

Utilizing Montessori and Universal Design Principles To Produce a Group Activity For People With Dementia

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Abstract—The Memory Magic™ Program was developed as a group activity for persons with dementia. Using Montessori principles and human factors research, we designed the activity to successfully engage individuals with varying levels of cognitive and physical ability. Incorporating Montessori principles that emphasize existing skills and cueing, an activity has been developed in which participants are empowered to engage in normal social activity rather than non-participation and negative behaviours. Such activities are reinforcing and therapeutic for participants and a positive and engaging experience for staff. Staff re-evaluate what residents are capable of after seeing positive outcomes with such activities. Staff success and satisfaction lead to greater willingness to do more for the persons in their care.

I. INTRODUCTION

A model intervention, called the Memory Magic™ Program (See Fig. 1) provides an example for expanding and innovating beyond the activities for individuals with cognitive impairments available today[1]. This model provides a challenge to activity professionals and researchers to extend new concepts to group settings that can be easily integrated into activity and therapy programs. As more activities are available and adopted in care settings, such considerations go a long way to helping match caregiver demand requirements with staffing[2].

Professional care giving is a demanding profession. As the number of older adults requiring professional care giving and supported living grows as the population ages, greater efficiencies must be achieved. But these efficiencies must be achieved with corresponding improvements in quality of life for residents and improved job experiences for those

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Fig. 1. Residents of a dementia unit in a Cleveland Ohio-based long-term care facility participating in a session of the Memory Magic™ Program. The program was used twice per week for 12 weeks alternating with standard activities such as BINGO, reminiscing cards, and singing. Staff indicated very positive responses to the activity for themselves and for the residents.

providing care. A. Sterns and colleagues are proposing a model of caregiver efficiency that provides a new framework for delivering effective, quality care with maximum efficiency. R. Sterns and colleagues propose a set of criteria for improving activity design that emerge from the perspective of the care demand efficiency model[2]. Incorporating Montessori principles that emphasize existing skills and cueing activities can be developed in which participants are empowered to engage in normal social activity rather than non-participation and negative behaviours. Such activities are reinforcing and therapeutic for participants and a positive and engaging experience for staff. Staff re-evaluates what residents are capable of after seeing positive outcomes with such activities. Staff success and satisfaction lead to greater willingness to do more for the persons in their care.

II. THEORETICAL APPROACH

A. Implementation of Interventions

In terms of implementation of new recreational activities, understaffing and high turnover rates in long-term care facilities must be considered. Meeks & Depp (2002) posit that such interventions are more effective when introduced by social service and activities staff at the institutional level, rather than on an individual, case-by-case basis or through occasional assessment by mental health

professionals. The authors advocate the frequent use of pleasant events to elevate the mental health of residents with cognitive impairment and depression. In order for activities to achieve optimum efficiency, they must be group-friendly, easy to learn for both staff and residents, and compatible with tight scheduling.

B. Montessori Principles, Cognitive Intervention, and Dementia

Over time, persons with dementia lose the ability to form and retain new memory associations. Maintenance of residual functioning is imperative, yet most memory interventions and activities show little if any effect in persons with severe cognitive impairment. Furthermore, aids such as memory wallets and books, while shown to be useful in enhancing communication and reducing disruptive behavior (Bourgeois, 1990), are not appropriate for a group setting. The Montessori approach, long established as a successful educational method for children, focuses on individual abilities and promoting social interaction. Activities are designed to be multi-sensory and dynamic in order to continually meet the needs of individuals with varying levels of competency. Fundamental Montessori principles include cueing, building on existing skills, and providing clear, specific tasks related to the activity (Sterns & Camp, 1998).

Under a grant from the National Institute on Aging to Creative Action LLC, a Montessori-based intervention designed to engage older adults with dementia was developed and tested (R. Sterns, A. Sterns, H. Sterns, & Antenucci, 2005; A. Sterns, H. Sterns, R. Sterns, & Naidoo, 2007). The activity, designed as a game consists of three components: an ergonomically designed game board with nine

windows, a set of game cards with single words that appear in each window, and questions and discussion points on a set of “calling cards.” The activity boards, game cards, and calling cards are shown in Figure 2. A facilitator reads a clue from a calling card – the beginning of a well-known sentence or phrase – and participants search the game board in front of them for the word that correctly completes the phrase. If the correct word appears, which it does for 9 of the 15 questions for each individual in each game, the participant covers it by closing a sliding, colored, translucent window shade. Cue cards also include hints and talking points for the facilitator and are devised to encourage group conversation following each question. The experimental intervention may be used on an individual basis or with multiple players, and requires a staff of one to two facilitators. Each game typically last for 20-30 minutes; each board contains 16 discrete games.

