Personalized One-to-One Intervention in Agitated Individuals With Dementia
Responders versus Non-Responders

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ABSTRACT
The aim of the current study was to explore why some individuals with dementia and agitated behavior showed limited response to a personalized intervention. Ten consistently agitated individuals (i.e., non-responders) were compared with 34 individuals who were more settled during the intervention (i.e., responders). Most participants had severe cognitive deficits; however, non-responders were more impaired. Where responders showed large improvements across conditions, agitated behavior remained equally high in non-responders. Responders and non-responders showed increased interest and engagement during the intervention. Increased agitated behavior was associated with severe cognitive impairment. Although studies have shown that psychosocial interventions can reduce agitated behavior, there does seem to be a point where it becomes more difficult to reduce this behavior. However, non-responders still displayed interest, and the authors believe further personalization of the intervention is possible. Therefore, severe dementia and agitated behavior should not exclude individuals from psychosocial interventions; however, a more detailed and timely implementation plan of such treatments may be warranted. [Journal of Gerontological Nursing, 41(3), 22-29.]
Strong evidence exists that interventions reduce dementia-related agitated behavior best when they are tailored to participants’ preferences (Cohen-Mansfield, 2001; O’Connor, Ames, Gardner, & King, 2009). One promising tailored intervention stems from the educational system developed by Maria Montessori and subsequent educational theorists to promote engagement in learning (Lin et al., 2009). Key elements of the methodology include matching demands to individuals’ levels of competence by breaking tasks into smaller components; grading elements in order of difficulty; and using guided repetition (Camp, 1999, 2006; Orsulic-Jeras, Judge, & Camp, 2000). Activities are designed to tap into procedural memory, which is better preserved than verbal memory in individuals with dementia (Squire, 2004), through minimizing language demands and providing external cues. Montessori-based activities elicited high levels of engagement and pleasure in a small study of nursing home residents with dementia (Camp, 2006) and led to a modest fall in reported agitated behavior in a larger trial (Lin et al., 2009). The current authors’ recent study with 44 nursing home residents showed large differences in observed agitated behavior compared with baseline, but the control condition showed similar reductions (van der Ploeg et al., 2013). The Montessori intervention was superior to the control condition in terms of eliciting interest and constructive engagement.

A systematic review that included 25 carefully selected studies emphasized the importance of reporting central tendencies and dispersions for such highly personalized interventions (O’Connor et al., 2009). For example, Garland, Beer, Eppingstall, and O’Connor (2007) found that overall, the impact of their simulated presence intervention was modest, whereas 43% of the study sample showed a marked decrease in agitated behavior counts. The authors found that large improvements in some individuals were neutralized by negative or neutral outcomes for others. Baillon et al. (2004) also reported considerable variation in the way individuals responded to their Snoezelen and reminiscence therapy interventions. Why interventions have worked for some individuals but elicited adverse responses in others has rarely been explored. Gardner (2000) found that the effectiveness of an individualized music intervention was most successful if family informants were able to identify meaningful music that elicited positive memories. A literature review (Van Mierlo, Van der Roest, Meiland, & Droës, 2010) focusing on the effectiveness of psychosocial interventions in subgroups of individuals with dementia found positive intervention effects for groups that had moderate to severe dementia, as well as for those with behavioral problems, for a number of outcomes, including aggressive, agitated behavior.

Because the Montessori method is a particularly personalized approach, the aim of the current study was to explore differences between responders and non-responders to this intervention in terms of (a) demography; (b) cognition, agitated behavior, interest, and engagement scores at baseline; and (c) agitated behavior, interest, and engagement scores during the Montessori intervention and the control condition. The authors also tested which factors were related to the frequency of agitated behavior during the Montessori intervention.

METHOD

Study Design

The current study used a repeated measures, crossover design with random allocation of the order of treatment and control condition. Recruitment of aged-care facilities in the Melbourne, Australia region began in July 2009, and data collection was completed in September 2011. Participants and facility staff were blinded to the study’s hypotheses. The protocol was approved by Monash University’s ethics committee and the participating health organizations. A more detailed study protocol has been published online (van der Ploeg & O’Connor, 2010).

