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THE EFFECTS OF SNOEZELEN (MULTI-SENSORY BEHAVIOR THERAPY) AND PSYCHIATRIC CARE ON AGITATION, APATHY, AND ACTIVITIES OF DAILY LIVING IN DEMENTIA PATIENTS ON A SHORT TERM GERIATRIC PSYCHIATRIC INPATIENT UNIT*

JASON A. STAAL, PSY.D.

AMANDA SACKS, PH.D.

Beth Israel Medical Center, New York

ROBERT MATHEIS, PH.D.
Fairleigh Dickinson University, New Jersey

LESLEY COLLIER, MSC., DIP COT SROT
University of Southhampton, United Kingdom

TINA CALIA, M.A.

HENRY HANIF, M.A., OTR/L

EUGENE S. KOFMAN, B.A.

Beth Israel Medical Center, New York

ABSTRACT

A randomized, controlled, single-blinded, between group study of 24 participants with moderate to severe dementia was conducted on a geriatric psychiatric unit. All participants received pharmacological therapy, occupational therapy, structured hospital environment, and were randomized to

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receive multi sensory behavior therapy (MSBT) or a structured activity session. Greater independence in activities of daily living (ADLs) was observed for the group treated with MSBT and standard psychiatric inpatient care on the Katz Index of Activities of Daily Living (KI-ADL; $P = 0.05$) than standard psychiatric inpatient care alone. The combination treatment of MSBT and standard psychiatric care also reduced agitation and apathy greater than standard psychiatric inpatient care alone as measured with the Pittsburgh Agitation Scale and the Scale for the Assessment of Negative Symptoms in Alzheimer's Disease ($P = 0.05$). Multiple regression analysis predicted that within the multi-sensory group, activities of daily living (KI-ADL) increased as apathy and agitation reduced ($R^2 = 0.42$; $p = 0.03$). These data suggest that utilizing MSBT with standard psychiatric inpatient care may reduce apathy and agitation and additionally improve activities of daily living in hospitalized people with moderate to severe dementia more than standard care alone.

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Key Words: Snoezelen, multi-sensory therapy, agitation therapy, dementia, behavior therapy, activities of daily living

INTRODUCTION

The present study is the first to assess whether a combined treatment comprised of standard psychiatric inpatient care and a non-pharmacological intervention, multi-sensory behavior therapy (MSBT), reduces agitation and apathy and improves ADLs in people with dementia on an acute care psychiatric hospital unit compared to standard psychiatric inpatient care alone.

Standard psychiatric inpatient care for the behavioral and psychological symptoms of dementia (BPSD) consists of atypical antipsychotics for the reduction of agitation and psychosis, as well as mood-stabilizers, antidepressants, a structured hospital environment, and occupational therapy [1]. Older people are often sensitive to adverse effects such as sedation, orthostatic hypotension, and extrapyramidal effects that can limit the use of medication and compromise efficacy [2].

Sensory stimulation was first introduced in America in the 1960s as an intervention to improve well-being in institutionalized people with dementia [3]. Sensory stimulation was developed in The Netherlands under the term Snoezelen.

Three previous studies suggest Snoezelen reduces BPSD [4-6]. To differentiate the study from it's a-theoretical predecessors (Multi Sensory Environmental Therapy (MSET) and Dutch Snoezelen), a new term, labeled multi-sensory behavior therapy (MSBT), was developed to describe the integration of behaviorism and Dutch Snoezelen [7]. The theoretical framework of MSBT is based on the operant paradigm of automatic reinforcement [8-9] and the physiological model

of the relaxation response [10]. Staal has developed a method of sensory assessment to match the preferences of the dementia patient with stimuli that target the visual, auditory, olfactory, and tactile systems and in turn individualizes the intervention to the participant [11].

We predicted that participants randomized to combined psychiatric care and MSBT would have a greater reduction in agitation and apathy and improvement in ADLs compared to those who received standard psychiatric care and attention controlled structured activity group. Furthermore, we hypothesized that the use of a combination treatment to treat BPSD would be associated with greater improvement in ADLs. Baseline and post-baseline assessment outcomes included measurement of level of agitation, apathy, and ADLs.

