Enhanced Task-Oriented Training in a Person With Dementia With Lewy Bodies

Carrie A. Ciro, Linda A. Hershey, David Garrison

MeSH TERMS
- dementia
- Lewy bodies
- motor skills
- task performance and analysis
- treatment outcome

Despite the inevitable loss of function seen in people with progressive dementias, interventions for reversing or minimizing functional loss are understudied. Research supports task-oriented training, but practical gaps in how to best evaluate clients for this training and how to implement it in clinical settings may be thwarting translation to occupational therapy practice. We structured an intervention model called STOMP (Skill-building through Task-Oriented Motor Practice) using a unique blend of task-oriented training and motor-learning principles. In this article, we describe through a case study the process and outcome of using STOMP to improve functional skills in a woman with moderate dementia with Lewy bodies. Our findings suggest that STOMP has the potential to serve as a structure for the evaluation and treatment of occupational performance deficits in people with dementia and that this model warrants further investigation.


I miss me sometimes.
—Mrs. C, case study participant

Dementia with Lewy bodies (DLB), the second most common type of dementia, is thought to affect 1–2 million Americans (Tarawneh & Galvin, 2007). People with probable DLB present with a memory disorder and at least two of the following characteristics: parkinsonism, daytime sleepiness, and visual hallucinations (McKeith et al., 2005). Presence of a rapid eye movement sleep disorder improves the clinical accuracy of the diagnosis (Ferman et al., 2011). Despite the prevalence of DLB, we were unable to locate studies examining the impact of a rehabilitation intervention on a person with DLB.

People diagnosed with any form of dementia eventually suffer losses in occupational performance that are not improved significantly by pharmacologic approaches (Hansen, Gartlehner, Lohr, & Kaufer, 2007). Task-oriented training (i.e., practicing the tasks the person is unable to perform) is a nonpharmacologic approach to improving occupational performance, is congruent with contemporary occupational therapy practice, and has been tested in people with dementia (Bier et al., 2008; Labelle & Mihailidis, 2006; Zanetti et al., 1997). Studies have documented various dosages and training routines, leaving occupational therapy practitioners without a specific structure for delivering the intervention. Therefore, we created an enhanced task-oriented training approach called STOMP (Skill-building through Task-Oriented Motor Practice) that structures the evaluation, planning, and implementation processes and is aimed at improving occupational performance in people with dementia.

The STOMP intervention model is a family-centered model with a unique blend of task-oriented training and motor-learning principles informed by neurobehavioral evidence (van Halteren-van Tilborg, Scherder, & Hulstijn, 2007; Wittenberg & Schaechter, 2009). To begin, families and participants choose meaningful goals to address in therapy. Second, performance is...
examined, and compensatory modifications are chosen that may improve performance. Finally, the goal is broken down into practicable steps that include the modifications or strategies for improving performance and are practiced repetitively according to specific motor-learning training principles. Given the lack of evidence for rehabilitation in people with DLB and of support for an intervention model, the purpose of this study was to describe the process and outcomes of using the STOMP intervention with a single person with DLB.

Method

Study Design

We designed this case study in preparation for a single-group pre–post design study. Descriptive and prestudy outcome measures were administered on two separate occasions before beginning the 10-day intervention. Postoutcome measures were administered on the last day of the intervention. Field notes were taken during the daily intervention. The University of Oklahoma institutional review board (IRB) approved the study.

Participant

The participant in this case study was recruited through a university health sciences center neurologist who specialized in dementia care (Linda A. Hershey, the second author) and e-mails sent to campus employees. Inclusion criteria were as follows: community-dwelling, English-speaking adult aged 55–90 yr living with a legally authorized representative; diagnosis of DLB by a neurologist; Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) score >10 but ≤25, indicating mild to moderate dementia; ability to understand and follow one-step commands and move one extremity; ability of the participant or family member to identify three goal areas related to functional performance; and ability to participate in 3 hr of daily intervention in the home environment for 2 consecutive weeks. Exclusion criteria included Creutzfeldt–Jakob disease, delirium, and severe anxiety.

