

A Mixed Methods Study of Behavioral Symptoms of Dementia
among Older Veterans with and without Posttraumatic Stress Disorder
in Residential Long-Term Care Settings

by

Bada Kang

Nursing
Duke University

Date: _____

Approved:

Eleanor S. McConnell, Advisor

Michele J. Karel

Wei Pan

Kirsten N. Corazzini

Dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy in Nursing
in the Graduate School
of Duke University

2020

ABSTRACT

A Mixed Methods Study of Behavioral Symptoms of Dementia
among Older Veterans with and without Posttraumatic Stress Disorder
in Residential Long-Term Care Settings

by

Bada Kang

Nursing
Duke University

Date: _____

Approved:

Eleanor S. McConnell, Advisor

Michele J. Karel

Wei Pan

Kirsten N. Corazzini

An abstract of a dissertation submitted in
partial fulfillment of the requirements for the degree of
Doctor of Philosophy in Nursing
in the Graduate School
of Duke University

2020

Copyright by
Bada Kang
2020

Abstract

Behavioral symptoms of dementia cause considerable distress for persons with dementia and their caregivers and are related to adverse outcomes that have significant social and economic impact. Thus, behavioral symptoms represent one of the most challenging aspects of dementia care. Over the past three decades, research on behavioral symptoms of dementia has laid the foundation for development of non-pharmacological interventions by identifying underlying mechanisms of symptom development. However, the research has largely overlooked how the needs of military veterans may influence development and treatment of behavioral symptoms of dementia, including those needs associated with co-occurring dementia and posttraumatic stress disorder (PTSD). This dissertation aimed to develop knowledge related to behavioral symptoms of dementia among older veterans with and without PTSD by synthesizing current understanding of neurocognitive and psychiatric comorbidities of PTSD among veterans as well as explicating relationships among background factors, proximal factors, and behavioral symptoms of dementia among veterans living in residential care using the need-driven, dementia-compromised behavior (NDB) model.

This dissertation includes a systematic review in Chapter 2 that synthesized the patterns of neurocognitive and psychiatric comorbidities of PTSD in older veterans and revealed a substantial gap in the literature with regards to understanding manifestations and treatment of behavioral symptoms of dementia among older veterans with co-occurring dementia and PTSD. The primary study of this dissertation that encompasses

Chapters 3 and 4 utilized an exploratory sequential mixed methods design using secondary data derived from the evaluation dataset of the STAR-VA training program. In Chapter 3, a qualitative study, as the first phase of the mixed methods study, analyzed text data that captured the interdisciplinary care team's observation of behavioral symptoms of dementia and their circumstances for the subsample of 33 veterans from the STAR-VA dataset. This qualitative study described how behavioral symptoms of dementia are manifested among veterans with and without PTSD in the context of personal, interpersonal/social, and environmental factors that trigger the symptoms. Findings demonstrated that behavioral symptoms of dementia are heterogeneous, with distinct clusters of triggers that are multi-level, thereby warranting an interdisciplinary, multi-level approach to developing person-centered interventions. In addition, findings from this qualitative study informed the development of the second phase of the sequential mixed methods study in Chapter 4 that aimed to test hypothesized pathways between background factors, interpersonal triggers (proximal factors), and behavioral symptoms of rejection of care and aggression and to explore the moderating effect of PTSD on the hypothesized pathways. The mixed methods approach integrated quantitative data measured by standardized scales and text data for 315 veterans derived from the STAR-VA dataset. After converting text data into categorical variables, structural equation modeling (SEM) was performed to compare the patterns of relationships among background factors, interpersonal triggers, and behavioral symptoms of rejection of care and aggression between veterans with and without PTSD. The direct

effect of interpersonal triggers and the indirect effect of background factors through interpersonal triggers on rejection of care and aggression emphasizes the importance of developing and implementing psychosocial interventions that improve interpersonal relationships. The multi-group SEM revealed that the full model was not moderated by PTSD. However, the differential direct and indirect effect of background factors and interpersonal triggers as a proximal factor on the behavioral outcomes between veterans with and without PTSD suggest potential different mechanisms of behavioral outcomes between veterans depending upon whether or not PTSD is present. Evidence for the PTSD-moderated mediating effect of interpersonal triggers on the relationship between depression and rejection of care was demonstrated, suggesting the need to develop targeted interventions for veterans with dementia and PTSD who have greater depressive symptoms.

The new knowledge generated from this dissertation helps to clarify complex patterns of associations among background factors such as PTSD and proximal factors and behavioral symptoms of dementia consistent with the NDB model, strengthening the foundation for development of novel approaches to designing and implementing person-centered care for veterans with co-occurring dementia and PTSD.

Dedication

I dedicate this dissertation to my parents whose endless support, encouragement, and prayers made this work possible.

Table of Contents

Abstract.....	iv
Dedication.....	vii
List of Tables.....	xiii
List of Figures.....	xv
Acknowledgements.....	1
1. Introduction.....	3
1.1 Problem and Significance.....	3
1.1.1 BSD.....	7
1.1.2 BSD in Veterans with Co-Occurring Dementia and PTSD.....	8
1.2 Theoretical Framework.....	9
1.2.1 Person-Centered Care.....	10
1.2.2 Need-Driven Dementia-Compromised Behavior (NDB) Model.....	12
1.3 Purpose Statement and Aims.....	15
1.3.1 Chapter 1 Aim.....	16
1.3.2 Chapter 2 Aim.....	17
1.3.3 Chapter 3 Aim.....	17
1.3.4 Chapter 4 Aim.....	18
1.3.5 Chapter 5 Aim.....	18
2. Neurocognitive and Psychiatric Comorbidities of Posttraumatic Stress Disorder among Older Veterans: A Systematic Review.....	19
2.1 Overview.....	19

2.2 Introduction.....	20
2.3 Methods.....	23
2.3.1 Search Strategy and Study Selection	23
2.3.2 Data Extraction	26
2.3.3 Quality Appraisal.....	26
2.4 Results.....	27
2.4.1 Quality of the Reviewed Studies	27
2.4.2 Characteristics of Studies	44
2.4.3 Measures	45
2.4.4 Prevalence and Incidence of Neurocognitive and Psychiatric Comorbidities of PTSD.....	46
2.4.5 Factors Associated with Neurocognitive and Psychiatric Comorbidities of PTSD	49
2.5 Discussion.....	52
2.5.1 Limitations	59
2.6 Conclusion	59
2.7 Acknowledgement	60
3. Manifestations of Behavioral Symptoms among Veterans with Dementia: A Qualitative Analysis of Data from STAR-VA	61
3.1 Background.....	61
3.1.1 Older Veterans Living with Dementia.....	62
3.1.2 Theoretical Framework.....	64
3.2 Methods.....	67
3.2.1 Design.....	67

3.2.2 Data Source.....	67
3.2.3 Study Sites and Participants.....	68
3.2.4 Instruments	70
3.2.5 Ethical Consideration.....	71
3.2.6 Data Analysis.....	72
3.3 Results.....	76
3.3.1 Unsolicited Direct-Care Approach Triggers Refusal, Resistance, or Combativeness with Care.....	84
3.3.2 Interpersonal Interactions That Hinder Self-Direction Trigger Aggressive Behaviors	86
3.3.3 Unmet Physiological Needs and Emotional Distress Trigger Non-Aggressive Behaviors.....	87
3.3.4 Inappropriate Stimulation from Social and Physical Environments Triggers Non-Aggressive Behaviors.....	88
3.3.5 Restrictive Organizational Culture of Care Influences the Conceptualization of Behavioral Symptoms	89
3.4 Discussion.....	91
3.4.1 Strengths and Limitations	97
3.5 Conclusion	99
4. Background Factors, Interpersonal Triggers, Rejection of Care, and Aggression in Older Veterans with Dementia with and without PTSD	100
4.1 Background.....	100
4.1.1 Theoretical Framework.....	101
4.2. Research Question and Aims.....	106
4.2.1 Research Question	106

4.2.2 Aims.....	106
4.3 Hypothesized Model	107
4.4 Methods.....	109
4.4.1 Data Source.....	110
4.4.2 Participants and Setting	111
4.4.3 Measures	112
4.4.4 Data Analysis.....	115
4.5 Results.....	118
4.5.1 Structural Equation Model.....	121
4.5.2 Invariant Model	123
4.6 Discussion.....	127
4.7 Conclusion	137
5. Conclusion	139
5.1 Summary of Findings.....	141
5.1.1 Neurocognitive and Psychiatric Comorbidities of Posttraumatic Stress Disorder Among Older Veterans: A Systematic Review.....	141
5.1.2 Manifestation of Behavioral Symptoms among Veterans with Dementia: A Qualitative Analysis of Data from STAR- VA.....	143
5.1.3 Background Factors, Interpersonal Triggers, Rejection of Care, and Aggression in Older Veterans with Dementia with and without PTSD.....	147
5.2 Implications for Research	149
5.3 Implication for Practice.....	151

5.4 Implications for Policy.....	154
5.5 Conclusion	155
Appendix A: Database Search Strategy	157
Appendix B: Quality Appraisal for Studies Included in Systematic Review	162
Appendix C: STAR-VA ABC Card.....	166
Appendix D: Codebook for Qualitative Coding	167
References.....	170
Biography.....	196

List of Tables

Table 1: Sample characteristics of reviewed studies (N=24).....	28
Table 2: A summary of the design and relevant findings of reviewed studies (N=24).....	32
Table 3: Six stages of framework analysis	75
Table 4: Participant characteristics (N=66)	77
Table 5: Categories and codes for behavioral triggers.....	79
Table 6: Frequency of types of behavioral symptoms and triggers among veterans with and without PTSD	82
Table 7: Frequency of types of behavioral triggers among veterans with and without PTSD.....	82
Table 8: Frequency of behavioral triggers by behavioral categories among veterans with and without PTSD	83
Table 9: Characteristics of veterans who participated in STAR-VA by presence of PTSD	119
Table 10: Correlations among study variables (N=315).....	120
Table 11: Comparison between unconstraint and constraint model	123
Table 12: Direct and indirect effects of variables on rejection of care by PTSD.....	125
Table 13: Direct and indirect effects of variables on aggression by PTSD	125
Table 14: PubMed search trail (updated 10/4/2018).....	157
Table 15: CINAHL search trail (updated 10/4/2018).....	158
Table 16: PsycINFO search trail (updated 10/4/2018)	160
Table 17: Quality appraisal for observational cohort and cross-sectional studies (N=24).....	162

Table 18: Codebook for behavioral symptoms of dementia.....	167
Table 19: Codebook for rejection of care and aggression	168

List of Figures

Figure 1: Need-driven dementia-compromised behaviors (NDB) model (Algase et al., 1996)	13
Figure 2: Selection of eligible articles	25
Figure 3: Need-driven dementia-compromised behavior (NDB) model (Algase et al., 1996) applied to current study	102
Figure 4: The hypothesized structural equation model.....	109
Figure 5: Final structural equation model.....	122
Figure 6: Multigroup SEM model.....	124

Acknowledgements

I would like to extend my deepest gratitude toward the many persons who have supported me over the past years to complete this dissertation. First of all, I am deeply grateful to my mentor and dissertation chair, Dr. Eleanor McConnell, who has shown tireless support throughout my doctoral journey. I am most appreciative for her trust and confidence that encouraged me to believe in myself as a researcher and in the importance of my research. The positive approach in her mentorship has inspired me in so many ways, and the incredible opportunities she provided to me have developed me professionally and personally. I am blessed to have her as a mentor and role model in my life.

Likewise, I also owe my deepest gratitude to my dissertation committee. I would like to thank Dr. Michele Karel who gave me the opportunity to analyze the dataset and supported this dissertation by sharing her valuable knowledge and expertise. I also thank Dr. Wei Pan who always welcomed my questions and requests and provided indispensable feedback and suggestions on my data analysis. Thank you to Dr. Kirsten Corazzini for providing provocative questions and invaluable opportunities to be involved in diverse research projects that have broadened my perspectives and shaped my research.

A special thank you extends to the Duke University School of Nursing and Duke University Graduate School for generously supporting my doctoral training, which allowed me to have focused time for my research and complete this dissertation. Special

appreciation also goes to my cohort and friends at DUSON who went through ups and downs together in this PhD adventure. I was also fortunate to work with brilliant and kind colleagues and friends, Hanzhang, Yuting, Sijia, and Michelle, and I truly enjoyed spending time with them in many aspects. In addition, I am greatly thankful to professors and mentors from Yonsei University College of Nursing, especially Drs. Eunhee Cho and Kyunghee Lee for their support and encouragement.

Finally, I owe my deepest thanks to my loved ones. I will always be indebted to my parents, Duksu Kang and Yangsook Ko. As passionate scholars, researchers, teachers, and lifelong learners, they are my inspiration and role models for scholarly pursuit, and I have learned the value of persistence from their lives. Their endless love, encouragement, and prayers enabled me to endure the rigors of my doctoral studies. My deepest gratitude also goes to my siblings, Baram and Haneol. Without their support and sacrifices, I could not focus on my dissertation and finish my doctoral study in time. Last but not least, words cannot express my gratitude for the unending support I received from my husband, Jonggyu that enabled me to achieve my dreams. I am sending my deepest love to you and our son, Hayul, who are my wonderful cheerleaders.

1. Introduction

1.1 Problem and Significance

Dementia is a major health challenge worldwide. It has significant impact not only on those with dementia, but for their caregivers, health care systems, and society (Alzheimer's Association, 2017). Prevalence estimates suggest that 5.3 million U.S. residents age 65 and older were living with Alzheimer's disease, the most common cause of dementia, in 2017, with the number projected to nearly triple to 13.8 million by 2050 (Hebert et al., 2013). Although progressive cognitive decline is the hallmark of dementia, the most challenging and distressing aspects are its behavioral symptoms. Behavioral symptoms of dementia (BSD) refer to any verbal, vocal, or motor activities that are considered aggressive, excessive, or lack adherence to social standards (Boustani et al., 2005) and are often expressed clinically as agitation, aggression, and apathy along with other behaviors such as repetitive vocalizations, shadowing, and wandering (Cerejeira et al., 2012; Kales et al., 2014; Lyketsos et al., 2011). Nearly all people with dementia experience at least one type of BSD at some point over the disease course (Lyketsos, 2007; Steinberg et al., 2008).

BSD cause tremendous distress for individuals with dementia, family caregivers, and formal caregivers (healthcare providers and direct care workers) and have an enormous impact on the healthcare system (Cerejeira et al., 2012). Compared to individuals with dementia without BSD, those with BSD experience a more rapid rate of cognitive decline and accelerated impairment in activities of daily living, poorer

prognoses, a decreased quality of life, and even higher mortality (Kales et al., 2015; Wancata et al., 2003). BSD also have both a physical and psychological impact on informal and formal caregivers such as worse health, increased caregiver stress and depression, and decreased quality of life (Allegri et al., 2006; Clyburn et al., 2000; Kales et al., 2015; Kunik, Snow, Davila, McNeese, et al., 2010; Van Den Wijngaart et al., 2007). BSD significantly adds to health care costs due to increased nursing home placements, hospitalizations and the use of specialized services (Herrmann et al., 2006; O'Brien & Caro, 2001; Wancata et al., 2003).

