Addressing Behavioral Symptoms of Dementia Through STAR-VA Implementation: Do Outcomes Vary by Behavior Type?

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Abstract

Objectives: The STAR-VA program in Veterans Health Administration Community Living Centers (CLCs, nursing home settings) trains teams to implement a psychosocial intervention with residents with behavioral symptoms of dementia (BSD).

Methods: Across 71 CLCs, 302 residents selected as training cases had target behaviors categorized into one of 5 types: physically aggressive (PA), physically nonaggressive, verbally aggressive, verbally nonaggressive, and behavior deficit (BD).

Results: Across all groups, there were significant declines in team-rated behavior frequency (36%) and severity (44%), agitation (10%), distress behaviors (42%), depression (17%), and anxiety (20%). The magnitude of changes varied across behavior category. For example, those with a PA target behavior experienced a greater percentage decline in agitation and distress behavior scores, and those with a BD target behavior experienced a greater percentage decline in depressive and anxiety symptoms.

Conclusions: STAR-VA, a multicomponent intervention, is generally effective across various types of behavioral symptoms associated with dementia.

Keywords
dementia, behavioral and psychological symptoms, nursing homes, veterans, ecopsychosocial interventions

Introduction

Behavioral and psychological symptoms are common among individuals with dementia, including those living in nursing home care settings. In this article, we refer to a range of observable behaviors, such as restlessness, hitting, screaming profanities, repeated vocalizations, and care refusal, as “behavioral symptoms of dementia” (BSD). We subscribe to conceptualizing such behaviors as reflecting an interaction between the person, the dementing illness, and the interpersonal and physical environment, which may also be thought of as behavioral expressions. Behavioral symptoms of dementia may co-occur with psychological phenomena, such as depression and anxiety. These behavioral and psychological experiences often have negative implications for the quality of life of nursing home residents with dementia and are often associated with distress in care staff.

Increased recognition of BSD’s multiple and modifiable determinants has led to the development of ecopsychosocial interventions, which help caregivers manage BSD by targeting environmental, psychological, and social factors driving the BSD. These interventions are now widely recommended as first-line approaches for treating BSD. Recent reviews, however, have found mixed empirical support for a range of ecopsychosocial interventions for managing BSD. The variability in treatment effects may, at least partially,
reflect conceptual and/or methodological challenges in this literature.

One challenge is in defining all BSD as a unidimensional construct when in fact it may be multidimensional. For example, agitation and aggression, commonly experienced2,3 and studied BSDs, have important differences in their manifestation and consequences. Agitation refers to “inappropriate verbal, vocal, or excessive motor activity”18 that may call attention to some unmet need; “agitation affects primarily the person with dementia (although the behaviors may be disruptive for others in his/her environment).”14 Aggression is defined as “destructive actions directed toward persons, objects, or self”18 or, sometimes, more specifically, as involving “at least one other person (the target of the aggression).”14 In either case, aggressive behavior causes risk to the person with dementia and/or other people, often direct caregivers.14,18

The conceptual distinction between agitation and aggression has some empirical support,19,20 including evidence of differences in the determinants.18 Similarly, conceptual and causal differences exist between agitation and apathy,18,21 another common behavioral symptom in dementia that refers to “loss of motivation that is accompanied by diminished self-initiated behavior, reduced goal-directed cognitive activity, and diminished emotion.”18 Differences in the nature and determinants of BSD may moderate an intervention’s effectiveness; however, few effectiveness studies have examined this question.14

The STAR-VA intervention, adapted from Teri and colleagues’ Staff Training in Assisted Living Residences (STAR) program22 for implementation in Veterans Health Administration (VHA) Community Living Centers (CLCs), is an interdisciplinary, multicomponent, ecopsychosocial intervention for managing BSD. Community Living Centers, previously known as nursing home care units, provide long-term skilled nursing care, as well as shorter term rehabilitation, hospice, and respite care services to veterans with a wide range of care needs, including those with dementia.23 Compared to the community nursing home population, CLC residents are mostly men, younger, and are more likely to have behavioral symptoms that interfere with care, cause risk for physical illness or injury, or interfere with participation in activities or social interactions.24-26 Veterans who stay in the CLC long term are required to have service-connected conditions such as post-traumatic stress disorder (PTSD), schizophrenia, amputation, and so on, involving psychiatric and mobility-related disabilities. In addition, CLCs have full interdisciplinary care teams including not only nursing, medicine, social work, dietary, recreation, and rehabilitation therapy but also pharmacy, psychology, and chaplaincy.

In the CLC, STAR-VA implementation entails a partnership between a mental health professional (typically an integrated psychologist) and a registered nurse champion who are trained to engage direct care staff and other team members in behavioral assessment and care planning for residents with distressed dementia-related behaviors. Early STAR-VA implementation demonstrated decreased frequency and severity of a broad range of behaviors, as well as decreased symptoms of depression, anxiety, and agitation, among STAR-VA-enrolled CLC residents with dementia.27,28 However, neither the STAR-VA evaluation to date nor previous evaluations of STAR have examined whether the intervention’s effects vary across types of behaviors that are commonly observed in individuals with dementia. Understanding whether outcomes vary based on the type of presenting behavior has important implications for ongoing program implementation.