Sample Selection

The study included individuals who had (a) a chart diagnosis of dementia; (b) a physically agitated behavior that occurred at least sev-
eral times per day outside nursing interventions; (c) confirmation by nurses, a visiting physician, and/or a psychiatrist that the agitated behavior was not due to untreated pain, physical illness, major depression, or psychosis; (d) resided in a specialist dementia unit or psychogeriatric nursing home for at least 3 months; and (e) provided consent to the study by way of next of kin or guardian. Residents were excluded from the study if (a) they refused the intervention on two occasions, (b) their psychotropic medications were likely to be changed over the study period, (c) nursing and medical staff reported an acutely life-threatening physical illness, or (d) an agitated behavior presented a potential hazard to researchers. A flow chart of inclusion and loss to follow up is provided in the Figure.

### Treatment

Participants were randomized to Montessori or control blocks for 2 weeks; they then switched to the other condition. Both conditions were delivered for 30 minutes twice weekly on a one-to-one basis, resulting in a total of four Montessori and four control sessions. Sessions were scheduled on the same days and times throughout the study when feasible (e.g., working around relatives’ visits) and were held consistently in the same area (i.e., private or shared room).

**Montessori Intervention.** Montessori facilitators were trained extensively using a didactic presentation and written guidelines, and they received regular personal supervision throughout the study. Activities included listening and singing along to favorite music, looking at and sorting pictures, arranging flowers, sorting dry pastas, folding towels, screwing nuts and...
observed agitated behavior before intervention showed the strongest correlation with *agitated behavior during intervention*.

The authors also explored correlations of this factor with the remaining possible predictors.

**RESULTS**

**Demographics**

Non-responders were slightly older and were more often male...
TABLE 1
DIFFERENCES IN DEMOGRAPHICS AND COGNITIVE, BEHAVIORAL, INTEREST, AND ENGAGEMENT SCORES AT BASELINE BETWEEN NON-RESPONDERS (N = 10) AND RESPONDERS (N = 34)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Non-Responders (n [%])</th>
<th>Responders (n [%])</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean [SD])</td>
<td>79 (8)</td>
<td>77.8 (10.5)</td>
</tr>
<tr>
<td>Gender (women)</td>
<td>6 (60)</td>
<td>24 (71)</td>
</tr>
<tr>
<td>English-speaking</td>
<td>8 (80)</td>
<td>24 (71)</td>
</tr>
<tr>
<td>Facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facility A</td>
<td>3 (30)</td>
<td>17 (50)</td>
</tr>
<tr>
<td>Facility B</td>
<td>1 (10)</td>
<td>4 (12)</td>
</tr>
<tr>
<td>Facility C</td>
<td>3 (30)</td>
<td>3 (9)</td>
</tr>
<tr>
<td>Facility D</td>
<td>0 (0)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Facility E</td>
<td>1 (10)</td>
<td>6 (18)</td>
</tr>
<tr>
<td>Order: Montessori first</td>
<td>4 (40)</td>
<td>11 (32)</td>
</tr>
<tr>
<td>CDR score**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild or moderate</td>
<td>0 (0)</td>
<td>15 (44)</td>
</tr>
<tr>
<td>Severe</td>
<td>10 (100)</td>
<td>19 (56)</td>
</tr>
<tr>
<td>MMSE score**</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>0.4 (1.0)</td>
<td>3.2 (6.5)</td>
<td></td>
</tr>
<tr>
<td>CMAI score**</td>
<td>43.2 (6.6)</td>
<td>43.1 (21.3)</td>
</tr>
<tr>
<td>Behavior</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before Montessori***</td>
<td>24.4 (7.4)</td>
<td>14.5 (9.4)</td>
</tr>
<tr>
<td>Before control***</td>
<td>25.5 (6)</td>
<td>14.8 (9.4)</td>
</tr>
<tr>
<td>During Montessori***</td>
<td>21.7 (8.5)</td>
<td>4.5 (6.1)</td>
</tr>
<tr>
<td>During control***</td>
<td>21.2 (8.8)</td>
<td>6.8 (8.3)</td>
</tr>
<tr>
<td>p value*</td>
<td>**</td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before Montessori**</td>
<td>2.4 (5.7)</td>
<td>7 (8.8)</td>
</tr>
<tr>
<td>Before control**</td>
<td>2.2 (5.9)</td>
<td>7.2 (9.2)</td>
</tr>
<tr>
<td>During Montessori***</td>
<td>12.6 (10)</td>
<td>21.7 (9.2)</td>
</tr>
<tr>
<td>During control***</td>
<td>9.5 (10.5)</td>
<td>18.4 (10.7)</td>
</tr>
<tr>
<td>p value*</td>
<td>*</td>
<td>***</td>
</tr>
<tr>
<td>Constructive engagement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before Montessori**</td>
<td>0.5 (1.2)</td>
<td>2.6 (4.6)</td>
</tr>
<tr>
<td>Before control**</td>
<td>0.3 (1.4)</td>
<td>2.5 (5.2)</td>
</tr>
<tr>
<td>During Montessori***</td>
<td>5.2 (6.4)</td>
<td>15.5 (9.9)</td>
</tr>
<tr>
<td>During control***</td>
<td>1.2 (2.4)</td>
<td>7.8 (8.4)</td>
</tr>
<tr>
<td>p value*</td>
<td>***</td>
<td>***</td>
</tr>
</tbody>
</table>

