An investigation of long-term effects of group music therapy on agitation levels of people with Alzheimer’s Disease

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Abstract

This study aimed to investigate the long-term effects of group music therapy on agitation manifested by nursing home residents with Alzheimer’s disease. A non-randomised experimental design was employed with one group receiving weekly music therapy \(n=26\) and another group receiving standard nursing home care \(n=19\). Agitation levels were measured five times over one year using the Cohen-Mansfield Agitation Inventory (Cohen-Mansfield, J. (1989). Agitation in the elderly. In N. Billig & P. V. Rabins (Eds.), Issues in geriatric psychiatry (pp. 101–113). Basel, Switzerland: Karger). Although music therapy participants showed short-term reductions in agitation, there were no significant differences between the groups in the range, frequency, and severity of agitated behaviours manifested over time. Multiple measures of treatment efficacy are necessary to better understand the long-term effects music therapy programs have on this population.

Introduction

Agitation leads to severe disturbances in the quality of life of people with Alzheimer’s disease and their carers (Cohen-Mansfield, 1986, 1999; Foli & Shah, 2000; Marin et al., 1997). Estimates of the prevalence of agitation vary depending on the terminology, assessment tool, population, and setting employed (Colenda, 1995; Tractenberg, Weiner, & Thal, 2002), ranging from 24% to 98% of people diagnosed with dementia (Gruber-Baldini, Boustani, Sloane, & Zimmerman, 2004; Sourial, McCusker, Cole, & Abrahamowicz, 2001).

People with Alzheimer’s disease show a range of agitated behaviours, including repetitive acts, behaviours inappropriate to social norms, and aggressive behaviours towards self or others (Cohen-Mansfield & Martin, 1999). The progression of a person’s agitated behaviours is difficult to predict. Although agitated behaviours are likely to persist and increase in severity over time, they do not worsen systematically (Eustace et al., 2002; Haupt, Kurz, & Jänner, 2000; Levy et al., 1996). Instead, agitated behaviours are more episodic in nature, fluctuating over time. Possible causes of agitation include under-stimulating or demanding environments, or a person’s reduced ability to communicate and have his/her needs met (Cohen-Mansfield & Martin, 1999). Interventions that address these possible causes of agitation are therefore imperative (Mahoney, Volicer, & Hurley, 2000; Opie, Rosewarne, & O’Connor, 1999).

Music therapy is one intervention which aims to create secure, stimulating environments, to meet social and emotional needs, and to reduce agitation displayed by people with Alzheimer’s disease and other types of dementia (Brotons, Koger, & Pickett-Coope, 1997; Nugent, 2002). Short-term reductions in agitated behaviour have been reported in music therapy case studies and research undertaken with people with dementia (Brotons & Pickett-Coope, 1996; Fitzgerald-Cloutier, 1993; Groene, 1993; Nugent, 2000; Ridder, 2003; Suzuki et al., 2004; Thomas, Heitman, & Alexander, 1997). Explanations for the success of music therapy in reducing agitation include the effects of music on attention (Baker, 2002; Ridder, 2003) and quality of life components (Ruud, 1998). Familiar music may serve to regulate a person’s arousal to a moderate level (Baker, 2002; Ridder, 2003), or redirect a person’s attention from misleading or confusing stimuli (Gerdner, 1999).

A person with dementia may then be more able to interpret his or her environment and any fear or agitation may be lessened. Success in singing, playing instruments, moving to music, or sharing memories or views related to music, may also meet a person’s unmet needs for self-expression, achievement, and meaning in life (Clair & Bernstein, 1990;
Pollack & Namazi, 1992; Prickett & Moore, 1991; Ridder, 2003; Rio, 2002; Short, 1995; Tomaino, 2000). Music therapy groups may especially promote feelings of belonging among participants with dementia (Ebberts, 1994; Pollack & Namazi, 1992; Rio, 2002). As agitation is viewed as an expression of feelings of despair, frustration, boredom, or loneliness (Cohen-Mansfield & Martin, 1999), music therapy may reduce agitated behaviour by lessening such feelings (Ashida, 2000; Bright, 1997; Groene, 1993; Pollack & Namazi, 1992; Rio, 2002; Short, 1995).