METHOD

Recruitment of Participants

The present study recruited 24 geriatric inpatients with the admitting diagnosis dementia with behavioral disturbances on an acute care geriatric psychiatry unit. Prior to the administration of baseline assessment measures, all study participants were randomly assigned to either the MSBT experimental group (n = 12) or a standard inpatient psychiatric care control group (n = 12). Standard care was comprised of occupational therapy involving all participants in the following group activities: movement awareness, grooming, crafts, and reality orientation with or without current events in a structured hospital environment. Informed written consent and a HIPAA form (Health Insurance Portability and Accountability Act of 1996) was obtained from all participants and legal guardians and the study was approved by the Institutional Review Board. The study sample was comprised of 8 males and 16 females (χ^2 = 1.67, p = 0.44). There were statistically significant differences in mean age between the treatment and control groups: The MSBT group (M = 80.33, SD =1.59) was significantly older than the control group (M = 72.00, SD = 0.84). There were no differences in Global Deterioration Scale (GDS) between the MSBT and control groups. Moderate differences in Mini Mental Status scores were observed where the MSBT group scored slightly higher (M = 19.17, SD = 1.47) than the control group (M = 11.83, SD = 2.77; p = 0.08); both groups, however, were within the critical range. Cognitive change was not an endpoint of this study and this cognitive screening instrument was a mere gate keeper measurement to insure that participants had a minimum cognitive status to understand directions and benefit from the intervention. Differences in group overall health scores, as measured by the Multi-level Assessment Instrument (MAI), were statistically significant between groups, with the MSBT group scoring a mean of 4.17 and the control group scoring a mean of 2.83.

Design

A mixed design evaluated the effectiveness of MSBT on activities of daily living. The between groups variable was the type of intervention (MSBT vs. structured activity) and the repeated within group variable was measures of improvement in ADLs over time.

Procedure

Baseline levels of agitation and apathy were measured. All participants, with a diagnosis of dementia with behavioral disturbance, received psychiatric treatment comprised of four classes of drug agents: the atypical antipsychotics, mood-stabilizers, cognitive enhancers, and antidepressants. As part of standard care, all participants received occupational therapy in a structured hospital environment. Participants were randomized to the comparison control group one to one attention using therapeutic recreation activities such as play dough or to the experimental group, one to one individualized sensory stimulation. The control group individually attended a one to one structured activity for 30 minutes. Each participant attended the structured activity with a researcher present, thus controlling for the effects of attention. The structured activity sessions were comprised of recreational intervention such as manipulative tasks (bead mazes), sorting tasks (puzzles), and tactile tasks (touch). The structural activity took place in the occupational therapy room located on the geriatric psychiatry unit. The participant was seated at a table and the tasks were presented to them. The participant had a choice of the activity in which to engage. The manipulative tasks consisted of manipulating beads in a maze such that the beads ended up at the end of the maze. The sorting task consisted of putting together puzzles. The tactile task included feeling different types of cloth. All participants received occupational therapy, which focused on activities of daily living and a structured hospital environment. A six session protocol, 25 to 30 minutes per session, was conducted post MSBT assessment (see Figure 1). Between-group contamination was minimized through the use of trained research assistants, who administered the interventions independently. While contact between randomized patients could not be prevented, control participants had no contact with the MSBT room in order to isolate the effect of the experimental intervention. Dressing was measured by research assistants post both groups using a sweater. Psychiatrists blinded to study subjects assessed and pharmacologically treated all study participants individually. Nurses blinded to the study's aims rated overall patient ADL post intervention. Research assistants measured apathy and agitation post sessions for both groups.