The participant, Mrs. C, met the inclusion and exclusion criteria. Her legally authorized representative (her spouse–caregiver) provided informed written consent, and Mrs. C provided verbal assent in their home using spouse–caregiver) provided informed written consent, her legally authorized representative (her representative; diagnosis of DLB by a neurologist; Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) score >10 but ≤25, indicating mild to moderate dementia; ability to understand and follow one-step commands and move one extremity; ability of the participant or family member to identify three goal areas related to functional performance; and ability to participate in 3 hr of daily intervention in the home environment for 2 consecutive weeks. Exclusion criteria included Creutzfeldt–Jakob disease, delirium, and severe anxiety.

The Canadian Occupational Performance Measure (COPM; Law et al., 1994) is a semistructured interview tool for prioritizing areas of functional performance deficit in three areas—self-care, productivity, and leisure—in people with a variety of conditions, including dementia. In our case, given the severity of this participant’s condition, we also included discrete functional tasks that were important to daily performance. The spouse–caregiver prioritized tasks that were most important and then rated performance and satisfaction for each task on a scale of 1–10 (1 = worst, 10 = best). Clinically significant change is ≥2 points (Law et al., 1994). Input for the COPM can be provided by social resources if the participant is unable to communicate on his or her own behalf (Law et al., 1994). Test–retest reliability (ICC) is .67 in people poststroke.

Goal Attainment Scaling (GAS; Kiresuk & Sherman, 1968) is an individualized measure of goal achievement to track within-subject longitudinal change. After examining performance of the COPM goals, we used the GAS ordinal measure (−2, −1, 0, 1, 2) to break down the COPM goal into five possible scenarios: 0 represents achievement of the intended goal, negative scores represent much less and somewhat less than the expected outcome, and positive scores represent somewhat more and much more than the expected outcome. For behavioral Mrs. C’s level of dementia, we used the MMSE, a scale that is commonly used to detect and stage dementia in research and has adequate to excellent internal consistency (Cronbach’s α = .54–.96; Tombaugh & McIntyre, 1992). The level of parkinsonism was described using Hoehn and Yahr (1967) staging; k interrater reliability scores range from .44 to .71 (Goetz et al., 2004). We examined depressive symptoms using the Cornell Scale for Depression in Dementia (Vida, Des Rosiers, Carrier, & Gauthier, 1994), a 19-item scale measuring the presence of depression in people with dementia that has good internal consistency (α = .82; Müller-Thomsen, Arlt, Mann, Mass, & Ganzer, 2005). Examiner-rated level of functional disability in activities of daily living (ADLs), locomotion, and social interaction were examined using the FIM™ (Keith, Granger, Hamilton, & Sherwin, 1987). The FIM has excellent consistency between raters (median interrater reliability = .95) across patients with different diagnoses and levels of impairment (Ottenbacher, Hsu, Granger, & Fiedler, 1996). Finally, we used the Caregiver Burden Scale (CBS) to examine Mrs. C’s caregiver’s perception of burden through items for health and personal, social, and financial well-being (Zarit, Reever, & Bach-Peterson, 1980); the CBS has excellent internal consistency (α = .89; Wang et al., 2008).

Pre- and Postoutcome Measures. The Canadian Occupational Performance Measure (COPM; Law et al., 1994) is a semistructured interview tool for prioritizing areas of functional performance deficit in three areas—self-care, productivity, and leisure—in people with a variety of conditions, including dementia. In our case, given the severity of this participant’s condition, we also included discrete functional tasks that were important to daily performance. The spouse–caregiver prioritized tasks that were most important and then rated performance and satisfaction for each task on a scale of 1–10 (1 = worst, 10 = best). Clinically significant change is ≥2 points (Law et al., 1994). Input for the COPM can be provided by social resources if the participant is unable to communicate on his or her own behalf (Law et al., 1994). Test–retest reliability (ICC) is .67 in people poststroke.