Although research indicates that music is an effective intervention for reducing agitated behaviours, there are weaknesses and limitations to existing studies, including small sample sizes and within-participants designs (Brotons et al., 1997; Koger, Chapin, & Brotons, 1999; Lou, 2001; Nugent, 2002; Sheratt, Thornton, & Hatton, 2004b; Ridder, 2005; Vink, Birks, Bruinsma, & Scholten, 2003). Furthermore, no studies have specifically tested whether music therapy can have long-term influences on the agitation levels of people with dementia (Ledger & Baker, 2005). This study aimed to address the limitations of earlier research, by employing a large sample size and a control group, and investigating the possibility that music therapy has long-term effects on people with Alzheimer’s disease. The study specifically tested whether music therapy participants with Alzheimer’s disease manifested fewer, less frequent, or less severe types of agitated behaviours over time than people who were not receiving music therapy.

Method

Design

The study employed a longitudinal repeated measures design with an experimental and control group. Participants were studied over a one-year period, this being appropriate to detect agitation changes in the participants (Levy et al., 1996; Weiner et al., 1998). Experimental group participants were offered weekly group music therapy treatment, while control group participants received their usual nursing and therapy care. This design was approved by one of the human ethics committees of the University of Queensland in accordance with the National Health and Medical Research Council’s guidelines.

Settings

Thirteen nursing homes in Queensland (12) and Victoria (1) participated in the study, two of which already offered music therapy services to its nursing home residents. Nursing homes within organizations known to show interest in music therapy services were selected based on location (i.e. within reasonable travelling distance from research personnel).

The chosen nursing homes were either community, church, or privately operated and offered a mixture of high and low nursing care. Each nursing home provided residents with access to activities such as outings, concerts, arts and crafts, games, cooking, or gardening.

Participants

A sample of 60 participants (30 experimental and 30 control) was required to detect significant differences between the experimental and control groups ($p<0.05$, power of 80%). Sixty-eight were initially recruited to allow for attrition. Inclusion criteria comprised:

(a) Primary diagnosis of Alzheimer’s type dementia.
(b) Stage 4, 5, or 6 on the Global Deterioration Scale (GDS) for assessment of primary degenerative dementia (Reisberg, Ferris, De Leon, & Crook, 1982).
(c) Cognitive impairment evident upon Mini-Mental State Examination (MMSE < 23. Folstein, Folstein, & McHugh, 1975) or Mental Status Questionnaire administration (MSQ > 2 errors; Kahn, Goldfarb, Pollack, & Peck, 1960).

Due to the high prevalence of agitation among people with moderate to severe dementia (Sourial et al., 2001), presence of agitation was not specified as an inclusion criterion. Nursing home residents were to be excluded if they were in poor health (indicating that they were unlikely to complete the year-long study). Although variability in demographic characteristics, psychotropic medication use, levels of pain, depression and fatigue, quality of staffing, quality of relationships with others, and past experiences of stress were considered likely to influence participants’ agitation levels, it was expected that these variables would be balanced between the experimental and control participants. Although these variables were not controlled, data pertaining to these variables was collected and the influence of these variables was explored.

Participants were allocated to either the experimental or control group based on their current place of residence (convenience sample). The five nursing homes assigned to the experimental condition were all within Brisbane, as this condition required weekly visits from a registered music therapist. Consent for 68 eligible participants was obtained, however eight did not participate in the study because: (a) five participants in the experimental group chose not to participate in music therapy; (b) one participant in the control group moved to a different nursing home and subsequently began receiving music therapy; (c) one participant died before receiving the first session of music therapy; (d) one participant became distressed in music therapy and the service discontinued after she received five sessions.
Of the 60 participants who began the study, only 45 participants completed all five testing phases. One participant from the experimental group left the study when she moved away and ceased receiving music therapy treatment. A further 14 participants (three from the experimental group and eleven from the control group) passed away in the course of the year’s research. Due to the highly individual, fluctuating, and unpredictable nature of agitation (Levy et al., 1996), only the data from those participants who completed the study were included in the analysis.

Characteristics of the 45 participants (26 experimental, 19 control) who completed the study are displayed in Table I. The participants ranged from 71 to 96 years of age (experimental group \(M = 84.81, SD = 6.62;\) control group \(M = 85.63, SD = 5.22\)) and most were female. Three participants in the experimental group and none in the control group were from non-English speaking backgrounds. About three quarters of the participants (21 experimental, 12 control) had contact with family or friends at least once per week. None of the participants had received music therapy treatment prior to the commencement of the research. Experimental group participants who completed the study attended a mean number of 44.65 ± 3.1 music therapy group sessions during the year of research.