BSD are particularly common in residential long-term care settings with a prevalence of 70%-98%, which is associated with personal, social, physical, and environmental factors (Lyketsos et al., 2011; Seitz et al., 2010; Selbaek et al., 2007). Such high prevalence rates can be attributed partially to the fact that the presence of BSD is a major reason for families' decision to place older adults with dementia into these care settings (Clyburn et al., 2000; de Vugt et al., 2005). Loss of control associated with being institutionalized by family members and their loved ones may also contribute to BSD. In addition, physical and social environmental factors, which include crowding, sensory overstimulation, size of the units, resident-staff ratio, caregivers' attitudes toward BSD, and recreational activities that are not matched to personality or preferences of persons with dementia can trigger and/or exacerbate the BSD in this care setting (Kolanowski et al., 2005; Zuidema et al., 2010). The burden of managing BSD leads paid caregivers to avoid working in residential long-term care settings where the prevalence of BSD is high,

and increases staff turnover and medication overuse in the care settings (Cohen-Mansfield, 2001; Selbaek et al., 2007; Yaffe et al., 2002).

Veterans are a rapidly growing proportion of the world's population of older adults. As Vietnam and Korean War veterans reach retirement age, a growing number of these aging veterans are suffering from dementia. In the United States, the number of military veterans totaled 18.5 million in 2016, and nearly half were over 65 years of age (United States Census Bureau, 2017). This rapidly growing older veteran population made up 22% of the U.S. population over 60 years of age (United States Census Bureau, 2012), and the number of older veterans living with dementia is also increasing exponentially (Sibener et al., 2014; Veitch et al., 2013). In addition to an age-associated risk for dementia, these veterans have a unique set of military risk factors such as a traumatic brain injury, depression and posttraumatic stress disorder (PTSD), all of which are common sequelae of combat and other service-related injuries caused by active duty participation (Veitch et al., 2013; Weiner et al., 2013b). Importantly, veterans with PTSD are at about a two times higher risk of dementia than veterans without PTSD (Meziab et al., 2014; Yaffe et al., 2010a).

Military service during wartime is considered a critical event in one's life course, having both short-term and long-term effects, yet it still remains a "hidden" variable in aging research (Settersten & Patterson, 2006; Spiro et al., 1997b). Although most of the research on aging has included veterans who had significant wartime military histories (e.g., World War II [WWII], the Korea War, and the Vietnam War), military service

during wartime and related-factors have been overlooked and seldom have been measured (Settersten, 2006; Spiro et al., 2016b). When assessing factors that precipitate and mitigate BSD, it is important to recognize that current BSD can be influenced not only by the affected individuals' current life circumstances, but also by their experiences throughout the life course (American Psychiatric Association, 2016). Previous traumatic experiences such as combat exposure may provoke individuals with dementia to exhibit BSD, particularly in the presence of current situational triggers (American Psychiatric Association, 2016; Cook et al., 2003). PTSD is one of the most common consequences of military service particularly in veterans returning from combat and have long-term effects throughout one's lifespan (Yaffe et al., 2010a). A lifetime prevalence of combat-related PTSD in Vietnam veterans was 20% to 30% (Dohrenwend et al., 2006). Almost five decades after returning from combat, a significant minority of World War II and Korean War veterans had a diagnosis of PTSD with a prevalence rate of 12% (Spiro et al., 1994). Yet, little is known about the long-term sequelae of PTSD in older veterans with dementia. Particularly, the presence of current and/or lifetime PTSD has barely been considered and measured in attempts to understand BSD in veterans.

In summary, the growing cohort of older veterans with comorbid dementia and PTSD will create greater challenges for veterans, their caregivers, and the healthcare system, unless we better understand how this complex comorbidity affects BSD. Thus, a focus on BSD in this population will not only inform the care of the veteran population with PTSD but will also inform the research in BSD more broadly. Accordingly, research

on BSD among the veteran population is critical for the Veterans Health Administration (VHA) system, and for the U.S. healthcare system as a whole, as they both face health challenges caused by the rapidly increasing prevalence of dementia.

1.1.1 BSD

Although BSD are associated with neurological deterioration associated with major neurocognitive disorders (e.g., Alzheimer's disease), the actual occurrence of the symptoms can be attributed to the confluence and interaction of diverse personal, interpersonal and environmental factors rather than neurocognitive impairment alone (Gitlin et al., 2009; Kales et al., 2015). Although a large amount of evidence has evaluated how personal characteristics (e.g., increased age, being male, severe cognitive deficit, and pain) influence BSD, there is relatively little evidence on other factors such as interpersonal and environmental factors of BSD and their interactions (Boustani et al., 2005; Kolanowski et al., 2017). A recent scoping review also noted that only in the case of depression as a single symptom had studies examined all three categories of determinants of BSD (i.e., patient, caregiver, and environmental factors) (Kolanowski et al., 2017).

The complex etiology of BSD creates challenges in developing effective interventions to ameliorate these symptoms. However, studies have demonstrated that many factors that typically trigger BSD are modifiable (Karlin, 2017; Lawlor, 2002; Lyketsos et al., 2011). Identifying the modifiable interpersonal and environmental factors that trigger BSD is the first step in developing interventions that will help manage BSD

and reduce the associated burden on both the individual and the caregivers. In addition, understanding how the personal, interpersonal, and environmental factors that form the etiology of these symptoms interact is needed to guide the development of person-centered approaches to prevent or manage BSD (Cohen-Mansfield, 2000; Gitlin et al., 2009).

1.1.2 BSD in Veterans with Co-Occurring Dementia and PTSD

Older veterans living with both dementia and PTSD may have unique care needs. Veterans with PTSD are likely to have poorer social functioning, difficulties with self-disclosure, and diminished expressiveness (Carroll et al., 1985; Keane et al., 1985; Sheffler et al., 2015). These disease features suggest that PTSD may influence the psychosocial needs of veterans with dementia, in turn creating unique BSD triggers related to interpersonal relationships and environments when their needs related to PTSD are unmet.

The threshold for response to trauma-related stimuli may be lowered in individuals with PTSD in combination with dementia (Cook et al., 2003; Hall & Buckwalter, 1987). Interpersonal and physical environments may remind veterans with dementia and PTSD of traumas involving injury or death that they experienced during their past military service and predispose them to exhibit BSD. Veterans with dementia and PTSD living in residential long-term care settings are particularly more likely to encounter a range of trauma-related interpersonal and environmental triggers of BSD. The range of triggers can include the close proximity of bedridden patients; noxious

scents; moaning, shouting, and crying sounds from delirious patients; ethnicities of caregivers that may evoke wartime memories; caregivers' use of authority or control; and caregivers speaking loudly or being impatient. Military symbols or photos in the residential long-term care settings operated by the Department of Veterans Affairs (VA) may also trigger BSD among veterans with dementia and PTSD (Carlson et al., 2008; Cook et al., 2003). Alternatively, reminding veterans of military service or war-time experiences could foster a sense of belonging and continuity in some veterans with dementia and PTSD who are proud of their military service and comradeship. As such, military-associated environment and activities can also be used as sources to ameliorate BSD among veterans. However, the unique triggers of BSD among veterans with co-occurring dementia and PTSD have not yet been empirically studied. An empirical examination of how comorbid PTSD relates to the manifestation of BSD among veterans is a necessary step toward the development of non-pharmacological and psychosocial interventions for older veterans with co-occurring dementia and PTSD.

1.2 Theoretical Framework

In this dissertation, the person-centered care philosophy and model (Kitwood, 1997a; Koren, 2010) frame my perspectives on dementia and BSD. The need-driven dementia-compromised behavior (NDB) model, a middle-range theory (Algase et al., 1996) is also being used as a theoretical framework for overall study design including guiding the development of research questions, hypotheses, and analysis methods.

1.2.1 Person-Centered Care

Beyond theoretical frameworks that specifically target BSD, person-centered care, based on the social-psychological theory of personhood in dementia, is a philosophy and model of care for persons with dementia and related-symptoms such as BSD (Kitwood, 1997b; Stein-Parbury et al., 2012). From the perspective of person-centered care, BSD are viewed as a result of interpersonal interaction between persons with dementia and the social world (Kitwood, 1997a; Stein-Parbury et al., 2012).

As a part of the culture change movement that aims to improve quality of long-term care for older adults, the institutional biomedical model of care has shifted to person-centered care around the world (Brownie & Nancarrow, 2013; Koren, 2010). Person-centered care promotes persons' dignity, autonomy and self-determination regardless of their functional and cognitive abilities, by providing a holistic, whole-person care that acknowledges and respects their values, preferences, and needs (Kogan et al., 2016). While there is a large body of literature on person-centered care, work by Kitwood (1997a) has been foundational in its application of the concept of personhood to people with dementia and has advanced and promoted person-centered care in the field of dementia care (Mitchell & Agnelli, 2015).

Kitwood (1997a) criticizes the biomedicalization of dementia that exclusively views the symptoms associated with dementia as a result of a neuropathological process. He maintains that the negative consequences of dementia are not only influenced by the disease itself, but are the products of a malignant social psychology, which refers to a

range of negative behaviors that undermine the personhood of persons with dementia (e.g., disempowerment, labelling, objectification, imposition, disparagement, and banishment) (Kitwood, 1997a). He also holds that people living with dementia retain their personhood in relational contexts across trajectories of the disease process (Davis, 2004; Kitwood, 1997a). In order to promote personhood and well-being as ultimate goals, person-centered care focuses on enhancing remaining strengths of persons with dementia rather than focusing on the deficits caused by neurodegenerative disease. Malloy and Hadjistavropoulos (2004) emphasize that enhancing preserved strengths of persons with dementia can only occur within the context of authentic relationship, in which “who one is and who one can be are defined” (p.152). As such, personhood of persons with dementia residing in long-term care settings can be maintained, supported, and promoted by relationships with caregivers.

Although Kitwood (1990) criticizes the dominant biomedical perspective in the field of dementia care, he does not exclude the contribution of the neurobiological basis of dementia to advancing pathophysiology, medical diagnosis, and treatment (Dewing, 2008). From the perspectives of person-centered care, BSD are the products of the interplay between biological (neuropathological and physical factors) and psychosocial factors embedded in an individual person with dementia (Kitwood, 1990). Thus, person-centered care focuses on identifying biological and psychosocial triggers of BSD in contrast to the traditional biomedical approach, which adopts a narrower view of symptom causation. In extreme cases, the traditional biomedical approach can result in an

over-reliance on medications to manage symptoms, which may prevent persons with dementia from expressing their needs (Stein-Parbury et al., 2012).

In addition, person-centered care emphasizes the importance of respecting persons' life history, in addition to their current preferences, needs, interests, and functional ability (Kitwood, 1997b). Downs (1997) states that "people with dementia are presented as people with unique biographies, personalities and life circumstances, all of which interact with the neurological impairment" (p. 598).

1.2.2 Need-Driven Dementia-Compromised Behavior (NDB) Model

The NDB model was originally proposed in the discipline of nursing to understand the purpose and meaning of BSD to the person with dementia and to help nurses identify needs of people with dementia and provide nursing care to meet their needs, so that problematic BSD can be prevented or managed (Algase et al., 1996). BSD are commonly viewed by caregivers as disruptive, disturbing and dysfunctional. However, the NDB model conceptualizes BSD as functional responses and/or communication methods of unmet needs of individuals with dementia from the perspectives of persons with dementia (Algase et al., 1996; Kolanowski, 1999). Thus, BSD can be meaningful and useful indicators for health care providers in identifying needs of persons with dementia and establishing care plans to address the needs. Severe BSD can be prevented and managed if caregivers respond to the expressed NDBs appropriately in a timely manner (Algase et al., 1996; Kolanowski, 1999).

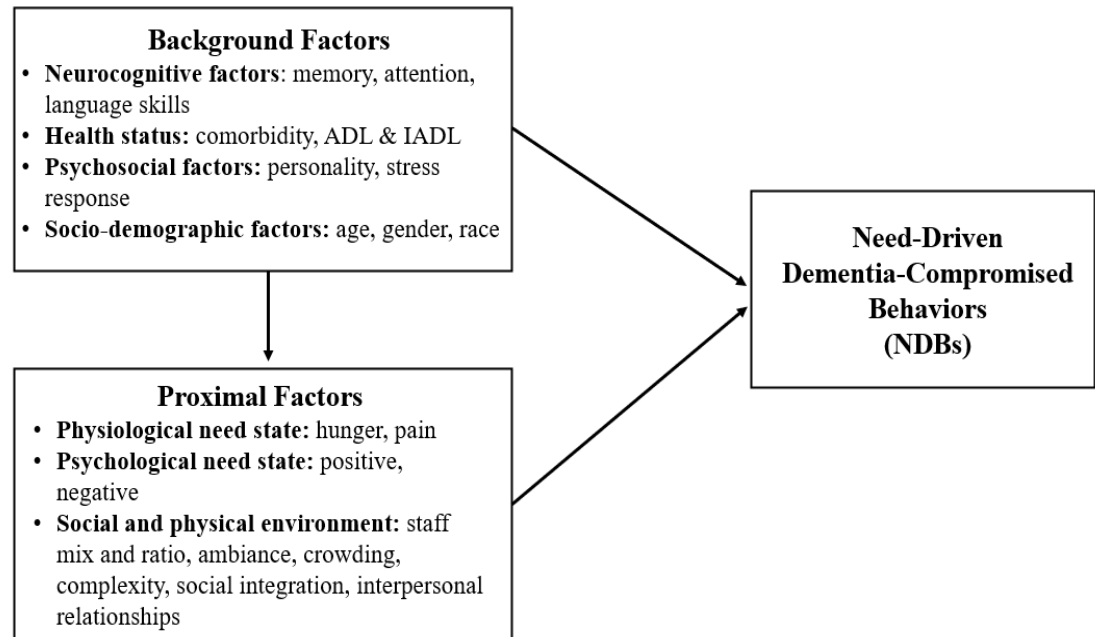


Figure 1: Need-driven dementia-compromised behaviors (NDB) model (Algase et al., 1996)

In the NDB model, BSD arise from interaction between background and proximal factors (See Figure 1). Background factors, consisting of neurological and cognitive factors, health status, personal characteristics, and sociodemographic factors, are relatively stable and therefore not frequently changeable. They form the internal factors that alter or affect the abilities that individuals with dementia perceive and/or interact with their environment, thus place individuals with dementia at risk for exhibiting BSD (Algase et al., 1996; Algase et al., 2007; Kolanowski, 1999).

Proximal factors are situational, more dynamic and changeable features of a personal need state and immediate environment that are more amenable to modification.

The proximal factors can be categorized as follows: (1) physiological need states (e.g., hunger, thirst, or pain), (2) psychological need states (e.g., good or bad feeling or emotion as manifested by facial expression or body language), (3) social environment (e.g., social interaction, staff mix, staff stability, staff ratio, ambiance, which is defined as the mood, quality, tone or atmosphere of the environment, or crowding, which is defined as the number of and distance between people in a specific area), and (4) physical environment (e.g., ambient condition, which is the combination of light and sound level, temperature and humidity, and complexity, which is defined as the assemblage of physical features of an environment such as a physical design) (Algase et al., 1996; Algase et al., 2007; Kolanowski, 1999). Social and physical environments are not mutually exclusive, and they can be interrelated (Algase et al., 1996). For example, ambiance can be created by the demeanor of a staff in a facility in combination with the physical factors of the environment such as temperature and noise level.