This evaluation aims to (1) summarize the impact of STAR-VA training program implementation between 2014 and 2017 on selected veteran clinical outcomes, including frequency and severity of target behavioral concerns, and symptoms of anxiety, depression, and agitation, and (2) examine whether these outcomes differ across 5 behavioral categories: physically aggressive (PA), physically nonaggressive (PNA), verbally aggressive (VA), verbally nonaggressive (VNA), and behavior deficit (BD).

**Methods**

**STAR-VA Intervention and Training Program**

Detailed descriptions of the STAR-VA intervention and training program are available elsewhere.27,28 In brief, the STAR-VA intervention has 4 core components: (1) promoting realistic expectations of individuals with dementia; (2) promoting effective verbal and nonverbal communication with persons with dementia; (3) utilizing the “ABC” behavioral model in which observable behaviors are understood to be a reaction to interpersonal, interperson, and/or environmental activators and shaped by consequences of those behaviors; and (4) identifying and increasing person-centered pleasant events into daily care.

The training program consisted of a 2.5-day in-person or virtual clinical workshop followed by a 6-month consultation period with experienced STAR-VA interventionists who served as training consultants (TCs). Two-member teams from each CLC participated in the training: (1) a CLC psychologist or psychiatric provider (“behavioral coordinator” or BC) and (2) a CLC registered nurse (“nurse champion” or NC). Both BC and NC implemented the STAR-VA approach with their local CLC interdisciplinary staff (“staff partners”), participated in weekly (for BCs) or monthly (for NCs) training consultation calls and in program evaluation activities.

During the 6 months of consultation, each CLC team implemented STAR-VA with at least 4 residents (ie, veterans). The CLC teams identified and enrolled veterans as training cases if (1) the veteran had a diagnosis of dementia; (2) the veteran had at least 1 behavior that occurred weekly or more frequently and was distressing to the veteran, other residents, staff, and/or family; (3) the behaviors were not directly related to delirium, other acute medical illness, acute psychotic symptoms, or a recent traumatic brain injury; and (4) the veteran was deemed medically stable and not receiving hospice care. Once the veteran was enrolled, the CLC team identified one specific behavior to address (ie, the target behavior) and developed a behavior plan to address that behavior using the “ABC” approach.

The ABC problem-solving approach provides a structured method for describing a target behavior (the “B”), defining a
desired goal behavior, and developing a plan to change the target behavior’s activators (the “A”) and the consequences (the “C”). The goal of this approach is to replace the distressed target behavior with a new goal behavior. The “ABC card” is a tool that helps teams to structure and communicate the “ABC” behavioral assessment and developing and communicating what is called the “Get Active” behavior plan. In the context of the training program, for each veteran enrolled, the CLC team completed an ABC card weekly, documenting the status of the target behavior, approaches taken to address the behavior, and adjustments to the behavior plan according to the resident’s response. This process continued weekly until the behavior had improved; the team had increased confidence in understanding, preventing, or managing the behavior; or the team felt another intervention was indicated.

Participants

Between 2014 and 2017, a total of 302 CLC veteran residents, across 71 facilities, were enrolled as STAR-VA training cases. Seventeen (5.6%) veterans were dropped from the analysis due to hospitalization, discharge, transfer, or insufficient information to determine target behavior. An additional 8 (2.6%) veterans died during enrollment and were also excluded from analyses. The final analytic sample consisted of 277 (91.7%) of the enrolled training cases.

Coding Target Behaviors

The categories used to organize target behaviors into subgroups were revised from previous reports,²⁹ to be consistent with empirical literature and to avoid categories with overlapping definitions. New behavior categories were chosen based on the Cohen-Mansfield Agitation Inventory’s (CMAI) conceptual differentiation of PA, VA, PNA, and VNA behaviors.³⁰ In 2014 and 2015, each resident’s target behavior was identified by the clinical team for each STAR-VA training case and documented on the ABC card; the TC selected the appropriate behavior category based on detailed case review in weekly consultation calls with the BC. In 2016 and 2017, BC trainees described the target behavior and selected the target behavior category on a case summary form; the TC was no longer asked to categorize the target behavior.

Two subject matter expert coders (both geropsychologist STAR-VA program leaders, coauthors K.C. and M.K.) reviewed case summary form descriptions of the target behavior and the selected behavior category for training cases in all years 2014 to 2017. The TC and/or BC were contacted by the coders for clarification in cases where (1) more than 1 behavior category was selected by the BC or TC, (2) no category was selected, or (3) the behavior category selected did not appear to match the target behavior described. Final behavioral category coding was determined by consensus of the 2 expert coders. During this review process, the coders identified a set of behaviors that did not fit in one of the initial 4 behavior categories. For these behaviors, the expert coders determined the target to be an absence of desired behavior rather than the presence of an undesired behavior, for example, declining to take important medication or to get out of bed. A fifth category was added, labeled “behavior deficit” (BD), which is distinct from the 4 categories of behavioral excesses. Table 1 presents examples of the types of behaviors coded into each of the 5 categories.