Note. CDR = Clinical Dementia Rating; MMSE = Mini-Mental State Examination; CMAI = Cohen-Mansfield Agitated Behavior Inventory.

*p Differences within groups across conditions.

Differences between groups: *p < 0.05; **p < 0.01; ***p < 0.001.
and English-speaking; however, these differences were not statistically significant (Table 1). As reported by staff, the groups did not differ in terms of agitated behavior on the CMAI or regarding where they resided or how they were randomized to the order of interventions. All non-responders scored severe impairment on the CDR, whereas one half of responders had a score of mild or moderate cognitive impairment. The MMSE scores revealed that the average score among non-responders approached 0, whereas responders scored a mean of 3. Non-responders displayed more agitated behavior, less interest, and less constructive engagement before the interventions.

**Differences During Interventions**

Agitated behavior, interest, and constructive engagement scores for both groups significantly improved during Montessori and control sessions compared with baseline, except for agitated behavior during the Montessori intervention for non-responders. Non-responders performed less well on all measures during both conditions compared with responders (Table 1). Responders showed significantly less agitated behavior, as well as more interest and constructive engagement, during the Montessori intervention when compared with the control condition. For non-responders, the agitated behavior score was similar in both conditions, but interest and, particularly, constructive engagement were higher during the Montessori intervention.

**Factors Associated With More Agitated Behavior**

Spearman correlations showed strong associations between agitated behavior during the intervention with baseline CDR and MMSE scores: individuals who were cognitively more impaired displayed more agitated behavior (Table 2). Agitated behavior before the intervention showed the strongest correlation with agitated behavior during the intervention. When exploring the associations with agitated behavior before the intervention, the authors again found strong correlations with CDR and MMSE scores at baseline, with more impaired cognition associated with more agitated behavior (Table 2).

**DISCUSSION**

The current study explored differences between non-responders and responders to a personalized psychosocial intervention to treat agitated behavior in dementia. The authors found that in non-responders, agitated behavior scores remained equally high during the intervention and control condition. Although interest and constructive engagement were lower than in responders, they observed more interest and engagement during the intervention compared with this group’s baseline and control condition scores.
The frequency of agitated behavior during the intervention was related to the frequency of agitated behavior before intervention; both were strongly associated with severely impaired cognition.