The main propositions of the NDB model are as follows. First, both background and proximal factors can have a direct influence on producing the NDBs as an independent factor. Second, background factors influence the effect of proximal factors on the occurrence of NDBs. In other words, people with dementia perceive or experience such proximal factors in the context of existing background factors. Third, background factors can have indirect effects on NDBs through proximal factors. Lastly, the main assertion of the NDB model is that NDBs arise from the interaction between background

and proximal factors, that is, the combination of both factors in some sequence (Algase et al., 2007).

1.2.2.1 Comorbid PTSD as a background factor in the NDB model

In the NDB model, comorbid PTSD can be viewed as a key background factor. Comorbid PTSD as a background factor can play not only an independent role but also a moderator role that interacts with proximal factors on the occurrence of NDBs (Algase et al., 2007). A moderator is defined as a factor including qualitative (e.g., sex or ethnicity) and quantitative variables that influence the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable (Baron & Kenny, 1986). The comorbid PTSD as a moderator specifies on whom or under what conditions the proximal factors will operate to produce the BSD (Baron & Kenny, 1986). In other words, comorbid PTSD is hypothesized to moderate the effect of proximal factors on the occurrence of BSD, thereby helping to identify individuals with dementia who are at greater risk for developing BSD or who are more likely to display certain types of BSD given the social and physical environmental triggers of BSD (Algase et al., 2007). For example, the presence of comorbid PTSD may moderate the effect of crying sounds in a residential long-term care setting on the occurrence of agitation.

1.3 Purpose Statement and Aims

The purpose of this dissertation is to develop knowledge related to BSD among veterans with and without PTSD by 1) synthesizing the current understanding of

neurocognitive and psychiatric comorbidities of PTSD among veterans, and 2) explicating the relationship between background factors, proximal factors, and BSD among veterans with dementia with and without PTSD through a person-centered lens. The main data source for this dissertation was derived from the STAR-VA training program evaluation. STAR-VA is a multisite behavioral intervention that taught staff how to identify and modify intrapersonal, interpersonal, and environmental triggers for improving BSD among veterans with dementia living in VA nursing homes called community living centers (CLCs). The primary study of this dissertation utilized an exploratory sequential mixed methods design to achieve the aims of the dissertation. Knowledge developed through this dissertation will provide a deeper understanding of the manifestations and underlying mechanisms of BSD among Veterans with and without PTSD. These findings will be critical to inform the continued development of person-centered approaches and interventions that improve the social and physical environment, and ultimately prevent BSD among Veterans with PTSD. The purpose of this dissertation was achieved through five overall aims addressed across the chapters.

1.3.1 Chapter 1 Aim

The aim of Chapter 1 was to introduce the problem of BSD in veterans with and without PTSD living in residential long-term care settings and to explain the significance of understanding the relationships among background factors, proximal factors, and BSD in veterans with and without PTSD.

1.3.2 Chapter 2 Aim

Chapter 2 aimed to conduct a systematic literature review to analyze and synthesize the literature on the neurocognitive and psychiatric comorbidities of PTSD among older veterans. The specific aims of this systematic review were to examine the prevalence, incidence, and patterns of neurocognitive and psychiatric comorbidities among older veterans with PTSD and to explore the factors associated with such comorbidities.

1.3.3 Chapter 3 Aim

Prior to investigating the influence of PTSD on behavioral symptom manifestations, we aimed to generate contextualized accounts of BSD by focusing on behavioral manifestations and their triggers as described by staff. The specific aim of Chapter 3 was to explore how BSD are manifested among veterans receiving care in VA CLCs, in the context of personal, interpersonal/social, and environmental factors that trigger the behavioral symptoms.

As the first phase of an exploratory sequential mixed methods study, a qualitative analysis of text data derived from the STAR-VA training evaluation program was conducted. The focus of the analysis was twofold: (1) to describe manifestations of BSD in relation to proximal factors and (2) to evaluate the potential to convert the text data to categorical variables for subsequent quantitative analysis. Findings from this qualitative study informed the development of the study design in Chapter 4, the second phase of the mixed methods study that used larger number of samples from the STAR-VA dataset.

Specifically, the patterns observed in this first phase informed the selection of proximal factors to be examined in relationship to BSD, and the resulting categories of behavioral triggers and symptoms from this qualitative study were used as quantitative variables in the second phase of the mixed methods study.

1.3.4 Chapter 4 Aim

Using the NDB framework as a guide, Chapter 4 aimed to test hypothesized pathways between background factors, interpersonal triggers (a proximal factor), and the behavioral symptoms of rejection of care and aggression, and to explore the moderating effect of PTSD on the hypothesized pathways in veterans with dementia and with and without co-occurring PTSD. These aims were achieved through a mixed methods analysis that combined text data from clinicians' observations of BSD characteristics and triggers that were transformed into categorical variables with existing quantitative data for background factors derived from STAR-VA training program evaluation dataset. Using these data, a series of structural equation models were estimated to compare the nature of relationships between background and proximal factors and behavioral outcomes in veterans with and without PTSD.

1.3.5 Chapter 5 Aim

The aim of Chapter 5 was to synthesize findings from each study of this dissertation and discuss implications for research, clinical practice, and policy for preventing the negative consequences of BSD and improving the well-being of veterans with dementia and with and without PTSD and their caregivers.

2. Neurocognitive and Psychiatric Comorbidities of Posttraumatic Stress Disorder among Older Veterans: A Systematic Review¹

2.1 Overview

Objectives: Posttraumatic stress disorder (PTSD) is associated with neurocognitive and psychiatric comorbidities, and older adults experience comorbid illnesses disproportionately. Little is known about the comorbidities of PTSD among older veterans. This systematic review examines the prevalence, incidence, and patterns of neurocognitive and psychiatric comorbidities of PTSD among older veterans and explores the factors associated with these comorbidities.

Methods: A systematic literature review was performed using PubMed, CINAHL, and PsycINFO databases. The search was limited to peer-reviewed articles published in English from January 1980 to October 2018. Eligible studies examined the comorbid neurocognitive and psychiatric disorders of PTSD among veterans aged 60 and older.

Results: Twenty-four studies met the criteria for inclusion. The risk for dementia was higher in veterans with PTSD than those without PTSD; hazard ratios ranged from 1.21 to 1.77. Depressive disorder was the most prevalent psychiatric comorbidity with estimates ranging from 33% to 52.3%, followed by generalized anxiety disorder (14%–

¹ This systematic review was published in *International Journal of Geriatric Psychiatry* (Kang, B., Xu, H., & McConnell, E. S. (2019). Neurocognitive and psychiatric comorbidities of posttraumatic stress disorder among older veterans: A systematic review. *International Journal of Geriatric Psychiatry*, 34(4), 522-538. doi:10.1002/gps.5055)

15%), and substance use disorders (1.9%–11.3%). Factors consistently associated with PTSD comorbidities included age, combat-related exposures, clinical conditions, health-related and psychosocial outcomes.

Conclusions: Despite heterogeneity in research designs and methodological limitations, this review highlights the need to consider comorbid neurocognitive and psychiatric disorders among older veterans with PTSD in order to individualize care approaches. Future research should incorporate factors associated with neurocognitive and psychiatric comorbidities of PTSD into study designs that can help improve prediction of comorbidity and generate evidence for developing and implementing tailored treatments in older veterans.

2.2 Introduction

Life course theory posits that early life events reverberate over the life course and intertwine with additional stressors to have a cumulative and lasting impact on health and well-being in later life (Elder Jr & Clipp, 1988; Spiro, Settersten, & Aldwin, 2016a). Military service is an important life event that has been considered a “hidden variable” in aging research, as military service and related factors are infrequently included in study designs (Spiro, Schnurr, & Aldwin, 1997a). For veterans, life course theory suggests that exposures associated with military service significantly influence physical, psychological, and social functioning throughout veterans’ lives (Elder Jr & Clipp, 1988; MacLean & Elder Jr, 2007; Settersten, 2006; Spiro et al., 1994, 1997a). A significant minority of veterans develop PTSD, which can have negative long-term effects throughout their lives,

even into old age (Davison et al., 2006; Kang, Natelson, Mahan, Lee, & Murphy, 2003; Magruder & Yeager, 2009; Spiro et al., 1997a; Spiro et al., 2016a; Tanielian & Jacox, 2008). Forty-five years after combat in World War II (WWII) and the Korean War, the prevalence of PTSD among U.S. veterans was nearly 12% (Spiro et al., 1994). Further, PTSD among adults ages 60 and older occurs in more diverse and complex forms than among middle-aged or young adults. For example, the symptoms of PTSD can appear with delayed onset in older adults even if they were absent or well-controlled in earlier life. Additionally, older adults can experience a chronic form of PTSD, wherein the symptom severity fluctuates over the life course (Averill & Beck, 2000; Busuttil, 2004; Lapp, Agbokou, & Ferreri, 2011).

PTSD is associated with a high prevalence of psychiatric comorbidities, and aging may increase the risk of developing comorbidities. The U.S. National Comorbidity Survey showed that 44% of women and 59% of men with PTSD had three or more comorbid psychiatric disorders (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). An Australian epidemiologic study of adults showed that approximately 50% of women and 60% of men with PTSD had two or more additional psychiatric disorders (Creamer, Burgess, & McFarlane, 2001). Age-related factors such as cognitive or sensory decline, immobility, and medical comorbidities potentially exacerbate chronic PTSD among older adults (Busuttil, 2004). Comorbidity of PTSD with other neurocognitive and psychiatric disorders is particularly problematic among older adults since it interferes with assessment, diagnosis, and treatment of comorbid disorders (Dinnen, Simiola, & Cook,

2015; Hegel et al., 2005; Thorp, Sones, & Cook, 2011). As experience of multiple chronic conditions vary by population characteristics and socioeconomic factors (Rijken et al., 2017), particularly for older adults with multiple psychiatric disorders, a patient-centered approach to diagnosing, monitoring and treating the multimorbidity is needed to provide high quality care, in order to meet their complex mental, physical, and social needs (Langan, Mercer, & Smith, 2013; Mery, Wodchis, Bierman, & Laberge, 2013).

As survival from combat-related injuries improves, the number of older veterans continues to grow worldwide (Lapp et al., 2011). Given the high prevalence of PTSD among veterans and the growing number of older veterans, the comorbidity of PTSD in the context of aging assumes greater importance. Previous reviews of PTSD in older adults have described unique aspects of PTSD, and effective psychotherapeutic treatments (Averill & Beck, 2000; Böttche, Kuwert, & Knaevelsrud, 2012; Dinnen et al., 2015; Lapp et al., 2011). However, these reviews have not distinguished older veterans from the general older adult population. PTSD among veterans may be characterized by a different course and severity, owing to differences in extent of combat exposure and injury, help-seeking behaviors, and the extent of post-deployment stressors (Flanagan, Teer, Beylotte, Killeen, & Back, 2014; O'Toole & Catts, 2017). To date, no study has synthesized the literature on the neurocognitive and psychiatric comorbidities of PTSD among older veterans. Therefore, we conducted a systematic review to examine the prevalence, incidence, and patterns of neurocognitive and psychiatric comorbidities

among older veterans with PTSD, and to explore the factors associated with such comorbidities.

2.3 Methods

2.3.1 Search Strategy and Study Selection

This literature review was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (Moher, Liberati, Tetzlaff, & Altman, 2009). A comprehensive literature search was conducted with the assistance of a medical librarian using three databases: PubMed, CINAHL, and PsycINFO. Five categories of search terms were used individually and in combination: PTSD, veteran(s), older adult(s), neurocognitive disorders, and psychiatric disorders. Each database was searched using key words and its own index (Tables 14-16 in the Appendix A). Because the American Psychiatric Association added PTSD to the third edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM) in 1980, the search was limited to articles published from January 1980 to October 2018 (Bramer & Bain, 2017).

Selection criteria required that articles be: (1) published in peer-reviewed journals, (2) published in English, (3) focused on older veterans or included subgroup analyses for veterans ages ≥ 60 , (4) and focused on comorbid neurocognitive and psychiatric disorders included in the *DSM* editions 3, 4, and 5. Studies were excluded if they: (1) were not empirical studies, (2) did not report comorbidities, (3) did not examine specific comorbid neurocognitive and psychiatric disorders, (4) focused on pharmacotherapeutics, (5) had mixed samples including veterans and non-veterans, or (6) did not report age distribution.

We retrieved 2,184 articles (1,292 from PubMed, 596 from CINAHL, and 296 from PsychINFO). After removing duplicates, 1,646 articles remained. The first author screened titles, abstracts, and full texts. The screening process was checked by the second author. Ultimately, 24 articles were included in the study (Figure 2).

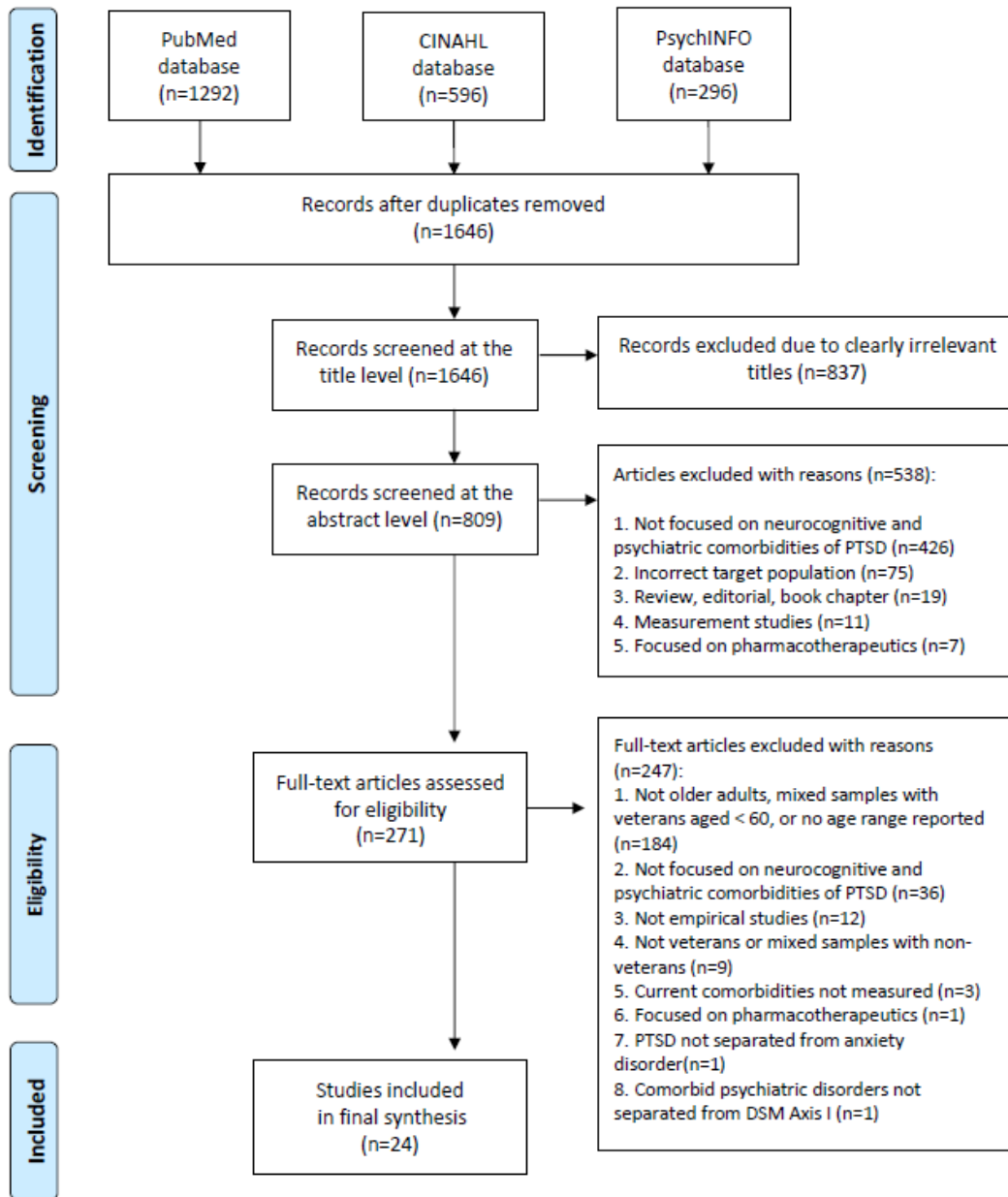


Figure 2: Selection of eligible articles

2.3.2 Data Extraction

In accordance with the matrix method (Garrard, 2014), the first author extracted the following information from eligible studies: setting; sample characteristics; study design; measures used to diagnose PTSD and comorbid neurocognitive and psychiatric disorders; pertinent covariates; and relevant findings on the prevalence, incidence, and patterns of neurocognitive and psychiatric comorbidities among older veterans with PTSD. The second author verified the extracted data, and any disagreements were resolved in discussion with the third author. Key information from the 24 articles is presented in Table 1 and 2. Given the heterogeneity in study design and measures used for PTSD and neurocognitive and psychiatric disorders, a meta-analysis was not performed.