R. Sterns et al. (2005) set out to demonstrate that participants would have higher levels of participation in the intervention and lower levels of engagement in other things, defined as attention given to anything other than the group activity. In addition, a significant increase in positive affect and decrease in negative affect were predicted. Participants in assisted living, adult day care, and skilled nursing facilities in 3 regions of the United States were tested. Results indicated significantly more active and passive engagement over standard activities (e.g. bingo, reminiscence, singing). Significantly less engagement in other things, such as sleeping, walking out on the activity, and disruptive behaviors were demonstrated. Most importantly, significantly more positive affect (smiling, laughing) were exhibited and more helping behaviors occurred.

C. Staffing Concerns

The experimental activity allows one to two staff members to engage more than 20 participants at a time without compromising attention to variations in cognitive ability. Depending on the participants’ needs and group size, the second facilitator may be useful in assisting individuals with finding words on the game boards, closing the sliding windows, or changing the cards. Because each participant has the opportunity to call out correct answers, but active involvement in the activity is not contingent upon doing so, more participants are able to join in.

Calling card cues used in this activity are widely recognized popular sayings, targeted toward the current cohort of older adults. Because many persons with dementia are often able to retrieve long-term memories, familiar phrases may remain accessible despite profound loss of other cognitive abilities. Further, the answer is cued for those with the word viewable on the board and in the group setting; once



Fig. 2. The Memory Magic™ Program consists of a set of 10 game boards, 40 game cards, 240 calling cards and instructions. The materials allow 10 participants of varying cognitive ability be engaged in social interaction and cognitive exercise for up to 60 minutes with a single staff person leading the activity.

one person answers the question, everyone knows the answer. Unlike bingo and other games, over half of all the answers appear on each person's board leading to finding the answer and reinforcing positive feelings. The conversational nature of the game encourages helping behaviors between residents, rather than competition. The activity can be set up in a matter of minutes, in advance or with participants already present. Game boards and cards lock securely together and contain no loose pieces. All components of the activity may be sanitized and stored neatly.

Talking points follow each phrase completion as a way to expand on each turn of the game. Each resident has the opportunity to share and reminisce about particular life events and points of view, which allows staff members to gain important understanding and insight. R. Sterns and colleagues' (2005) finding that levels of both passive and active engagement were increased through use of the experimental cognitive intervention supports the ideas that more quality interaction between staff and residents are possible. And efforts by facilitators can be met with interest rather than increasing disengagement staff often expect.

III. METHOD

A. Participants

Data were collected from 40 participants at 12 facilities of three different types: assisted living (N=6), adult day care (N = 14), and nursing home care (N = 19). Data collection took place in three different national regions: South (Birmingham, Alabama); East Coast (Greater Washington, D.C.), and the Midwest (Greater Cleveland including Akron, Ohio, and Western Pennsylvania). All participants were activity directors (35%) or activity staff (65%). Each individual was involved in supervising or directly leading activities as part of an observational study on comparison of engagement between the experimental intervention and similar standard activities conducted by the R. Sterns and colleagues (R. Sterns et al., 2005).

Those older adults participating in the experimental and standard activity were adults aged 60 or older who consented to participate themselves or through a guardian. The average age of activity participants was 84.8 years (S. D. = 7.4). The average education of the participants was about the level of high school graduate with either a technical education or some college. Consistent with higher numbers of women in long-term care, assisted living, and adult day care facilities, the sample consisted of 81% females and 19% males. The average Mini Mental Status Exam (MMSE) score was 15.3 (S. D.

= 7.2), approximately the score of someone showing cognitive difficulties associated with moderate level of impairment associated with Alzheimer's disease. For the Wide Range Achievement Test (WRAT) reading test, participants are asked to read a list of words that gradually increases in complexity. The average WRAT reading score was 40.4 (S. D. = 12.5). The mean number of people participating in the activity was 15.3 (S. D. = 8.9).