| Table 1. Behavior Categories and Target Behavior Examples. |
|-----------------------------------------------------------|
| **Behavior Category** | **Target Behavior Example** | **STAR-VA Enrollees** |
|-----------------------|-----------------------------|-----------------------|
| Physically aggressive (PA) | “Veteran punches male staff.” | 58 |
| | “Veteran had grabbed a staff by the neck.” | |
| | “Veteran hitting, kicking, scratching, spitting, yelling, and cursing during care.” | |
| Verbally aggressive (VA) | “Veteran yells loudly, at times screams, uses profanity and disparaging words toward staff.” | 75 |
| | “Veteran would yell and curse at female nursing staff when attempting to help him with toileting cares.” | |
| | “Veteran makes sexual comments to staff and asks personally intrusive questions.” | |
| Physically nonaggressive (PNA) | “Veteran repeatedly attempts to get out of bed or his manual wheelchair on his own.” | 61 |
| | “Veteran takes items that don’t belong to him.” | |
| | “[B]ecomes distracted when he sees dirt/uncleanliness. Starts cleaning tables, chairs, other residents’ bathrooms, etc.” | |
| Verbally nonaggressive (VNA) | “Veteran yelling in bedroom… Veteran is alone.” | 49 |
| | “Veteran yells ‘Help me!’ when he wants to go home to his wife or is not getting what he wants.” | |
| | “Veteran would yell nonstop for hours.” | |
| Behavior deficit (BD) | “Veteran does not open his mouth to take medications.” | 34 |
| | “Veteran refuses to comply with toileting.” | |
| | “Veteran stays in bed and refuses to get out of bed in the morning when nurses ask him.” | |

Measures

Clinical Covariates

A set of demographic and clinical characteristics of the STAR-VA enrolled veterans were obtained using a demographic form completed by the BC. Demographic characteristics collected included sex, age, marital status, education, service era, combat...
exposure, indicators of mental health diagnoses (psychotic disorder, mood disorder, anxiety disorder, PTSD, and other mental health diagnoses), receipt of an antipsychotic or benzodiazepine, and type of CLC unit.

Cognitive and functional status was assessed at baseline using the Blessed-Orientation-Memory-Concentration Test (BOMC) and the Functional Assessment Staging Tool (FAST). The BOMC serves as an indicator of cognitive functioning. Weighted scores of 10 or greater are considered more indicative of dementia. The FAST assesses functioning with scores that range from 1 (no functional impairment) to 7 (severe functional impairment).

In addition to clinically relevant veteran characteristics, the length of enrollment in the intervention for each training case was tracked and defined as the time between the first and last weekly ABC card completed during the training program. The “end” of the intervention (ie, the last ABC card) was determined as the point when the CLC team implemented a behavioral plan that helped address the target behavior, or the clinical team decided an alternative approach to STAR-VA may be necessary. In practice, behavioral intervention does not “end” as the team continues to implement and refine a plan to meet the resident’s needs.

Outcomes

The primary outcomes of interest were the association between target behavior category and change in (1) the frequency rating of the target behavior, (2) the severity rating of the target behavior, (3) overall agitation, per the CMAI, and (4) overall distress behaviors per the Minimum Data Set (MDS) 3.0. We selected multiple measures expected to capture outcomes of STAR-VA implementation including measures assessing the frequency and severity of the target behavior and overall distress behaviors captured by a validated clinical measure and a routine measure given in the nursing home setting. Because of the high prevalence of depression and anxiety in dementia and their association with BSD, secondary outcomes included changes in symptoms of depression and anxiety.

Frequency and severity. Target behavior frequency and severity were assessed with ratings included on the ABC card completed at baseline and then weekly until the end of the intervention. Ratings were completed by the BC with input from staff partners. Behavior frequency was coded as: 0 = “never,” 1 = “not in past week,” 2 = “1 to 2 times per week,” 3 = “3 to 6 times per week,” or 4 = “daily or more often.” Target behavior severity was coded as: 0 = “not at all,” 1 = “mild,” 2 = “moderate,” 3 = “very,” or 4 = “extreme.” We model frequency and severity of the target behavior separately.

Agitation. The Cohen-Mansfield Agitation Inventory–Short Form (CMAI-SF) was administered to assess the frequency of 14 agitated behaviors at baseline and intervention conclusion. Symptom frequency was based on staff partner report over the previous 2 weeks using a 5-point frequency scale (1 = “never,” 2 = “less than once a week,” 3 = “once/several times a week,” 4 = “once/several times a day,” or 5 = “few times an hour/continuous for half an hour or more”). The 14 items were summed to create a total CMAI-SF score for both the baseline and postintervention assessments. Internal consistency within this population was acceptable (baseline: $\alpha = .67$; post: $\alpha = .76$). We model the association between the target behavior category and the change in the total CMAI-SF score from baseline to postintervention.

Distress behaviors. The MDS 3.0 is a mandatory set of screening, clinical, and functional status items used in nursing homes to communicate resident problems and to monitor the quality of care. Section E of the MDS focuses on behavioral symptoms that may be distressing, harmful, or disruptive to the resident, other facility residents, staff, family, and other visitors. Section E items of the MDS assessing the frequency and impact of a range of behavioral symptoms were completed by the BC in consultation with staff partners at baseline and postintervention. Behavioral symptoms assessed are (1) physical behavioral symptoms: hitting, kicking, pushing, scratching, grabbing, abusing others sexually; (2) verbal behavioral symptoms: threatening others, screaming at others, cursing at others; (3) other behavioral symptoms: hitting or scratching self, pacing, disrobing in pubic, disruptive sounds; and (4) rejection of care: blood work, taking medications, activities of daily living assistance. Behavior frequency is coded as: 0 = “not exhibited,” 1 = “occurred 1 to 3 days,” 2 = “occurred 4 to 6 days,” or 3 = “occurred daily.”