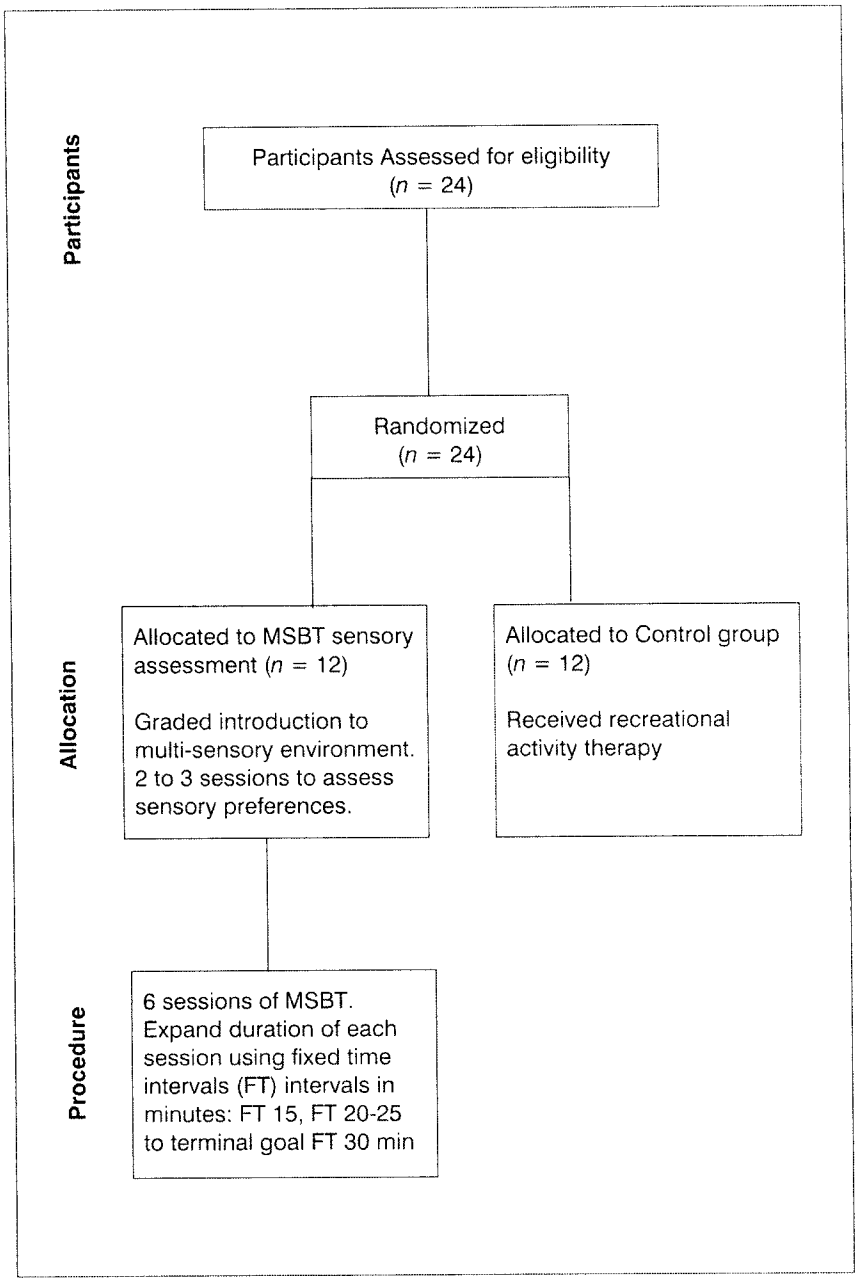

Figure 1. Intervention sequence.

Outcome Measures

The Global Deterioration Scale (GDS) determined stage of illness. The inter-rater concordance for the GDS is .95 for a zero or one point difference and a concordance of .70 for exact agreement [12].

The Pittsburgh Agitation Scale (PAS) assessed agitation. Inter-rater reliability for all four domains assessed with kappa exceed .80 [13].

From the Multi-level Assessment Instrument, one subscale (Physical Health) as a covariate in this study. The test-retest reliability of the physical health domain was 0.95 and the clinician-rated validity was 0.65 [14].

