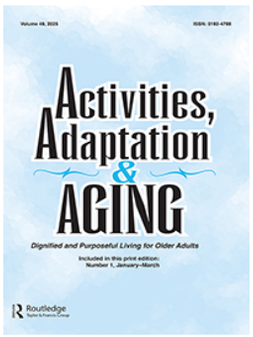

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Effects of Zentangle on Older Adults' Anxiety, Happiness, and Dexterity

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ABSTRACT

During the COVID-19 pandemics, supporting older adults living in nursing homes to engage in meaningful experiences was challenged. This study aimed to investigate the changes in anxiety, happiness, manual dexterity, and enjoyment for adults aged 72–100 after an eight-week Zentangle mindfulness-based art therapy course. The course was conducted in a regional Australian nursing home during COVID-19 visitation restrictions. Twenty participants assigned to either an experimental or control group completed the study. Experimental participants attended Zentangle sessions which incorporated instructor-led drawing and mindfulness techniques. A randomized block design was used with quantitative pre and post-assessments of anxiety, happiness, and fine motor skills, as well as demographic cognitive screening at enrollment. Attrition and session data were collected to monitor participants' engagement and enjoyment of the course and any disruptions. Experimental participants showed significant reduction in anxiety (−7%) and increase in happiness (+26%), with 71% percent reporting they would continue attending or recommend it. A potential protective effect in manual dexterity was observed. Participants experiencing mild to moderate cognitive changes reported the most enjoyment of the course. Results suggest that Zentangle could be offered as pleasurable activity and a non-pharmacological addition to anxiety treatment.

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KEYWORDS
Anxiety; happiness; older adults; zentangle; mindfulness-based art therapy

Introduction

Despite an increasing preference among older adults to age-in-place across Europe, North America, and Australia (Hodgson, 2020; James et al., 2019; Sumner et al., 2021), individuals with complex care needs are often unable to remain at home, resulting in increased reliance on nursing homes (Sun et al., 2021). With the percentage of persons older than 65 forecast to rise to 24% by 2100 (United Nations, 2022), it is expected that demand for nursing home communities in these regions will increase as the population ages (Byttebier, 2022; OECD, 2021). Aligned with the United Nations Decade of Health Ageing (2021–2030), the drive

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to maintain quality of life through meaningful activity is a key consideration (Smith et al., 2018; World Health Organization, 2022). Expressive arts and mindfulness are two of many pursuits known to foster wellbeing among adults in nursing homes (Terry et al., 2021; Vaartio-Rajalin et al., 2021). The mindfulness-based Zentangle art technique combines both elements (Krahula, 2012).

During the COVID-19 pandemics, social interaction for older adults in both the greater community and nursing homes was at times significantly curtailed by infection control measures. Reduction in social connection occurred across the Americas, Europe, Africa, and the Asia-Pacific region, although the need for precautions was recognized and endorsed by the adults themselves (Morrison et al., 2022; Rocard, 2023). Reduced ability to participate in meaningful group pursuits resulted in increased isolation and loneliness, as well as worsening mental health outcomes for older adults (Simard & Volicer, 2020; Usher et al., 2021; Wolman et al., 2023). Studies of nursing home workers in the UK and Europe found staff felt trapped between maintaining infection control standards and supporting individuals' emotional wellbeing (Giebel et al., 2022; Kaelen et al., 2021; Richardson et al., 2022). Meta-analytic learnings from past pandemic research suggests these negative outcomes are not limited to COVID-19 but can be expected in future pandemics (Roy et al., 2020). It is therefore important to find ways to preserve social interaction and mitigate negative impacts on the wellbeing of people in nursing homes when crisis-level infection control protocols are active (Usher et al., 2021).

Older adults living in nursing homes are likely to have complex care needs. Studies from Australia, Asia, Europe, and North America report these individuals often live with one or more mental health conditions such as depression or anxiety (Bhar et al., 2020; Lind et al., 2020), reduced self-esteem (Šare et al., 2021) and declining ability to carry out activities of daily living (Edemekong et al., 2023). The number of people living in nursing homes who experience at least one mental health condition is high, ranging from 19–40% (Amare et al., 2020; Grabowski et al., 2010; Kehyayan et al., 2021). Anxiety, in particular, is common among people living in nursing homes, with prevalence ranging from 19–28% (Creighton et al., 2018; Ishikawa et al., 2020). Additionally, a Canadian study found older adults' anxiety increased during the COVID-19 pandemics (Gosselin et al., 2022). Difficulty with the fine motor skills required to perform activities of daily living (ADLs) such as dressing and grooming can also occur as individuals age (Owada et al., 2023). Longitudinal studies have shown that older adults' fine motor skills show gradual decline, particularly when participants are also facing cognitive changes (Curreri et al., 2018; Hoogendam et al., 2014). These challenges, along with the difficulties of group living and the loss of independence associated with moving from one's private home, can increase risk for anxiety (Polacsek & Woolford, 2022) and reduce happiness in nursing home communities (C. Liu et al., 2022; Neocleous & Apostolou, 2016).

While meta-analytic studies indicate pharmacotherapy can effectively reduce anxiety in older adults (Pinquart & Duberstein, 2007), non-pharmacological approaches including mindfulness-based therapies can also be effective in combination with or as an alternative to medication for the treatment of late-life anxiety (Andreescu & Lee, 2020). Art therapy is also recommended as a non-pharmacological intervention for older adults living with depression and cognitive change (Batubara et al., 2023). Both mindfulness and expressive art can reduce anxiety in older adults (Koo et al., 2020; Smart & Segalowitz, 2017), and increase happiness (Ho et al., 2019). It has been suggested that creative arts requiring hand dexterity such as drawing or playing music can exercise older adults' fine motor skills (Bae & Kim, 2018; MacRitchie et al., 2020) and can potentially have a therapeutic effect on fine motor skills amongst individuals living with degenerative disease (Marco et al., 2022). Further, when art gatherings are led by nursing home staff, additional benefits of increased trust and intergenerational social engagement can occur (Broome et al., 2017). The group element is also important. Social connection has been shown to improve when adults come together to engage in art as well as in mindfulness activities (Foulk et al., 2014; Smart & Segalowitz, 2017; Vaartio-Rajalin et al., 2021). It been further suggested that the state of flow, defined as a positive emotional state resulting from engagement with an activity (Csikszentmihalyi, 1990), can be achieved by older adults engaging in leisure pursuits (Standridge et al., 2020), and that flow and happiness are influenced by older adults' positive or negative experiences (Collins et al., 2009).