The MDS further assesses whether the physical, verbal, or other behavioral symptom (1) puts the resident at significant risk for illness or injury, (2) significantly interferes with the resident’s care, (3) interferes with the resident’s participation in activities or social interactions, (4) puts others at risk for injury, (5) intrudes on the privacy/activity of others, and (6) disrupts care or the living environment. These 10 MDS 3.0 behavioral and impact items were summed as a dementia-related behavior indicator (DBI). Dementia-related behavior indicator scores range from 0 to 18. The DBI demonstrated acceptable or good reliability (baseline: $\alpha = .75$; post: $\alpha = .85$) in this population. Change in total DBI score from baseline to postintervention is modeled.

Depression. Depressive symptoms were assessed at baseline and intervention conclusion using the Cornell Scale for Depression in Dementia (CSDD). Ratings for each of 19 items were based on observation and information from semistructured interviews with the veteran and staff partners: 0 (absence of symptoms), 1 (mild or intermittent symptoms), or 2 (severe symptoms). Items were summed and a total score of 8 or more is considered indicative of significant depressive symptoms. Good internal consistency for the total score was demonstrated at both baseline ($\alpha = .83$) and postintervention ($\alpha = .93$). We model the association between behavior category and change in total CSDD score from baseline to postintervention.
Anxiety. The Rating Anxiety in Dementia (RAID) was utilized to assess anxiety symptoms at baseline and intervention conclusion. Ratings were based on veteran interview/observation and staff partner report. Items were rated on a scale from 0 (absence of symptoms) to 3 (severe symptoms). A total score of 11 or more across the 18 items indicates significant anxiety symptoms. Good internal consistency for the total score was demonstrated at both baseline ($\alpha = .94$) and postintervention ($\alpha = .93$). The association between behavior category and change in RAID score is estimated.

Statistical Analysis

Because CLC sites and veteran residents were not randomly selected to participate in STAR-VA nor randomly assigned to behavior category, we assessed whether veteran characteristics differed significantly across behavior categories. For categorical variables, differences were assessed with $\chi^2$ or Fisher exact test. For continuous variables, differences were assessed with $F$ tests and independent $t$ tests. All $P$ values were 2 sided and values less than .05 were considered statistically significant.

The association between behavior group and any differential change in outcomes after participation in STAR-VA was assessed using a linear mixed model framework. Mixed models are appropriate for repeated-measures data, where observations cannot be considered independent. Further, a mixed model approach does not require complete data, allowing for estimates to also be informed by incomplete cases. The distribution of the outcome variable as well as likelihood ratio tests comparing models determined the appropriateness and selection of a linear, Poisson, or negative binomial model as the final model estimated for each outcome. The final model selected for each outcome is identified in Table 2. We also tested the fit of each model with a correction for CLC-level variance. Results for each outcome suggested that model fit was improved when CLC-level variance was not included (results not shown). Finally, we estimated and present only the average marginal effects for ease of interpretation.
behavior categories, we estimated adjusted models by including covariates for each characteristic that differed at baseline. We include unadjusted results for comparison. All analyses were conducted using Stata 15.1.

**Results**

**Veteran Characteristics**

Veteran training cases included in the analytic sample were on average 78.5 years of age; were mostly male (96.7%); the majority had obtained at least a high school education (55.7%); and were either married or divorced/separated (70.1%). The largest proportion (48.9%) had served during Vietnam, and 43.2% were reported to have experienced combat exposure during their military service. At least 1 psychiatric diagnosis was documented by the BC for 68.2% of the training cases. At baseline, 56.0% of the training cases were reported by the BC to be receiving an antipsychotic or benzodiazepine medication and were rated as having the lowest cognitive functioning (compared only to VA).

Table 3 presents baseline and postintervention clinical measures by target behavior category and highlights differences, if any, between target behavior groups on each of the measures. On average, veterans selected as training cases exhibited moderately severe signs of cognitive decline (FAST = 5.8, standard deviation [SD] = 0.8). Although not significantly so, veterans with a PA target behavior were rated the most severe (FAST = 6.1, SD = 0.7). Dementia was indicated across all training cases (Blessed = 21.0, SD = 7.6) and highest, although not significantly so, Blessed scores were observed among veterans with a PA target behavior (Blessed = 22.8, SD = 6.6).

Comparisons demonstrated significant differences between behavior categories in age, education attainment, service era, receiving 1 or more antipsychotic or benzodiazepine medications, length of enrollment in the intervention, and baseline cognition, anxiety symptoms, depressive symptoms, and agitation (Tables 3 and 4). Only those characteristics with significant differences between behavior groups were included as covariates in the final models. Of note, veterans with a VNA target behavior were on average oldest and had the highest proportion serving during World War II. Veterans with a PNA target behavior had the highest proportion with service during Vietnam. Veterans with a BD had the highest percentage with service in the post-Vietnam era. Veterans with a PA target behavior had the highest percentage receiving at least 1 antipsychotic or benzodiazepine medication and were rated as having the lowest cognitive functioning (compared only to VA).