The Scale for the Assessment of Negative Symptoms in Alzheimer's Disease (SANS-AD) measured negative symptoms in patients with dementia. Inter-rater reliability ranged from 0.70 for affective flattening to 0.88 for avolition-apathy [15].

The Katz Index of Activities of Daily Living (KI-ADL) assessed bathing, dressing, toileting, transfer, continence, and feeding. Inter-rater reliability assessed with a kappa coefficient was 0.70 [16].

The Refined Activities of Daily Living Assessment Scale (RADL) assess ADLs. Agreement on nurses' ratings using Cronbach's alpha ranged from 0.89 to 0.98 and correlations with existing established ADL scales were 0.60 with the Physical Self-Maintenance Scale and 0.64 with the Performance Test of Activities of Daily Living suggesting moderate validity [17]. The Beck Dressing Performance Scale BDP measures dressing ability. The content validity and inter-rater reliability for this instrument calculated by kappa coefficients was established to be 0.80 [18].

The Mini Mental Status Exam (MMSE) is an instrument for screening gross cognitive functioning, with interrater reliability at 0.88 and test-retest reliability of 0.89 [19].

Statistical Analyses

In order to determine the effects of MSBT, a 2 (group) × 6 (time) repeated measures analysis of covariance (ANCOVA) examined the efficacy of MSBT on apathy and agitation and ADLs while covarying out physical health and age (Table 1). Assessment of agitation was conducted by a 2 (group) × 6 (time) ANCOVA. To determine the effect on apathy, a 2 (group) × 6 (time) ANCOVA was employed (Table 2). A hierarchical multiple regression was used to determine if measures on agitation and apathy were predictive of improvement in ADLs.

RESULTS

The results of this pilot study revealed that the MSBT group improved significantly in levels of agitation as compared to the control group ($F(6, 120) = 3.56$, $p = 0.003$). The MSBT group significantly improved in level of apathy as

Table 1. Mean ADL Posttest Scores across Study

	Session measured							
	Baseline	1	2	3	4	5	6	Mean change
Mean KI-ADL[a]								
MSBT	8.62	8.30	8.36	7.47	7.22	7.16	6.76	7.70
(*SD*)	(0.73)	(0.78)	(0.68)	(0.87)	(0.93)	(0.78)	(0.88)	(0.74)
Control	10.30	9.87	10.39	9.94	10.37	10.26	10.49	10.23
(*SD*)	(0.73)	(0.78)	(0.68)	(0.87)	(0.93)	(0.78)	(0.88)	(0.74)
Mean RADL[b]								
MSBT	209.33	—	—	204.92	—	—	208.42	3.15
(*SD*)	(4.50)			(21.44)			(16.52)	(2.60)
Control	197.50	—	—	202.15	—	—	196.75	-2.31
(*SD*)	(25.35)			(18.40)			(25.61)	(2.60)
Mean BDP								
MSBT	32.22	33.83	—	40.20	—	—	39.63	36.47
(*SD*)	(3.74)	(3.60)		(3.53)			(3.10)	(3.32)
Control	26.87	27.50	—	25.39	—	—	25.96	26.43
(*SD*)	(3.74)	(3.60)		(3.53)			(3.10)	(3.32)

[a]Increasing scores denote less independence. [b]Decreasing scores denote less independence. All scales were not administered at every session; empty cells denote a scale was not administered.

compared to the control group ($F(1, 20) = 4.47$, $p = 0.04$). Repeated measure analysis revealed a significant interaction; only participants in the MSBT treatment group experienced improvement in apathy from baseline to session six ($F(6, 120) = 3.15$, $p = 0.01$). One-way univariate analyses of variance (ANOVA) were conducted to ensure group equivalence at baseline on all ADL measures. The results indicated no significant group differences in KI-ADL scores ($F(1, 23) = 1.00$, $p = 0.33$), RADL scores ($F(1, 23) = 2.53$, $p = 0.13$), or BDP scores ($F(1, 23) = 1.17$, $p = 0.29$). A 2 (group) × 7 (time) repeated measures factorial ANCOVA was employed with time and group as primary factors and age and general health status as covariates. The results revealed the MSBT treatment group to have significantly improved levels of independence in ADLs on the KI-ADL than members of the control group ($F(1, 20) = 4.72$, $p = 0.04$).