2.3.3 Quality Appraisal

The National Institutes of Health (NIH) Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies was used to assess study quality. This 14-item tool is widely used to evaluate the internal validity of a study by assessing clarity of study objectives, potential risks of selection bias, information bias, measurement bias, the causal relationship between exposure and outcome, and whether confounding variables were measured (National Institute of Health, 2014). Two authors independently evaluated the quality of each article. Any discrepancies regarding the quality appraisal were resolved in discussion with the third author.

2.4 Results

2.4.1 Quality of the Reviewed Studies

Selection bias of the reviewed studies was minimal. All studies clearly defined the study objectives and population, then applied predetermined eligible criteria uniformly. Twelve studies were conducted with nationally representative samples, strengthening the validity of prevalence and incidence estimates. All but two studies used clearly defined measures with reported reliability and validity. However, the quality appraisal also demonstrated methodological limitations. Only one of the 12 cohort studies assessed PTSD status more than once, so it was impossible to determine whether the exposure status was correctly classified, and the effects of changes in PTSD over time could not be examined. Eleven studies did not specify a sufficient timeframe for examining the association between exposure and outcome. Twelve cross-sectional studies could not assess exposure prior to outcome measurement, thereby precluding an evaluation of a potential causal relationship and temporality. Twenty-two did not blind outcome assessors to the exposure or independent variables, which contributed to information bias. Twenty studies neither justified sample size nor reported the estimates of variance or effect size; therefore, some studies may have been underpowered to detect differences between groups. More than half of the studies did not include key covariates that could influence study outcomes. The covariates included in each study are listed in Table 2. Detailed results from the quality appraisal are available in the Appendix B (Table 17).

Table 1: Sample characteristics of reviewed studies (N=24)

First author (year)	Country	Setting	Sample Characteristics				
			Sample size (N)	Key attributes	Age (mean, range, or minimum)	Male %	White %
PTSD and comorbid neurocognitive disorders							
Ball (2009)	USA (Houston, Texas)	VA outpatient clinic	215	Veterans with newly diagnosed dementia and no aggression symptoms at baseline	≥ 60	95.4	76
Bhattarai (2018)	USA	VA outpatient clinics	4,800	Veterans aged ≥ 60	64.6	50	50
Hart (2008)	USA (Central Arkansas)	Community sample recruited through a POW outreach program	2:	Male former POWs who had combat exposure during either WWII or Korean war	80	100	NR
King (2015)	USA (Upstate NY)	VA outpatient geriatrics clinics	476	Veterans with cognitive impairment	≥ 65, 81.4	95	84
Mawanda (2017)	USA	VA outpatient and inpatient care	417,172	Veterans aged ≥ 56 years at baseline	67.7	97.9	82
Meziab (2014)	USA	VA outpatient and inpatient care	182,879	Veterans classified by POW status	≥ 55, 68.4	NR	NR
Qureshi (2010)	USA (Southwest region)	Outpatient and inpatient care in 10 VA medical centers	10,481	Veterans classified by PTSD diagnosis and Purple Heart (PH) medal receipt	≥ 65, 73	99.9	62–82 in all groups

First author (year)	Country	Setting	Sample Characteristics				
			Sample size (N)	Key attributes	Age (mean, range, or minimum)	Male %	White %
Roughead (2017)	Australia	Outpatient and inpatient care	15,612	Male Vietnam war veterans	55–65 at study entry (median = 57)	NR	NR
Verma (2001)	USA	VA inpatient geropsychiatric care	252	Veterans whose primary diagnosis is dementia and admitted for the treatment of behavioral disturbances	73.4	100	77
Yaffe (2010)	USA	Outpatient and inpatient care at all VA medical centers	181,093	Veterans aged ≥ 55 who did not have a diagnosis of dementia from fiscal years 1997 through 2000	68.8	96.5	NR
PTSD and comorbid mood disorders							
Clark (2018)	USA (Boston, MA)	Outpatient clinic	50	Geriatric mental health clinic veterans	76.8	96	88
Hyer (1999)	USA	Outpatient psychiatric and medical outpatient clinic at one VA medical center	139	Treatment-seeking elderly male WWII or Korean Conflict combat veterans	68.1	100	73
Ikin (2010)	Australia	Community sample recruited via mail	5352	Korean war male veterans who completed depression and PTSD measures	75	100	NR
Kilbourne (2004)	USA (Western Pennsylvania)	VA outpatient and inpatient care	813	Veterans identified as having a diagnosis of bipolar disorder in fiscal year 2000; classified by race and age	≥ 60 in older age groups	90	85

First author (year)	Country	Setting	Sample Characteristics				
			Sample size (N)	Key attributes	Age (mean, range, or minimum)	Male %	White %
Sajatovic (2006)	USA	VA outpatient and inpatient care	14,932	Veterans with bipolar disorder during fiscal year 2001 identified through psychosis registry	≥ 60	95	75
PTSD and comorbid substance use disorders (SUD)							
Blow (1992)	USA	VA outpatient clinics	22,463	Veterans diagnosed with AUD receiving treatment in substance abuse clinics or mental health clinics	20% of sample (n=4529) aged ≥ 60	98.7	NR
Bohnert (2013)	USA	VA outpatient and inpatient care	272,509	Veterans diagnosed with PTSD who received services in fiscal year 2004 alive at the start of fiscal year 2005	15% of sample (n=41,033) aged ≥ 65	93.7	41.4
Chen (2018)	USA	VA outpatient clinics	830,825	Veterans screened positive for unhealthy alcohol use	21.6% (n=179,772) age ≥ 65	97	73
PTSD and multiple psychiatric disorders studied in one study							
PTSD and comorbid mood and anxiety disorders							
Hovens (1992)	Netherland	Community sample recruited from private foundation for Dutch veterans	147	WWII Dutch Resistance male veterans	60-65	NR	NR
Kidson (1993)	Australia	Outpatient psychiatric clinic in a veterans' hospital	108	WWII Male veterans	71.5	100	NR

First author (year)	Country	Setting	Sample Characteristics					
			Sample size (N)	Key attributes	Age (mean, range, or minimum)	Male %	White %	
PTSD and comorbid mood disorders and SUD								
Marmar (2015)	USA	Community sample drawn from national survey study of community dwelling Vietnam veterans	400	Non-institutionalized Vietnam veterans who completed the NVVLS phase 3 clinical interview	Age not specified, but assumed Vietnam veterans aged ≥ 60 in 2012 when the data was collected	NR	NR	
Schlenger (2016)	USA	Community sample drawn from national survey study of community dwelling Vietnam veterans	848	Vietnam theater veterans who participated in NVVLS	67.3	71	85	
PTSD and comorbid mood, anxiety, and SUD								
Lu (2012)	USA (Pacific Northwest)	VA outpatient clinics	5556	Veterans who screened positive for PTSD	35% of the sample was aged ≥ 60	80	50	
Sutker (1993)	USA	VA outpatient clinic and community samples recruited from veterans' organizations	65	WWII Pacific theater veterans who survived POW confinement and WWII combat veterans who had not been captured	66	NR	90 and 94 in each group	

Abbreviation. AUD = alcohol use disorder; NR = not reported; NVVLS = National Vietnam Veterans Longitudinal Study; POW = prisoners of war; PTSD = posttraumatic stress disorder; VA = Veterans Affairs; WWII = World War II

Table 2: A summary of the design and relevant findings of reviewed studies (N=24)

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
PTSD and comorbid neurocognitive disorders					
Ball (2009)	Prospective cohort study	ICD-9-CM	<ul style="list-style-type: none"> • Dementia: ICD-9/DemRS2 • Aggression: CMAI 	NA	<p>PTSD was present in 4.7% of veterans with dementia.</p> <p>No difference in risk of aggression was observed based on PTSD status.</p>
Bhattarai (2018)	Retrospective cohort study	ICD-9	Dementia/ cognitive impairment: ICD-9	Sociodemographic status(SDS), duration of depressive disorders and PTSD	PTSD diagnosed prior to age 55 was associated with increased risk of incident dementia and other forms of cognitive impairment (OR = 1.62, 95% CI = 1.21, 2.16).
Hart (2008)	Cross-sectional	CAPS-2 (DSM-III-R criteria)	<ul style="list-style-type: none"> • Cognitive impairment: neuropsychological battery^a • Comorbid psychiatric disorders: SCID-4 (DSM-4 criteria) 	NA	<p>When comparing former POWs with PTSD alone or PTSD with psychiatric comorbidity to those without disorders:</p> <ul style="list-style-type: none"> • Psychomotor function significantly more impaired among those with PTSD alone compared to other groups; • Phonemic fluency and cognitive flexibility significantly less among those with PTSD and comorbid psychiatric illness.

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
King (2015)	Cross-sectional	ICD-9	Mild cognitive impairment/ dementia: ICD-9	NA	Comorbid PTSD was present in 5.3% of veterans with cognitive impairment. Comorbid PTSD and depression were present in 2.3% of veterans with cognitive impairment.
Mawanda (2017)	Retrospective cohort study	ICD-9	Dementia: ICD-9	SDS, medical comorbidity, other psychiatric disorders, Charlson comorbidity score, number of primary care and mental health visits	Risk of dementia was higher in veterans with PTSD after adjusting for covariates (HR = 1.36, 95% CI = 1.28-1.44). Increased risk for dementia varied with types of psychotropic medication use.
Meziab (2014)	Retrospective cohort study	ICD-9-CM	Dementia: ICD-9-CM	SDS, specific medical and psychiatric comorbidities, and period of service	Risk of dementia increased with PTSD and POW status after adjusting for covariates as follows: <ul style="list-style-type: none"> • PTSD alone: HR = 1.52 (95% CI = 1.41-1.64) • POW status alone: HR = 1.61 (95% CI = 1.30-1.98) • POW status and PTSD: HR = 2.24 (95% CI = 1.72-2.92).

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Qureshi (2010)	Retrospective cohort study	ICD-9	Dementia: ICD-9	Sex, race, specific medical comorbidities, SUD, and the number of VA primary care and mental health clinic visits	Prevalence (OR=2.0, 95% CI = 1.6-2.5) and incidence of dementia (OR = 1.7, 95% CI = 1.4-2.2) was higher in those with PTSD who did not receive a medal than those without PTSD who received a medal after controlling for covariates.
Roughead (2017)	Retrospective cohort study	ICD-10, any PTSD diagnosis records	Dementia: ICD-10, any dementia diagnosis records, and any dispensing of a medicine for dementia	SDS, specific medical comorbidities and psychiatric comorbidities. and benzodiazepine use	Having PTSD without a hospital admission for PTSD was not significantly associated with increased risk for dementia (HR = 0.81, 95% CI = 0.62-1.06). Risk of dementia was higher in veterans with a hospital admission for PTSD adjusting for covariates, but was not statistically significant (HR = 1.21, 95% CI = 0.77-1.89). Risk of dementia significantly associated with antipsychotic use (HR = 2.11, 95% CI = 1.37-3.25).

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Verma (2001)	Cross-sectional	DSM-III-R and DSM-IV criteria;	Dementia: DSM-III-R/ DSM-IV criteria	NA	Veterans with dementia and co-morbid PTSD group compared to matched controls with dementia and no PTSD had greater prevalence of comorbid psychiatric disorders as follows: <ul style="list-style-type: none"> • Psychotic disorder: 31% vs. 14% • Mood disorder: 25% vs. 7% • Delirium: 25% vs. 19%.
Yaffe (2010)	Retrospective cohort study	ICD-9-CM	Dementia: ICD-9-CM	SDS, medical and neuropsychiatric comorbidities, and the number of VA visits	Risk of dementia among veterans with PTSD increased compared to those without PTSD, after adjusting for covariates (HR = 1.77, 95% = 1.70-1.85).
PTSD and comorbid mood disorders					
Clark (2018)	Prospective cohort study	PCL-Military version	Depressive disorder: GDS	Social stressors (decrease, change, or loss of social activities or relationships) and environmental stressors (retirement, bereavement, financial, other)	Depressive symptoms were common (64%) and likely to persist after treatment in veterans with PTSD than in those without, after adjusting for covariates ($R^2 = .36$, $F(4,26) = 3.57$, $p = .02$).

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Hyer (1999)	Cross-sectional	CAPS, DTREE, SCID-PTSD (DSM-III-R criteria)	Depression: MMPI-2-Depression	Combat exposure	PTSD was associated with overall adjustment (Adj.R ² = .31, F = 13.3) and health status (Adj.R ² = .16, F = 6.50) after controlling for combat exposure and depression. PTSD was not associated with social support, and heart rate, after controlling for combat exposure, and co-existing depression.
Ikin (2010)	Cross-sectional	PCL-specific (DSM-IV criteria)	Depression: HADS	SDS, war-related variables (rank, service branch, wounded in action, severity of combat exposure, and deployment era)	Prevalence of comorbid depression and PTSD was 52.3%, and was significantly associated with impaired life satisfaction, reduced quality of life, and greater symptom severity. Rank, severity of combat exposure, and deployment to Korea during the active warfare phase were significantly associated with comorbidity of PTSD and depression.

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Kilbourne (2004)	Cross-sectional	ICD-9	Bipolar disorder: ICD-9	NA	No significant difference was found in the prevalence of comorbid PTSD among veterans with bipolar disorder according to race or age groups.
Sajatovic (2006)	Retrospective cohort study	ICD-9-CM	Bipolar disorder: ICD-9-CM	NA	Prevalence of comorbid PTSD was 5.4% in veterans who had bipolar disorder. These veterans had more hospitalizations, greater use of outpatient care, and higher annual medical costs during the two years following their bipolar disorder diagnosis than those with bipolar disease alone.
PTSD and comorbid substance use disorders (SUD)					
Blow (1992)	Cross-sectional	DSM-III-criteria	AUD: DSM-III-criteria	NA	The prevalence of comorbid PTSD among veterans with AUD decreased with age as follows: <ul style="list-style-type: none"> • 30-39 years: 14.9% • 60-69 years: 3.9% • 70+ years: 2.4 %.