During the COVID-19 pandemics nursing home staff sought opportunities for meaningful social and creative engagement modified as necessary to accommodate infection control protocol (Elsheikh et al., 2021). Classes and social events to increase face-to-face interaction to protect against mental health deterioration were especially important (Geyer et al., 2023). Additionally, given the fluctuating restrictions on external visitors, opportunities to engage socially with nursing staff outside the context of clinical care were also recommended when external visitors were prohibited (Rodney et al., 2021), for both current and future pandemic planning (Usher et al., 2021). A review to identify pursuits which could be offered in a COVID-safe environment to reduce loneliness and isolation in older adults was conducted by Williams et al. (2021). Both mindfulness and art were identified as opportunities for meaningful group engagement that could also be made COVID-safe. Art therapy, in particular, was recommended as a possible way to mitigate the risk of increased deterioration in wellbeing resulting from isolation during the pandemics (Braus & Morton, 2020). An online mindfulness study with older adults during the pandemics included technological support to assist participants to engage, and showed significant improvement in depression, loneliness, and perceived social support (Shapira et al., 2021).

Participatory creative therapies, including visual art, dance, drama, and music, can improve health and wellbeing (Gorny-Wegrzyn & Perry, 2022). Specifically, the act of participation, rather than simply observing the art, is key to experiencing positive effects (Y. Liu et al., 2023) Art therapists identified an increased drive to create art in groups where possible, which they attributed to a need to connect to overcome physical distancing during the COVID-19 pandemics (Legari, 2022). Art therapists around the world contributed to the literature by documenting ways to encourage connection and deliver art therapies during the pandemics. Depending on the country and level of physical distancing restrictions, some therapists migrated their practices to the online space (Karkou et al., 2023). However, technology was a barrier, particularly in the early stages of the pandemics where older adults did not yet possess the technological skills to participate in online workshops (Keisari et al., 2023; Lim & Bowman, 2022; Zhao et al., 2022). The need to find ways to make art available and accessible during COVID-19 was noted by practitioners and researchers across the world in the early stages of the pandemics (Miller & McDonald, 2020; Potash et al., 2020).

Mindfulness-based art therapy (MBAT) combines mindfulness-based stress reduction therapy with art therapy (Hinchey, 2018). The technique commences with mindfulness-based stress reduction (Kabat-Zinn, 2003), which is known to have a beneficial effect on older adults' wellbeing (Lee et al., 2022). MBAT then flows from mindfulness techniques into art therapy including drawing self-portraits and using art to express emotion (Peterson, 2014). MBAT has been studied in clinical samples of older adults with cancer or heart disease, showing reductions in anxiety and depression (Jang et al., 2016; Monti et al., 2012). Other populations across the lifespan have also experienced anxiety reduction after receiving MBAT (Beerse et al., 2020; Van Lith et al., 2020), although it has been acknowledged that gaps in the literature exist, particularly in evidence for wellbeing and quality of life outcomes (Newland & Bettencourt, 2020). Nevertheless, the potential of MBAT as a psychosocial intervention has been recognized (Joshi et al., 2021).

Zentangle is an art therapy technique that organically combines mindfulness and creative expression. It might best be described as mindful, purposeful drawing using a predetermined sequence of deliberate strokes, delivered in a group setting (Thomas & Roberts, 2003). A series of steps listed in a Zentangle manual included intentional relaxation, controlled breathing, and reflection on both the self and the art in addition to the practical steps taken to create each drawing or "tangle" (Krahula, 2012). What differentiates Zentangle from MBAT are the simultaneous delivery of art and mindfulness concepts with a focus on meditative art-making, and a lack of formal mindfulness-based stress reduction exercises (Kopeschny, 2016). The practice of Zentangle is beginning to be incorporated into experimental research (Chia et al., 2020; Hsu et al., 2021; Hui & Ma'rof, 2019; Masika et al., 2021). Findings so far support the

possibility that this activity could achieve positive outcomes for older adults. One randomized controlled trial with older adults found reduced depression post-Zentangle (Chan & Lo, 2023). A second found reduced depression and increased cognitive acuity, with qualitative feedback that participants perceived a reduction in anxiety after completing the Zentangle course (Masika et al., 2021). Additional endorsement for this concept was identified in a meta-analysis, where the use of Zentangle and other art therapies as psychosocial interventions for older adults experiencing mild cognitive change was supported (Mohd Safien et al., 2021).

Experimental Zentangle studies found anxiety reduction in several participant populations (Chia et al., 2020; Hsu et al., 2021; Sufrin, 2015). Gray literature revealed anecdotal reports of anxiety reduction in people living in nursing homes (Berrios, 2016) and community-dwelling older adults (Sherman, 2016; Tate, 2014). Increases in affective well-being, positive affect, emotional wellbeing, and quality of life after Zentangle workshops were reported in experimental studies with other age groups (Chung et al., 2022; Hsu et al., 2021; Hui & Ma'rof, 2019; Moore, 2013; Vidal, 2021) as well as reducing distress in older adults with behavioral disturbances associated with cognitive change (Anderson et al., 2019). It was noted by Kopeschny (2016) that the structured Zentangle environment might promote psychological safety, and that varying the pace of instruction might increase accessibility to accommodate participants with physical disabilities or cognitive differences. Studies with other populations conducted during the COVID-19 pandemics showed that Zentangle increased positive affect and reduced depression (Cheung et al., 2023), and also showed benefit when modified for online delivery (Sit et al., 2022). Zentangle also had a positive impact on fine motor skills in other age groups (Hesterman & McAuliffe, 2017). Gray literature showed perceptions of fine motor skill improvement and ability to self-soothe in older adults living in nursing homes (Berrios, 2016).