Table 2. Agitation and Apathy across Study

	Time measured							
	Baseline	1	2	3	4	5	6	Mean change
Mean Agitation[a]								
MSBT	2.33	1.08	0.83	0.50	0.25	0.33	0.17	0.78
(*SD*)	(2.10)	(1.44)	(0.94)	(0.52)	(0.62)	(0.89)	(0.58)	(1.01)
Control	2.08	1.58	1.75	1.33	1.67	1.67	1.42	1.64
(*SD*)	(2.50)	(2.64)	(1.76)	(2.57)	(2.42)	(3.17)	(2.07)	(2.45)
Mean Apathy[a]								
MSBT	30.33	28.33	25.08	19.50	19.83	15.92	15.17	22.02
(*SD*)	(9.10)	(7.35)	(6.90)	(7.33)	(7.70)	(8.55)	(7.99)	(7.85)
Control	35.50	34.50	35.42	28.00	30.58	30.17	30.75	32.13
(*SD*)	(7.32)	(10.48)	(8.20)	(11.29)	(10.90)	(10.13)	(10.21)	(9.79)

[a]Increasing scores denote worse performance.

Contrary to our hypothesis, neither group demonstrated significant change in ADL status as measured by the RADL, or on the BDP when dressing was assessed post group sessions.

The results of the multiple regression analysis revealed that KI-ADL performance was predicted significantly from the proposed model which included apathy and agitation scores as well as health status and age as covariates ($R = 0.65$, $R^2 = 0.42$; $F(4, 19) = 3.40$, $p = 0.03$). The RADL was predicted significantly only by agitation scores ($R = 0.68$, $R^2 = 0.46$; $F(4, 19) = 4.00$, $p = 0.02$), and the model did not predict BDP scores beyond chance expectations ($R = 0.56$, $R^2 = 0.31$; $F(4, 19) = 2.16$, $p = 0.11$).

Within the experimental group (MSBT), 9 of the 12 participants were on atypical antipsychotic medications (Table 3). A one-way, post hoc, between groups ANOVA was run for each measure to compare those participants on antipsychotic medications that received MSBT and those not on antipsychotic medications that received MSBT. The findings were not significant for any of the measures; however, the trend for agitation was in the hypothesized direction ($F(1, 12) = 2.80$, $p = .133$). The nine participants who received MSBT and atypical antipsychotic medications did have better results than the three subjects who received MSBT and were not on atypical antipsychotic medications.

Table 3.