B. Instrument

The structured interview to ascertain staff perceptions consisted of a survey instrument comprised of closed-ended rating questions and a number of open ended questions to probe the reasons behind the ratings on closed-ended questions. Questions asked for staff to evaluate intervention outcomes for their older adult participants as well as for themselves. The instrument questions included an overall rating, best and least liked aspects of the intervention, perceptions that the experimental intervention met expectations, perceptions of functionality of the experimental intervention, perceptions of its functionality compared to standard and favourite activities, and perceptions of participants' response to the experimental intervention.

C. Procedure

All interviewees participated in a study to assess the amount and quality of engagement exhibited by persons with dementia while taking part in the experimental cognitive intervention versus standard group activities. The engagement analysis is reported in Sterns et al. (2005). The activity therapists (those individuals participating in the interviews reported here) conducted both types of group activities while trained research staff collected engagement data on each participant in Ohio, Pennsylvania, and Washington, D.C. In Pennsylvania staff trained in observational techniques collected behavioral and social interaction data.

For each of nine facilities, the Memory Magic™ Program was scheduled twice a week for at least twelve weeks (e.g., on Mondays and Wednesdays) and compared with another group activity (e.g., discussions, bingo, reminiscing, current events, sing-alongs, etc) scheduled for the same time period on other days (e.g., on Tuesdays and Thursdays). Pennsylvania sites are the exception where the interviews were conducted after 4 weeks. The complexity of the calling card (one of three levels available) was matched to the players' cognitive levels. This schedule varied somewhat among daycare participants whose participation times were limited to attendance less than 4 days per week.

The research staff trained the activities staff at each setting how to implement the Memory Magic™ Program. A standardized protocol was created for this purpose. Activities staff were videotaped leading the Memory Magic™ Program and their performance was assessed, and feedback provided to them regarding ways to improve their adherence to protocols.

After the completion of the data gathering efforts a member of the research staff interviewed each of the activity staff participating in the study. The interview instrument guided the interview. The completed data was forwarded to the authors for analysis.

IV. RESULTS

A. Overall Impressions

Impressions of the intervention were highly positive, overall. Survey participants rated the intervention positively for older adults within their care. On a five-point scale ranging from 1, “poor” to 5, “excellent,” the mean rating was 4.15 (SD = .62), which roughly corresponds to “very good.” These ratings were not significantly different depending on the type of the facility ($F(2, 37) = 2.67, p > .05, \eta^2 = .13$). These means are shown in Figure 3.

When asked to explain overall ratings of the intervention, 10 (27%) of respondents said that the experimental intervention promoted interaction and group participation. Six (16%) indicated that the intervention seemed to stimulate residents’ memories, and an additional 6 (16%) of respondents believed that participants found the intervention enjoyable or fun. Two (5%) respondents indicated that the experimental intervention benefited residents through physical movements (pulling the shades down), and another 2 (5%) believed that players learned from experimental intervention. Activities staff were also asked what they liked best about the intervention. Engagement and participation were the most frequent responses (22%), followed by high levels of resident interaction (16%) and stimulating questions (14%) as the most positive aspects of the intervention. An additional 14% of respondents said that Memory Magic™ seemed to trigger memories and facilitate reminiscing among players.

The experimental intervention tended to exceed respondents expectations. On a three-point scale with response options 1, “fell below”, 2, “just met”, and 3, “exceeded”, the mean rating was 2.57 (SD = .55). The intervention exceeded expectations for 24 respondents (60%), just met them for 15 respondents (38%), and fell below them for only 1 respondent (2%). These ratings did not significantly differ by facility type ($F(2, 36) = 2.08, p > .05, \eta^2 = .10$).

Similarly, 36 respondents (90%) rated the experimental intervention as the same or better than their favorite activity, while only 3 (10%) rated it as worse. These ratings did not differ significantly by facility type ($F(2, 36) = 2.55, p > .05, \eta^2 = .12$), again with more favorable ratings occurring in adult day care facilities.

B. Perceptions of Participants Reactions

Respondents tended to believe that older adults responded well to the experimental intervention. On a five-point scale ranging from poor to excellent, the mean rating was 4.36 (SD = .67) for how well older adult players responded to the games. These ratings did not differ by facility type ($F(2, 36) = 2.37, p > .05, \eta^2 = .12$). Additionally, all forty respondents indicated that the residents were more engaged or engaged at about the same level during the experimental intervention compared to similar standard activities. None indicated that they were less engaged. These ratings did not differ significantly by facility ($F(2, 35) = 3.24, p > .05, \eta^2 = .16$). Finally, of 39 respondents, 31 (80%) indicated that the experimental intervention attracted residents who rarely participate in regular activities, compared to 6 (15%) who said it did not, and 2 (5%) who said that they did not know.