The necessity of providing meaningful engagement opportunities to adults living in nursing homes that adhered to COVID-19 infection control measures and could be supported by staff, led the wellbeing team at a group of nursing homes in New South Wales, Australia to consider a number of recreational options. Consideration of new activities was driven by the need to replace classes run by external instructors which had to be canceled during visitation restrictions. A registered nurse who is also an artist and certified Zentangle instructor had previously run workshops popular with older adults. It was discussed that Zentangle classes could be offered under COVID-safe conditions, and an experimental study could extend the literature by studying the effects of a Zentangle course on anxiety, happiness levels, and fine motor skill acuity in older adults living in nursing homes.

The present study aimed to investigate the physical and mental health effects of an eight-week Zentangle course on older adults living in nursing

homes. It was hypothesized that the experimental group would experience significant improvement in fine motor skills, reflected in their ability to carry out activities of daily living, as compared to a passive control group. It was further hypothesized that the experimental group would experience significantly reduced anxiety compared to the control group. Finally, it was hypothesized that experimental participants would report increased happiness following the intervention. The research approach is visualized as a diagram in Figure 1 to support replication.

Materials and methods

Participants

The study protocol was approved by the Human Research Ethics Committee at Southern Cross University (ECN- 2020-079). Participants were recruited from a not-for-profit nursing home located in a small coastal town in northern New South Wales. The median annual

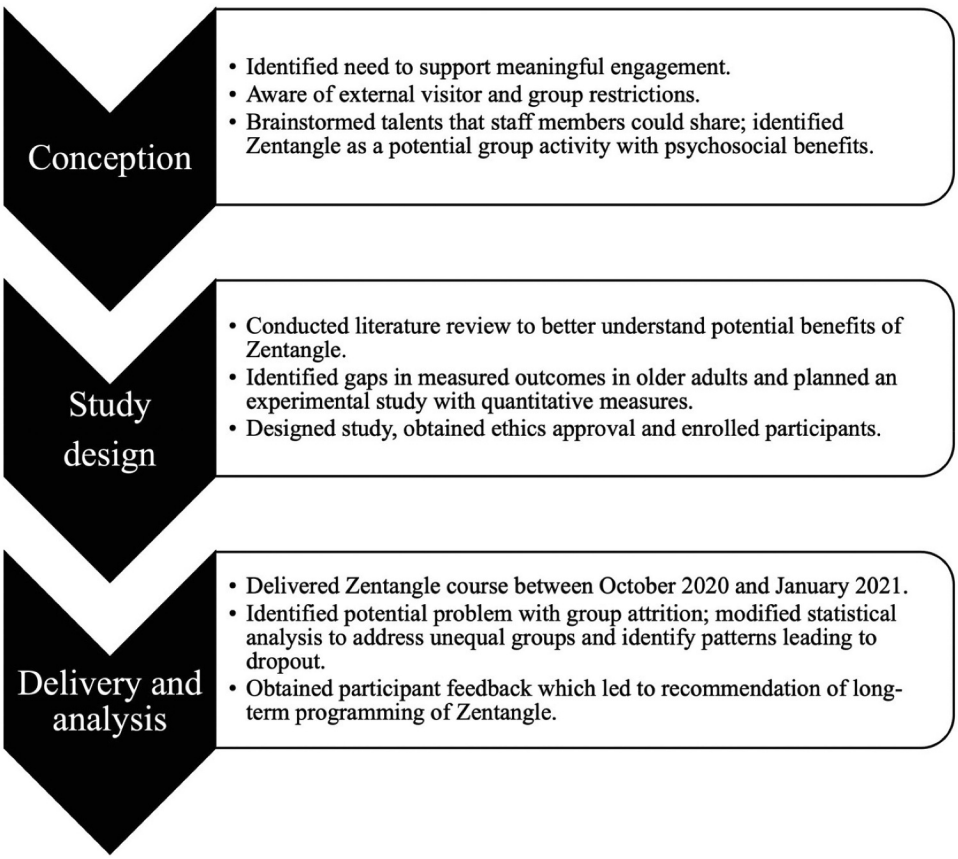

Figure 1 Research process diagram.

household income in the area was $AUD 63,690 with primary occupations listed as professionals, tradespersons, and health care workers (Australian Bureau of Statistics, 2016).

Preliminary power analysis suggested an effect size of .25 and power level of .80 could be achieved with 20 participants (Faul et al., 2009). However, due to known attrition rates of older research participants (McHenry et al., 2015) it was decided to enroll as many participants as possible. All individuals in residence ($n = 70$) were invited to participate by an independent third party, a member of the wellbeing staff known to all invitees, who was not otherwise part of the study. Participants were provided with an information sheet describing the study and a written consent form. Eight participants were not able to understand the invitation or provide consent. Twenty-six gave signed informed consent, were matched by age and sex and assigned to either an experimental or control group using a randomized block design. It was not feasible to match pairs by cognition as well as by age and sex due to the heterogeneity of MoCA scores. However, independent Bonferroni t-tests revealed no significant differences between groups in the initial group assignment. Participant flow is represented in Figure 2.