Some participants had neurological or psychiatric disorders alongside dementia of the Alzheimer’s type (experimental \(n = 9,\) control \(n = 6\)), such as depression, schizophrenia, Parkinson’s Disease, stroke, brain injury, cerebral aneurysm, and epilepsy. Twenty-two experimental and seventeen control group participants were assessed as in stages five or six (moderate or moderately severe Alzheimer’s disease) on the GDS and the remainder (four experimental, two control) were assessed as in stage four (mild Alzheimer’s disease) of the GDS. Most participants (experimental \(n = 22,\) control \(n = 16\)) showed moderate to severe cognitive impairment on either the MMSE or MSQ. A greater proportion of the experimental participants (42% of experimental participants versus 21% of control participants) had been prescribed antipsychotic medication, which may have contributed to lower baseline agitation levels (Weiner & Schneider, 2003).

### Table I. Characteristics of participants.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Experimental group</th>
<th>Control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>71–75</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>76–80</td>
<td>4</td>
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</tr>
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<td>81–85</td>
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<td>86–90</td>
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<td>6</td>
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<td>91–95</td>
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<tr>
<td>96–100</td>
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<td>1</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>22</td>
<td>18</td>
</tr>
<tr>
<td>GDS stage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
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</tr>
<tr>
<td>5</td>
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<td>10</td>
</tr>
<tr>
<td>6</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Level of cognitive impairment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Moderate</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Severe</td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>Not recorded</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Medications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetylcholinesterase inhibitors</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Antipsychotic</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Antidepressant</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Antianxiety</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Narcotic</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Social Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Once/week or more</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Less than once/week</td>
<td>5</td>
<td>7</td>
</tr>
<tr>
<td>Not recorded</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*Experimental \(n = 26;\) Control \(n = 19;\) Total \(N = 45\)

Intervention

Participants in the experimental group participated in weekly sessions (30–45 minutes) of group music therapy for at least 42 weeks within a year. Research suggests that the effects of music therapy on agitation can be noted with one-to three-weekly sessions (Brotons & Pickett-Cooper, 1996; Clair & Bernstein, 1990; Ebberts, 1994; Jennings & Vance, 2002; Olderog Millard & Smith, 1989; Sambandham & Schirm, 1995; Suzuki et al., 2004). Sessions were held at consistent times in accordance with residents’ existing routines—three of the groups took place in the morning and two of the groups took place in the mid afternoon. Groups consisted of two to ten research participants.
at any one time. Group music therapy was preferred over individual therapy as this intervention is reported in music therapy literature as effective in addressing people’s unmet needs for interaction and belonging (Christie, 1995; Ebberts, 1994; Pollack & Namazi, 1992; Rio, 2002; Silber & Hes, 1995) and reducing agitation during and immediately post-session (Lesta & Petocz, 2006). Participants who resided at nursing homes allocated to the control condition received their usual nursing and therapy care over the one-year period.

Four of the music therapy groups were conducted by the first author (a qualified music therapist) and one group was conducted by a research assistant (also a qualified music therapist). The musical content of the music therapy sessions was decided by the treating music therapist and varied depending on participants’ assessed needs, abilities, backgrounds, and musical preferences. Each group had a similar overall structure (greetings-main section-song requests-farewells) and sessions included techniques that aim to promote self-expression, control, mastery, belonging, and purpose (Brotons & Pickett-Cooper, 1996; Clair & Bernstein, 1990; Ebberts, 1994; Groene, Zapchenk, Marble, & Kantar, 1998; Hanson, Gfeller, Woodworth, Swanson, & Garand, 1996; Prickett & Moore, 1991; Rio, 2002). Participants joined in sessions through listening to music played by the therapist, choosing or requesting favourite songs, guessing song-titles from melodic/lyric clues, singing, playing instruments, moving to music, and discussing feelings and memories.