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Bohnert (2013)	Prospective cohort study	ICD-9-CM	SUD: ICD-9-CM	SDS, specific psychiatric disorders, medical comorbidity, and VA service connection	Among veterans with PTSD aged ≥ 65 , comorbid SUD was significantly associated with injury-related mortality (AHR = 1.94, 95% CI = 1.23-3.08). The association of having comorbid SUD with non-injury related mortality was not significant.
Chen (2018)	Cross-sectional	ICD-9-CM	AUD: AUDIT-C	SDS, VA eligibility status, facility-level rate of AUD or mental health diagnosis, specific psychiatric comorbidities, medical comorbidity, and VA outpatient health services	The prevalence of veterans with coexisting AUD and PTSD was 7.5%. PTSD was associated with higher rates of alcohol-related and mental health care, and the association was strongest for older veterans aged ≥ 65 .
PTSD and multiple psychiatric disorders studied in one study					
PTSD and comorbid mood and anxiety disorders					
Hovens (1992)	Cross-sectional	SCID (DSM-II-R criteria)	• Anxiety: Spielberger Trait-Anxiety Inventory • Depression: Zung Self-Rating Depression scale	NA	Veterans with PTSD reported significantly higher scores on anxiety, depression, and anger compared to those without.

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Kidson (1993)	Cross-sectional	DSM-III-R	Anxiety, depression: clinical audit returns of the treating doctors, otherwise unspecified	NA	The prevalence of anxiety was significantly higher in veterans with PTSD than those without (59% vs. 31%). The prevalence of depression was not significantly different between groups. The prevalence of co- occurring anxiety and depression was significantly higher in veterans with PTSD than those without (69% vs. 22%).

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
PTSD and comorbid mood disorders and SUD					
Marmar (2015)	Cross-sectional of a longitudinal study	CAPS-5 (DSM-5 criteria)	Major depressive disorder and SUD: SCID-NP (DSM-4 criteria)	NA	<p>The prevalence rates of comorbid major depressive disorder were as follows:</p> <ul style="list-style-type: none"> • War-zone PTSD group: 36.7% • Sub-threshold PTSD group: 30.9% • No PTSD group: 0.7%. <p>The prevalence rates of AUD were as follows:</p> <ul style="list-style-type: none"> • War-zone PTSD group: 2.2% • Sub-threshold PTSD group: 0.7% • No PTSD group: 3.2%. <p>The prevalence rates of drug abuse were as follows:</p> <ul style="list-style-type: none"> • War-zone PTSD group: 1.9% • Sub-threshold PTSD group: 3.2% • No PTSD group: 0.6%.
Schlenger (2016)	Retrospective cohort study	M-PTSD	Depressive disorder: PHQ AUD: AUDIT	NA	<p>Moderately severe depression rates varied by PTSD symptomatology over 25 years as follows:</p> <ul style="list-style-type: none"> • High severity of PTSD: 39.7% • Increasing PTSD severity: 30.4%

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
					<ul style="list-style-type: none"> • Decreasing PTSD severity: 2.8% • Low severity of PTSD: 1.6%. Prevalence of high risk of alcohol problems varied by PTSD symptomatology over 25 years as follows: <ul style="list-style-type: none"> • High severity of PTSD: 14.0% • Increasing PTSD severity: 8.5% • Decreasing PTSD severity: 1.4% • Low PTSD severity: 3.0%.
PTSD and comorbid mood, anxiety, and SUD					
Lu (2012)	Retrospective cohort study	PC-PTSD: DSM-IV criteria	Depressive disorders/anxiety disorders: measure not specified	SDS, and rural vs. urban residence	Prevalence rates of comorbid depressive disorders, anxiety disorders, and AUD significantly varied by age groups among veterans with PTSD as follows: <ul style="list-style-type: none"> • Depressive disorders: 21% (18-29 years) vs. 33% (30-44 years) vs. 40% (45-59 years) vs. 38% (60-74 years) vs. 33% (75+ years) ($p < .001$).

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
Sutker (1993)	Cross-sectional	National Institute of Mental Health DIS (DSM-III criteria)	Affective disorder, anxiety disorders, and AUD: National Institute of Mental Health DIS		<ul style="list-style-type: none"> • Anxiety disorders: 13% (18-29 years) vs. 15% (30-44 years) vs. 19% (45-59 years) vs. 15% (60-74 years) vs. 14% (75+ years) (p = .003). • AUD: 7% (18-29 years) vs. 8% (30-44 years) vs. 20% (45-59 years) vs. 13% (60-74 years) vs. 4% (75+ years) ($p < .001$). <p>Older veterans with PTSD, particularly for the veterans aged ≥ 75, were less likely to receive antidepressant medication and adequate mental health visits.</p> <p>Prevalence rates of comorbid anxiety disorders, affective disorders, and AUD among POWs and combat veterans without POW history were respectively as follows:</p> <ul style="list-style-type: none"> • Anxiety disorders: 26% vs. 7% • Affective disorders: 17% vs. 18% • AUD: 0% in both

First author (year)	Study design	PTSD measure	Comorbid disorder measures	Covariates	Relevant findings
					POWs and combat veterans. The prevalence rates did not significantly differ between two groups.

Abbreviation. AHR = adjusted hazard ratio; AUD = alcohol use disorders; AUDIT-C = Alcohol Use Disorders Identification Test-Concise; CAPS = Clinician Administered Posttraumatic Stress Disorder Scale; CI = confidence interval; CMAI = Cohen-Mansfield Agitation Inventory; DemRS2 = Dementia Rating Scale-2; DIS = Diagnostic Interview Schedule; DSM = Diagnostic and Statistical Manual of Mental Disorders; DTREE = Decision Tree; GDS = Geriatric Depression Scale; HADS = Hospital Anxiety and Depression Scale; HR = hazard ratio; ICD-9-CM = International Classification of Diseases-9th Revision; MMPI = Minnesota Multiphasic Personality Inventory; OR = odds ratio; PCL = Posttraumatic Stress Disorder Checklist; PC-PTSD = Primary Care PTSD Screen; PHQ = Patient Health Questionnaire; POW = prisoners of war; PTSD = posttraumatic stress disorder; Clinical Modification; SCID = Structured Clinical Interview for DSM; NA = not applicable; VA = Veterans Affairs.

^aMini-Mental State Examination (MMSE), North American Adult Reading Test (NAART), Boston Naming Test, Category Fluency, Controlled Oral Word Association Test, Trails A and B, Digit span forward and backward, Rey Auditory Verbal subtest of the Wechsler Memory Scale-Revised (WMS-R), Warrington Recognition Memory Test, Judgment of line orientation, Symbol Digit Modalities Test (SDMT)

2.4.2 Characteristics of Studies

Of the final 24 studies, 20 were conducted in the United States, 3 in Australia, and 1 in the Netherlands. Twelve studies were cross-sectional, and the rest were retrospective (n=8) or prospective cohort studies (n=4).

Most studies analyzed data from clinical samples (n=18), although five studies analyzed data from community samples, and one study incorporated data from both settings. Of the 20 U.S. studies, 16 were conducted in collaboration with the U.S. Veterans Health Administration (VA). Four approaches were used to identify those with PTSD and comorbidities: assessing for comorbid PTSD and neurocognitive and psychiatric disorders among a general sample of veterans (n=13; Bhattarai, 2018; Clark, Rouse, Spangler, & Moye, 2018; Hovens et al., 1992; Hyer, Stanger, & Boudewyns, 1999; Ikin, Creamer, Sim, & McKenzie, 2010; Kidson, Douglas, & Holwill, 1993; Marmar et al., 2015; Mawanda, Wallace, McCoy, & Abrams, 2017; Meziab et al., 2014; Qureshi et al., 2010a; Roughead et al., 2017; Schlenger et al., 2016; Yaffe et al., 2010b); assessing for comorbid PTSD among veterans diagnosed with other neurocognitive and psychiatric disorders (n=7; Ball et al., 2009; Blow, Cook, Booth, Falcon, & Friedman, 1992; Chen, Owens, Browne, & Williams, 2018; Kilbourne, Haas, Mulsant, Bauer, & Pincus, 2004; King et al., 2015; Sajatovic, Blow, & Ignacio, 2006; Verma et al., 2001b); assessing for comorbid neurocognitive and psychiatric disorders among veterans diagnosed with PTSD (n=2; Bohnert et al., 2013; Lu, Carlson, Duckart, & Dobscha, 2012); and assessing for comorbid PTSD and neurocognitive and psychiatric disorders

among veterans who were prisoners of war (POWs; n=2; Hart et al., 2008; Sutker, Allain, & Winstead, 1993).

The majority of study participants were male and Caucasian; eight studies did not provide information about race (Blow et al., 1992; Hart et al., 2008; Hovens et al., 1992; Ikin et al., 2010; Kidson et al., 1993; Meziab et al., 2014; Roughead et al., 2017; Yaffe et al., 2010b), and two studies did not report the sex of the participants (Meziab et al., 2014; Sutker et al., 1993).

2.4.3 Measures

PTSD was ascertained using four methods: International Classification of Disease 9th Revision (ICD-9) codes that were determined by healthcare providers and captured in local and national electronic databases as part of routine clinical care (n=12; Ball et al., 2009; Bhattarai, 2018; Bohnert et al., 2013; Chen et al., 2018; Kilbourne et al., 2004; King et al., 2015; Mawanda et al., 2017; Meziab et al., 2014; Qureshi et al., 2010a; Roughead et al., 2017; Sajatovic et al., 2006; Yaffe et al., 2010b); diagnostic interviews based on DSM criteria using the Structured Clinical Interview for DSM (SCID), the Clinician-Administered PTSD Scale (CAPS), and the Diagnostic Interview Schedule (DIS; n=8; Blow et al., 1992; Hart et al., 2008; Hovens et al., 1992; Hyer et al., 1999; Kidson et al., 1993; Marmar et al., 2015; Sutker et al., 1993; Verma et al., 2001b); a clinician-administered screening, Primary Care PTSD Screen (PC-PTSD; n =1; Lu et al., 2012); and self-reported measures, PTSD Checklist (PCL), and Mississippi Scale for Combat-Related PTSD (n=3; Clark et al., 2018; Ikin et al., 2010; Schlenger et al., 2016).

Studies that used DSM criteria-based instruments to diagnose PTSD used five different editions of the DSM: DSM-II-R (n=1; Hovens et al., 1992), DSM-III (n=2; Blow et al., 1992; Sutker et al., 1993), DSM-III-R (n=3; Hart et al., 2008; Hyer et al., 1999; Kidson et al., 1993), DSM-IV (n=3; Ikin et al., 2010; Lu et al., 2012; Verma et al., 2001b), and DSM-5 (n=1; Marmar et al., 2015). Comorbid neurocognitive and psychiatric disorders were ascertained using similar approaches: ICD-9 codes (n=11; Ball et al., 2009; Bhattarai, 2018; Bohnert et al., 2013; Kilbourne et al., 2004; King et al., 2015; Mawanda et al., 2017; Meziab et al., 2014; Qureshi et al., 2010a; Roughead et al., 2017; Sajatovic et al., 2006; Yaffe et al., 2010b); diagnostic interviews based on DSM criteria (n=5; Blow et al., 1992; Hart et al., 2008; Marmar et al., 2015; Sutker et al., 1993; Verma et al., 2001b); self-report scales for anxiety and depression (n=4; Clark et al., 2018; Hovens et al., 1992; Ikin et al., 2010; Schlenger et al., 2016); clinician-administered rating scales including standardized neuropsychological tests, Minnesota Multiphasic Personality Inventory (MMPI), and Alcohol Use Disorder Identification Test (AUDIT; n=5; Ball et al., 2009; Chen et al., 2018; Hart et al., 2008; Hyer et al., 1999; Schlenger et al., 2016); and unspecified measures (n=2; Kidson et al., 1993; Lu et al., 2012).

2.4.4 Prevalence and Incidence of Neurocognitive and Psychiatric Comorbidities of PTSD

Neurocognitive disorders. An association between dementia and PTSD was demonstrated. In two studies of older U.S. veterans with dementia or mild cognitive impairment in VA outpatient clinics, the prevalence of comorbid PTSD was 4.7% and

5.3%, respectively (Ball et al., 2009; King et al., 2015). Retrospective cohort studies of U.S. veterans have consistently demonstrated an increased risk for dementia among veterans with PTSD compared to those without PTSD (Mawanda et al., 2017; Roughead et al., 2017; Yaffe et al., 2010b). In the most recent study using a national sample of 417,172 U.S. veterans, the hazard ratio (HR) for incident dementia in veterans with PTSD was 1.36 (95% CI=1.28–1.44) after adjusting for demographics, specific medical and psychiatric comorbidities, overall comorbidity score, and clinic utilization (Mawanda et al., 2017). These findings align with three prior longitudinal studies in the United States that used national samples, and found hazard ratios ranging from 1.21 to 1.77 (Bhattarai, 2018; Qureshi et al., 2010a; Yaffe et al., 2010b). However, an Australian study using national samples of 15,612 Vietnam veterans showed no significant association between PTSD and risk for dementia (Roughead et al., 2017).

Mood disorders. Mood disorders were prevalent among veterans with PTSD, although the estimates are imprecise. In a U.S. national survey of Vietnam veterans (Marmar et al., 2015), the estimated prevalence of depression co-occurring with PTSD was 36.7 % (95% CI = 6.2–67.2), consistent with findings from analyses of regional VA data (33%–38%; Lu et al., 2012). An Australian study of a national sample of Korean war veterans found that 52.3% of those with PTSD had co-existing depression (Ikin et al., 2010). The prevalence of PTSD in older veterans with bipolar disorder ranged from 5.4% to 9% in two U.S. studies (Kilbourne et al., 2004; Sajatovic et al., 2006). Results regarding the relationship between PTSD and depression were inconsistent. One study

reported older, community-dwelling Dutch resistance fighters with PTSD were significantly more depressed than those without PTSD (Hovens et al., 1992). These results were contradicted by another study conducted in a psychiatric outpatient clinic in Australia, where there was no significant difference in depression between WWII veterans with and without PTSD (Kidson et al., 1993).

Anxiety disorders. Anxiety disorders were prevalent among veterans with PTSD. One U.S. study using regional VA data estimated the prevalence of comorbid anxiety disorders among older veterans with PTSD seen in outpatient clinics as between 14% and 15% (Lu et al., 2012). An Australian study reported a 59% prevalence of comorbid anxiety disorder among WWII veterans with PTSD recruited from a psychiatric outpatient clinic (Kidson et al., 1993). Two additional studies comparing the prevalence of anxiety disorder between veterans with and without PTSD found that significantly more veterans with PTSD had anxiety than those without (Hovens et al., 1992; Kidson et al., 1993).

Substance use disorders. The prevalence of comorbid PTSD and substance use disorder, including alcohol use disorder, ranged from 1.2% to 11.3 % (Marmar et al., 2015; Qureshi et al., 2010a). In a nationwide cross-sectional study, the prevalence of PTSD was 7.5% among all 830,825 U.S. veterans who screened positive for alcohol use disorders (Chen et al., 2018). One study of 390 Vietnam veterans compared the prevalence of alcohol use disorder and other substance use disorders for veterans with and without PTSD. A higher prevalence of comorbid substance use disorders was found

in veterans with PTSD than those without (1.9% vs. 0.6%), but the prevalence of comorbid alcohol use disorder in veterans with PTSD was lower than those without (2.2% vs. 3.2%; Marmar et al., 2015).