The experimental participants received at least four and up to eight weekly one-hour Zentangle art classes. The control participants were invited to attend other events within the home such as exercise classes, games, crafting, and movies. The eight-week course length was based upon previous MBAT interventions showing anxiety reduction with older adults and clinical populations (Monti et al., 2012; Smart & Segalowitz, 2017). Both groups included thirteen participants at commencement; however, six participants assigned to the Zentangle group either declined to attend or dropped out after attempting to participate in the first session, resulting in unequal groups (Intervention [$n = 7$]; Control [$n = 13$]). This represents a dropout rate of 26%, which is within known attrition rates in psychosocial or group class studies of older adults (Grover et al., 2018; Jacobsen et al., 2021). Final participant details are summarized in Table 1, with post-hoc t-tests confirming no significant differences in age or sex between groups. Post-hoc comparison of MoCA scores between groups revealed no significant difference in categorical data, with both groups experiencing moderate cognitive changes. However, when examining the mean MoCA scores as numerical data, a significant difference at $p = .027$ was revealed, with the experimental group showing less cognitive change. As suggested by Rusticus and Lovato (2014), the analysis plan was modified to use the smallest group for post-hoc evaluation, and implications of the cognitive differences are addressed in the discussion section.

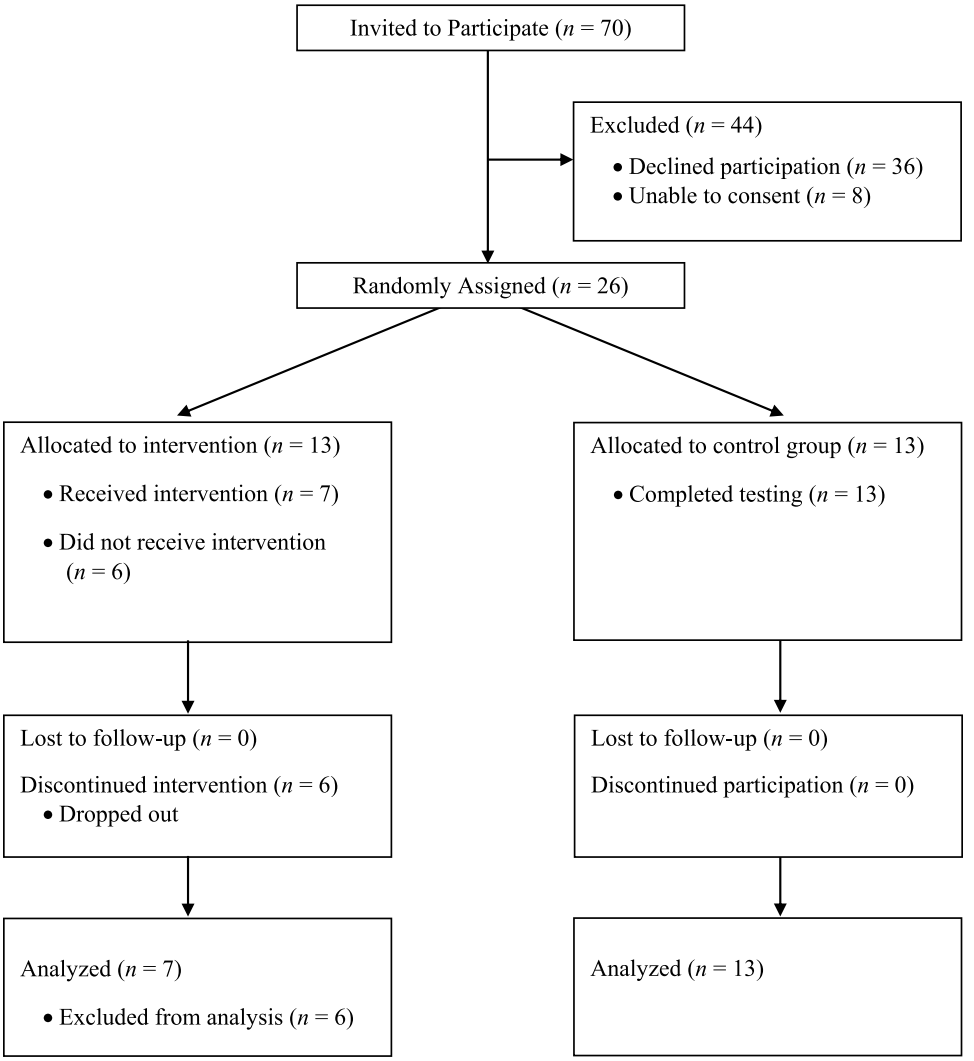

Figure 2 Participant flow chart.

Table 1. Demographic Data for Experimental and Control Participants.

	Experimental ($n = 7$)		Control ($n = 13$)	
Sex	Male	Female	Male	Female
	3	4	5	8
	M	*SD*	*M*	*SD*
Age	83.29 years	8.79	88.69 years	5.50
	M	*SD*	*M*	*SD*
MoCA score	16.86	5.70	10.35	4.41
	Moderate		Moderate	

Categorical thresholds of cognitive change for the MoCA scores are mild = 25–18; moderate = 17–10; Severe = less than 10 (Nasreddine et al., 2005).

Measures

Geriatric Anxiety Inventory (GAI)

The 20-item GAI (Pachana et al., 2007) is validated as an effective measure of anxiety in older adults against DSM-5 criteria for generalized anxiety disorder (Johnco et al., 2015). Cronbach's alpha is .91 in healthy, community-dwelling adults and .93 in those receiving psychological services (Pachana et al., 2007). Its concurrent validity against other measures is $r = 0.80$, and has test-retest and inter-rater reliability of .91 and .99, respectively (Pachana & Byrne, 2012.)

Barthel Index (BI; grooming and dressing scales)

The 2-item grooming and 3-item dressing scales of the BI (Stone et al., 1994) were completed by each participant's regular carer as a measure of fine motor skills. The grooming scale is rated from 0–5 points, with 0 indicating full carer dependence, and 5 representing completely independent ability of a person to wash their face, hair, brush teeth, and shave as applicable (Stone et al., 1994.) The dressing scale is rated from 0–10, with 0 representing full carer dependence and 10 representing independent ability of an individual to dress themselves including zippers, tying shoelaces, and buttoning (Stone et al., 1994.) BI has been validated as a measure of ability to carry out activities of daily living in older adults with Cronbach's alpha of .82 (Hopman-Rock et al., 2019), ${}_{w}k$ coefficients of agreement with other measures from .81–1.00 (Ohura et al., 2017) and person-reliability of .88 (Yi et al., 2020). The BI was specifically recommended for use in residential settings where the index is completed by care staff (Mlinac & Feng, 2016).