**Clinical Outcomes**

At baseline, veterans with a PA target behavior were observed to have the highest agitation (CMAI) scores, but only significantly higher than BD categorized veterans (Table 3). The DBI scores were also highest among veterans with a PA target behavior (differences with all other groups were significant). From the ABC card, target behavior severity scores were highest in the VA group, but the only significant difference was between VA and PNA groups. The target behavior was rated the most frequent (ABC card) among veterans with a BD target behavior; however, no significant differences between behavior groups was observed. On average, CSDD scores indicated significant depressive symptoms, with highest scores observed
among veterans with a BD or VA target behavior. However, depressive symptoms differed at baseline between VA and PNA target behavior groups only. On average, training cases experienced significant anxiety symptoms at baseline, with symptoms rated highest among those with a VNA and VA categorized behavior. Significant group differences in RAID scores were also observed at baseline (Table 3), with significantly higher anxiety symptoms rated for those with a PA target behavior compared with VNA and BD behavior types, for those with VA compared with PNA target behaviors, and significantly lower ratings of anxiety for those with BD compared with VNA behavior types (Table 3).

### Impact on Behavioral and Clinical Outcomes

**ABC card target behavior frequency.** Regression results adjusted for veteran characteristics (Table 2) show that, overall, frequency ratings of the target behavior declined significantly

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| Total | PA | VA | PNA | VNA | BD | Category Differences |
|-------|----|----|-----|-----|----|----------------------|
| Total analytic sample, n (%) | 277 (100.0) | 58 (20.9) | 75 (27.1) | 61 (22.0) | 49 (17.7) | 34 (12.3) |
| Sex, n (%) | | | | | | |
| Male | 265 (96.7) | 55 (94.8) | 70 (95.9) | 60 (98.6) | 47 (95.9) | 33 (100.0) |
| Female | 9 (3.3) | 3 (5.2) | 3 (4.1) | 1 (1.6) | 2 (4.1) | |
| Age, mean (SD) | 78.5 (10.6) | 78.8 (11.4) | 77.6 (12.0) | 77.2 (8.7) | 72.2 (8.7) | 81.2 (10.2) |
| Marital status, n (%) | | | | | | |
| Married/partnered | 108 (39.4) | 29 (50.0) | 25 (34.3) | 20 (32.8) | 25 (51.0) | 9 (27.3) |
| Divorced/separated | 84 (30.7) | 12 (20.7) | 30 (41.1) | 19 (31.2) | 11 (22.5) | 12 (36.4) |
| Widowed | 57 (20.8) | 9 (15.5) | 14 (19.2) | 16 (26.2) | 9 (18.4) | 9 (27.3) |
| Single/never married | 25 (9.1) | 8 (13.8) | 4 (5.5) | 6 (9.8) | 4 (8.2) | 3 (9.1) |
| Education, n (%) | | | | | | |
| Less than high school | 43 (15.8) | 8 (13.8) | 15 (20.8) | 6 (9.8) | 12 (24.5) | 2 (6.1) |
| High school | 109 (39.9) | 26 (44.7) | 21 (29.2) | 33 (54.1) | 15 (30.6) | 14 (42.4) |
| Some college | 43 (15.8) | 8 (13.8) | 16 (22.2) | 8 (13.1) | 3 (6.1) | 8 (24.2) |
| College graduate | 35 (12.8) | 3 (5.2) | 13 (18.1) | 4 (6.6) | 12 (24.5) | 3 (9.1) |
| Some graduate school | 2 (0.7) | 0 (0.0) | 0 (0.0) | 2 (3.3) | 0 (0.0) | 0 (0.0) |
| Graduate degree | 18 (6.6) | 4 (6.9) | 4 (5.6) | 5 (8.2) | 3 (6.1) | 2 (6.1) |
| Unknown | 23 (8.4) | 9 (15.5) | 3 (4.2) | 3 (4.9) | 4 (8.2) | 4 (12.1) |
| Service era, n (%) | | | | | | |
| WWII | 51 (18.8) | 12 (21.4) | 12 (21.9) | 2 (3.3) | 15 (30.6) | 6 (18.2) |
| Korean War | 86 (31.6) | 17 (30.4) | 22 (31.9) | 22 (36.1) | 18 (36.7) | 8 (24.2) |
| Vietnam | 133 (48.9) | 27 (48.2) | 34 (46.6) | 39 (63.9) | 17 (34.7) | 16 (48.5) |
| Post-Vietnam | 18 (6.6) | 1 (1.8) | 7 (9.6) | 4 (6.6) | 1 (2.0) | 5 (15.2) |
| Combat exposure, n (%) | | | | | | |
| Yes | 118 (43.2) | 26 (44.8) | 32 (43.8) | 22 (36.7) | 24 (49.0) | 14 (45.5) |
| No | 103 (37.7) | 20 (34.5) | 30 (41.1) | 24 (40.0) | 14 (28.6) | 15 (42.4) |
| Unknown | 52 (19.1) | 12 (20.7) | 11 (15.1) | 14 (23.3) | 11 (22.5) | 4 (12.1) |
| Psychiatric diagnoses, n (%) | | | | | | |
| Psychotic disorder | 21 (7.7) | 7 (12.3) | 6 (8.2) | 2 (3.3) | 3 (6.1) | 3 (9.4) |
| Mood disorder | 110 (40.4) | 25 (43.9) | 26 (35.6) | 26 (42.6) | 20 (40.8) | 13 (40.1) |
| Anxiety disorder | 44 (16.2) | 9 (15.8) | 9 (12.3) | 9 (14.8) | 13 (26.5) | 4 (12.5) |
| PTSD | 65 (23.9) | 17 (29.8) | 15 (20.6) | 15 (24.6) | 13 (26.5) | 5 (15.6) |
| CLC unit type | | | | | | |
| LTC, general | 153 (55.8) | 27 (46.6) | 38 (52.1) | 34 (55.7) | 30 (61.2) | 24 (72.7) |
| LTC, dementia | 86 (31.4) | 21 (36.2) | 19 (26.0) | 22 (36.1) | 17 (34.7) | 7 (21.2) |
| LTC, focus | 1 (0.4) | 0 (0.0) | 1 (1.4) | 0 (0.0) | 0 (0.0) | 0 (0.0) |
| Other | 34 (12.4) | 10 (17.2) | 15 (20.6) | 5 (8.2) | 2 (4.1) | 2 (6.1) |
| Antipsychotic/benzo receipt, n (%) | | | | | | |
| Antipsychotic | 127 (46.5) | 38 (65.5) | 32 (44.4) | 27 (44.3) | 20 (40.8) | 10 (30.3) |
| Benzodiazepine | 42 (20.8) | 13 (31.0) | 11 (22.0) | 6 (12.0) | 10 (28.6) | 2 (8.0) |
| Any Rx medication | 155 (56.0) | 45 (77.6) | 38 (50.7) | 33 (54.1) | 28 (57.1) | 11 (32.4) |
| Length of intervention (days), mean (SD) | 37.9 (17.6) | 35.0 (15.2) | 42.0 (22.9) | 36.0 (14.0) | 41.8 (16.2) | 32.2 (13.1) |