Medications for Control Group	Medications for Experimental Group
Subject #1 Olanzapine (10 mg/QMS), Strata (up to 40 mg/QW), Ritalin (5 mg/BTW)	Subject #1 Donepezil HCl (5 mg, Risperidone (.25 mg)
Subject #2 Citalopram Hydrobromide (40 mg/pogd), Olanzapine (5 mg/pogd), Donepezil HCl (10 mg/pogd), Quetiapine fumarate (25 mg po/daily)	Subject #2 Olanzapine (5 mg), Donepezil HCl (5 mg/qd)
Subject #3 Quetiapine fumarate (50 mg/qam & 75 mg/qd, Donepezil HCl (10 mg/qd)	Subject #3 Donepezil HCl (10 mg/qd), Quetiapine fumarate (300 mg/qam + QHS), Olanzapine (dosage unknown)
Subject #4 Quetiapine fumarate (100 mg), Citalopram Hydrobromide (30 mg)	Subject #4 Quetiapine fumarate, Donepezil HCl, Ginko (dosage unknown)
Subject #5 Quetiapine fumarate (dose unknown), Cognitive enhancer—type and dose unknown	Subject #5 Citalopram Hydrobromide (4 mg), Ativan (.5 mg)
Subject #6 Neurotin (400 mg TID), Donepezil HCl (5 mg, QD), Risperidone (dose unknown)	Subject #6 Atavan (.5 mg/BID), Haldol (2 mg/QD), Risperidone (.5 mg/BID), Citalopram Hydrobromide (10 mg/QMS)
Subject #7 Olanzapine (5 mg/POD)	Subject #7 Risperidone, Donepezil HCl, Memantine HCl (dosages unknown)
Subject #8 Risperidone, Divalproex Sodium (doses unknown)	Subject #8 Olanzapine (10 mg/QHS), Divalproex Sodium (250 mg/BP), Reminyl (4 mg/POBD), Haldol (1 mg/POQpm)
Subject #9 Zoloft (50 mg), Risperidone (5 mg)	Subject #9 Olanzapine (5 mg/QHS), Zoloft (75 mg/POQD), Donepezil HCl (10 mg)
Subject #10 Lexapro (10 mg), Olanzapine (2.5 mg)	Subject #10 Klonopin, Quetiapine Fumarate (doses unknown)
Subject #11 Trazadone (150 mg), Abilify (15 mg), Remenyl (4 mg)	Subject #11 Atavan (3 mg), Divalproex Sodium (75 mg)
Subject #12 Unable to retrieve medical chart due to missing chart number	Subject #12 Unable to retrieve medical chart due to missing chart number

DISCUSSION

The results indicated that over the course of six sessions of intervention, both the MSBT group and control group had reduced agitation. However, the MSBT group demonstrated higher decreases in agitation than the control comparison group. Improvement by both groups may reflect the efficacy of psychiatric inpatient care. However, it appears that the combination of pharmacological treatment and MSBT may reduce levels of agitation more than standard treatment alone.

The results for apathy indicated that the MSBT group demonstrated improvement compared to the control group. Different from agitation, however, the comparison control group did not show improved levels of apathy. MSBT may reduce apathy when combined with psychiatric inpatient care by evoking interest/focusing on the environment.

The MSBT group had higher levels of general independence in ADLs compared to members of the comparison control group as measured by the KI-ADL. In contrast, no difference between groups was observed when using discrete ADL assessment (RADL) and when assessing sweater dressing behavior (BDP). A possible explanation is the KI-ADL's sensitivity to identifying levels of functional independence.

Theoretically, the operant paradigm is used to explain the mechanism of action of MSBT in improving agitation and apathy and the global functioning in ADL. First, the use of modified operant procedures was used to match the preferences of the person to the sensory stimuli [11]. Secondly, non-contingent, automatic sensory reinforcement is theorized to be the active factor of the intervention resulting in improved well being of people with dementia [11].

Controlling for health status and age, both apathy and agitation scores emerged as statistically significant predictors of KI-ADL performance. RADL performance was predicted significantly by the proposed model; however, only agitation scores specifically predicted performance on that scale. Agitation and apathy were not found to be predictive of BDP performance. The finding that the proposed model containing agitation, apathy scores, and the covariates of physical health and age predict performance (as measured by the KI-ADL and RADL scales) is consistent with previous research indicating that these factors negatively impact ADLs [16]. Demonstrating this relationship infers a theoretical basis to demonstrate how MSBT may improve independence in ADL functioning, by reducing agitation and apathy.

The current study improved upon previous studies of MSEs. It is hypothesized that by matching a stimulus (sensory reward) to the person's preference and using graded intervals of time to allow people to become accustomed to the MSE environment resulted in no early termination from the MSBT group. A prior MSE study resulted in four dropouts due to negative reactions [20].

In this study, a non-contingent schedule of reinforcement was utilized [21]. The presentation of sensory reward was not based on a desired response from the participant or performance of a behavior at a set time. The use of a non-contingent schedule of reinforcement combined with orienting/prompting the person with dementia to each type of stimulation differs from the enabling approach used in previous MSE studies [22].