Visual Analogue Mood Scale (VAMS)

On a weekly basis, happiness was measured using the happiness subscale of the VAMS, which asks the individual to rate their level of happiness from 0–10 with 0 indicating sadness, 5 indicating neutrality and 10 indicating the happiest they have been (Temple et al., 2004). VAMS shows good concurrent validity for older adults including those experiencing cognitive changes (Temple et al., 2004), Cronbach's alpha of .74–.8 (Kontou et al., 2012), and reliability of $r = .73$ for the happiness scale (Stern et al., 1997). The VAMS was administered weekly, with Week 1 and Week 8 scores used for quantitative analysis, and Weeks 2–7 collected by the instructor and recorded in session diaries.

Montreal Cognitive Assessment (MoCA)

All participants also completed cognitive screening with a MoCA-certified administrator. The 30-item MoCA measures function across eight cognitive domains including executive function, naming, memory, attention, language, abstraction, delayed recall, and orientation (Nasreddine et al.,

2005). Cognitive screening was conducted for demographic purposes to identify whether participants' cognitive profiles fell into four categories as defined by the published MoCA severity levels: none or minimal, mild, moderate, or severe. The team did not use the MoCA score as a dependent variable but rather examined this data for any pattern or relationship between cognitive profile and individuals' ability to participate or enjoyment of the course, which could inform future research. Cronbach's alpha is .83 and the intra-class correlation coefficient is .92 (Nasreddine et al., 2005). The MoCA is validated as a cognitive screening tool for adults aged 65+ (Sweet et al., 2011).

Procedure

The MoCA and GAI were administered to both groups by the first author (AM), a psychologist working under the supervision of the third author (LH). The VAMS was administered by the second author (SM). The BI grooming and dressing scales were completed by each individual's usual carer at the home. Training for the VAMS and BI were provided by the first author.

The Zentangle course was delivered according to the developers' training manual (Krahula, 2012) and was led by certified instructor SM, employed by the home as a registered nurse. Classes took place weekly between October 2020 and January 2021, in a communal area large enough to accommodate physical distancing requirements. The first session included an explanation of the concepts of mindfulness and art, and a description of the Zentangle activity. Each session lasted 60 minutes and included elements of guided meditation as well as structured steps to create and appreciate participants' work. Representative examples of the tangles created during the course are shown in Figures 3–5. A detailed description of the content and form of each session is presented in Table 2. A risk assessment and COVID-19 safety plan was completed by the researchers in conjunction with the instructor to ensure participants' physical wellbeing as well as the integrity of the study.

Analysis

A 2×2 mixed model repeated measures ANOVA in IBM SPSS, version 28 (IBM, 2021) was used with Bonferroni adjustment including between and within measures to analyze results of tests administered before and after the course. The effects of time, group and interaction on dependent variables were observed with six assessment scores: two each for anxiety and fine motor skills and happiness. Post-hoc power to detect effects was calculated at .66 using the smallest group.

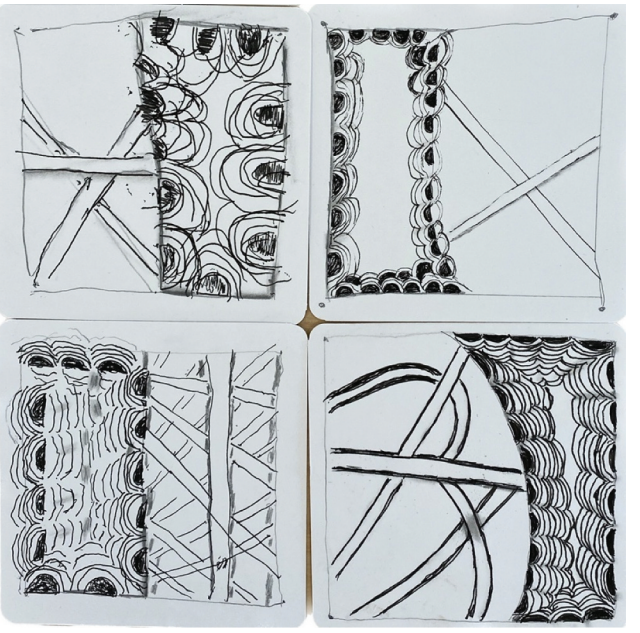

Figure 3 Elemental strokes.

Figure 4 Tangles "Florz" and "Jetties".

Figure 5 Tangle "paradox" mosaic created with eight tiles. Initials were removed to maintain participant anonymity.

Table 2. Zentangle Session Content.

Steps within sessions	Description
Gratitude and appreciation	Participants were encouraged to breathe deeply and clear their minds. They were invited to focus on the things they were grateful for in their lives, appreciate the opportunity to meet and spend time together and to focus on positive aspects of life. This step also included a sensory appreciation of the tools to be used, to feel the quality of the paper tile. The small pieces of paper used are called "tiles" because they can be assembled into a mosaic.
Corner Dots	Creation of four dots, one in each corner of the paper tile.
Border	Creation of four lines connecting the four dots and creating a border on the tile.
String	Adding of wavy or curled lines to divide the space within the border into smaller sections. The ritual of creating the dots, border and string negate the fear of being faced with a blank piece of paper. They also introduce the concept of the Zentangle method "Elegance of Limits". They are done lightly in pencil and participants can choose to work within their borders or ignore them. This inspires creativity and freedom of expression with its suggested boundaries and structured patterns.
Tangle	Tangles are the structured patterns created with simple shapes (dots, lines, simple curves, S-curves and orbs) which are referred to as "Elemental Strokes". See Figures 3 and 4. They are drawn in pen following the "No Mistakes" philosophy, as perceived "errors" are considered opportunities. As participants focus on each individual stroke their minds relax.
Shade	The instructor reminds participants that nothing in life is completely black and white. Shading with pencil creates dimension and depth.
Initial and Sign	This step encourages participants to take ownership of their work and be proud of their creations. It is also useful for individuals to identify their work when the groups tiles are laid out in a mosaic.
Appreciate	Participants are encouraged to view their tile from various perspectives then create a mosaic with the group. This is an opportunity to compliment and support each other. See Figure 5.