Although the majority of staff surveyed did not have direct contact with families during the experimental intervention, six (16%) respondents reported that family members reacted favorably to the game. However, one staff member indicated that a family asked that her mother be removed from the intervention because she appeared agitated.

C. Perceptions of Intervention Ease-of-use

Overall, participants found the intervention to be extremely easy to use. Respondents indicated how easy they found different aspects of the experimental intervention on five-point scales ranging from 1, “very difficult,” to 5, “very easy.” The mean of all 16 of the different intervention features rated on these five-point scales was 4.79 (SD = .26). This mean rating did differ by facility ($F(2, 28) = 2.61, p > .05, \eta^2 = .16$). Table 1 shows a breakdown of the ratings for each of the 16 components. As can be seen in Table 1, all items had means greater than 4, indicating that intervention administrators found all aspects of the game easy to use. In addition, respondents rated a number of positive statements about ease of game use on a five-point agreement scale with response options ranging from 1, “disagree a lot,” to 5, “agree a lot.” The mean of responses to all 14 of these statements was 4.69 (SD = .30). Again, this mean rating did not differ by facility ($F(2, 37) = 5.34, p < .01, \eta^2 = .22$). Table 2 shows a breakdown of the ratings for each of these

14 statements. Again, all responses had means greater than 4, indicating that game administrators found all aspects of the game easy to use.

Finally, respondents rated the game in terms of ease of use for the older adults who were playing it. Eight items were used, each with a five-point response scale ranging from 1, "very difficult," to 5, "very easy." The mean of responses to all 8 of these statements was 4.16 (SD = .24). The mean rating did differ by facility ($F(2, 35) = 3.56, p < .05, \eta^2 = .17$). Table 3 breaks down these 8 responses. As can be seen from Table 3, the only aspects of the intervention that staff facilitators felt older adults found difficult, as evidenced by mean ratings considerably below 4, were pulling up ($M = 2.88, SD = 1.32$) and pushing down ($M = 3.62, SD = 1.07$) game cards. However, it is important to note that the magnitudes of these ratings are not terribly low on the 5-point scale, roughly corresponding to neither easy nor difficult.

Table 1. Ease of use for staff: Intervention components

Item	Mean	SD
Follow training instructions?	4.81	.57
Follow the written instructions?	4.93	.27
Distribute the game for 10-15 players?	4.58	.77
Set up the game for play?	4.61	.76
Lead the game with the older adults?	4.81	.40
Place the Game Cards in the Game Board?	4.47	.84
Read the Game Cards?	4.94	.24
Push Game Cards down to play another game?	4.81	.46
Move the lever/pull up Game Cards to play another game?	4.42	1.03
Open/close the legs on the Game Board?	4.95	.23
Open/close the window shades on the Game Board?	4.97	.16
Read the Calling Cards?	5.00	.00
Use the cues on the Calling Cards for discussion?	4.91	.29
Determine the appropriate game for different levels of dementia?	4.60	.76
Use a sanitizing rinse or wipe?	4.85	.37
Stack and store the Memory Magic™ Program Board?	4.78	.53

n = 40; Scale: 1= Very difficult, 5= Very easy

Table 2. Staff ease of use: Intervention

Item	Mean	SD
You can quickly distribute the game to 15 players	4.47	.93
It is easy to set up games in advance	4.77	.63
It is easy to distribute to players	4.82	.45
It is easy to retrieve from players	4.87	.41
It is easy to change from one game to the next	4.40	.84
It is difficult to lose pieces	4.55	1.01
It is easy to stack and store	4.88	.40
The rhymes and talking points on the Calling Cards were helpful	4.93	.26
The board and game cards can survive a sanitizing rinse or wipe	4.86	.42
It is easy to play more than one game during an activity session	4.63	.67
It is easy for staff to monitor players during the game	4.85	.43
The game fits on a lap and on a tabletop	4.82	.51
You would recommend this game to other activity professionals	4.83	.45
You enjoyed playing the game with residents	4.90	.31

n = 40 ; Scale: 1= Disagree a lot, 5= Agree a lot

V. DISCUSSION

As suggested in the first sections of this paper, professional caregivers in institutional settings face many challenges in providing care to residents with dementia. Results of this study indicate that the experimental intervention may provide an opportunity for staff to easily engage groups of residents with varying levels of cognitive ability, potentially reducing workload and job-related stress. The intervention draws from participants' remaining abilities, and an array of themes and topics creates the possibility for social interaction, helping behaviors, and reflection on cultural customs, phrases and traditions. Reminiscence among residents allows abilities, be delivered in a group setting, and be staffed by a single activity professional. The experimental intervention was perceived to approach these ideals by many of the staff interviewed.

