

## Evaluating Impact of Mindful Immersive Nature Therapy (MINT) Pilot Among Long Term Care Dementia Residents

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**Abstract:** Rich activities empower and enable Persons with Dementia (PWDs) to live inspiring, quality lives. The development of mindfulness, nature therapy and other non-pharmacological interventions is an exciting and growing interest in dementia care. The current study seeks to evaluate the pilot of a nature therapy programme called Mindful Immersive Nature Therapy (MINT) for 10 dementia residents in long-term residential care. The impact of MINT and the factors important for maximising its beneficial impact are examined through a mixed-methods study. Pairwise comparisons were conducted to compare the wellbeing scores for the MINT programme versus other home routine activities. To further outline the range of impact of MINT and identify factors important for maximising its beneficial impact, thematic analyses of focus group discussions with eight staff were conducted. Results indicated that residents with dementia had higher wellbeing scores during MINT as compared to other routine activities. Themes regarding the impact of MINT were identified: (1) residents enjoyed greater social engagement, (2) residents enjoyed a better relationship with nature, (3) residents expressed their individuality and individual abilities, (4) residents practised mindfulness, and (5) limitations to the impact of MINT. Staff, resident, and programme factors were also identified to evaluate the MINT implementation on its enhancing and detracting elements.

**Keywords:** mindfulness, nature therapy, nature activities, wellbeing, dementia, long term residential care, mixed-method

## INTRODUCTION AND CONTEXT

Along with the rise of an ageing population, awareness and growing concern for dementia and dementia care have increased. According to the Well-being of the Singapore Elderly (WiSE) study led by the Institute of Mental Health, the prevalence of dementia in the elderly aged 60 years and above was 10% (Subramaniam et. al., 2015). Dr Amy Khor, Senior Minister of State of Health, reiterated the importance of having greater support and funding for research, service streams and support for persons with dementia (PWDs) and their caregivers (2019). The Singapore government has also launched the 2023 Action Plan for Successful Ageing, a national blueprint to support Singaporeans to age well, and to target for better support for PWDs and their caregivers (Tang, 2023). Early identification of dementia, infrastructure changes such as setting up therapeutic gardens, and building community outreach teams, are among such planned improvements (Tang, 2023). Dementia care organizations and practitioners in Singapore can ride on such traction to further enhance dementia care.

Apex Harmony Lodge (AHL) is a dementia-specific long term residential care that aims to provide person-centred care for the wellbeing and dignity of dementia residents. AHL is constantly evolving care practices to better normalize and naturalise care for dementia residents. Hence, it is of great interest to AHL to deepen person-centred care and services through continuous review and an evidence-based practice.

## THEORETICAL FRAMEWORK AND RESEACH OBJECTIVES

### **Dementia, Meaningful Activities and Wellbeing**

Currently, the lack of cure for dementia has led to the focus of interventions, enabling PWDs to experience wellbeing and a good quality of life (Camic et. al., 2021). It is important to enable PWDs to live enriching lives by spending their time in the nursing home meaningfully on preferred and engaging activities (National Collaborating Centre for Mental Health, 2018). Meaningful activities provide elements of socialization, self-expression, and independent living that are crucial to living well for PWDs (National Collaborating Centre for Mental Health, 2018; Scales et al., 2018). Some papers see meaningful activities as part of the bigger umbrella of non-pharmacological interventions for addressing behavioural and psychological symptoms of dementia (Md Hussin et al., 2021; Scales et al., 2018), with the opportunity to naturalise or incorporate elements of formal therapy like reminiscence or cognitive therapy. Kitwood's (1997) Person-Centred Care outlined five psychological needs. Among which, occupation needs or the need to be involved in daily activities as an equal partner is crucial to the wellbeing of PWDs. Occupational activities could also provide opportunities for fulfilling the other four needs namely: identity, inclusion, attachment, and comfort (Chung et al., 2017; Kitwood, 1997). Hence for the above reasons, it is important to ensure a variety and the accessibility of meaningful activities for PWDs in long term residential care settings.

### **Mindful Immersive Nature Therapy (MINT)**

The benefits of exposure to nature for wellbeing are well established. In Singapore, a study on therapeutic horticulture found benefits beyond mental health, but also in physical health like healthy sleep, and a positive relationship with nature (Sia et al., 2020). Internationally, nature therapy and nature-based activities have been found to support PWD's mood (White et al., 2017), social interaction and individual motivation (Evans et al., 2019). Engagement with urban greenery or nature spaces and activities within indoor compounds, was also found to improve the mental wellbeing of PWDs (Cook, 2022).

Current reviews (Berk et al., 2018; Chan et al., 2020) also suggested that mindfulness-based interventions benefit PWDs and their caregivers. A systematic review by Shim and colleagues (2020) found that mindfulness-based interventions benefited psychosocial outcomes (i.e., depression and anxiety). Churcher Clarke and colleagues (2017) found positive changes in quality of life following an adapted mindfulness intervention among people with mild to moderate dementia in a care home. Current literature also points towards the potential of mindfulness on the wellbeing of PWDs.