Thomas and Roberts (2003).

Results

The hypotheses that performance on measures of anxiety and happiness would significantly improve in the group of older adults attending the Zentangle course was supported. The hypothesis that fine motor skills would significantly improve in the experimental group was not supported. However, a small protective effect was observed in the experimental group. Effect sizes are reported as partial-eta squared (η_p^2) and evaluated against the following benchmarks: S = 0.01, *M* = 0.06 and L = 0.14 (Cohen, 1988) with means visually represented in graphs as a function of intervention and time for the experimental group and time only for the control group.

Anxiety

The Zentangle course had a significant main effect on anxiety levels for group, $F(1, 18) = 6.06$, $p = .024$, $\eta_p^2 = .252$, and a significant interaction between time and group $F(1, 18) = 4.48$, $p = .049$, $\eta_p^2 = .199$ with large effect sizes. A significant effect for time was not found $F(1, 18) = .006$, $p = .938$, $\eta_p^2 < .001$. Anxiety was significantly reduced at posttest in participants completing the Zentangle course, with the mean scores falling by 7% in the experimental group as plotted in Figure 6.

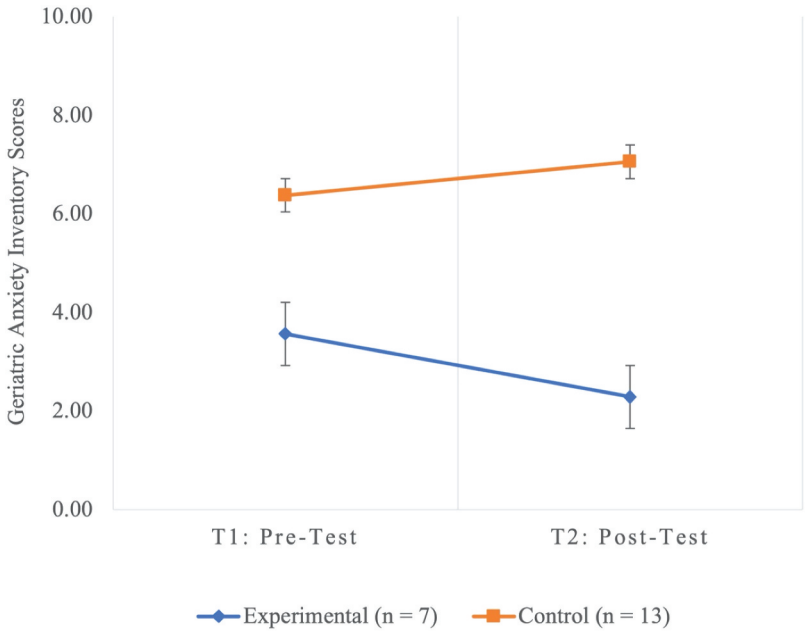

Figure 6 Geriatric anxiety inventory mean scores plotted as a function of time of testing. The error bars are the standard error of the mean.

Happiness

Change in self-reported happiness is presented in Figure 7 for both groups. A significant interaction effect between time and group was obtained $F(1,18) = 5.13$, $p = .036$, $\eta_p^2 = .222$ with a large effect size. Effects for time $F(1,18) = .461$, $p = .506$, $\eta_p^2 = .025$ and group $F(1,18) = 4.33$, $p = .052$, $\eta_p^2 = .194$ were not statistically significant, with small effect sizes produced. The experimental group showed a 26% increase in happiness over the time period.

Fine motor skills

Changes in fine motor skills acuity were measured by care staff's rating of participants' ability to complete activities of daily living. Data are visually represented in Figure 8 for both groups. Effects for time $F(1,18) = 3.08$, $p = .096$, $\eta_p^2 = .146$, group $F(1,18) = 2.98$, $p = .147$, $\eta_p^2 = .113$, and the interaction between time and group $F(1,18) = 3.76$, $p = .068$, $\eta_p^2 = .173$ were not statistically significant, although all showed medium to large effect sizes. The experimental group showed a very slight (1%) improvement; however, the control group showed a 26% decrease. Means comparison using a one sample t-test showed the change in the control group was statistically significant at $p < .001$, potentially suggesting the presence of a protective effect on fine motor skills in the Zentangle group as measured, given the significant decline in the control group.

Session diaries

Session diaries were kept by the Zentangle instructor with notes on each participant's progress and any feedback. Additionally, part of the

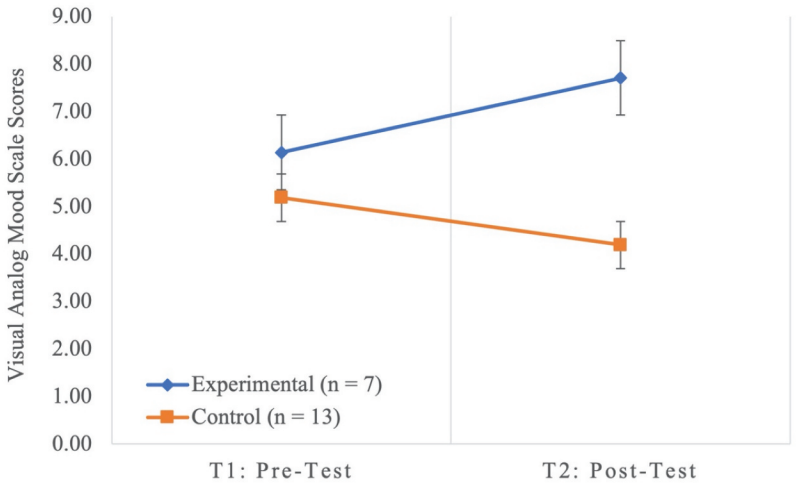

Figure 7 Visual analogue mood scale mean scores plotted as a function of time of testing. The error bars are the standard error of the mean.