Abbreviations: BD, behavior deficit; CLC, Community Living Center; PA, physically aggressive; PNA, physically nonaggressive; PTSD, post-traumatic stress disorder; SD, standard deviation; VA, verbally aggressive; VNA, verbally nonaggressive; WWII, Second World War.

*Tests of group differences were estimated using $\chi^2$ and Fisher exact tests for categorical variables. $F$ tests were conducted for differences in continuous variables. $P < .05$. $P < .01$. 

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**Table 4. Comparison of STAR-VA Enrolled Veteran Characteristics by Target Behavior Category.*a**

*Tests of group differences were estimated using $\chi^2$ and Fisher exact tests for categorical variables. $F$ tests were conducted for differences in continuous variables. 

$P < .05$. 

$P < .01$. 

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The results indicate that veterans with a BD or VA target behavior experienced significant anxiety symptoms at baseline, with symptoms rated highest among those with a VNA and VA categorized behavior. Significant group differences in RAID scores were observed at baseline, with higher anxiety symptoms rated for those with a PA target behavior compared with VNA and BD behavior types, for those with VA compared with PNA target behaviors, and significantly lower ratings of anxiety for those with BD compared with VNA behavior types (Table 3).

**Impact on Behavioral and Clinical Outcomes**

**ABC card target behavior frequency.** Regression results adjusted for veteran characteristics (Table 2) show that, overall, frequency ratings of the target behavior declined significantly among veterans with a BD or VA target behavior. However, depressive symptoms differed at baseline between VA and PNA target behavior groups only. On average, training cases experienced significant anxiety symptoms at baseline, with symptoms rated highest among those with a VNA and VA categorized behavior. Significant group differences in RAID scores were also observed at baseline (Table 3), with significantly higher anxiety symptoms rated for those with a PA target behavior compared with VNA and BD behavior types, for those with VA compared with PNA target behaviors, and significantly lower ratings of anxiety for those with BD compared with VNA behavior types (Table 3).
from the preassessment to the postassessment. However, only the BD and VNA groups differed significantly in this observed decline. Marginal effects estimates suggest a 35.9% decline (−1.2 scale points) across all behavior categories from baseline to the post period (Table 5). Practically, the results suggest an average decline in frequency from approximately 3 to 6 times per week (adjusted mean = 3.2) to 1 to 2 times (adjusted mean = 2.1) by the end of the intervention for all veterans. The decline in the frequency of the target behavior was greatest for the BD group (−1.5 points, −a 44.7% decline); however, the magnitude of this decline was only significantly greater than the VNA group (−0.9 points, −a 27.9% decline; Table 5). The BD group did have the highest unadjusted ABC frequency rating at baseline (3.4 points); however, the unadjusted baseline frequency scores were not significantly different across behavior categories (Table 3).