In the present study, AHL collaborated with a certified Nature and Forest Therapy Guide<sup>1</sup> to conduct the Mindful Immersive Nature Therapy (MINT) course for our residents, with the intent of improving residents' wellbeing with mindfulness naturalised through nature engagement, and training staff to facilitate MINT. The emphasis on mindfulness here is enjoying being in the moment, observing and experiencing each sensory input, our surroundings and each other. Each session of MINT followed a consistent sequence, outlined in Figure 1. This sequence aimed to provide a framework to slow down and pay attention to bodily senses, then gradually invite and immerse participants into experiencing nature through different activities. The senses exploration is most similar to raisin meditation, with the purpose of re-focusing our awareness on one thing at a time (Penman & Williams, 2011). The nature-based sensory invitation changes with each session to focus engagement on different parts of nature or different senses. Examples of different nature-based sensory invitations include perfume potions, gathering rainbows, nature hugs, and saying hello to the sea, amongst others.

**Figure 1**

*Sequence for MINT, copyright of Xiu Nature Connections by RE-MEMBERING PTE. LTD.*



The MINT pilot ran for eight sessions, with one hour of activity and interaction with residents and a subsequent one hour of debriefing between staff and the MINT trainer. Four sessions were conducted in the garden within AHL's premises, while the remaining four sessions were conducted at the Therapeutic Garden in Pasir Ris Park. Children aged 5 to 6 from Little Shepherd Schoolhouse were invited to participate alongside the dementia residents. The children joined the fourth and last MINT session. The debriefing sessions conducted after each session with the MINT trainer allowed staff to address their difficulties with MINT facilitation and to receive feedback to align staff facilitation back to the MINT framework. Apart from these eight sessions, additional materials like facilitation notes and two additional workshops were conducted for staff at the beginning and at the mid-point of the course of MINT to further deepen staff's learning and facilitation skills.

## Research Objectives and Scope

The present study, as a form of implementation research, aims to address the following research questions:

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<sup>1</sup> Ms Youmin Yap, founder of Xiu Nature Connections. She is a certified forest therapy guide trained with The Association of Nature and Forest Therapy Guides and Programs.

RQ1: What is the impact of MINT on dementia residents' wellbeing?

RQ2: What are the enhancing and detracting factors in MINT programme implementation, for maximising its benefits for dementia residents?

Both qualitative and quantitative results will be reported to provide valuable insight into residents' experience of the MINT programme.

## METHODS

### Participants

Ten residents of Chinese ethnicity participated in the MINT programme, with four (40%) being male residents. Their age ranged from 55 to 85 years. Two (20%) were diagnosed with early-onset dementia. All had mild to moderate dementia. Residents were selected through convenience sampling. As MINT required participants to be mobile, participants were selected based on their community-ambulatory status (as assessed by our Physiotherapy team), and resident's preference for nature-related activities known to care staff through our individualized care planning. Apart from purely academic research concerns, there were few justifications to adopt random sampling. There were also ethical concerns where our activity engagement provided to residents should be person-centred and not random.

Staff who participated and were trained in the MINT programme were also selected through convenience sampling, streamlined from a larger pool of staff who had previously undergone an eight-week course in mindfulness and who preferred nature-related activities. All MINT staff were also activity facilitators for one or more activities in the home routine on a weekly basis. Coincidentally, all MINT staff were also trained DCM mappers in AHL's competent pool, and who had previously been involved in home routine activity mapping. Hence, the profile of MINT staff was largely homogenous. Eight staff completed the full MINT programme and training.

### Measures

All measures used were observational data from staff. Due to the emphasis on mindfulness and with MINT being a pilot programme, staff were encouraged to experience MINT with an open mind (e.g., MINT sharing questions and staff debriefing questions were intentionally kept broad, "What did you notice?"). There were no pre-set outcomes to look out for. As with other home routine activity mappings, MINT DCM mapping was treated as part of AHL's prevailing culture of data collection for programme evaluation and continuous improvement review. MINT mapping was not made distinct from other home routine activity mappings, nor were any plans for publication being made when MINT commenced. Hence, no active measures were taken to highlight or address potential observational bias.

### *Dementia Care Mapping (DCM)*

The DCM 8 observational tool was built by University of Bradford to measure quality of life and quality of care in PWDs (Bradford Dementia Group, 2005). Based on Kitwood's and Bredin's (1992) concept of Person-Centred Care, a PWD's state of well- or ill-being could be observed by care staff. DCM comprise of two main codes: the Mood and Engagement (ME) value and the Behaviour Category Codes (BCC). ME values, which measure the state of well-being and connectedness to the activity or people during the engagement, score observations in PWDs for positive (+5, +3, and +1) and negative moods (-1, -3, and -5) or high (+5, +3, and

+1) and low engagement (-1, -3, and -5) (Appendix A). This is accompanied by Behaviour Category Codes (BCC) to code for the type of engagement the PWD is involved in (Appendix B). One ME value and one BCC code is mapped for each five-minute interval for each resident. The overall well- or ill-being (WIB) score can be computed from the average of all the ME values mapped, as a measure of the PWD's wellbeing for the time duration being mapped. The full DCM map also includes mapping of care staff interaction with PWDs, in the form of Personal Enhancers (PEs) and Personal Detractors (PDs), to inform on the quality of care provided. However, PEs and PDs were not mapped for this study as this pilot run of MINT also acted as an on-the-job training for staff to learn MINT facilitation rather than to evaluate the care provided. DCM was mapped at four points: the first, fourth, fifth and eighth (last) session.