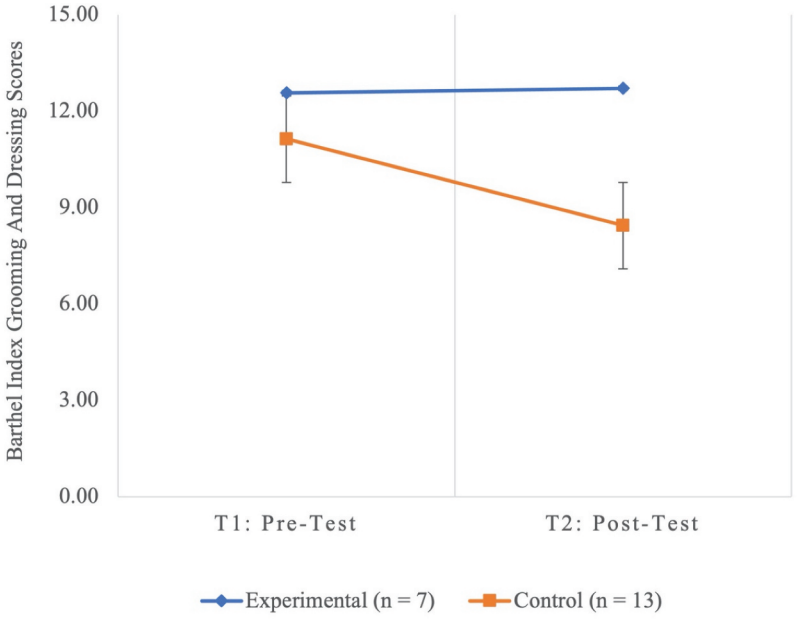

Figure 8 Barthel index grooming and dressing scale mean scores plotted as a function of time of testing. The error bars are the standard error of the mean.

instructor's usual protocol included measuring satisfaction following each session. For consistency, it was decided to use the same Visual Analogue Mood scale used in the pre and posttest analysis on a weekly basis for this purpose. They recorded the designs created during each session, and noted whether participants had difficulty participating or experienced disengagement. Any significant disruptions occurred in class that impacted participation were noted as well. At the end of the course, participants were asked whether they would choose to continue the course if offered. This information was collected for program evaluation, and also adhered to the recommendation that evaluation of creative arts therapies should provide space for both positive and negative participant experiences, as both are valuable for service improvement (Gorny-Wegrzyn & Perry, 2022).

The weekly change in satisfaction showed some fluctuation, which is represented in Figure 9 below. Implications of this variability are addressed in the discussion section. Of the seven participants who completed the course, five (71%) reported enjoying the experience and expressed a desire to continue the activity. Two participants reported they would prefer not to engage in any future workshops, leaving eight participants who either dropped out or did not enjoy the experience.

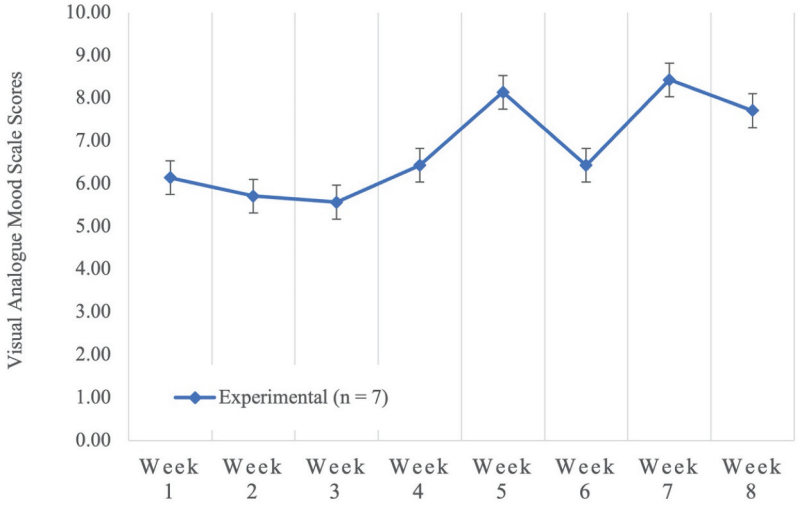

Figure 9 Weekly visual analogue mood scale mean scores for the experimental group only. The error bars are the standard error of the mean.

Discussion

The present study is distinct from other art, mindfulness, and Zentangle therapies discussed which were conducted during the COVID-19 pandemics (Karkou et al., 2022; Keisari et al., 2023; Shapira et al., 2021; Sit et al., 2022), in that the classes were delivered face-to-face with no online component. The ability of the experimental participants to come together in a group in person, to socialize and share the experience, may have contributed to both participants' enjoyment, and may also have positively influenced the quantitative outcomes. Key findings and their proposed implications are expressed in Table 3 and discussed in greater detail below.

The experimental group showed reduced anxiety levels as well as increased happiness. That these results were achieved with older adults serves to extend previous Zentangle literature which showed benefit to other age groups (Cheung et al., 2023; Hsu et al., 2021; Hui & Ma'rof, 2019; Masika et al.,

Table 3. Key Findings and Implications.

Finding	Implication
Anxiety decreased for the experimental group.	Zentangle could be offered as a non-pharmacological coping strategy for anxiety.
Happiness increased for the experimental group.	Zentangle could be offered for increased social engagement and wellbeing.
Fine motors skills remained static for experimental participants and declined for the control group.	Exercise which may protect fine motor skills from decline could be achieved with Zentangle.
People with more severe cognitive changes dropped out or reported less enjoyment.	People with minimal to moderate cognitive change may enjoy Zentangle
Participants' enjoyment was affected by distractions.	It may be helpful to offer separate groups for participants with differing levels of cognitive change.