Table 3. Leaders perceptions of participants ease of use

Item	Mean	SD
Play the game overall?	4.35	.63
See the Game Cards with black print on white background?	4.66	.63
See the Game Cards with white print on black background?	4.61	.69
See the Calling Cards?	4.58	.83
Open/close the legs on the Game Board?	4.03	1.06
Open/close the window shades on the Game Board?	4.35	.95
Pull up on the Game Cards to change the game?	2.88	1.32
Push down on the Game Cards to change the game?	3.62	1.07

n = 40; Scale: 1= Very difficult, 5= Very easy

In addition to aiding in cognition, an ideal activity should be emotionally, physically, socially, and culturally stimulating to the participants. When considered from this holistic or comprehensive perspective, the Memory Magic™ Program used as the experimental intervention is shown here to be an example of such an effective intervention. Cognitively impaired residents use remaining abilities such as reading. Tasks are broken down into simple, repetitive steps that are easy to follow. Rather than competing, residents are encouraged to share fond memories with staff and each other, and various themes embodied in the intervention create opportunities for social interaction and discovery. Sliding the shades to cover the windows on the game boards exercise gross and fine motor skills without being overly challenging for residents with limited mobility, Parkinson's disease or arthritis. Facilitated discussion questions and talking points generate reflection on cultural customs, phrases, and traditions, and are designed to be age-appropriate. This makes the interaction positive and engaging for

both residents and staff as indicated by staff comments.

Anecdotal evidence in the studies showed that when used by family members, this kind of intervention did provide persons with dementia support and enough contexts to reminisce. The resulting conversation is satisfying to family because it provides opportunities for positive interactions and opportunities for the person with dementia to demonstrate they still have this information and know their own history. Similar Montessori activities played by family members have been shown to have these positive effects, at least in one-on-one interactions (Rose, Camp, Skrajner, and Gorzelle, 2003).

Thirty-eight (95%) respondents stated that the intervention was administered to a group of individuals with a wide range of cognitive ability. The positive ratings of how players responded to the intervention suggest that it is a successful intervention at the group level, regardless of impairment. These ratings were consistent across group size, highlighting the intervention's versatility.

In terms of efficient delivery, the Memory Magic™ Program has several benefits. First, its usefulness in engaging large groups of individuals with varying degrees of dementia lessens the probability of disruptive behaviors among participants. The experimental intervention allows for one or two staff members to engage up to 20 residents at a time for up to one hour. The average number of activity participants in this study was 15 with a range of 2 to 28 individuals per group. This increases the efficiency of staff while easing workload, allowing those administering the activity to provide an enjoyable group atmosphere, rather than having to redirect individual residents or interrupt pleasant interactions. Other staff is then free to administer one-on-one interventions or individual therapies as needed. Ease of setup and short preparation time also maximize efficiency by making more staff available to residents. Increased efficiency translates into cost effectiveness—a concern for providers and consumers.

VI. CONCLUSION

Professional care giving is a demanding profession. As the number of older adults requiring professional care giving and supported living grows as the population ages, greater efficiencies must be achieved. But these efficiencies must be achieved with corresponding improvements in quality of life for residents and improved job experiences for those providing care.

R. Sterns et al. (2005) proposed that the activities must meet three criteria from the

perspective of the care demand efficiency model. The ideal therapeutic activity provides: 1) appropriate stimulation to a wide variety of residents; 2) in a group setting; 3) with a single activity staff person.

More importantly, the participants are not engaging in negative behaviors, rather they are engaged in a normal social activity. This is reinforcing and therapeutic for participants and a positive and engaging experience for staff. Staff reevaluate what residents are capable of when provided with appropriate well crafted activities and expand their offerings. Staff success and satisfaction lead to greater willingness to do more for the persons in their care.

The experimental intervention provides a model for expanding the innovative activities of today. This model provides a challenge to activity professionals and researchers to extend new concepts to group settings that can be easily integrated into activity programs. As more activities are available and adopted in care settings, such considerations should go a long way to helping match caregiver demand requirements with staffing.

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