

Short Report

# B Sharp—The cognitive effects of a pilot community music program for people with dementia-related disorders

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## Abstract

**Introduction:** Dementia has been described as the greatest global challenge for healthcare in the 21st century. Pharmaceutical interventions have dominated dementia treatment despite limited efficacy. There is increasing interest in alternatives to delay the progression of cognitive decline, such as community-based programs, promoting social and stimulating experiences. This article discusses a pilot music-based community program (B Sharp) for persons with dementia-related disorders.

**Method:** In the pilot study, we assessed 23 persons with dementia-related disorders who, with their caregivers, attended the symphony season and accompanying social hours over a 10-month period. Participants completed a baseline and follow-up brief neuropsychological test to assess cognitive changes.

**Results:** Significant improvements were observed between the pre- and post-B Sharp program assessments ( $P < .010$ ).

**Discussion:** Results support the feasibility of the B Sharp program as a community-based program to target cognitive decline. Additional research is needed to understand the mechanisms involved in the improvements observed in this program.

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## Keywords:

Dementia; Cognition; Music; Community; Nonpharmacological

## 1. Introduction

Dementia is an acquired condition involving multiple cognitive impairments that interfere with activities of daily living [1]. The expected worldwide population affected by dementia is projected to increase from 47 million people today to over 130 million by 2050, with costs of care estimated at \$20 trillion over the next 40 years [2]. Pharmaceutical interventions have dominated treatment since the first drug was approved by the Food and Drug Administration in 1993 to target memory and thinking difficulties. However,

these treatments have shown limited efficacy and can be accompanied by side effects and poor compliance. Recently, following the discontinuation of dementia drug development at multiple major pharmaceutical companies, the president of Lilly Research Labs said, “The complexity of Alzheimer's disease poses one of the most difficult medical challenges of our time, and we are deeply disappointed for the millions suffering from this devastating disease” [3]. While research must continue to target cures for dementia, programs that slow progression of the disease are also needed. Recent research suggests that individuals with diagnosed cognitive decline exhibit lower rates of progression to severe cognitive impairment when they engage in a greater number of social activities [4]. Delay in progression of dementia, in terms of informal and formal care costs, has been associated with an economic gain of \$183,227 for a 1-year delay [5].

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Nonmedical interventions, specifically social prescribing (SP) programs, have received increasing attention in the last decade. SP is defined as “a mechanism for linking patients with nonmedical sources of support within the community” [6]. A recent review of SP programs targeting multiple populations (e.g., anxiety, chronic illness) noted improvements in qualities such as self-esteem, well-being, and positive mood. Of the 86 programs reviewed, 14 included quantitative outcome measures (e.g., mood), but none assessed changes in cognitive functioning [7]. For older adults with cognitive decline, greater understanding of the impact of SP on cognition is needed as cognitive functioning is the strongest predictor of a person’s ability to maintain independence [8].

To assess the cognitive effects of a nonmedical program targeting persons with diagnosed dementia-related disorders (PWDs), we piloted a community-based music program called B Sharp. We chose a music arts program for a number of reasons. First, local health care providers and the local Alzheimer’s Association contacted university researchers to assist with evaluating a local B Sharp program. Second, the local symphony supported the program by providing season tickets via a donation drive to patrons. Third, a community music event was chosen based on opportunities for enhancing social interactions and because of the extensive literature indicating positive effects of music in older adults [9].

## 2. Materials and methods

The B Sharp community music program in Fort Collins, Colorado, was inspired by a community arts program, the B Sharp Music Wellness life enrichment program in Phoenix, AZ [10]. In our pilot program, researchers at Colorado State University were asked to add a research component to better understand feasibility and gather initial data pertaining to the effects of the program. PWDs and their at-home caregivers (primarily spouses) were invited to five MasterWorks symphonic performances spanning an eight-month (October-May) concert season. The dyads received donated season tickets and invitations to social receptions before and after concerts, which most dyads attended on a regular basis. The 23 dyad participants were recruited through dementia-focused community organizations. The inclusion criterion for the study was diagnosed pathological memory loss (see Table 1). The initial sample that was recruited consisted of 44 individuals (i.e., 22 pairs). One additional dyad was enrolled after the first concert, but before the second concert, making a total of 23 dyads. All participants provided consent that was approved by the Institutional Review Board at Colorado State University and complies with the Helsinki Declaration of 1975. The B Sharp program spanned 10 months (September-June) with pretesting