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change, the GAS has demonstrated test–retest reliability ($r$) of .45 and internal consistency ($r$) of .60 (McGaghie & Menges, 1975). The GAS in combination with the COPM has been used to successfully measure clinical change in adults with traumatic brain injury (Doig, Fleming, Kuipers, & Cornwall, 2010). All measures were administered by the first author (Carrie A. Ciro), who has 22 yr of clinical experience working with adults and 13 yr of academic experience.

**Procedure**

**Initial Sessions.** The participant was involved in two sessions before beginning the intervention. In Session 1, the treating occupational therapist (Ciro) worked to establish a therapeutic relationship by being genuinely empathetic, being socially “with” the participant and family, and honoring their goal choices (Price, 2009). Creating the foundation for this relationship was an important part of this session, which also included describing the study, testing for inclusion and exclusion criteria, and obtaining informed consent and assent. The occupational therapist obtained a sociodemographic profile and performed preliminary testing. In Session 2, the caregiver chose and prioritized COPM goals, and the therapist observed the functional performance of each goal.

**Preassessment Preparatory Work.** In preparation for the STOMP intervention, the occupational therapist spent approximately 2 hr creating an intervention specific to client strengths and limitations. The therapist considered adaptive equipment and task and environmental modifications and developed the sequence of practiceable steps for training in each goal.

**Treatment Sessions.** The first author (Ciro) conducted all treatment sessions in the participant’s home for 2–3 hr/day, 5 days/wk, for 2 wk. This dosage was chosen on the basis of neurorehabilitation training protocols with people poststroke (Wittenberg & Schaechter, 2009). The occupational therapist and participant spent 1 hr on each goal. At the beginning of each hour, the therapist introduced the goal and initiated repetitive, blocked practice of each task, which was carried out as many times within the hour as the participant tolerated. If the participant showed signs of fatigue, the therapist provided short activity breaks with rest or diversion. The therapist used an errorless learning paradigm so that the participant completed the task with as little error as possible during practice. To do so, she provided hand-over-hand assistance or physical guidance as needed for early sessions but gradually downgraded to fewer physical cues and more gestural and verbal cues. The therapist provided verbal praise indicating good performance at the end of each step of the training sequence.

**Intervention Fidelity.** Five components are hypothesized to be the active elements of the STOMP intervention: (1) family-centered goals; (2) task-specific training; (3) repetitive, blocked practice delivered with continuous verbal praise; (4) errorless learning; and (5) therapeutic relationship. The treating occupational therapist developed the intervention, so extra training was not necessary. She used daily checklists, however, to ensure consistent use of all elements and consistent delivery of the active elements of the protocol.

**Posttesting.** The treating occupational therapist completed the postintervention assessments using the COPM and the GAS on the last intervention day.

**Data Analysis**

We used descriptive analysis to report our findings and synthesize field notes from the intervention. Pre- and postoutcome scores, as well as change scores, were reported for the COPM. The final GAS score was compared with baseline. Field notes were used to describe issues that affected the process of the intervention. Adherence to the five active ingredients was expressed as a total percentage. Data were stored for review in a password-protected Excel spreadsheet.