Measures

Participants’ agitation levels were assessed using the CMAI-long form (Cohen-Mansfield, Marx, Rosenthal, 1989) prior to the commencement of the experimental or control period, and then at three, six, nine, and twelve months following commencement of the experimental or control period. The CMAI measures the frequency of 29 agitated behaviours in the two weeks prior to the CMAI assessment. CMAI scores can be summarized according to four behaviour subtypes – verbal non-aggressive behaviour (e.g., repeated unwarranted requests for attention such as calling out), verbal aggressive behaviour (e.g., cursing, threatening, or insulting language, verbal sexual advances), physical non-aggressive behaviour (e.g., repetitive behaviours such as wandering, tapping, or repeated attempts to undress inappropriately), and physical aggressive behaviour (e.g., destroying objects or property, throwing objects, grabbing, pushing people) (Cohen-Mansfield, 1999; Cohen-Mansfield & Martin, 1999). CMAI scores correlate significantly with scores on other measures of agitation, and demonstrate high internal consistency reliability (r ≥ 0.82), test-retest reliability (0.97), and high inter-rater reliability (r = 0.8) (Finkel, Lyons, & Anderson, 1992; Miller, Snowdon, & Vaughan, 1995; Shah, Evans, & Parkash, 1998; Sourial et al., 2001; Snowdon, Miller, & Vaughn, 1996; Weiner et al., 2000).

As research personnel (the first author and the research assistant) were only present during music therapy sessions, they interviewed nursing staff to obtain more comprehensive CMAI assessments for the research participants. Research personnel recorded nurses’ responses on a tick-sheet. Due to the high turnover of nursing staff in the participating nursing homes, it was not always possible to interview the same staff at each of the five time points. As the goal of the CMAI is “to achieve the most accurate reflection of the frequency at which these behaviours occurred” (Cohen-Mansfield, 1991, p.4), research personnel interviewed the nurse on duty who had the most frequent contact with research participants during the previous two weeks. An average of three nursing staff were interviewed at each nursing home over the one-year period.

Analysis

Total CMAI scores and subtype scores for each participant at each of the five time points were calculated by assigning values to the frequency ratings for each behaviour (“Never” = 0 through to “Several times an hour” = 6). Means and standard deviations of the experimental and control groups’ total and subtype CMAI scores were then determined for each time point. A repeated measures multivariate analysis of variance was employed to test for differences between the experimental and control groups in the range, frequency and severity of agitated behaviours manifested over time.

Therapist’s log

In addition to the CMAI measures, the two qualified music therapists conducting the clinical interventions kept a log of observed changes in participants’ agitation from pre to post session using the CMAI behaviours as descriptors. Only noticeable changes were recorded.

Results

Range and frequency of behaviours

The range and frequency of agitated behaviours are reflected in the participants’ mean total CMAI scores, graphed in Figure 1 for the five data collection points. Initial CMAI scores were significantly higher (t = 2.17, p < 0.05) for the control group and both groups showed large standard deviations before the commencement of the music therapy intervention (control group: CMAI M = 39.05, SD = 22.15; experimental group: CMAI
$M = 25.92, SD = 15.42$). Total CMAI means for both groups fluctuated from one data collection point to the next. The control group showed a large decrease between the baseline and first reassessment of CMAI, and then a large increase at the next reassessment (time point 3) before a decline in agitation at the end of the study (time point 4 and 5). The experimental group showed an increase between the baseline and first reassessment of CMAI, followed by a small decrease at the next CMAI reassessment (time point 3), then an increase in agitation (time point 4), before returning to an agitation level similar to time points 2 and 3. Control group participants showed their highest degree of agitation at time point 3, but the experimental group showed their highest degree of agitation later, at time point 4.

The repeated measures multivariate analysis of variance revealed significant effects within-participants over time ($F = 2.61; p < 0.05$), but not within-participants over time by group (experimental or control; $F = 1.61; p = 0.432$). This indicated that there were no significant differences between the experimental and control groups in the range and frequency of agitated behaviours manifested over time.

**Severity of behaviours**

The means and standard deviations for CMAI subtype scores (verbal aggressive, verbal non-aggressive, physical aggressive, and physical non-aggressive) across the five time points are shown in Table II. In the experimental group, the course of agitation appeared to remain more stable for verbal aggressive behaviour (Figure 2) than for the other subtypes and are therefore focused on in this paper. However, the repeated measures multivariate analysis of variance revealed no significant differences between the groups in the manifestation of any of the four different types of agitation over time (verbal non-aggressive $F = 0.33, p = 0.57$; verbal aggressive $F = 0.59, p = 0.45$; physical non-aggressive $F = 0.62, p = 0.44$; physical aggressive $F = 0.78, p = 0.38$). The experimental group did not manifest a significantly lesser degree of non-aggressive behaviour, nor the more severe aggressive behaviour, over time.