One class of reward, edible reinforces (food), was excluded from this study even though it has been a part of the multi-sensory package of stimuli used in MSEs. The results suggest that sensory reinforcement (visual, auditory, olfactory, and tactile) may act as classes of rewards in the people with dementia. As individuals experience actions that lead to reward though engagement in MSBT, meaning may occur, which may lead to subjective states of well being and behavioral momentum for action which may continue across contextual settings [23, 24].

The results of this study suggest that MSBT combined with standard psychiatric care reduced levels of agitation and apathy, central components of BPSD on an acute care inpatient geriatric psychiatric unit. This finding expands upon previous Multi-sensory Environmental (MSE) studies, which demonstrated reductions in apathy and agitation in therapeutic settings such as day treatment programs and nursing homes [4-6].

Further, previous MSE studies did not account for standard psychiatric care that may have been received by participants and therefore did not validate MSE as a complementary treatment to standard pharmacological care [4-6, 20, 21].

The current study assessed for stage of dementia utilizing the GDS, which allowed for a greater specificity of research sample. Controlling for the stage of illness infers that MSBT combined with standard psychiatric care may be beneficial for moderate to severe stages of dementia.

In addition, this study controlled for physical health and age, both of which can negatively impact on individuals' ability to engage in ADL despite level of BPSD or dementia. Including these factors as covariates in the statistical analysis allowed for a more accurate examination of study variables and demonstrated that the combined treatment is useful despite such differences.

MSBT treatment combined with standard inpatient psychiatric care achieved within this study appears to transfer from the MSE room to the unit. This finding is consistent with Baker's study [22], which concluded generalization of the effects whereby improvements in behavior and mood from a day treatment center were maintained at home. Other MSE studies failed to detect a transfer of effect from the Snoezelen room to the care environment [20, 21].

There are several limitations to the present study. The first methodological limitation of the study involves instrument selection. Baseline measures of dressing revealed that some study participants had the capacity to dress themselves. Since these participants were not excluded from the study, the

improvement that was made by these higher functioning participants may have been too small to be detected due to the lack of measurement sensitivity of the measures used (RADL, BPD). Behavioral, not cognitive, change is a more important variable in relation to BPSD improvement. A change in a measure, which assesses BPSD may be more important than gatekeeper measures such as the MMSE, which may reveal very little about functional change for this population.

A second limitation, observer bias may have occurred by the use of observational measures to assess agitation and apathy. The nature of working on a small psychiatric unit may have revealed the group (experimental or control) of a given participant. However, the group identity of the participant was less likely to be known by the nurses performing the global ADL measure due to blinding of raters and the delay between intervention and assessment.

Measuring independence in ADLs on an inpatient unit presented methodological challenges. No control was exercised in relation to meal time and staff activity during mealtime.

Assessment of toileting was hindered by respect for patient privacy and nurse discomfort with assessing toileting.

There are limitations in the design of this analysis, particularly sample size yet due to the pilot nature of the investigation and the rigors of inpatient research. A smaller sample size is tolerable. Replication by independent research teams is warranted.

Future MSBT studies should examine schedules of reinforcement to assess maintenance of MSBT treatment benefits over time, assessing session frequency and temporal spacing. Training staff in MSBT methods and procedures and integrating multi-sensory interventions into care plans may play a role in the efficacy of MSBT treatment to continue post therapy sessions [9].

Behavioral interventions, Strategies for Promoting Independence of ADLs (SPID) has had relative success increasing independence of ADLs in people with dementia [25]. MSBT used in conjunction with SPID may provide a comprehensive behavioral treatment for increasing ADL independence.

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Direct reprint requests to:

Jason A. Staal, Psy.D.
Assistant Professor of Psychiatry
University Hospital for the Albert Einstein College of Medicine
Department of Psychiatry, Division of Psychology
Beth Israel Medical Center
First Avenue at 16th Street
Office location: 6K
New York, NY 10003
e-mail: Jstaal@chpnet.org