2.4.5 Factors Associated with Neurocognitive and Psychiatric Comorbidities of PTSD

Age. Findings regarding the association of age with prevalence of psychiatric comorbidities of PTSD were mixed, depending on the comorbid disorder. Among veterans aged 45-59, the prevalence of comorbid depression with PTSD was highest and showed a decreasing trend in successively older age groups. Specifically, compared to veterans aged 75 and older, veterans aged 60-74 had a higher prevalence of comorbid depression (38% vs. 33%; Lu et al., 2012). The prevalence of comorbid alcohol use disorder was also lower in the oldest group than in younger groups. Veterans with PTSD aged 75 and older had a lower prevalence of comorbid alcohol use disorder (4%) compared to those aged 60-74 (13%; Lu et al., 2012). Another study found similar results; the oldest veterans with alcohol use disorder aged 70 and older had a lower prevalence of comorbid PTSD (2.4%) compared to those aged 60-69 (3.9%; Blow et al., 1992). However, no significant age group differences were found in the prevalence of comorbidity of PTSD with anxiety and bipolar disorder (Kilbourne et al., 2004; Lu et al., 2012).

Combat-related exposures. POW status during wartime, which typically involves severe trauma or stress, was associated with an increased incidence of dementia

after controlling for the effects of PTSD. In a retrospective cohort study of VA patients, the risk of dementia increased 50% among those with PTSD alone (HR=1.52; 95% CI=1.41-1.64) compared to those with neither PTSD nor POW status, while the risk of dementia increased more than 200% among veterans with PTSD who were also POWs (HR=2.24, 95% CI=1.72-2.92; Meziab et al., 2014). POW history was also related to increased severity of behavioral symptoms among veterans with PTSD and dementia, with significantly higher mean scores for paranoia and less verbal agitation compared to those without a POW history (Verma et al., 2001b).

Findings regarding the relationship between combat-related exposures and having comorbid PTSD and mood disorders were inconsistent. Increasing severity of combat exposure, deployment during active warfare, and combat-related physical injury were associated with having comorbid PTSD and depression, according to an Australian study of Korean War veterans (Ikin et al., 2010). However, another study that compared WWII veterans who were POWs with those who saw combat but were not POWs found no significant association between POW status and prevalence of PTSD comorbidity with affective disorders, anxiety disorders, or alcohol use disorders (Sutker et al., 1993).

Clinical conditions. A high prevalence of multiple comorbidity was found in older veterans with comorbid PTSD and neurocognitive disorders (King et al., 2015; Verma et al., 2001b). For example, 44% of cognitively impaired older veterans with comorbid PTSD also had co-occurring depression (King et al., 2015). In another study, a higher percentage of dementia patients with PTSD had a diagnosis of mood disorder than

those without PTSD (25% vs. 7%), although these differences were not statistically significant (Verma et al., 2001b). Additionally, a significantly higher number of veterans with PTSD had co-occurring anxiety and depression than those without PTSD (Kidson et al., 1993).

Comorbidity of PTSD and neurocognitive and psychiatric disorders was associated with symptom severity in some studies, but the evidence was inconsistent. Tests of frontal lobe function and psychomotor function were significantly more impaired in older veterans who were WWII POWs with PTSD than in those without PTSD (Hart et al., 2008). In two prospective cohort studies, the risks of aggressive and agitated behaviors among veterans with dementia and PTSD were not significantly higher when compared to those without PTSD (Ball et al., 2009; Verma et al., 2001b). In an Australian study of Korean War veterans, comorbidity of PTSD and depression was significantly associated with greater symptom severity of both disorders compared to having either disorder alone (Ikin et al., 2010). In a U.S. study of veterans receiving care at a geriatric mental health clinic, comorbid PTSD was associated with more severe depressive symptoms after three months of treatment when compared to veterans without PTSD (Clark et al., 2018). PTSD symptomatology over time was also a factor that was associated with comorbid psychiatric disorders. In a study of U.S. Vietnam veterans in community settings, the prevalence of moderately severe depressive disorders and alcohol use disorders was greater in veterans with high, stable, or increasing PTSD

symptomatology over 25 years when compared to veterans with low, stable, or decreasing PTSD symptomatology (Schlenger et al., 2016).

Health-related and psychosocial outcomes. Comorbidity of PTSD with other psychiatric disorders was also associated with greater healthcare utilization. Veterans with PTSD and bipolar disorder had more frequent hospitalizations and outpatient visits (Sajatovic et al., 2006). Higher rates of alcohol-related and mental health care utilization were reported in veterans with PTSD than those without (Chen et al., 2018). One study reported that comorbid substance use disorder with PTSD was a predictor for injury-related mortality such as accidents and suicide in older veterans aged 65 and older (Bohnert et al., 2013). Additionally, comorbidity of PTSD and depression was associated with poorer life satisfaction and reduced quality of life among Australian Korean War Veterans compared to veterans with only one or no disorders (Ikin et al., 2010). One study examined the influence of PTSD and depressive disorders on social support and overall adjustment among older U.S. community-dwelling veterans and found that while depressive disorders were more often associated with social support, PTSD was more often associated with overall adjustment (Hyer et al., 1999).

2.5 Discussion

This systematic review suggests that comorbid neurocognitive and psychiatric disorders occur frequently among older veterans with PTSD and are related to important health outcomes. Factors associated with PTSD comorbidities included age, combat-related exposures, clinical conditions, health-related issues, and psychosocial outcomes.

The complexity associated with the multiple comorbidities of neurocognitive and psychiatric disorders, PTSD, and adverse outcomes among older veterans suggests a need for more focused approaches to clinical management, decision-making, and coordination (National Quality Forum, 2012). Studies that employ more rigorous designs are needed to better explicate the mechanisms that underlie these complex patterns of comorbidity so that individualized interventions can be developed and tested.

This review noted the increased risk for dementia among older veterans with PTSD compared to those without PTSD. Several plausible pathophysiological pathways have been suggested (Greenberg, Tanev, Marin, & Pitman, 2014; Weiner et al., 2013a). Diminished volume of the hippocampus and increased cortisol levels in veterans with PTSD were found to be associated with memory impairment (Karl et al., 2006; Lupien et al., 1998). Early life stress may alter glucocorticoid receptor responsiveness through epigenetic mechanisms, and consequently increase the subsequent development of PTSD and risk for dementia (Yehuda et al., 2010). Additionally, the high incidence of comorbid depression, traumatic brain injury, diabetes, stroke, and heart disease—risk factors for developing dementia—are another potential explanation for the higher incidence of dementia among veterans with PTSD (Diniz, Butters, Albert, Dew, & Reynolds, 2013; Weiner et al., 2013a).

The prevalence of mood disorders, anxiety disorders, and substance use disorders among older veterans with PTSD was higher compared to both the general veteran population and the older adult population in the United States. In a U.S. study using a

nationally-representative community-based sample of older adults, the prevalence of psychiatric disorders was 6.8% for any mood disorders, 11.4% for any anxiety disorders, and 3.8% for any substance use disorders (Reynolds, Pietrzak, El-Gabalawy, Mackenzie, & Sareen, 2015). A meta-analysis of these disorders among older U.S. veterans reported prevalence rates of 13.4% for depressive disorders, 9.1% for anxiety disorders, and 5.4%–5.7% for substance use disorders (Williamson, Stevelink, Greenberg, & Greenberg, 2017). In contrast, the prevalence of these disorders was higher among older veterans with PTSD, with prevalence estimates for co-existing depression ranging from 33%–52.3%, generalized anxiety disorders, 14%–15%, and substance use disorders, 1.9%–11.3%. Several potential mechanisms could explain the greater psychiatric comorbidity associated with PTSD. Preexisting psychiatric disorders can increase vulnerability to traumatic events, which increases the likelihood of developing PTSD (Breslau, 2009; Smith, Goldstein, & Grant, 2016). Comorbid psychiatric disorders may develop as consequences or complications of PTSD. For example, individuals with PTSD often attempt to self-treat PTSD symptoms with alcohol or other substances, and develop substance use disorders as a consequence (Brady, Killeen, Brewerton, & Lucerini, 2000; Breslau, 2009). Common underlying causes, overlapping symptoms, diagnostic criteria, and a shared genetic association between PTSD and other psychiatric disorders may also explain the high comorbidity rates (McLeod et al., 2001; Pietrzak, Goldstein, Southwick, & Grant, 2011).

With respect to age effects, two studies found that the prevalence of comorbid PTSD and other psychiatric disorders peaked in middle age and decreased in successively older age groups (Blow et al., 1992; Lu et al., 2012). One explanation for these findings is a war-era cohort effect. Vietnam veterans had more severe psychiatric symptoms and a greater lifetime frequency of psychiatric disorders preceding combat exposure than WWII veterans (Davidson, Kudler, Saunders, & Smith, 1990). Increased mortality rates associated with either PTSD or comorbid psychiatric disorders could also explain the decreasing trend in older veterans (Ahmadi et al., 2011; Lu et al., 2012). The lower prevalence of psychiatric disorders in older cohorts might be related to the stigma of mental disorders in older adults, which could lead to underreporting of psychiatric symptoms (Gum, King-Kallimanis, & Kohn, 2009; Mojtabai, 2007).

Studies also revealed that the neurocognitive and psychiatric comorbidity of PTSD is associated with poorer health and psychosocial outcomes. Managing coexisting PTSD and neurocognitive or psychiatric disorders adds another layer of complexity to care, and may increase the risk of treatment failure and serious adverse outcomes (Blow et al., 1992). Since older adults are reluctant to seek mental health services and are more likely to present with somatic symptoms, healthcare providers should be vigilant regarding hidden comorbidities, and routinely assess for a history of previous trauma or negative life stressors, PTSD, pre-existing psychiatric disorders, and related symptoms in primary and mental health care (Cook & Niederehe, 2007; Moye & Rouse, 2014). This assessment could be conducted during the Medicare Annual Wellness Visit, which calls

for assessing psychosocial risk factors. Incorporating questions regarding military service history, combat exposure, and past experiences of mental health problems could trigger screening for PTSD and referrals to appropriate diagnostic or treatment services (Center for Medicare and Medicaid Services, 2018). The PC-PTSD may help healthcare providers identify older veterans at risk for PTSD, who present with somatic symptoms rather than emotional difficulties, as its questions are based on the patients' physical responses to stress (Osei-Boamah, Pilkins, & Gambert, 2013).

Clinicians should also be aware that retirement and institutionalization may trigger prior trauma and reawaken psychological distress among older veterans residing in institutional settings such as nursing homes or assisted living facilities (Busuttill, 2004; Cook et al., 2005; Moye, 1997). Undiagnosed PTSD among older veterans with other neurocognitive and psychiatric disorders in institutional settings can be attributed to the complexity of PTSD symptoms and lack of a standardized PTSD assessment instrument for older veterans with limited cognitive and/or communicative abilities. Further, PTSD symptoms can be confused with neurocognitive disorders, psychosis, and medication effects. For such complex cases where comorbid disorders make it harder to obtain accurate and reliable PTSD histories, clinicians should be prepared to use observational measures, collateral assessment from caregivers, and existing medical records to determine the existence of neurocognitive and psychiatric disorders or trauma exposure and to facilitate accurate diagnoses (Cook et al., 2005). Unless clinicians recognize the potential for co-occurrence of other neurocognitive and psychiatric disorders with PTSD,

they may overlook treatable illnesses, leading to unnecessary suffering. Subgrouping patients with PTSD according to the presence of comorbid neurocognitive and psychiatric disorders would enable providers to tailor care to a specific pattern of comorbid illness.

The imprecision of prevalence estimates and inconsistent results regarding associated factors may be explained by heterogeneous research designs. The different measures used to diagnose comorbid illness may underlie discrepancies among studies. For example, the highest prevalence of comorbid depression was reported among community-dwelling Korean war veterans with PTSD (52.3%) in an Australian study, which used a self-report measure (Ikin et al., 2010) compared to 36.7% of comorbid depression among community-dwelling Vietnam veterans with PTSD in a U.S. study where a diagnostic interview was used (Marmar et al., 2015). Moreover, PTSD criteria have evolved from DSM-III to DSM-5. Changes in the criteria for trauma exposure, symptoms, and PTSD onset/chronicity indicators across the DSM editions makes direct comparison and consolidation of study findings difficult (North, Suris, Smith, & King, 2016). The validity of prevalence studies that used previous editions of the DSM is weakened due to the likelihood of under-diagnosis or misdiagnosis of PTSD. Likewise, the study setting can influence prevalence estimates. Illness status of participants can be more severe in inpatient or long-term care settings than in community settings, which can inflate the rates and severity of comorbidities relative to the population as a whole. Lastly, half of the reviewed studies did not adjust for potential confounding factors and other

factors that influence the comorbidity of PTSD, and other neurocognitive and psychiatric disorders went unmeasured. The effects of psychosocial factors such as social support, social network, and living place (rural vs. urban residence) need to be considered to understand the mechanism of PTSD comorbidity (Adams et al., 2017; Gros et al., 2016; Wallace, Weeks, Wang, Lee, & Kazis, 2006). Other potential unmeasured confounding factors include cognitive reserve, body mass index, physical functioning, physical activity, and the effects of antipsychotic use (Roughead et al., 2017). Future research should consider using more sophisticated methods such as propensity scores or instrumental variables to account for differences in sample characteristics between older veterans with and without PTSD.

This systematic review revealed important gaps in knowledge about the associations between PTSD and other neurocognitive and psychiatric disorders. Prior studies have noted that chronic PTSD was associated with reduced social support, a greater frequency of social phobia, and greater avoidance symptoms than acute PTSD (Davidson, Hughes, Blazer, & George, 1991), suggesting several targets for intervention that may influence the course of PTSD in older adults. However, only one study accounted for the number of years since first PTSD diagnosis. No other studies described the onset and illness trajectory of PTSD. Longitudinal studies are needed to further examine the relationships between PTSD and other comorbid disorders and the underlying mechanisms of the comorbid conditions. Examining how different types of PTSD influence the development of comorbid conditions across the lifespan would

inform the development of individualized patient-centered interventions. Studies are also needed to explore the differences in comorbid illnesses between older veterans whose PTSD has been treated, those who have had untreated PTSD for years, and those who have only recently manifested PTSD symptoms. Such studies would reveal how treatment of PTSD can affect development of other neurocognitive and psychiatric disorders. Lastly, developing interventions tailored to older veterans with PTSD who are sub-typed by comorbid disorders and evaluating their efficacy would strengthen the scientific foundation for clinical care.

2.5.1 Limitations

The major limitation of this systematic review arises from heterogeneous study designs, which made it difficult to compare studies. Additionally, the searches were limited to publications in English. Thus, findings from non-English articles are unknown, and a lack of evidence from non-U.S. countries makes it difficult to generalize findings globally. The fact that the majority of participants in the reviewed studies were white men also makes it difficult to generalize findings to ethnic minority veterans or women veterans, who comprised 9% and 22%, respectively, of the total veteran population in 2016 (National Center for Veterans Analysis and Statistics, 2018).

2.6 Conclusion

Neurocognitive and psychiatric comorbidities are prevalent among older veterans with PTSD. Additional research is needed to address the imprecision and inconsistency of findings across studies and their methodological limitations. Future studies with

appropriate sample sizes and more rigorous research designs are needed to obtain more accurate estimates of comorbidity prevalence and interplay among these illnesses.