**Results**

**Participant**

Mrs. C was a 73-yr-old White woman who lived with her husband, the primary caregiver, in a single-story ranch home. She was a mother, grandmother, and painter. She had completed high school and had worked as a lab director in an allergy clinic. Table 1 provides detail about Mrs. C’s status at preassessment screening. Mrs. C had been diagnosed with DLB 2 yr before study enrollment; her family had noted memory changes beginning 6 yr earlier. Other medical issues included bilateral hip arthritis, persistent low back pain, occasional heart palpitations, osteoporosis, and frequent falls (1×/wk). She had difficulty sleeping through the night and had significant daytime drowsiness. Two alternating paid daytime attendants provided her with supervision and care during the day. She spent time in a recliner in the living room, either watching TV or napping, most of the day. She maintained a strong sense of humor, good social graces, and periods of lucidity that enhanced interactions with the treating occupational therapist, allowed for the co-creation of a therapeutic relationship, and provided insight into the world of DLB. Mrs. C had not previously received occupational therapy for DLB.
Process for Structuring the STOMP Intervention
Table 2 summarizes the STOMP planning process. The occupational therapist first considered Mrs. C’s existing occupational performance. Second, she devised activity adaptations to support Mrs. C’s performance, such as prearousal activities, assistive technology, and external cueing methods (sequencing list). Third, the therapist developed a training sequence for each goal that included assistive technology and external cueing methods that could be practiced using STOMP methods. Finally, on the basis of the progress the therapist thought Mrs. C could achieve, and given the intervention strategies and time frame, the therapist formatted the COPM goals for measurement using GAS scaling (Table 3).

Pre- and Postintervention Performance
Pre- and postintervention outcome scores are provided in Table 4. Being able to stand safely from the recliner was the most important goal for both Mr. C and Mrs. C’s attendants. Her preintervention COPM scores for performance and satisfaction were low but improved by the end of the intervention. The final GAS score indicates that Mrs. C met the expected level of performance for this goal.

Prearousal activities appeared to yield only transient improvements in arousal. Interestingly, on 2 of the 10 days Mrs. C was alert and performed at study expectations (i.e., practiced for 30–45 min/hr), resulting in more repetitions of each activity.

Field Notes During Intervention
During the intervention, the treating occupational therapist recorded notes about Mrs. C’s performance, including instances when the intervention could not be completed, and data on therapist adherence to the intervention. A checklist for monitoring adherence to the five active ingredients of STOMP over 10 days indicated that the therapist followed the protocol 96% (48/50) of the time. The most significant and reoccurring reason for not completing a session was decreased arousal. According to the field notes, the attendants reported that Mrs. C had slept poorly in 8 of 10 sessions. Fatigue routinely diminished Mrs. C’s practice time to 20–30 min/hr. Prearousal activities appeared to yield only transient improvements in arousal. Interestingly, on 2 of the 10 days Mrs. C was alert and performed at study expectations (i.e., practiced for 30–45 min/hr), resulting in more repetitions of each activity.

The second issue affecting intervention completion was Mrs. C’s low back pain. Although she did not complain of pain when standing from the recliner, she displayed several pain behaviors during toothbrushing, such as grabbing her back, holding on to the sink, and stopping the activity for a rest. This break in activity affected her ability to address this goal and the number of times this goal could be repeated.

Discussion
This case study describes the process and outcome of using the STOMP intervention to improve performance in it reflected the impact of DLB on her overall functional performance. Her initial COPM performance and satisfaction scores were low but improved by the end of the intervention. Her final GAS score, +1, reflects achievement of a level of performance one level beyond what was anticipated given her starting level and available adaptations.
a person with DLB. In two of the three goals the spouse–
caregiver selected, Mrs. C made progress as perceived by
the caregiver using the COPM and as observed by the
treating occupational therapist using GAS scaling. Field
notes indicated that Mrs. C’s ability to participate fully
was affected by decreased arousal and chronic pain.

Our first aim in this study was to examine the effects of
a rehabilitation intervention for a person with DLB.
Despite the presence of signature characteristics of DLB,
such as varying arousal, parkinsonian features, sleep
disorder, and hallucinations (Knopman, Boeve, &
Petersen, 2003), this participant improved her perfor-
mance of functional tasks that held meaning for her
family. Given that the STOMP intervention is built on
performing a sequence of steps, the participant’s ability to
improve despite motor apraxia is noteworthy. Previous
work has indicated that apraxia and motor learning may
be dissociable in people with Alzheimer’s disease because
different brain areas control each element (i.e., premotor
area for apraxia, parietal area for motor learning; Jacobs
et al., 1999). This research lends credence to findings that
people with dementia are able to participate in and im-
prove through rehabilitation programs despite advanced
and progressive cognitive losses. Moreover, in people
with dementia, psychostimulants may enhance arousal
systems, resulting in increased attention and time on
tasks; pharmacotherapy may have been helpful in this
way to our participant with DLB (Dolder, Davis, &