Univariate test results revealed a significant effect of the variables time and group for verbal aggressive behaviour ($F = 2.70; p < 0.05$). It is therefore possible that the experimental group manifested less verbal aggressive behaviour over time, only the effect size was too small to be detected through multivariate analysis. This interpretation is supported by evidence that the experimental group’s levels of verbal aggressive behaviour fluctuated less over time (Figure 2).

![Figure 1. Mean total CMAI scores for the experimental and control groups.](image)

**Table II. CMAI subtype means and standard deviations.**

<table>
<thead>
<tr>
<th>Time Pt</th>
<th>Group</th>
<th>Verbal non-aggressive</th>
<th>Verbal aggressive</th>
<th>Physical non-aggressive</th>
<th>Physical aggressive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>CMAI 1</td>
<td>Exp$^3$</td>
<td>7.65</td>
<td>4.31</td>
<td>4.12</td>
<td>4.04</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>11.11</td>
<td>4.90</td>
<td>7.21</td>
<td>4.69</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9.11</td>
<td>4.83</td>
<td>5.42</td>
<td>4.55</td>
</tr>
<tr>
<td>CMAI 2</td>
<td>Exp</td>
<td>9.92</td>
<td>5.68</td>
<td>4.88</td>
<td>5.01</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>9.68</td>
<td>5.56</td>
<td>4.21</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9.82</td>
<td>5.57</td>
<td>4.60</td>
<td>4.53</td>
</tr>
<tr>
<td>CMAI 3</td>
<td>Exp</td>
<td>10.54</td>
<td>4.71</td>
<td>4.62</td>
<td>4.12</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>11.13</td>
<td>5.48</td>
<td>5.24</td>
<td>4.43</td>
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<tr>
<td>CMAI 4</td>
<td>Exp</td>
<td>12.04</td>
<td>5.65</td>
<td>4.92</td>
<td>4.42</td>
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<tr>
<td></td>
<td>Control</td>
<td>11.61</td>
<td>6.33</td>
<td>5.29</td>
<td>4.25</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>11.86</td>
<td>5.88</td>
<td>5.08</td>
<td>4.30</td>
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<tr>
<td>CMAI 5</td>
<td>Exp</td>
<td>9.42</td>
<td>5.85</td>
<td>5.23</td>
<td>5.07</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>8.58</td>
<td>6.93</td>
<td>5.21</td>
<td>4.89</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9.07</td>
<td>6.26</td>
<td>5.22</td>
<td>4.94</td>
</tr>
</tbody>
</table>

$^1$Time Pt = time point. $^2$Exp = experimental group. Experimental $n = 26$; Control $n = 19$; Total $N = 45$. 

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A. J. Ledger & F. A. Baker
Therapists’ observations

Prior to sessions, the therapists noted that most participants wandered, fidgeted, grabbed or insulted others, yelled, complained, made anxious statements (e.g., about others stealing), or asked repetitive questions (e.g., asking to “go home”). These behaviours were seen considerably less frequently within music therapy sessions and in many cases, participants remained less agitated immediately after sessions.

Discussion

The results of this study showed interesting trends with regard to the longitudinal effects of weekly music therapy sessions on the agitated behaviours of people with Alzheimer’s disease. First, there were no significant differences between the two groups in the range and frequency of agitated behaviours manifested over time. Furthermore, there were no significant differences between the groups in the manifestation of any of the four different agitation subtypes over time.

The finding that there were no significant differences between the groups over time may indicate that music therapy has only immediate effects on agitation while it is regulating people’s orientation and arousal levels (Baker, 2002; Ridder, 2003) or promoting a safe and secure environment (Gerdner, 1999). The effects of music therapy may disappear once the predictable and structural qualities of familiar music (Clair & Bernstein, 1994) are no longer present.

The finding that music therapy participants showed only small, steady increases in verbal aggressive behaviour over time could be linked to music therapy’s success in maintaining participants’ expressive capabilities. During group sessions, music therapy participants shared memories, joked, greeted and complimented others, and commented on the music, their achievements, and their experiences within sessions. Participants also voiced concerns regarding aging and losses in health, beauty, independence and possessions. Some spoke of anger towards family members and nursing staff.