**ABC Card Target Behavior Severity.** The adjusted model suggests that target behavior severity ratings declined significantly from baseline to the postintervention assessment for all groups (Table 2). Marginal effects estimates show that STAR-VA enrollees experienced an average decline of 1.2 scale points (−44.1%) during the intervention period from roughly “very” to “mild” severity (Table 5). The magnitude of the decline in the severity of the target behavior was largest for those with a PA target behavior (−1.4 points, −50.5% decline) but only significantly greater than those with a VNA target behavior (−0.9 points, −32.8% decline; Table 5). We note that baseline severity scores were not significantly different between the PA and VNA groups (Table 3). The largest percentage change (54.6%, −1.3 points) was observed in average severity ratings of the BD target behavior group; however, this percentage change in average severity rating was not significantly different from other behavior groups.

**Distress-related behavior indicator.** Regardless of target behavior group, enrolled veterans were at a lower risk for experiencing distress behaviors by the end of the STAR-VA training program (Table 2). Distress behaviors declined significantly by 3.2 points (41.7%) from baseline to postintervention (Table 5). Adjusted regression and marginal effects estimates suggest that STAR-VA may impact distress behaviors differently depending on the target behavior. At baseline, the highest DBI scores were observed in the PA group and were significantly higher than the average scores in all other target behavior categories (Table 3). It should also be noted that the BD group had the lowest observed DBI scores and that the differences were significant between BD and the other behavior groups, except for the PNA behavior group (Table 3). Despite several significant baseline group differences, the change in DBI score was only significantly different between 2 pairs of target behavior categories: (1) PA group (−4.5 points, −49.6%) and the BD group (−0.6 points, −15.8%) and (2) between the BD target behavior group and VA group (−2.5 points, −36.4%).

**Agitation (CMAI).** Adjusted models demonstrated that, on average, agitation symptoms (CMAI) declined significantly from preassessment to postassessment (Tables 2 and 5). On average, marginal effects estimates point to a decline of 2.6 points (10.2%) from baseline to postintervention. The results also suggest a possible differential impact on agitation by behavior category. Declines in total agitation scores were largest among...
veterans with a PA target behavior (−4.9 points, −17.4% decline). The PA group experienced declines significantly greater than the VA (−2.7 points, −10.3%), VNA (−0.9 points, −3.6%), and BD (1.4 points, 6.3%) target behavior groups. It is noted that baseline agitation scores were highest among the PA group, but only significantly higher than those with a BD target behavior (Table 3). In addition, the PNA target behavior group experienced a significantly greater decline in CMAI scores (−3.9 points, 14.8% decline) compared to the VNA group. Although not significant, adjusted marginal effects suggest an increase in CMAI scores among the BD target behavior group (1.4 points, 6.3% increase).

Other mental health symptoms—Depression and anxiety. Depressive symptoms (CSDD) declined 16.8% (−1.4 points) across all behavior groups from baseline to postintervention (Table 5). Depressive symptomology declined most for those veterans with a BD target behavior (−2.1 points, −22.9% decline). Significant declines were also observed among veterans with a VA (−1.2 points, −15.5%) or a PNA (−1.5 points, −18.1%) target behavior. Adjusted marginal effects and regression coefficients do not suggest differential effects of STAR-VA on depressive symptomology by target behavior categorization.

Likewise, anxiety symptomology (RAID) declined on average from baseline to postintervention across all behavior groups by 20.3% (−1.9 points; Table 5). The VNA target behavior group experienced the largest point decline (−2.2 points, −20.8%); however, the BD group experienced the largest percentage decline in RAID scores (−2.0 points, −26.2%). All behavior groups, except for the PNA group (−1.2 points, 13.0% decline), experienced significant declines in anxiety as measured by the RAID from baseline to postintervention. However, adjusted marginal effects and regression coefficients suggest similar decreases in anxiety symptoms across all target behavior categorizations, despite significant differences between groups in baseline RAID scores.

Discussion
This evaluation compared clinical outcomes for veteran residents before and after implementation of STAR-VA across 71 VA CLC teams trained between 2014 and 2017. Adjusting for differences in individual veteran characteristics, we demonstrate that implementation of STAR-VA resulted in decreased frequency and severity of behaviors targeted for intervention, decreased overall distress behaviors as measured by the MDS 3.0 behavior items, and decreased symptoms of agitation and anxiety. These outcomes are generally consistent with earlier STAR-VA program evaluation findings.

This analysis extends previous work by examining the intervention’s impact across 5 target behavior types: PA, VA, PNA, VNA, and BD. We find differences for some clinical outcomes in the magnitude of change across behavior type. For example, the veterans with a PA target behavior showed the greatest decline in target behavior severity ratings, overall distress behaviors, and agitation compared to at least 1 other target behavior category. Veterans with a VA target behavior experienced greater decline in overall distress behaviors and agitation compared to the BD group. However, a greater number of between-group differences appeared with respect to our measure of agitation (CMAI), suggesting that the MDS 3.0 measure of distress behaviors may be less sensitive to differences in the impact of STAR-VA by behavior type or that the 2 measures are capturing different constructs.