The current study is one of the first to explore why personalized interventions may sometimes not reduce agitated behavior associated with dementia. Findings were only partly in line with those from the Cooke, Moyle, Shum, Harrison, and Murfield (2010) study, which found that, in addition to level of cognitive impairment, duration in the facility and gender were important predictors of aggressive behaviors, as measured with the CMAI. This difference may be explained by the different measure of agitated behavior. As shown in the authors’ model, staff-reported CMAI scores did not predict the frequency of agitated behavior that was observed. However, because cognitive impairment was associated with agitated behavior across such different measurement tools, the importance of the level of cognitive impairment in predicting the success of personalized non-pharmacological interventions was emphasized. The authors have built on the findings of Van Mierlo et al.’s (2010) literature review by further exploring predictors within a group of individuals with advanced dementia and associated agitated behavior. Although Van Mierlo et al. (2010) reported that those individuals with moderate to severe dementia and agitated behavior benefited most from psychosocial interventions, they found that within this population, a turning point exists by which it becomes harder to effectively treat agitated behavior.

The authors of the current study found differences in cognitive functioning, as measured with the CDR and MMSE, between the two groups, with non-responders being more severely impaired. However, both the Montessori intervention and control condition (i.e., a simple social interaction with no personalized elements) were successful in reducing agitated behavior, even in a group with advanced dementia (mild-severe on CDR and average MMSE score of 3 [namely the responders]). When cognitive functioning levels drop even further (i.e., all severe on CDR, MMSE approaching 0), reducing agitated behavior became more arduous. Future studies should explore what specific aspects of brain function may explain this difference. However, even in a severely impaired and agitated group (i.e., non-responders), the authors were able to capture interest and elicit some constructive engagement using the Montessori intervention. Future research must study if further personalization of this intervention and similar treatments (i.e., by adapting the frequency and duration of the sessions to every individual’s capabilities) may result in gradual improvements in outcomes for this cognitively impaired group.

Severe dementia and agitated behavior should not lead to abstaining from psychosocial interventions but may warrant a more detailed and timely implementation plan of such treatments.

The timing of the Montessori intervention could also be varied. An aim of the current study was to target individuals when they were at their most agitated. In some cases, individuals may have been too agitated to participate. Future studies could test if using interventions at a time when individuals are less agitated may result in reduced agitated behavior and possible carryover effects to those times when they are most agitated. For clinical practice, severity of dementia and frequency of agitated behavior should be precisely determined before putting an intervention in place. Severe dementia and agitated behavior should not lead to abstaining from psychosocial interventions but may warrant a more detailed and timely implementation plan of such treatments (e.g., a more gradual introduction of activities at times when a participant is not too agitated).

LIMITATIONS

The current study was subject to some limitations. The choice of definition of responders and non-responders may seem arbitrary. Other definitions of non-responders could be useful as well. For example, future researchers could focus on individuals who displayed increased agitated behavior during intervention compared with before the intervention. However, only five individuals became more agitated during the intervention, which led to power issues when analyzing the data. Another option would have been to focus on individuals with the smallest difference in agitated behavior before and during the intervention. However, a small difference in score can be a result of high-frequency baseline agitated behavior that is difficult to reduce, but also to low-frequency baseline agitated behavior (i.e., floor effect), thus resulting in an ambiguous sample. Therefore, the authors decided to offset those in-
individuals who were agitated for the majority of the session from those who were not. Due to the diversity in the participants’ backgrounds, the authors were unable to conduct the MMSE with individuals who had lost their fluency in English. However, the percentage of non-English speaking participants was similar in both groups.

CONCLUSION
Numerous studies have shown that psychosocial interventions are able to reduce agitation in individuals with dementia. The current study adds that there may possibly be a stage of dementia during which this becomes more challenging. Despite showing no improvement in terms of agitation, the non-responders experienced more interest and active engagement when involved with the intervention, compared with the baseline situation and the control condition. Furthermore, the current intervention could be further tailored to individuals’ needs (i.e., in terms of the frequency and duration of sessions). Thus, severe dementia and agitated behavior should not exclude individuals from psycho-social interventions; however, these interventions may need more consideration and tailoring in regard to the individual’s capabilities and interests.

REFERENCES