayons will be placed in the middle of the table. Instructors will then ask participants to fill in the blank shapes like the gradation examples provided (gradation examples can also be coloured).</p>

Background Questionnaire

Task Information

Date: _____

Time: _____

Participant Information

ID Number: _____

Gender: _____

Age: _____

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 C: Pre-Post Group Means

Table 11

Pre- and Post-Test Scores for Each Task According to Group

	Experimental Group		Waitlist Control Group	
	Pre-Test Mean	Post-Test Mean	Pre-Test Mean	Post-Test Mean
	(SD)	(SD)	(SD)	(SD)
MMSE	13.59 (7.06)	NA (NA)	13.29 (6.63)	NA (NA)
MoCA	8.82 (7.48)	9.19 (8.04)	8.31 (5.68)	8.54 (5.89)
Forward Digit Span	7.24 (2.5)	7.37 (2.01)	7.16 (3.69)	6.72 (3.86)
Backward Digit Span	2.59 (2.38)	2.56 (2.38)	2.72 (2.59)	2.76 (2.76)
Body Part Pointing Test (Recall)	1.96 (1.7)	2.1 (1.85)	2.89 (1.68)	2.46 (1.56)
Body Part Pointing Test (Order)	1.62 (1.7)	1.84 (1.89)	2.48 (1.67)	2.11 (1.65)

Appendix D: Normative Aging Backward Digit Span Results

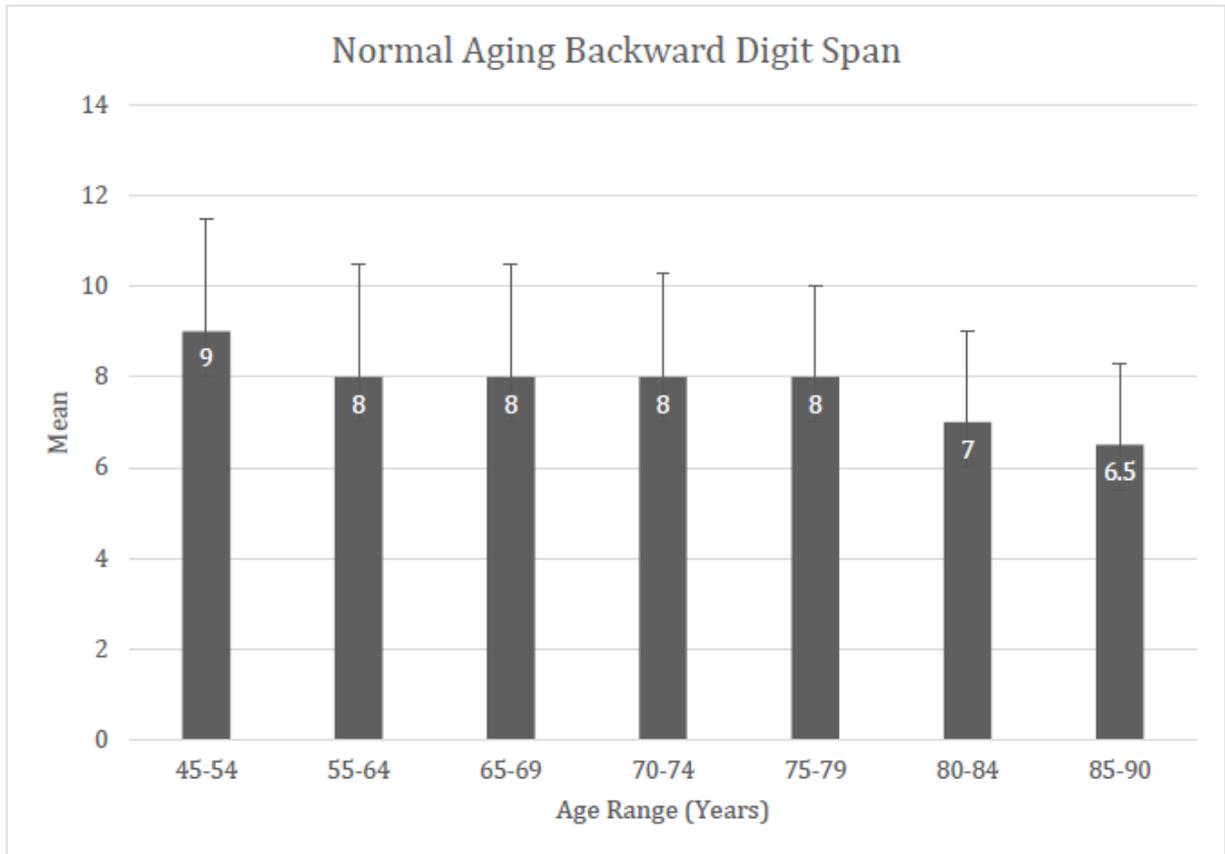


Figure 1. Estimated Normal Aging Backward Digit Span Means and Standard Deviations.

Estimated Backward Digit Span means and standard deviations from Wisdom, Mignogna & Collins (2012).