The treating music therapists noted that few music therapy participants exhibited declines in verbal communication skills during the course of the year and improved language functioning has been reported as an outcome in previous studies of music interventions for people with dementia (Brotons & Koger, 2000; Quinn, 2003; Sambandham & Schirm, 1995; Smith, 1986; Suzuki et al., 2004). The verbal non-aggressive behaviour of the music therapy participants steadily increased over the first nine months of the study, also supporting an improvement in language functioning.

The control group’s degree of verbal aggressive and verbal non-aggressive behaviour decreased in the final six months of the study. This could indicate that control participants were losing the ability to express agitation in a verbal form. Koss et al. (1997) attributed limited verbal agitation to increasing language difficulties in participants in the lower MMSE stratum. Through exercising verbal skills within music therapy groups, experimental group participants may have sustained abilities that deteriorated in the control group during the course of the study.

Limitations of the study

High inter- and intra-participant variability in agitation levels may account for the lack of significance found between the two conditions. The pooled sample’s standard deviation values for the total CMAI scores were large (Table III) and total CMAI scores fluctuated substantially from one time point to the next (Figure 1). Furthermore, the control group showed a greater degree of agitation at baseline and time points 3 and 5, but the experimental group showed a greater degree of agitation at time points 2 and 4. The observation that participants showed high inter- and intra-participant variability over time is consistent with other music and agitation studies (Casby & Holm, 1994; Clair & Bernstein, 1994; Clark, Lipe, & Bilbrey, 1998; Groene, 1993; Nugent, 2000; Sherratt, Thornton, & Hatton, 2004a) and reports in general gerontology literature (Cohen-Mansfield, 1999, 2000; Levy et al., 1996).
The large number of uncontrolled variables could have contributed to this high degree of variability in agitation levels. There were many outside factors that could have affected participants’ agitation levels over the year–illnesses, hospitalizations, changes in medications, bedroom changes, and deaths among family and friends. Differences in the nursing home environments, timing of music therapy sessions, music therapy group sizes, music therapy techniques employed, and therapists conducting the sessions could also have influenced the results of the study. Future researchers may wish to collect more detailed information on potential outside influences on agitation, to enhance the reliability of their findings.

Low endorsement of CMAI behaviours may also account for the lack of significance found between the two conditions. The CMAI instruction manual (Cohen-Mansfield, 1991) puts forward that a person can be considered ‘agitated’ if they display aggressive behaviour at least several times per week, physical non-aggressive behaviour at least once a day, or verbal agitation at least once a day. Although medical charts and the treating therapists’ observations indicated that participants reached these levels of agitation, CMAI scores did not reflect this. The pooled sample’s mean total CMAI scores ranged from only 30.29 (time point 5) to 37.31 (time point 4) out of a possible 174 points, suggesting that the participants displayed an agitated behaviour less than once per week on average. Nugent (2000) similarly identified low scoring of behaviours as an obstacle to achieving statistical significance in her research. It is therefore advised that future researchers using the CMAI as an outcome measure determine a minimum CMAI score for selecting research participants.

As high inter-and intra-participant variability and low endorsement of CMAI behaviours could have been obstacles to achieving statistical significance, it is recommended that future studies evaluate changes in the particular, unique behaviours displayed by individual music therapy participants. Rating scales such as the CMAI are quick and cost-effective ways of measuring agitated behaviours (Neville & Byrne, 2001), but it can be difficult to achieve statistical significance based on changes in the total scores or subtype scores. Music therapy researchers may be more successful in establishing effects on agitation by employing more than one method of agitation measurement. Observational measures may be particularly effective in detecting changes in agitation levels over time (Sherratt et al., 2004b).

**Conclusion**

As a unique investigation of long-term effects of music therapy on people with Alzheimer’s disease, this study highlights possibilities for further research. The music therapists observed that sessions had lasting effects on areas of functioning aside from agitation. The suggestion that music therapy participants maintained verbal abilities over time particularly requires further longitudinal study. It may also be worth investigating long-term effects of music therapy on quality of life. Observations throughout the year suggested that music therapy was a safe, useful intervention for reducing existing agitated behaviours when they occurred. Group music therapy participants who displayed agitation prior to sessions typically showed less agitated behaviour during and immediately after sessions. As agitated behaviours have major implications for the well-being of people with Alzheimer’s disease and those who care for them, interventions that may reduce agitation are vital, whether outcomes are short or long-term.

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**References**


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