Table 1  
Background characteristics of the participants (N = 23)

Characteristics	n (%)
Sex	
Male	15 (65.2)
Female	8 (34.8)
Age	
50s	3 (12.5)
60s	3 (12.5)
70s	4 (16.7)
80s	11 (45.8)
90s	2 (8.3)
Ethnicity	
White non-Hispanic	23 (100)
Diagnosis	
Alzheimer’s disease	12 (50)
Vascular dementia	3 (12.5)
Frontotemporal dementia	1 (4.2)
Unspecified dementia	4 (16.7)
Mild cognitive impairment	3 (12.5)
Years since diagnosis	
< 1 year	0 (0)
1–2 years	1 (8.3)
3–4 years	8 (33.3)
5+ years	13 (54.2)
Unsure of diagnosis year	1 (4.2)

occurring approximately a month before the first concert in October and posttesting occurring one month after the final concert in May. Testing occurred at a community event space donated to the program (e.g., church classrooms). There were four additional concerts occurring during the season (November, February, March, and April). The present study focuses on preprogram and postprogram testing on a neuropsychological assessment during a 10-month span. During the program, participants were also administered brief mood and cognitive measures before and after each of the six concerts, for a total of eight assessments. Each participant could attend between 1–8 assessments. The following indicates how many of the 23 PWD completed each number of possible assessment periods, shown in parentheses: all 8 assessments (2), 7 assessments (5), 6 assessments (1), 5 assessments (4), 4 assessments (6), 3 assessments (1), 2 assessments (2), 1 assessment (2). The average number of assessments completed was 5 ( $SD = 2.06$ ).

PWDs were evaluated in person by trained undergraduate and graduate students using the Repeatable Battery for Assessment of Neuropsychological Status (RBANS) [11], consisting of 12 subtests, yielding five Index scores (immediate memory, delayed memory, attention, language, and visuospatial/constructional abilities) and four parallel versions that have been tested to control for practice effects. The Total score of all five Index scores was used to capture overall cognitive functioning even if select individual

subtest scores were within normal limits. The RBANS was initially developed to assess cognitive changes in older adults associated with pathological aging but has been more widely used to assess changes associated with interventions and clinical trials. Treatment study findings generally indicate no significant changes in RBANS Total score across parallel forms observed in the control or waitlist groups and more variability in outcome associated with the treatment groups [12]. For example, a study using RBANS to assess treatment effects in older adults with pathological aging, specifically Parkinson's disease, found that 0% of the control group either declined or improved on RBANS over a five-month span, whereas 15% declined and 25% improved in the deep brain stimulation treatment group [13].

### 3. Results

Participants were administered RBANS forms A and B to evaluate cognitive performance at assessment time 1 (September) and, following the intervention, at assessment time 8 (June). The difference in RBANS scores between preassessment and postassessment was measured with a positive score indicating an increase from beginning to end scores. A significant difference in Total scores between the preprogram and postprogram RBANS assessment for the 10 participants who completed both assessments (assessment 1 and assessment 8) was observed

( $P \leq .010$ ). Of the 23 dyads enrolled in the program, 15 participants completed at least two RBANS assessments (assessment 1, 2, or 3 and assessment 8), with a significant difference observed between the initial and later RBANS assessment ( $P \leq .010$ ; Fig. 1). Eight PWDs did not complete assessment 8 because of a variety of reasons (e.g., lack of participation, illness). In addition, Pearson correlation results suggested that greater participation (attendance at more events) was related to greater change in Total RBANS scores between assessments 1 and 8 ( $R = .50, P = .058$ ).

### 4. Discussion

Although there has been increased interest in nonpharmacological community-based arts programs to help ameliorate symptoms of cognitive decline in dementia, few studies have evaluated preprogram and postprogram cognitive factors in PWDs. The B Sharp pilot study results suggest that passive participation (listening), music-based community activities may be beneficial in terms of cognitive performance for older adults with cognitive decline. Results suggest that overall cognitive test performance improved over the course of the 10-month assessment period. Although there was a small sample with limited generalizability, there was a trend suggesting that greater involvement in the program was associated with greater cognitive improvement over the 10-month span. There