All AHL DCM mappers, be it MINT mappers or home routine activity mappers, have undergone DCM training and are certified by Dementia Singapore. Every year, *all* DCM mappers in AHL will be involved in mapping residents' home routine activities over a day. To ensure that all DCM assessors are mapping based on a common understanding, an inter-rater reliability session is conducted every year where all mappers map the same residents for the same duration. A minimum IRR of 70% concordance is required before mappers are deemed as eligible to map DCM within the lodge. A subset of *all* DCM mappers in AHL were then selected to map MINT sessions. MINT DCM mappers selected were also MINT staff participating and being trained through this pilot. Due to manpower constraints, separate and independent mappers were not assigned to mapping MINT.

### ***Focus Group Discussion***

A descriptive qualitative approach using focus group discussion interviews was applied. Eight staff completed the MINT programme. Of these, seven staff and the MINT trainer participated in the focus group discussion that was conducted in English. The focus group discussion was completed across two sessions. The first session was conducted three weeks after the last MINT session and involved five staff and the MINT trainer, who attended the first half of the interview. The second session was conducted eight weeks after the last MINT session and involved the remaining staff and the MINT trainer again, to carry on with the remaining questions. The focus group discussions were a hybrid of face-to-face and online discussions. Discussions varied between 44 minutes and 65 minutes. A semi-structured interview guide was drawn up and used as the primary data collection tool for the focus group discussion (Appendix C).

### **Statistical Analyses Plan**

All analyses for DCM quantitative data were carried out using IBM SPSS Statistics Software Version 29. To ensure confidentiality of participants, residents' data were anonymised.

### ***Excluded and/or missing data.***

All 10 resident's DCM participation data were included.

### ***RQ1: What is the impact of MINT on dementia residents' wellbeing?***

To explore research question 1, a comparison between MINT DCM data and home routine activities DCM data was done. As part of routine assessment, DCM is mapped for residents in various instances: new admission mapping (i.e., three to four weeks after admission into AHL), annual mapping (i.e., once a year to examine a resident's home routine) and engagement with other activities. Hence, the average of all WIB scores for DCM maps done previously for each resident will form the basis of comparison against the average WIB score

in MINT DCM mapping to see if MINT enhances the mood and engagement of our residents above and beyond other home routine activities they had engaged in before.

Normality testing was carried out to determine a suitable significance test. A paired samples t-test was conducted to see if the differences between the average WIB scores mapped during MINT and the average WIB scores mapped in other home routine mappings were statistically significant. Effect size as defined by Cohen's  $d$  was considered (Cohen, 1992, 1998), with the following suggestions:  $d = 0.20$  (small),  $d = 0.5$  (medium) and  $d = 0.80$  (large).

Additionally, the frequencies for each BCC were calculated as a group frequency across all residents who attended MINT. These frequencies will be interpreted alongside the themes identified regarding the impact of MINT on resident's wellbeing.

***RQ2: What are the enhancing and detracting factors in MINT programme implementation, for maximising its benefits for dementia residents?***

To explore research question 2, the enhancing and detracting factors in the maximisation of the impact of MINT were identified through the thematic analysis of staff qualitative data.

**Thematic Analyses Plan**

Thematic analysis with a deductive analytical approach was done on staff qualitative data. The second author, WZYN was the interviewer of the study. Thematic analyses of the staff qualitative interview were guided by the six steps outlined in Braun and Clarke (2006). The two focus group discussions were audiotaped and transcribed to text, by the first author, TSYS and the second author, WZYN. To ensure the confidentiality of participants, the staff's focus group discussion was anonymised. Referring to preconceived notions of possible themes, the main author identified initial codes to suit the subthemes. The second level of analysis involved both the first author, TSYS and the second author, WZYN reviewing the codes and subthemes to see how subthemes would fit into the pre-conceived themes and for the consideration of the addition of new themes. Additional themes had been developed in the second level of analysis. In the third stage, the main author identified relevant quotes. This was done in discussion with the reviewing team.

**RESULTS**

**Statistical Analyses**

***Normality***

For research question 1, differences between the average DCM WIB scores mapped during MINT and the average DCM WIB scores mapped during other home routine activities were computed. Visual inspection of the histogram and Q-Q plot of the differences did not show an observable departure from normality. No outliers were identified from the visual inspection of the box plot. The absolute value of skewness was calculated to be 0.17 and the absolute value of kurtosis was calculated to be 1.19, both of which were below the cut-off of 2.00 (Field, 2009; Orcan, 2020). The Shapiro Wilk test of normality yielded statistically non-significant results,  $p = .58$ . Hence, a normal distribution was assumed.