Our second aim was to examine the STOMP in-
tervention as a way to provide structure to evaluation,
planning, and implementation of a task-oriented training
program by occupational therapy practitioners. In terms of
evaluation structure, we demonstrated that use of the
COPM and GAS creates a unique pairing for outcome
measurement for people with dementia that is sensitive
to the goals of clients and families while allowing for
examiner-rated performance. Discovery and prioritization
of clients’ goals followed by examination of their perfor-
mance toward these goals as the blueprint for occupa-
tional therapy intervention is in line with professional
practice guidelines (Moyers & Dale, 2007). Practically,
the COPM may not extend evaluation time, but GAS,
which is unfamiliar to many occupational therapists, may
initially exceed the therapist’s available time for goal de-
velopment. However, occupational therapists have re-
ported that with repeated use of GAS, they become faster
(Joyce, Rockwood, & Mate-Kole, 1994). Combined use
of the COPM and GAS may provide a practical system
for examining performance and measuring outcomes for
task-oriented training.

Given our expectation that the cognitive skills of
someone with dementia would not improve, we chose
a planning structure that uses a compensatory approach to
improve occupational performance (Moyers & Dale,
2007). Devising modifications that immediately support
occupational performance, such as environmental alter-
ations (e.g., couch cane, pillow in chair) and external
cueing strategies (e.g., posted sequencing list), is supported
by occupational therapy research (Letts et al., 2011;
Padilla, 2011). Breaking the task down into practiceable
steps requires task analysis and is a core feature in task-
oriented rehabilitation (Wittenberg & Schaechter, 2009).
The STOMP intervention, which is based on a synthesis

<table>
<thead>
<tr>
<th>Stage</th>
<th>Steps</th>
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| Preintervention occupational performance | 1. Participant attempted to use rocking momentum to stand from the chair, but the chair was a rocking recliner, so it rocked with her.  
2. Participant attempted to use her arms to push up from the chair.  
3. Participant did not monitor feet placement, so she stood up with her feet together and became unbalanced; she required maximal assistance to stand from the chair.  
4. Because her unguided performance took several minutes, she forgot what she was attempting to do. |
| Activity adaptations | 1. We attempted prearousal activities, including playing beloved old music or vigorously rubbing the tops of legs.  
2. We placed a block under the recliner to prevent the chair from rocking.  
3. We placed a “Couch Cane” under one side of the chair to provide a pull-up bar for standing.  
4. We placed a pillow behind the participant’s back to improve her posture in the chair and to keep her in a dynamic pelvic position for standing. |
| Task sequence for STOMP training using practiceable steps | 1. Grab couch cane (this required participant to automatically scoot forward and flex at hips and minimized the motor sequence directions).  
2. Spread feet.  
3. Stand up. |

Note: STOMP = Skill-building through Task-Oriented Motor Practice.
of occupational therapy and neurorehabilitation literature, provides a potential structure for planning task-oriented training interventions.

In choosing an implementation structure, we turned to tested motor-learning variables. Previous work has suggested that people with Alzheimer’s disease can benefit from massed practice of the task, but not more than healthy control participants, suggesting a ceiling limit for practice (Dick, Hsieh, Dick-Muehlke, Davis, & Cotman, 2000). Because of our participant’s low arousal and pain, she received about half of the dosage we anticipated for the goals practiced. We do not feel that she reached her ceiling limit, and she might in fact have performed better with more sophisticated methods of managing arousal and pain.