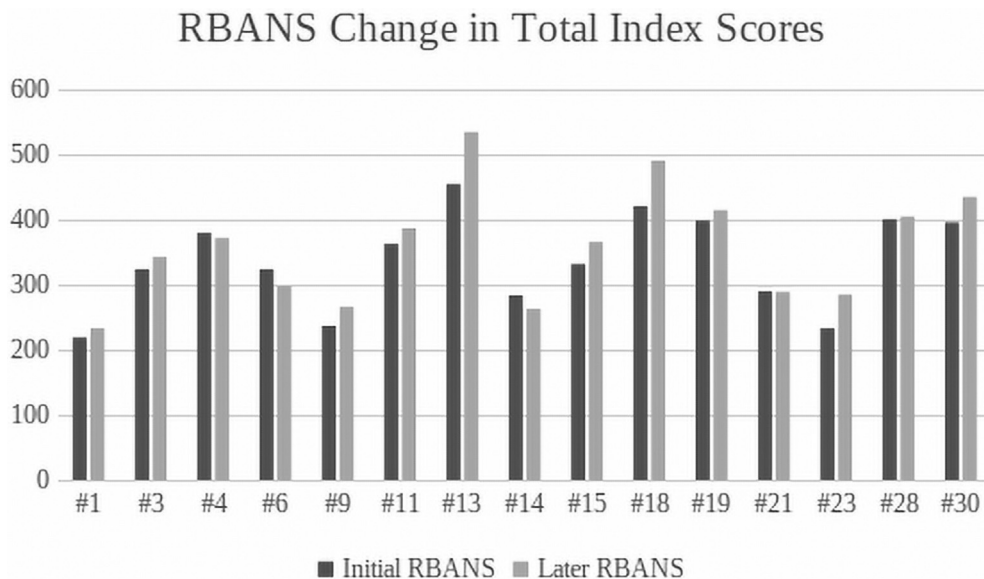


Fig. 1. RBANS change in Total Index score. NOTE: Bar graph of the preprogram and postprogram assessments (white and black bars, respectively). Repeatable Battery for Assessment of Neuropsychological Status (RBANS) Total Index scores for 15 participants completing initial and postprogram alternate parallel form assessments (RBANS form A and form B). The Total Index score consists of 12 subtests (age- and education-corrected scaled scores [mean {M} = 10, standard deviation {SD} = 3]), yielding five Index scores (immediate memory, delayed memory, attention, language, and visuospatial/constructional abilities) (age- and education-corrected scaled scores [M = 100, SD = 15]). The five Total Index scores are totaled across five Index scores (each Index score has a range of 40–160 with a mean of 100 and SD of 15). The Total Index score ranges from 200 to 800.

are, however, a number of factors that require further research. In the pilot study, all participants who wished to participate were included without controlling for type of dementia or use of memory enhancement drugs. Further studies with a larger sample would be useful to better understand the role of type of disease and interaction with medication, in addition to whether stage of disease impacts participation or outcome. While this pilot did not include a control group, previous studies of “normal” older adults found that the average change in RBANS Total score over a 12-month span was a 3.5% “decrease” in Total score [14]. In the 15 participants completing preintervention and postintervention assessment, the four participants who showed a decrease showed an average 4.25% “decrease” and the 11 who improved showed an average 10.27% “increase” in Total score despite having diagnosed cognitive decline. Furthermore, the underlying mechanisms associated with cognitive improvement are poorly understood. Similar programs assessing community-based social activities have speculated that positive cognitive effects might be due to increased social connectedness, engaging in cognitively stimulating social activities that may directly affect deposition of amyloid  $\beta$  protein, or by reducing stress levels in leisure activities that participants self-select [4]. Further research, with a larger sample, may help elucidate which factors drive the cognitive changes observed. The current feasibility study suggests that there are PWDs and their caregivers who are likely interested in participating in community-based arts programs. Although this is a small-sample study, results are promising and suggest that nonpharmacological community-based programs deserve further investigation.

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### RESEARCH IN CONTEXT

1. **Systematic review:** The authors reviewed the research literature and findings from dementia-based organizations in regard to community-based, nonpharmacological programs to better understand how the B Sharp program fits into the context of current literature. There are few arts-based community programs targeting dementia and fewer that systematically assess cognitive changes over the duration of the program.
2. **Interpretation:** Findings suggest that low-cost, community-sponsored programs may help in the prevention of cognitive decline in individuals with cognitive decline using a well-established neuropsychological assessment. Our results support recent goals to delay the progression of the disease.
3. **Future directions:** While the feasibility study results suggest positive results in terms of cognitive improvement accompanying the B Sharp program, future research should focus on understanding the elements of the program that are critical and yield the greatest benefits.

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