Longitudinal studies would permit understanding of temporal and causal relationships among PTSD and comorbid disorders across the life span. As we await those studies, clinicians should be vigilant in assessing for the comorbidity of PTSD and other neurocognitive and psychiatric disorders among older veterans, particularly those who report stressful wartime experiences.

2.7 Acknowledgement

This is an Author's Original Manuscript of an article published by John Wiley & Sons, Ltd. in International Journal of Geriatric Psychiatry on April 2019, available online at <https://doi.org/10.1002/gps.5055>.

3. Manifestations of Behavioral Symptoms among Veterans with Dementia: A Qualitative Analysis of Data from STAR-VA

3.1 Background

Behavioral symptoms of dementia (BSD) are core features of Alzheimer's disease and related dementias along with cognitive and functional decline, and they are increasingly recognized as the most challenging and distressing sequelae of Alzheimer's disease and related dementias (Lyketsos et al., 2011). BSD are often described clinically as agitation, aggression, and apathy along with more specific descriptions of behaviors such as repetitive vocalizations, shadowing, resistance to care, and wandering (Kales et al., 2014; Lyketsos et al., 2011). Nearly all people with dementia experience at least one type of behavioral symptom at some point over the disease course (Lyketsos, 2007; Steinberg et al., 2008). These symptoms are associated with adverse outcomes for persons living with dementia including decreased daily functioning, quality of life, accelerated disease progression, and even excess mortality (Kales et al., 2015; Wancata et al., 2003). BSD are also associated with caregiver outcomes such as increased burden and decreased quality of life for caregivers (Allegri et al., 2006; Kales et al., 2015; Kunik, Snow, Davila, McNeese, et al., 2010), and result in increased health care costs by increasing nursing home placements, hospitalizations, and the use of specialized services (Herrmann et al., 2006; O'Brien & Caro, 2001; Wancata et al., 2003).

BSD are particularly commonplace in residential long-term care settings, such as skilled nursing homes, with a prevalence ranging between 70% to 95% (Seitz et al., 2010; Selbaek et al., 2013). One reason for the high prevalence of BSD in this care setting is that greater care burden due to BSD experienced by families is often a predictor for family caregivers seeking other care options such as nursing home placement for older adults with dementia (Clyburn et al., 2000; de Vugt et al., 2005). Other factors that can trigger and exacerbate BSD in residential care settings are attributes of the immediate physical and social environment that the older adults with dementia cannot control such as crowding, sensory overstimulation, caregivers' attitudes, and recreational activities that are unmatched to personality or functional capability (Kolanowski et al., 2005; Zuidema et al., 2010). The burden of managing BSD increases staff turnover and medication overuse in this care setting (Middleton et al., 1999; Spore et al., 1992; Yaffe et al., 2002).

3.1.1 Older Veterans Living with Dementia

The rising prevalence of dementia associated with aging of its population has also impacted care of military veterans with dementia in the United States. The largest subsection of older veterans are Baby Boomers of retirement age who served during the Vietnam War (VeteransAgainstAlzheimer's, 2017). In addition, military service-related dementia risk factors such as traumatic brain injury and posttraumatic stress disorder (PTSD) are also associated with the rising prevalence of dementia in veteran population (Sibener et al., 2014; Weiner et al., 2013b). An estimated 791,115 veterans had

Alzheimer's disease and related dementias in 2014, of which 262,899 received care within the Veterans Health Administration (VHA). The majority of institutional long-term care for veterans provided within the VHA occurs in Community Living Centers (CLCs), which are VHA-owned and operated skilled nursing facilities (Colello & Panangala, 2016; The Office of the Assistant Deputy Under Secretary for Health for Policy and Planning (ADUSH/PP), 2013). In alignment with the national culture change movement in long-term care, CLCs have emphasized resident-centered care that promotes residents' quality of life and self-direction and addresses a range of needs including short-term rehabilitation, hospice care, and respite care (Sullivan et al., 2018; Sullivan et al., 2019). Furthermore, the dramatic rise in older veterans with dementia and the expected long-term threat to younger veterans with service-related risk factors for dementia have driven work to confront the challenges associated with dementia care through evidence-based programs in VHA CLCs (VeteransAgainstAlzheimer's, 2017).

Veterans receiving long-term care in CLCs are a clinically complex population with high rates of chronic conditions, including military service-connected physical disability and psychiatric comorbid illnesses such as PTSD as well as low socioeconomic status (Colello & Panangala, 2016). Coupled with these chronic conditions, dementia and related behavioral symptoms add another layer of complexity to addressing veterans' complex care needs, providing necessary care and ensuring their health and well-being. Thus, examining BSD in veterans with dementia living in VHA CLCs provides an opportunity to understand the unique challenges that affect older veterans who are living

with dementia in residential care. Moreover, understanding BSD among older veterans with dementia in CLCs would provide important insights to improve understanding of challenges that veterans experience in community residential long-term care settings, where the prevalence of dementia and the BSD are likewise growing. To sum up, investigation of BSD among veterans in CLCs provides valuable insights for the dementia care in both the VHA and public and private residential long-term care settings, where older veterans with dementia receive care.

3.1.2 Theoretical Framework

The need-driven dementia-compromised behavior (NDB) model framed our perspectives on BSD. The NDB model views dementia-related behaviors as the most integrated and meaningful responses and means of communicating unmet needs of persons with dementia possible, given the functional limitation imposed by the neurocognitive impairment and preserved strengths from the person's basic abilities and personality (Algase et al., 1996; Kolanowski, 1999). Reframing of BSD from "disruptive" or "disturbing" behaviors from the caregivers' view to "need-driven" behaviors has suggested an etiology centered on the person with the behaviors (Yao, 2004). BSD reflect a response to constraints, challenges, or limited supports arising from the physical and social environments influenced by the presence of background factors among persons with dementia (Algase et al., 1996). Thus, BSD are viewed as meaningful indicators for caregivers as they attempt to improve well-being by identifying unmet

needs of persons with dementia, and implementing approaches to care that respond to those unmet needs (Algase et al., 1996; Kolanowski, 1999).

The main proposition of the NDB model is that BSD are products of the dynamic interaction between background and proximal factors. Background factors consist of individual characteristics including sociodemographic factors, underlying health status, functional status, psychosocial factors (e.g., comorbid psychiatric disorders, traits and personality, and response to stress). Proximal factors are situational physiological and psychological need states and immediate social and physical environmental conditions that trigger the occurrence of BSD. For the study population of military veterans, combat exposure and baseline comorbid PTSD are conceptualized as background factors of veterans with dementia that may influence their psychosocial needs and create unique interpersonal/social and physical environmental triggers of BSD (Carlson et al., 2008; Cook et al., 2003). However, these important background factors have seldom been measured or incorporated into prior research. While far fewer studies examined the influence of PTSD on behavioral symptoms in long-term care settings (Carlson et al., 2008; Sutker et al., 1991; Verma et al., 2001a), none of them included proximal factors in their study design.

Despite the complex etiology of BSD attributed to the confluence and interaction of multiple contributory factors embedded in persons with dementia (Gitlin et al., 2009; Smith et al., 2006), research demonstrates many factors that typically trigger the behaviors are modifiable (Kales et al., 2015; Kolanowski et al., 2017; Lyketsos et al.,

2011). Thus, non-pharmacological interventions that address the underlying triggers for BSD are considered the first line of treatment, particularly in light of the limited efficacy and undesired adverse effects of the antipsychotic medications for BSD (Reus et al., 2016).

However, as Boustani et al. (2005) and Kolanowski et al. (2017) noted, while a number of studies have focused on the biological factors related to persons with dementia, little is known about interpersonal/social and physical environmental factors and their interactions. Furthermore, BSD studies as a whole have been criticized for use of inconsistent measures and for considering BSD imprecisely as one construct (i.e., agitation, BSD, and behavioral and psychological symptoms of dementia) (Kolanowski et al., 2017). Another criticism is that the umbrella term of BSD including agitation represents labels from the staff perspectives rather than a person-centered approach and does not take into account the context in which the behavior occurs. While a few studies provide evidence to support that individual behavioral symptoms in dementia often co-occur, others contend that they are distinct, having different determinants and consequences (Volicer, 2019; Volicer & Galik, 2018). However, there is very little research on how the individual behavioral symptoms differ related to the unique triggers. The investigation of BSD closely linked to the personal, interpersonal, and environmental triggers is critical to develop person-centered interventions that target the root causes (Kolanowski et al., 2017).

Therefore, the purpose of this study was to explore how BSD are manifested among veterans living in residential long-term care settings, in the context of personal, interpersonal/social, and environmental factors that trigger the symptoms.

3.2 Methods

3.2.1 Design

This qualitative descriptive study employed a secondary analysis of text data derived from the evaluation dataset of the STAR-VA training program to generate contextualized accounts of BSD.

3.2.2 Data Source

Adapted from the original Staff Training in Assisted Living Residences (STAR) program for implementation in VHA CLCs (Teri et al., 2005), STAR-VA is a team-based, multicomponent psychosocial intervention to help CLC interdisciplinary care teams understand and manage BSD (Karel et al., 2016; Karlin et al., 2014). In STAR-VA, mental health providers (psychologists, psychiatrists, or psychiatric-mental health nurse practitioners) called “behavioral coordinators” and registered nurse (RN) champions serve as a leadership dyad to implement the core components of STAR-VA with engagement of other members of the CLC interdisciplinary team (i.e., nursing staff, recreation therapists, social workers, rehabilitation therapists, dietitians, chaplains, and medical providers) and family members. STAR-VA has four core components: (1) identifying and modifying intrapersonal, interpersonal, or environmental Activators and Consequences of Behaviors (behavioral analysis using ABCs), (2) identifying and

increasing personally meaningful pleasant events through a structured and individualized process, (3) creating realistic expectations among staff based on individual veterans' abilities and disabilities, and (4) promoting use of effective verbal and non-verbal communication strategies.

The STAR-VA intervention training program included an intensive 2.5 day in-person or virtual training workshop, followed by six-months of skills-based consultation via conference calls with experienced STAR-VA interventionists who served as training consultants. Behavioral coordinators and RN champions also participated in program evaluation activities. The documentations of ABC behavioral assessments and care plans as well as pre-post clinical data for training cases were collected and aggregated into an evaluation dataset maintained by the Serious Mental Illness Treatment Resource and Evaluation Center (SMITREC). Access to a systematically developed training evaluation dataset offers the opportunity to analyze careful descriptions of symptoms from an interprofessional perspective including mental health and nursing professionals. Detailed information about the intervention has been provided in previously published papers (Karel et al., 2016; Karlin et al., 2014).

3.2.3 Study Sites and Participants

The STAR-VA training program has been implemented in more than half of the VHA CLCs between a pilot program in 2010 and annual offerings of the training program between 2013 and 2018. The data derived from the 2013-2016 dataset from the training program were used in the current analysis. From 2013 to 2016, 76 VA CLCs

were selected to participate in the STAR-VA training program. CLCs were selected for the STAR-VA program if they served veterans with dementia who had behavioral symptoms; had a mental health provider who was integrated into the interdisciplinary team in the CLC; had support from nurses who played the role of nurse champion in the STAR-VA leadership team; had support from facility and leadership for STAR-VA during the implementation initiative as well as for sustaining the program as an ongoing component of clinical care; and had support from frontline staff of nursing, recreation therapy and social work for collaborative work with the mental health provider and nurse champion.

From those 76 CLCs participating in STAR-VA training and implementation in 2013-2016, 315 residents were assessed and received individualized treatment plans. The following were the inclusion criteria for STAR-VA enrollment: (1) having a diagnosis of dementia, and (2) having a dementia-related behavior that was distressing to the resident, other CLC residents, family, or staff. Veterans were excluded from STAR-VA if (1) behaviors were directly related to delirium, acute medical illness, acute psychotic symptoms, or a recent traumatic brain injury, (2) they were having active primary serious mental illness diagnoses (i.e., schizophrenia-related disorder or bipolar disorder), or (3) they were receiving end-of-life care (Karel, 2015; Karlin et al., 2014).

For this exploratory study, we selected a stratified random sample using presence of PTSD and combat exposure as stratifiers to ensure that we had sufficient numbers of veterans with these factors that had not been adequately examined in prior studies, yet

may reflect important background factors for BSD. After excluding cases with missing data on the background variables (n=76), we chose a stratified random sample of 10% of 239 veterans for the first phase of coding (n=23) and 20% of the remaining samples for the second phase of coding (n=43). The sample for this secondary analysis study comprises 66 veterans.

3.2.4 Instruments

The instruments used for this present study were administered by the behavioral coordinators with collaboration from RN champions and care staff. Behavioral coordinators received training to administer the instruments during the in-person or virtual training session.

3.2.4.1 Sociodemographic data

We used sociodemographic data, including age, sex, race, educational level, marital status, and war era in which veterans participated during their military service, obtained from a Demographic/Background Information questionnaire. Whether the Veteran has a history of combat exposure and a diagnosis of PTSD was also assessed through a medical chart review as part of the questionnaire.

3.2.4.2 Cognitive and functional status

We also used standardized measures, which were administered as part of the program by the behavioral coordinators, to indicate baseline characteristics of cognition and function for veterans included in the current study. The Blessed Orientation-Memory-Concentration (BOMC) was administered to evaluate cognitive functioning at

baseline (Meiran et al., 1996). A weighted score of 10 or greater reveals signs related to cognitive impairment. The Functional Assessment Staging Tool (FAST) (Reisberg, 1988) was administered to measure baseline functional status. With a range from 1 to 7, a score of 1 indicates no functional impairment and 7 indicates severe impairment.

3.2.4.3 Behavioral symptoms

We analyzed text data that were written responses to structured open-ended questions on the ABC Card to assess BSD and their circumstance. The ABC Card is a structured method for identifying BSD and developing care plans (See Figure in Appendix C). The open-ended questions, guided by the ABC behavioral analysis approach, were as follows: “What happened just before the behavior? (Activator)” “What was the resident doing? Who was present? Where was this happening? When was this happening? (Behavior)” “What happened just after behaviors? (Consequence)” For each veteran case, the behavioral coordinators and/or RN champions with the local interdisciplinary staff completed an ABC Card weekly. This weekly assessment process using the ABC Card continued until the symptoms had improved, and the team had increased confidence in managing the BSD. An average of five ABC Cards were completed for each veteran enrolled.

3.2.5 Ethical Consideration

Institutional Review Board (IRB) approval for this study was obtained from the Duke University Health System and the Durham VA Medical Center.

3.2.6 Data Analysis

Descriptive statistics were conducted to summarize sociodemographic characteristics and functional status of participants using SAS 9.4 (SAS Institute Inc, 2014).

Text data from the ABC Cards were analyzed using framework analysis (Gale et al., 2013). Framework analysis was originally developed for large-scale social policy research and has been widely employed in healthcare research. Framework analysis is useful to systematically reduce data using a highly structured matrix output, through which large amounts of qualitative data can be managed and summarized. The systematic and structured process and output of this analytic approach is also well suited for comparing data across cases as well as within individual cases (Gale et al., 2013).