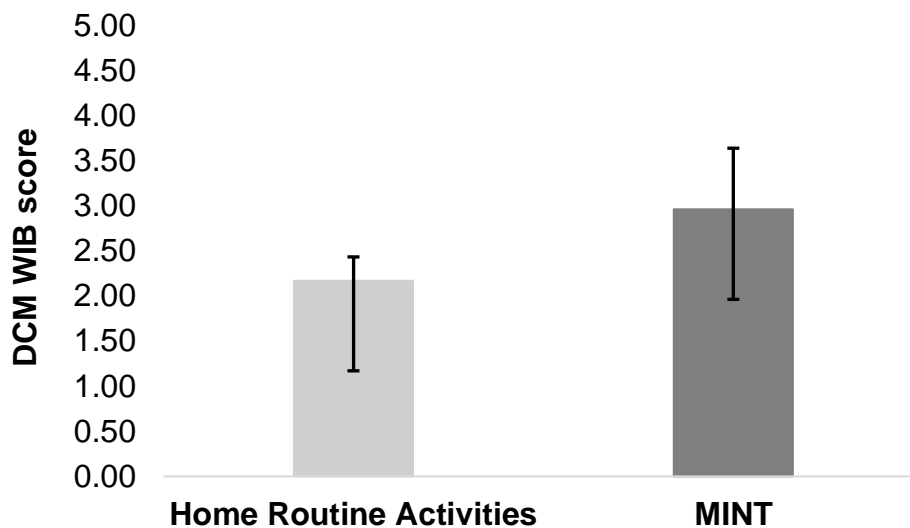
***RQ1: What is the impact of MINT on dementia residents' wellbeing?***

A paired samples t-test was conducted to see if the differences between the DCM WIB scores mapped during MINT and DCM WIB scores mapped for other home routine activities were statistically significant. There was a significant difference,  $t(9) = -4.025$ ,  $p = .003$ , 95%

CI [-1.24, -0.38], in resident's average WIB scores mapped during MINT ( $M = 2.97$ ,  $SD = 0.68$ ) and resident's average WIB scores mapped in other home routine activities ( $M = 2.17$ ,  $SD = 0.26$ ). Residents were mapped with higher mood and engagement during the MINT programme as compared to home routine activities.

**Figure 2**

*Mean DCM WIB scores for Home Routine Activities and MINT. Error bars represent standard deviations.*

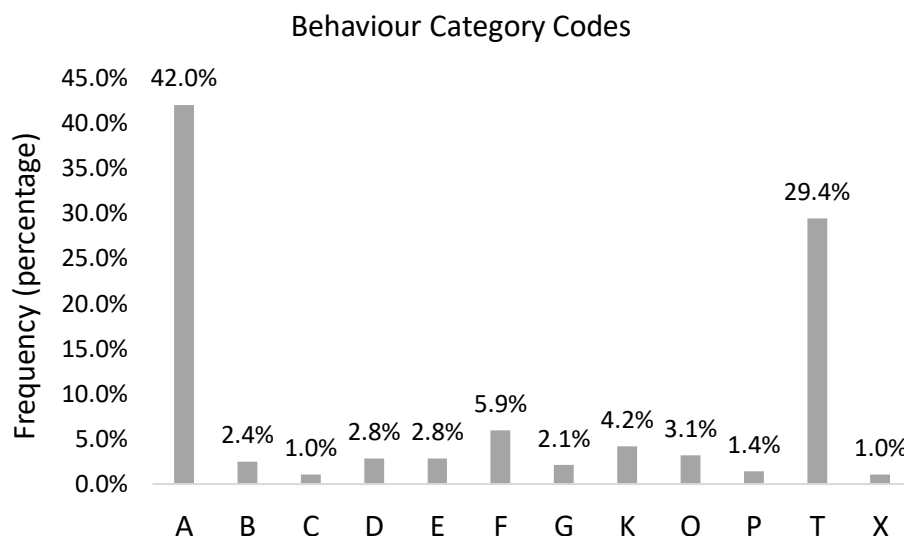


Effect size computation, the absolute value of  $d = 1.27$ , indicated that not only was there a large effect size (i.e., greater than 0.80), but the differences in WIB scores were more than one standard deviation apart.

Frequencies for each BCC were calculated as a total group frequency across all residents and across all MINT sessions. BCCs coded at least 1% throughout MINT mapping are shown in Figure 3.

**Figure 3**

*Frequency of Behaviour Category Codes during MINT programme.*



This represents the range of behaviour categories the residents were involved in during MINT sessions. Out of the 12 BCCs coded, 10 of them are high potential behaviour codes, one is a moderate potential behaviour code and the remaining one is a low potential behaviour code. The top two behaviours being coded were Articulation (45.0%) – interacting with others verbally or otherwise – and Timilation (32.3%) – direct engagement of senses.

## **Thematic Analyses**

### ***RQ1: What is the impact of MINT on dementia residents' wellbeing?***

Emerging themes related to the impact of MINT on residents' wellbeing were: (1) residents enjoyed greater social interaction; (2) residents enjoyed better relationship with nature; (3) residents explored their individuality and individual abilities; (4) residents practiced mindfulness, and (5) limitations to the impact of MINT.

#### ***Residents enjoyed greater social interaction***

It was observed that residents socialised and communicated more with both staff and children in the MINT programme.