2021). Additionally, the present results complement existing literature with older adults where improvement was shown in other mental health conditions such as depression (Chan & Lo, 2023). These results suggest that Zentangle may be of benefit either as a standalone activity or a non-pharmacological addition to mental health treatment. While the Zentangle course did not improve fine motor skills as expected, the significant deterioration of the control group suggests a potential protective effect given the known gradual decline in older adults' fine motor skills. It is possible the workshop may have served as motor skills practice for participants.

To further investigate a potential relationship between participant enjoyment and cognition, session diaries were reviewed. Of the participants who completed the course and expressed a wish to continue, all had mild to moderate cognitive change, with an average MoCA score of 16.00. Some participants reported finding the repetitive nature of the pencil strokes soothing. Others reported satisfaction from coming together with the same group of people on a weekly basis, without the need to contribute to a topic of conversation. In Week 6, one participant with moderate cognitive change disturbed the others with rambling conversation irrelevant to the workshop. This interruption may have negatively influenced other participants, particularly if they had reached a state of flow, and coincided with a dip in the mean happiness levels of the experimental group. All participants reported experiencing some shifts in mood, at times frustrated with their progress or fixating on perfecting a particular stroke, and at other times experiencing elation and satisfaction at learning a new technique.

Patterns relating to participant dropout and enjoyment were also identified. The initial randomized groups were statistically equal in cognitive profile; however, some change was observed following an attrition rate of 26% in the experimental group. Both final groups remained in the moderate cognitive change category. However, the mean MoCA scores were significantly different, with the final experimental group showing less cognitive change. Of the eight participants who either dropped out or indicated they would be unlikely to continue the activity following the experiment, six cited inability to participate and two reported frustration. This feedback was compared to the participants' cognitive profiles as assessed by their MoCA scores at enrollment. The average MoCA score of those participants who cited inability to participate as a reason to drop out or discontinue was 6.79% lower than those who completed the course, with all meeting criteria for moderate or severe cognitive shifts. The two participants who cited frustration or difficulty relaxing as a reason to drop out or discontinue had an average MoCA score 12.96% higher than those who completed the course; one met criteria for mild cognitive change and the other participant had not experienced any cognitive changes. Both of these participants expressed to the instructor that they were negatively influenced by their spouses' participation. It is proposed that their negative

affective experience of their spouses' behavior, rather than their cognitive acuity, may have prevented or interrupted a state of flow, reducing their enjoyment.

Participants with severe cognitive change reported being unable or unwilling to participate. This could indicate that the demands of the activity were too great, or they may have been overwhelmed in a group setting. Severely impacted participants may have benefitted from one-on-one instruction as discussed by Anderson et al. (2019) or from an adapted pace (Kopeschny, 2016). It appeared that the participants who most enjoyed the course had mild to moderately shifting cognition, which may indicate that Zentangle can be an appropriate activity for individuals experiencing mildly changing cognitive abilities. These results support previous findings that Zentangle can be beneficial for older adults experiencing cognitive changes (Mohd Safien et al., 2021).

Our results support post-pandemic literature that participatory creative arts can have a positive effect on older adults, particularly when outlets for social connection and creative expression are limited. The integration of mindfulness and visual art, two pursuits known to have independent social and emotional benefits, has potential to be an accessible group activity for older adults.

Limitations

Some limitations were identified. Given the heterogeneity of MoCA scores across participants, pair matching for random assignment was based on age and sex only. Participant withdrawal resulted in unequal group sizes, with attrition primarily occurring with participants experiencing moderate to severe cognitive changes. The statistical analysis plan was adjusted to accommodate group differences, which resulted in lower post-hoc power than expected. Additionally, inconsistent attendance of some experimental participants combined with time constraints on course delivery resulted in the number of sessions required for experimental participants being reduced to four.

A possible limitation identified during research design was the use of quantitative measures in a population likely to show decline between evaluation time points. The control group participants declined in fine motor skill acuity as assessed by an observer-rated quantitative measure. It is possible that a performance-based task may have been a less subjective measure. Finally, due to the small sample size and in-situ nature of the sampling frame, medications and underlying health conditions were not controlled. This limits the generalizability of results. However, no participants withdrew from the study for health reasons.

Future research

Future studies could aim for a larger sample size to preserve power. Given the variable course lengths showing significant effects across studies, future investigations could attempt to identify the minimum number of sessions needed to achieve significant benefits. Our results suggest that cognitive change is potentially a significant variable, which could be explored in future studies by separating groups based on cognitive profile. More severely impacted individuals may benefit from smaller or one-on-one delivery, or a less structured form of participatory art. Additionally, the influence of distraction upon flow and happiness levels for older adults could inform future research and course delivery.

Conclusion

The provision of opportunities for social interaction and meaningful recreational pursuits to preserve mental health is a consistent priority in nursing home communities. The COVID-19 pandemics presented additional challenges to participants' emotional wellbeing with increased restrictions to maintain appropriate infection control standards, with documented decline in mental health. This study demonstrated that the Zentangle course provided significant psychosocial benefits that were achieved alongside enjoyment. Furthermore, it could be safely conducted under infection control conditions, which continue to be relevant for future pandemic planning and the "new normal" consideration that physical distancing may impact abilities to interact. Our results extend the body of literature evaluating Zentangle as a viable and potentially meaningful creative endeavor for older adults that can bring mental health benefits. It can be delivered safely during enhanced infection control measures, and can be enjoyed by adults who live with varying levels of cognitive change. While not suggested as a panacea for the improvement of mental or physical health, it may have earned a place as a suitable option for older adults living in nursing home communities.

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Data availability statement

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io/7h6z5/.

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