We also embraced blocked practice of the task (i.e., no change in setup, task sequence, or environment) instead of random practice. Studies have indicated that people with dementia learn better when they are not allowed to make errors (Thivierge, Simard, Jean, & Grandmaison, 2008) and may need the support of continuous external reinforcement to support performance; more research, however, is needed to understand this aspect (van Halteren-van Tilborg et al., 2007). The field notes indicated that verbal praise at every step was the most difficult aspect of STOMP to adhere to initially.

Limitations

This research has inherent limitations. The case study design limits designation of causality and generalization to a broader population. One occupational therapist served as the evaluator and treating therapist, which could bias the results of outcome testing. However, having a single therapist serve as the interventionist during the 2-wk intervention likely strengthened the therapeutic relationship and, perhaps, the eventual results (Price, 2009). Because of the limited scope of this project, we did not examine maintenance of the results. We intend to address these methodological concerns in a subsequent study with a stronger design and fewer threats to internal validity.

Table 4. COPM Goals Formatted for Goal Attainment Scaling

<table>
<thead>
<tr>
<th>Prioritized Goals</th>
<th>+2 Much More Than Expected Outcome</th>
<th>+1 Somewhat More Than Expected Outcome</th>
<th>0 Projected Performance Expected by the End of the Measurement Period</th>
<th>-1 Somewhat Less Than Expected Outcome (Baseline Level)</th>
<th>-2 Much Less Than Expected Outcome (Regression)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 1: Stand from recliner</td>
<td>Stands from recliner with modified independence 75% of the time</td>
<td>Stands from recliner with standby assist using a couch cane 75% of the time</td>
<td>Stands from recliner with minimal assist using a couch cane 75% of the time</td>
<td>Stands from recliner with maximal assist 75% of the time</td>
<td>Stands from recliner with maximal to total assist 100% of the time</td>
</tr>
<tr>
<td>Goal 2: Brush teeth</td>
<td>Brushes teeth thoroughly using a picture sequence with minimal assistance and cues</td>
<td>Brushes teeth thoroughly using a picture sequence with moderate assistance and cues</td>
<td>Brushes teeth thoroughly using a picture sequence with maximal assist and cues</td>
<td>Brushes teeth thoroughly (front, back, and sides) with total assist</td>
<td>Refuses to allow others to brush her teeth</td>
</tr>
<tr>
<td>Goal 3: Don eyeglasses</td>
<td>Picks up eyeglasses and dons with 2–3 verbal cues to initiate and complete</td>
<td>Picks up eyeglasses and dons with 1 verbal cue to initiate task and 2–3 verbal cues to complete</td>
<td>Picks up eyeglasses and dons with minimal assistance and 2–3 verbal cues</td>
<td>Picks up eyeglasses and dons with moderate assist and 4 verbal cues</td>
<td>Picks up eyeglasses and dons with maximal assist and &gt;4 verbal cues</td>
</tr>
</tbody>
</table>

Note. COPM = Canadian Occupational Performance Measure.
Future Directions

Future research is needed to examine the STOMP intervention model using multisubject designs, expanded patient populations (e.g., those with Alzheimer’s disease) and goals (e.g., ADLs), and attention to dosage. As reflected in the quote at the beginning of this article, many people with dementia have periods of lucidity that researchers can explore through qualitative methods. Our goal was to provide occupational therapists with a standardized evaluation and intervention system they can individualize for people with dementia to improve functional performance. Evidence-based treatment paradigms support occupational therapy practitioners’ ability to treat people with dementia as a primary or secondary diagnosis in the many settings in which they care for older adults.

Implications for Occupational Therapy Practice

We demonstrated that occupational therapy can positively influence occupational performance deficits in a person with DLB. Occupational therapy practitioners may find value in examining the STOMP intervention as an overlay for
• Systematic evaluation of occupational performance deficits in people with dementia and
• Structured treatment planning and implementation strategies for improving occupational performance deficits. ▲

Acknowledgments

This project was supported by a University of Oklahoma Health Sciences Center research seed grant. Carrie Ciro is grateful to Thubi Kolobe for her mentorship and guidance.

References