For example, (resident D) ..., (resident E) ..., I think they were very happy to share their opinions ... when they got the chance to ... It was a good opportunity for them to also hear their voice lah. Maybe they don't get this opportunity when they are in the home... (Staff 5)

The residents' greater socialisation also took on more charitable forms, over and above talking to one another:

(Resident J), she don't really talk so much one right. But that session, at the beach right, she does open up and talk to me... (She squeezed through the bushes) and she (said), "Be careful, be careful". Like normally ... she was just like ... very straight (or quiet and reserved). (Staff 2)

All in all, the social interactions observed were pleasant, encouraging and boosted resident's enjoyment of the MINT programme. For some residents, social engagement increased over the course of MINT.

#### ***Residents enjoyed better relationship with nature***

It was observed that through the MINT programme, residents had a curious exploration of nature and their five senses, and a better relationship with nature.

I do see that the residents are more open to getting along with nature, like going to the garden and interacting with all the plants. (Staff 6)

#### ***Residents explored their individuality and individual abilities***

It was observed that there were some instances where residents explored, expressed and shared their individual preferences and creativity. Some of the residents were also observed engaging in their cognitive abilities like reminiscence.

(Resident C) ..., she had this fantastic idea that she wouldn't decorate her own cup, but instead she would pass the cup around to let everybody else to sign on it. So these are like in her own initiative ..., that was showing up. (Staff 8)



For just like five to ten minutes, very easy (resident G) can tell all his old stories, all the memories that he had with the dog and last time kampong times with all the different fruits and plants and friends he had. (Staff 7)

### ***Residents practiced mindfulness***

As mindfulness was part and parcel of MINT, residents practised mindfulness in naturalised ways in nature without formal meditation.

When they ... look at the sky, look at the wind, which [MINT trainer's] sessions is like to awaken all that senses, which we normally don't really notice. (Staff 2)

We have been though the mindfulness [course] with another instructor. What we learn back then is quite similar to what we see in MINT also, like using our senses to explore. But in MINT its more like exploring nature with your senses, so its ... for me, I can see [mindfulness] being incorporated well. (Staff 6)

All in all, residents showed enjoyment and had pleasant experiences in different types of engagement in MINT. The positive impact on residents spilt over to staff. Staff also had a positive mood and engagement in MINT sessions. Staff learnt new skills for activity facilitation and building relationships with residents. Additionally, the staff also appreciated nature more. Staff 3 said, "It's not say that there is no structure, but there's also unstructured-ness within the structure when bringing (residents) through (MINT). Sometimes like I do therapy sessions with residents, ... can learn how to go with the flow at the same time".

### ***Limitations to the impact of MINT***

The abovementioned examples were straightforward to staff as positive impact on MINT. Staff also raised their concerns about the difficulty of observing the impact on residents. Two sub-themes emerged relating to the barriers to measuring impact: (1) mixed views on impact sustained beyond MINT sessions, and (2) mixed views on observed and expressed impact versus impact that is not observed or expressed.

There were mixed views on whether the positive impact of MINT was mostly contained within MINT sessions or not. Staff noted that apart from a few residents who remembered and brought it up for sharing, there seems to be little or no spillover effect from the MINT sessions to residents' daily routine and engagement.

Quite a few times, [Resident A] actually stop me, "come, come, come". "Yesterday ah, [MINT trainer] and the group of children there ah, we do this this ..." So he is the only guy who, who actually talk about it. So he must have enjoyed it throughout, to want to share with me, with his own initiative. But the rest ah, next time you ask them, "eh, we are going out to Pasir Ris ". [Their reply was] "go Pasir Ris for what? They cannot remember that they actually go Pasir Ris Park before. (Staff 1)

There were also mixed views raised by staff that some impact of MINT could potentially be unobservable to staff, where residents did not verbalise or express their engagement or enjoyment when they were engaged.

Just now I was telling you [Resident A] will talk about this right, ...? At the session there right, he is the least involved one. He will be like scratching, looking at the floor, closing eyes, like not very involved. But yet he is the only one actually remember and talk about it. The rest of them ... very active right, but ... (Staff 1). But yet they forget

(laugh)... So that's why we were saying like visually, sometimes it's hard to tell. (Staff 8, finishing Staff 1's conversation)

***RQ2: What are the enhancing and detracting factors in MINT programme implementation, for maximising its benefits for dementia residents?***

Emerging themes related to the enhancing and detracting factors in MINT implementation were identified as follows: (1) staff and children (or external party) factors that enhanced MINT impact; (2) resident factors that enhanced MINT impact; (3) programme factors that enhanced MINT impact; and (4) factors that detracted MINT impact.

***Staff and children (or external party) factors that enhanced MINT impact***

Having the presence of staff and children boosted residents' engagement and enjoyment of MINT. Staff taking the first steps to initiate conversation or to do the activity spurred residents to do the same. Related to this was that one-to-one engagement or staff ratio was available for staff to take that first step in the first place. Staff 2 said, "They will prefer that kind of one-to-one, when you give them ... the full attention ... And give them the reassurance that that they are doing this, and then just follow".