Overall declines in agitation were greatest for veterans with physical aggressive behavior and PNA behavior compared with veterans demonstrating verbal nonaggressive behaviors and BDs. We note that this analysis does not point to clear, systematic differences between behavior types across multiple clinical outcomes. Yet, we conclude that STAR-VA, a multicomponent intervention, is generally effective across various types of behavioral symptoms associated with dementia. We also highlight the importance of including multiple outcome measures when addressing a range of behavior types.

Physical aggression is often the most concerning behavior among individuals with dementia, given the risk of injury to self and others. Having an effective approach to aggressive behavior is imperative to maintain the well-being and safety of both residents and staff. Traditionally, and in this sample, psychotropic medications are often utilized to address aggressive behaviors. An important message of this evaluation is that a person-centered, ecopsychosocial intervention like STAR-VA can help teams to manage and decrease PA behaviors. In fact, STAR-VA interventions targeting PA behaviors lead to the greatest decline in target behavior severity ratings, distress behaviors, and overall agitation. As such, STAR-VA may reduce the use of antipsychotic medications as a first approach to care, consistent with goals of the National Partnership to Improve Dementia Care in Nursing Homes. Future evaluations will examine the impact of STAR-VA on psychotic prescribing.

In STAR-VA, BD represented a category of behavior that did not reflect any of the verbally or PA or nonaggressive behaviors but, nonetheless, was concerning to the care team. Residents with a BD may not receive as much attention as those whose behaviors are more disruptive to their care or the care environment. This category was heterogeneous, including behaviors such as not taking medications when offered and declining to participate in activities. Not surprisingly, this group had relatively low agitation and distress scores at baseline and had the lowest percentage of veterans taking an antipsychotic medication. Although not statistically significant, this group had one of the highest baseline levels of depressive symptoms, suggesting that depression might contribute to some of the disengaged behaviors observed. Certainly, although not measured in this evaluation, apathy, a common behavior in individuals with dementia, may also contribute to the behavioral presentation of veterans in this group. The STAR-VA intervention was also effective with this group, with the shortest average intervention time, largest decrease in frequency of target behaviors, and the largest declines in depressive symptoms. It is important for future investigations to examine the
effectiveness of behavioral interventions for behaviors that may be less disruptive but may affect quality of life and for caregivers to realize that this group can also be supported to work toward positive behavioral goals through an intervention like STAR-VA.

STAR-VA was not designed as an intervention for anxiety or depression and its focus is principally on the target behavior of concern. Nonetheless, our analysis demonstrates that this intervention may also improve symptoms of anxiety and depression, which frequently co-occur with BSD in individuals with dementia.\textsuperscript{2,3} For all but those with a PNA target behavior, anxiety symptoms were significantly lower at the end of the intervention compared to baseline. We did not find as consistent and strong an effect of the program on depressive symptoms; yet, for 3 of the 5 behavior categories, depressive symptoms were significantly lower by the end of the intervention. Previous research has demonstrated the effectiveness of targeted ecopsychosocial behavioral interventions for depression (eg, pleasant events, a component of STAR-VA)\textsuperscript{42,43} and anxiety\textsuperscript{44,45} in individuals with dementia. Likewise, although this program did not measure symptoms of PTSD, the relationship between PTSD and BSD among individuals with dementia, including veterans with combat or other trauma history, is an important area for ongoing research.\textsuperscript{36}

This evaluation must be considered in the context of its strengths and limitations. Strengths of the present work include that STAR-VA has been implemented in a national health-care system, over multiple years, with many participating CLC sites and teams. Both BCs and NCs trained as site leaders participated in 6 months of intensive consultation as they worked with their teams to learn and implement this care approach. Training consultants worked with BC and NCs at each site to respond to questions and assist in overcoming challenges to implementation. Further, standardized clinical evaluation tools were administered by participating doctoral-level psychologists or psychiatric providers in collaboration with the team.

This evaluation of a program implementation was not designed as a research study. Therefore, we did not have the advantage of an explicit control group. Veterans included were selected by the BC, NC, and TC as training cases, excluding those with delirium or primary psychotic illness or receiving hospice care, and behaviors demonstrated may not be representative of the entire range of BSD. There may have been other factors influencing the selection of cases for the training program, such as choosing relatively less complex cases or, conversely, choosing cases of most concern to the team. The interventionists were the same people who completed the pre- and postmeasures; there were no independent raters of the clinical outcomes. In addition, there are a variety of ways in which the target behaviors addressed by the teams could have been categorized based on other theoretical systems. Further, a veteran often experienced more than 1 behavior across the 5 categories; however, the goal was to select one target behavior for the intervention. This evaluation does not inform possible interrelationships among different behaviors within veterans nor the effectiveness of the intervention for various combinations of behaviors.

Overall, this evaluation suggests that, with resident-centered, individualized ecopsychosocial assessment and intervention, CLC teams can help residents with BSD to experience less distress and to decrease the frequency and severity of target behaviors. Note that these STAR-VA program findings may or may not generalize to other nursing home care settings, given differences in populations served, team/staff composition, and/or training resources. Ongoing STAR-VA evaluation will focus on the impact of STAR-VA on systemic outcomes, including overall rates of distressed behaviors in VHA CLCs, psychotropic medication prescribing, staff injuries, and transitions in care. It will be important to continue to evaluate the impact of STAR-VA by behavior type, to optimize high-quality, resident-centered care for veterans in VA CLCs.

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