Staff's knowledge of individual residents' culture and preferences are for the rapport between staff and residents. If there is rapport between staff and individual resident, residents' engagement in MINT is greater. Staff 7 mentioned "Or because the resident know us better. Because that relationship really makes the difference, whether I can invite the resident or I cannot invite the resident if I don't have the relationship with him".

For the two sessions the children participated alongside the residents during MINT, residents were observed to be more excited and took an effort to initiate interactions with the children.

For [Resident C] right, only when the kids are here, then she take on the facilitator role. Then she like, "come and touch this, come and see this" blah blah blah, out of her own initiative, I never say anything one ah. (Staff 4)

***Resident factors that enhanced MINT impact.***

It was observed that residents' engagement level and type of engagement during MINT depend partly on their own preferences and abilities. In particular, preferring nature or outdoor activities and having social, cognitive and communicative abilities enhanced MINT engagement. Staff 7 said, "I believe at the very beginning, we choose those that particular few individuals because they are open to outdoors. Like [Resident B], he always appreciates Koi fish, so of course they will enjoy".

***Programme Factors that enhanced MINT impact***

Staff found the 5-step MINT sequence illustrated in Figure 1 being consistent, simple and comprehensive enough. Staff 1 mentioned "Everything they can do, because all of [trainer's] activity are quite simple... It's not like all complicated or all cognitive. That is why I think her programme is very good".

Additionally, the more tangible aspects of MINT were celebrated as being more highly engaging. The tangible aspects include those that appeal to multi-sensory needs (like the sensory exploration in the second step of the MINT sequence), those invitations that include more physical materials to work with or physical actions to do, and those that include visual aids. Staff 1 said, "The five senses. Sure work... Just hear, see, taste, touch [and smell] all these. They all sure engage one". Staff 8 replied, "The more active ones like nature perfume, the rainbow one, [we are] definitely keeping".

Staff also found that the outdoor environment is more engaging and enjoyable for the residents than the indoor environment. Staff 1 added “So bringing them out is good. Can see, can see it”.

### ***Factors that detracted MINT impact***

The staff also managed to identify certain factors that downplayed the positive impact of MINT that could be improved in future runs of MINT. Just as how the more tangible aspects of MINT were better received, the more non-tangible aspects of MINT were observed to be challenging for residents and not as dementia-friendly. The non-tangible aspects of MINT included open-ended questions, appreciating silence, and the less-tangible (more abstract and reflective) invitations.

There was a time where we need to hug nature. [Resident G] gave me looks and was questioning, “are you serious, you want me to hug this tree? (Staff’s name), you out of your mind? ... Like what Staff 6 said, sometimes the activity make the resident a bit hard to understand. (Staff 7)

There were also resident factors that staff identified that detracted MINT impact. Just as how linking to their preferences or having high levels of social, cognitive and communicative abilities enhanced MINT, staff noticed that not suiting residents’ preferences or residents having lower levels of these abilities detracted MINT impact.

For this group of residents with this kind of better ability, they really can enjoy because they can express it. For the resident that is not so, ... they will follow but the kind of enjoyment and interaction from what I can see is a bit lesser lah (Staff 7)

## **DISCUSSION**

Quantitative data highlighted a large effect size of how MINT affects the wellbeing of the residents. The positive impacts of MINT are further supported by the observation of the 10 high potential behaviour categories, suggesting a high variety in the types of behaviours observed in residents during MINT. It highlights that MINT engagement is diverse and dynamic and covers different domains of wellbeing. In particular, the high frequency of behaviour codes Articulation and Timilation suggests that social interaction and the direct sensorial experience were the key drivers of well-being in residents. The qualitative data supported this observation, as increased social interaction and practising mindfulness through sensorial experiences with nature were observed to positively impact well-being. Themes of social interaction, expression of individuality and better relationship with nature and mindfulness were also identified in the focus group discussions. Taken together, we see that the impact of MINT is not limited to mood and engagement, but also development in other domains important to personhood and wellbeing.

The findings from the present study align with existing literature on the positive impact of mindfulness (Giulietti et al., 2023; Paller et al., 2014) and nature therapy and/or nature-based activities (Scott et al., 2022; Gonzalez & Kirkevold, 2013) on PWDs. However, there is little existing research on the adoption of the mindfulness approach with PWDs naturalised through nature engagement.

As this is implementation research, the processes are as equally important as the outcomes. Research question 2 considered staff feedback on the enhancing factors important for maximising the beneficial impact of MINT on dementia residents. Close staff attention, prompt facilitation, good understanding and matching of residents’ preferences, and keeping tasks simple and consistent are among common adaptations for activity engagement with

PWDs. Particular to MINT, outdoor setting and having children co-participate benefitted the residents' mood and engagement. For programme planning, paying attention to sensorial input one at a time in the senses exploration step (step two in Figure 1) is an interesting factor when it comes to future mindfulness-based or nature-based activities. Many programmes in AHL and most residential care are more task-focused instead of focusing on the pleasures of the experience.

Going deeper, qualitative data highlighted how the more tangible aspects of MINT work better for the dementia participants than the non-tangible aspects. This is consistent with current literature where multisensorial approaches (Cheng et al., 2019; Sánchez et al., 2012), concrete instructions as opposed to abstract ones (Jefferies et al., 2009), and engagement with external work are better for PWDs, since their internal thought processing is impaired (Simm et al., 2015). Thus, future mindfulness-based or nature therapy programmes should retain the more tangible aspects like paying attention to sensorial stimulation one at a time and eliciting their thoughts or feelings and minimise the more abstract and non-tangible aspects like 'hugging nature' and reflecting on their relationship with nature. This differentiates mindfulness and nature-therapy-based interventions for PWDs from other forest therapy or traditional forms of mindfulness practices for adults *without* dementia, which can involve more intangible engagements like introspection and reflective thinking (Nykliček et al., 2020).

### ***Strengths and limitations of this study***

Two strengths of this study were identified. Firstly, this study adopted a mixed-method design to address both explorative and deductive aspects of the impact of MINT. As a result, the discussion on the impact of MINT in this study was multi-faceted and suitable in addressing a concept as equally multi-faceted as wellbeing.

Secondly, to our knowledge, this is the first study to explore the benefits of mindfulness and nature therapy on PWDs within the Asian context. This confirms our MINT programme as a feasible approach to the adoption and naturalisation of mindfulness. The majority of existing literature revolved around the Western population, severely limiting its generalisability to those from a different cultural context. We hope that our study will be the first of many more.

Two limitations of this study were identified. Firstly, sample size restrictions affected the results of the statistical analyses. With such a small sample size, it is also challenging to generalise the results of this study. Given that this pilot study was the first run of MINT with dementia residents that was combined with staff on-the-job training, it was understandable that the number of participants was kept small. Future research could adopt an a priori power analysis and determine a suitable sample size before conducting the research.

Secondly, there were many sources of bias in this study. Both participants and staff were selected through convenience sampling, where many of the dementia residents selected for MINT were known to have an inclination for nature activities. Staff selected for MINT training were also experienced in activity facilitation as they conducted activities on (at least) a weekly basis. Additionally, DCM mappers were also participating MINT staff in the programme, instead of separate and independent teams of DCM mappers and observers. Furthermore, the author of this paper was also one of the participating MINT staff. All these biases could have contributed to making the programme seem more effective than it is. Future research on MINT could intentionally aim to reduce these sources of bias by improving manpower allocation.

### ***Implications of the study***

The MINT programme has demonstrated benefits on dementia residents' mood and engagement, social interaction, individual expression and relationship with nature. These

findings support the potential and suitability of mindfulness and nature therapy interventions for PWD's wellbeing. Additionally, the present study adds to the emerging literature as a method of implementation research of non-pharmacological interventions on PWDs.

The study highlighted the factors important for maximising the beneficial impact of nature-based therapy programmes for PWDs. These are also practical implications for the implementation and improvement of future MINT programmes, and for therapists/practitioners and programme facilitators who are interacting with PWDs in nature-based activities.

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### **STATEMENT OF ETHICAL CLEARANCE**

Ethics approval was not actively sought as the data collected was from routine assessments and continuous improvement review. Given that MINT was a pilot programme that combined both the introduction of a new activity and staff on-the-job training, the data was collected in an attempt to evaluate the pilot programme's impact and important features of its implementation (i.e., what worked and what did not). All resident and staff data were anonymized.

### **DATA AVAILABILITY STATEMENT**

Data is available upon request from the authors.

### **DECLARATION OF ORIGINALITY**

We declare that the current submission is our work and is not being considered for publication elsewhere. We certify that referenced work used in this submission has been properly acknowledged in text and in the reference list.

### **CONFLICT OF INTEREST STATEMENT**

The authors report no conflicts of interest.

### **PUBLISHER'S NOTE**

The views and claims expressed in this article do not represent the Board of Editors and the Reviewers.

### **AUTHOR CONTRIBUTIONS**

Tang S. Y. S. conceived the study, analysed and interpreted the data, and drafted and revised the manuscript. Wong Z. Y. N. and Cheong Z. G. authors analysed and interpreted the data and revised the manuscript. Goh W. L. D. and Soh. M. C authors conceived the study and revised the manuscript. Yeo. D. conceived the study, analysed and interpreted the data, and revised the manuscript.

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## APPENDIX A

### DCM Mood and Engagement Values Score Descriptions

Score	Score Description
+5	Very high levels of enjoyment or positive mood, and high levels of participation and interaction in the engagement.
+3	Considerable levels of enjoyment or positive mood, and considerable participation and interaction in the engagement, but distractable.
+1	Neutral mood (i.e. no observable indication of positive or negative mood), and short and occasional participation or engagement.
-1	Slight indications of negative mood (e.g. boredom, restlessness, lethargy), and withdrawn from engagement.
-3	Considerable levels of negative mood (e.g. being upset, angry, anxious, distressed).
-5	Very high levels of negative mood (e.g. being extremely upset, angry, anxious, distressed).

## APPENDIX B

### General Description of DCM Behaviour Category Codes

Code	Definition and General Description
A	<b>Articulation</b> – interacting verbally or non-verbally with others
B	<b>Borderline</b> – being passively engaged (i.e. watching but not participating)
C	<b>Cool</b> – being disengaged or withdrawn
D	<b>Doing for self</b> – engaging in activities related to self-care
E	<b>Expressive</b> – engaging in activities with creative or expressive elements and intents
F	<b>Food</b> – engaging in activities related to eating or drinking
G	<b>Going back</b> – engaging in activities related to reminiscence
I	<b>Intellectual</b> – engaging in activities that prioritises use of cognitive abilities
J	<b>Joints</b> – engaging in physical activities
K	<b>Kum and go</b> – walking or moving independently (in absence of other types of engagement)
L	<b>Leisure</b> – engaging in recreational activities for interest and fun
N	<b>Nod Land of</b> – sleeping or dozing
O	<b>Objects</b> – interacting with or manipulating inanimate objects, and showing attachment to the object
P	<b>Physical</b> – receiving physical or personal care from staff
Q	<b>Quit</b> – code Q when participant or mapper has left mapping area and mapper is unable to observe participant.
R	<b>Religious</b> – engaging in activities related to spirituality or religion

S	<b>Sexual expression</b> – engaging in sexual expression
T	<b>Timalation</b> – engaging in sensorial stimulation
U	<b>Unresponded to</b> – attempting to communicate needs but having no response
V	<b>Vocation</b> – engaging in activities related to work or work-like activity
W	<b>Withstanding</b> – engaging in self-stimulating actions that are repetitive
X	<b>X-cretion</b> – engaging in actions related to excretion
Y	<b>Yourself</b> – interacting with self, in the absence of others
Z	<b>Zero option</b> – code Z if observed engagement does not fit into any of the above codes.

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## APPENDIX C

### Focus Group Discussion Interview Schedule for MINT

Focus Group Discussion Interview Schedule for MINT	Research Problem and Interview Method	Questions
	<p>Exploratory</p> <ul style="list-style-type: none"> <li>What is the impact of MINT on: <ul style="list-style-type: none"> <li>a) Resident</li> <li>b) Quality of interaction between residents</li> <li>c) Quality of resident's relationship with nature</li> <li>d) Staff/facilitator</li> <li>e) Quality of interaction between staff and residents.</li> </ul> </li> <li>Future continuity/CIR: How shall we conduct MINT in the future? <ul style="list-style-type: none"> <li>a) Incorporation of Mindfulness into programme</li> <li>b) Programme Flow</li> </ul> </li> </ul> <p>→ To do Focus Group Discussion, due to:</p> <ul style="list-style-type: none"> <li>- Having more staff to do FGD</li> <li>- Having less questions</li> <li>- To simultaneously CIR the whole group</li> <li>- Estimate 1h</li> </ul>	<p><b>(a) Residents outcomes</b></p> <ul style="list-style-type: none"> <li>How did the resident respond during MINT? Give us some examples. <ul style="list-style-type: none"> <li>[Specific Prompt]: Did you observe, and what differences did you observe, when the resident is participating in MINT and when he/she is doing his/her daily routine?</li> <li>[Specific prompt]: How was the resident's mood and engagement during MINT?</li> <li>[Specific Prompt]: Did the resident express anything about the way he/she sees himself/herself?</li> </ul> </li> </ul> <p><b>(b) Resident-Resident interaction outcomes</b></p> <ul style="list-style-type: none"> <li>How did the residents respond to each other during MINT? Give us some examples. <ul style="list-style-type: none"> <li>[Specific Prompt]: Were there any differences you observed, in how the residents interact with each other during MINT and how resident interact with each other out of MINT?</li> </ul> </li> </ul> <p><b>(c) Residents' relationship with nature</b></p> <ul style="list-style-type: none"> <li>How did the residents respond to being in nature or the natural surroundings during MINT? Give us some examples.</li> </ul> <p><b>(d) Staff/Facilitation-outcomes</b></p> <ul style="list-style-type: none"> <li>How was your experience facilitating MINT? <ul style="list-style-type: none"> <li>[Specific Prompt]: What were some strengths or areas of growth you experienced in facilitating MINT?</li> <li>[Specific Prompt]: What were some challenges or drawbacks</li> </ul> </li> </ul>

		<p>you experienced in facilitating MINT?</p> <ul style="list-style-type: none"> <li>• <b>Has this experience changed the way you approach the residents? How so?</b> Give us some examples.</li> </ul> <p><b>**Closing for Part 1:</b> Describe any special moments that happened during the sessions, if any and if not mentioned earlier. (For inspiring story, if not already mentioned earlier.)</p> <p><b>(e) Incorporation of Mindfulness into programme</b></p> <ul style="list-style-type: none"> <li>• How do you think Mindfulness was incorporated into the programme?</li> <li>• What were your expectations (if any) before the program started? Were your expectations met?</li> <li>• How do you think we can improve or further incorporate Mindfulness into the programme?</li> </ul> <p><b>(f) Programme feedback</b></p> <ul style="list-style-type: none"> <li>• What are some specific elements/activities in the programme that worked well and/or we should continue for the next run of MINT? Why?</li> <li>• How suitable is the programme duration and pace?</li> <li>• What are some improvements we can make to the programme?</li> <li>• Any logistical or technical issues for improvement?</li> </ul>
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