The analysis for this study proceeded in six stages: familiarization, coding, establishment of a working analytic framework, indexing (application of the thematic framework), charting data into the framework matrix, and interpretation and mapping (Gale et al., 2013; Pope et al., 2000). The detailed process for each stage is summarized in Table 3. The coding team consisted of a PhD student in Nursing who has clinical experience with older adults with dementia (BK) and a PhD level clinical nurse researcher who has clinical experience in VA CLCs and expertise in BSD management (ESM). A PhD level psychologist with expertise in geriatric mental health (MK) and a sociologist with expertise in long-term care provided consultation (KC) throughout the coding and analysis process. An integrated coding approach incorporating both deductive

and inductive coding were used, during which coders used an initial set of a priori codes to conduct line-by-line coding, incorporating new data-driven codes as they emerged during the coding process (Fereday & Muir-Cochrane, 2006; Gale et al., 2013). We developed a set of a priori codes from a previous study of the pilot implementation of STAR-VA, the Cohen-Mansfield Agitation Inventory, the NDB model, and current literature on BSD (Algase et al., 1996; Cohen-Mansfield, 1991; Curyto et al., 2017; Kales et al., 2015; Kolanowski et al., 2017).

Of the weekly administered ABC Cards, coders read text from the initial card and the last card to understand the broader context regarding whether the target behaviors or triggers changed over time. We excluded any cases if the target behaviors were completely different between cards, or if the information on the cards for the case was too limited to allow interpretation. Although in most cases behavioral symptoms and triggers did not vary between cards, we used the initial as well as last card for this analysis to capture the information comprehensively. For cases where the initial or last card had key information missing, we used all the remaining cards to provide needed context.

Analysis was undertaken in six stages throughout the framework analysis to ensure the trustworthiness and rigor of the qualitative data analysis assuring qualitative validity and minimizing bias (Lincoln & Guba, 1985). To ensure the credibility of the study, a working analytic framework, where a set of codes was assigned to categories, was developed as a data management template in an iterative way throughout the analysis (Crabtree & Miller, 1992; Fereday & Muir-Cochrane, 2006; Gale et al., 2013). To ensure

confirmability, the research team had weekly debriefing sessions for coding reliability checks (Shenton, 2004). When discrepancies in use of codes arose, we used a consensus process to refine definitions and achieve agreement on the applied codes. An audit trail of all analysis decisions and detailed description of each code and category was facilitated through the code-definition and linked-memo functions in Nvivo 11 software (QSR International, 2015). After analyzing the 66 cases, theoretical saturation was achieved, as indicated by no new themes or categories emerging.

Table 3: Six stages of framework analysis

Stage	Process in each stage
Familiarization	<ul style="list-style-type: none"> • The text data was already archived as an Excel file and was transferred to Nvivo. • The coding team selected a random sample of 10% of cases stratified by presence of PTSD and combat exposure and read through the raw data in order to become familiar with the data. • Each coder recorded any questions, analytical notes, thoughts or impression through linked-memo functions in NVivo.
Coding	<ul style="list-style-type: none"> • A set of a priori codes that were listed in the provisional analytic framework with definitions in NVivo project file was used for initial coding. • The two researchers carefully read the data of the randomly selected 10% sample of cases line by line, applying the pre-defined codes. • Data-driven inductive codes were also added into the provisional analytic framework and used as they were identified throughout the coding process.
Developing a working analytic framework	<ul style="list-style-type: none"> • Once 10% of cases were coded, the codes were reviewed during a team meeting and then sorted into categories and sub-categories based on the relations and linkages between different codes and the context (Hsieh & Shannon, 2005; Patton, 1990). • At this coding phase, discrepancies of a priori codes as well as inductive codes were discussed by coders in the coding team meetings until 100% consensus agreement was reached. • A working analytical framework, in which codes, sub-categories, and categories were structured into a matrix with clear definitions for each code, was developed.
Indexing: applying the analytic framework	<ul style="list-style-type: none"> • The coding team selected additional cases to achieve a stratified random sample of 20% of cases by presence of PTSD and combat exposure. • Each of the randomly selected samples was coded using the analytic framework by two researchers (BK and ESM). • Throughout the coding process, the analytic framework was refined with emergent codes added and applied into the data of every individual case in an iterative way.
Charting data into the framework	<ul style="list-style-type: none"> • The data were rearranged so that all quotes coded with same code and category were grouped together. Coded data were then abstracted into a matrix that include quotes, code, category, and the

matrix	<p>relevant context.</p> <ul style="list-style-type: none"> • Researchers also synthesized the individual quotes indexed by codes within an ABC card into case level summaries and entered the summary statements into the framework matrix. • The consistency of charting was ensured by comparing and contrasting the style of summary in the regular coding team meeting.
Interpreting the data	<ul style="list-style-type: none"> • An analytic memo was added to note impressions, interpretation, and potential themes throughout every stage. • We compared the data within each case and across cases to identify characteristics of and differences between the data, through which themes related to the research questions were generated. • We also mapped out connections between categories to explore relationships.

3.3 Results

In this study, 66 veterans were included, of which the majority were White male veterans aged 70 or older. Approximately 44% of veterans served during the Vietnam War, and 56% of veterans were exposed to combat during their military service. Table 4 details veterans' demographic characteristics. The weighted mean score of 20.8 (standard deviation [*SD*] = 8.0) for the BOMC and the mean score of 5.8 (*SD* = 0.8) for the FAST measured at baseline indicate significant cognitive impairment and moderate to severe functional impairment, respectively.

Table 4: Participant characteristics (N=66)

Variables	n (%)
Age ^a	
50-59	3 (4.8)
60-69	15 (23.8)
70-79	15 (23.8)
80-89	10 (15.8)
≥ 90	20 (31.8)
Gender	
Male	64 (97.0)
Female	2 (3.0)
Education	
Less than high school	13 (19.7)
High school	24 (36.4)
Some college or college graduate	19 (28.8)
Some graduate or graduate degree	7 (10.6)
Unknown	3 (4.6)
Race	
White	49 (74.2)
Black	12 (18.2)
Hispanic/Latino	4 (6.1)
American native	1 (1.5)
Marital status ^b	
Currently married	25 (38.5)
Divorced/separated	21 (32.3)
Widowed	14 (21.5)
Single/never married	5 (7.7)
War era ^c	
World War II	17 (25.8)
Korean War	15 (22.7)
Vietnam War	29 (43.9)
Post-Vietnam era	7 (10.6)
Combat exposure during military service	
Yes	37 (56.1)
No	29 (43.9)
PTSD diagnosis	
Yes	20 (30.3)
No	46 (69.7)

Note. a=4.5% (n=3) missing; b=1.5% (n=1) missing; c=3.0% (n=2) participated in two wars.

The behavioral symptoms were grouped into four broad categories: rejection of care, aggressive behaviors (physical and/or verbal), non-aggressive behaviors (physical and/or verbal), and a new behavioral category that was not captured with any of the pre-defined codes. When behavioral symptoms co-occurred with one or more behavioral symptoms within a case, we coded them with multiple behavioral categories. The descriptive codes for behavioral triggers were categorized into intrapersonal, interpersonal, and environmental triggers as summarized in Table 5. Thereafter, the data were rearranged by category and were grouped together in the framework matrix.

Table 5: Categories and codes for behavioral triggers

Categories	Codes	Exemplar quotes
Intrapersonal activators	Resident expressed physiological needs	Patient usually sits calmly until he recognizes an immediate need (urgency to use restroom, hungry).
	Resident in discomfort or distress	Veteran was restless and anxious (worried and nervous) and wanted to rest and feel calm. He repeatedly asked for medicine so he could go to sleep.
Interpersonal activators	Direct-care approach	Peri-care needs to occur during a shower or after toileting. The Veteran is given a wipe or washcloth and does not wipe himself, or the Veteran has been toileted and cleaned, and his attends (incontinence briefs) are being pulled up.
	Other social interaction - with family	Wife is preparing to leave after a visit with Veteran. Veteran remembers something that reminds him of his wife and not being able to go home.
	Other social interaction - with other residents	...when staff or other residents bump his wheelchair; when he thinks staff or other residents are talking about him behind his back...
Environmental (social and/or physical)	Over-stimulation	Resident sits in a small room while staff bring in multiple residents into this small room for the 'coffee group' activity. The room can become too crowded and noisy for the veteran. Also, when the veteran is kept up too long, for example sitting in the day room after lunch, this is another example of overstimulation because the veteran becomes tired and starts yelling.
	Under-stimulation (lack of structured activities)	[behaviors occur] During the day in between meals and activities when not engaged in something to do.

Categories	Codes	Exemplar quotes
	Crowding	Patient was in a crowded room with a loud TV and people talking (coffee time).
	Ambient conditions	The lights are off, and it is dark (he is scared of the dark).
Organizational culture of care	Veteran's role and independence vs. safety concern	A veteran spent time in room or in quiet area, he attempted to assist other residents by providing condiments, beverages, napkins, and other items.

The frequency of behavioral symptoms and behavioral triggers are displayed for the full sample of 66 participants as well as by two groups (veterans with and without PTSD) in Tables 6 and 7. In the full sample, 41% of cases exhibited some form of rejection of care with or without co-occurring behavioral symptoms (n=27), of those, 29% cases co-occurred with physical or verbal aggressive symptoms. Approximately 21% of cases (n=14) exhibited physical and/or verbal aggression with or without non-aggressive symptoms outside of the context of direct care, and 32% cases (n=21) exhibited non-aggressive physical and/or verbal symptoms without aggression. A new behavioral category that was not pre-defined arose from the analysis in about 6% of cases (n=4). These behaviors tended to focus on veterans engaging in self-care activities without assistance or helping other residents. Multiple behavioral triggers were identified in many cases.

There were similarities and differences in behavioral symptoms and triggers between veterans with and without PTSD. The most notable differences between the two

groups were that veterans with PTSD tended to exhibit rejection of care with aggressive behaviors compared to those without PTSD, and a higher proportion of triggers related to the staff's direct-care approach were found in veterans with PTSD than those without PTSD. In addition, veterans without PTSD were twice as likely to exhibit non-aggressive behaviors compared to those with PTSD.

From the framework matrix, we summarized the proportion of four categories of BSD and their linkage to the specific categories of triggers (Table 8). With regard to the linkage between BSD and triggers, every case that exhibited any form of rejection of care was triggered by an unsolicited direct-care approach. Of the 14 cases where aggressive behavioral symptoms occurred outside of providing direct care, in seven cases, the interpersonal triggers resulted in aggressive behaviors. In the remaining eight cases, a combination of intra, interpersonal, and environmental triggers led to co-occurring aggressive and non-aggressive behaviors. Of 21 cases where non-aggressive behaviors occurred, the most frequent triggers arose from the social or physical environment. The next most common triggers were physiological unmet needs and/or emotional distress, followed by a combination of environments and physiological and/or emotional distress. Additionally, a new behavioral category linked to organizational culture of care emerged from the analysis.

Table 6: Frequency of types of behavioral symptoms and triggers among veterans with and without PTSD

Types of behavioral symptoms	Total (N=66), % (n)	No PTSD group (n=46), % (n)	PTSD group (n=20), % (n)
Any form of rejection of care	40.9 (27)	34.8 (16)	55 (11)
Verbal refusal only	10.6 (7)	13.0 (6)	5 (1)
Verbal refusal + non-aggressive behaviors	1.5 (1)	0 (0)	5 (1)
Verbal refusal + aggressive behaviors	10.6 (7)	4.3 (2)	25 (5)
Aggressive behaviors only	18.2 (12)	17.4 (8)	20 (4)
Aggressive behaviors not in the context of care	21.2 (14)	21.7 (10)	20 (4)
Aggressive behaviors only	9.1 (6)	10.9 (5)	5 (1)
Aggressive + non-aggressive behaviors	12.1 (8)	10.9 (5)	15 (3)
Non-aggressive behaviors	31.8 (21)	40.0 (17)	20 (4)
Behaviors described by staff as unsafe	6.1 (4)	6.5 (3)	5 (1)

Table 7: Frequency of types of behavioral triggers among veterans with and without PTSD

Types of behavioral triggers	Total (N=66), % (n)	No PTSD group (n=46), % (n)	PTSD group (n=20), % (n)
Intrapersonal triggers (physiological unmet needs or emotional distress)	24.2 (16)	26.1 (12)	20 (4)
Direct-care approach	37.9 (25)	30.4 (14)	55 (11)
Interpersonal interactions not in the care context	24.2 (16)	26.1 (12)	20 (4)
Environmental triggers	25.8 (17)	28.3 (13)	20 (4)
Organizational culture of care associated with new behavioral category	6.1 (4)	6.5 (3)	5 (1)

Table 8: Frequency of behavioral triggers by behavioral categories among veterans with and without PTSD

Types of behavioral triggers	Total (N=66), % (n)	No PTSD group (n=46), % (n)	PTSD group (n=20), % (n)
Behavioral triggers observed with rejection of care			
Direct-care approach	36.4 (24)	30.4 (14)	50 (10)
Direct-care approach + intrapersonal triggers	3.0 (2)	4.3 (2)	0 (0)
Direct-care approach + environmental triggers	1.5 (1)	0 (0)	5 (1)
Behavioral triggers observed with aggressive behaviors not in the context of care			
Interpersonal triggers	10.6 (7)	13.0 (6)	5 (1)
Interpersonal triggers + intrapersonal triggers	4.5 (3)	4.3 (2)	5 (1)
Interpersonal triggers + environmental triggers	6.1 (4)	4.3 (2)	10 (2)
Behavioral triggers observed with non-aggressive behaviors without co-occurring aggression			
Intrapersonal triggers	10.6 (7)	10.9 (5)	10 (2)
Environmental triggers	13.6 (9)	17.4 (8)	5 (1)
Intrapersonal triggers + environmental triggers	6.1 (4)	6.5 (3)	5 (1)
Interpersonal triggers	1.5 (1)	2.2 (1)	0 (0)
Behavioral triggers observed with new behavioral category			
Organizational culture of care	6.1 (4)	6.5 (3)	5 (1)

Using the framework analysis approach, we identified five patterns that represent links between specific types of triggers and behavioral symptoms: (a) unsolicited direct-care approach triggers refusal, resistance, or combativeness with care, (b) interpersonal interactions that hinder self-direction trigger aggressive behaviors, (c) unmet physiological needs or emotional distress trigger non-aggressive behaviors, (d) inappropriate stimulation from social and physical environments trigger non-aggressive behaviors, and (e) restrictive organizational culture of care influences how staff conceptualize behavioral symptoms. Below, each of these patterns is presented along

with case-level summary statements synthesized in the charting stage as exemplars or quotes if necessary.

3.3.1 Unsolicited Direct-Care Approach Triggers Refusal, Resistance, or Combativeness with Care

In all cases, rejection of care was triggered by an unsolicited direct-care approach, where any form of resistance towards care was observed in the context of direct care encompassing a range of care including personal care and assistance with activities of daily living (e.g., bathing, toileting, feeding, dressing, transferring, and ambulating) and medical procedures (e.g., administering medication and checking blood glucose).

Veterans verbally refused care or assistance by saying “No,” “I’m fine. I don’t need one,” or “I don’t want that” with or without explanation of reasons when staff announced their intent to provide care or when they noticed any cues of upcoming care. For example, while a veteran took his methadone, he declined to take his valproic acid stating he could not take “red” medicine because he believed that the medications that are red hurt his throat (Veteran 1071). Another veteran refused to take a bath or shower providing reasons such as pain or a “brain problem,” when staff asked if he would like to take a shower (Veteran 1143).

Verbal refusal of care often escalated to resistance and combativeness towards staff when direct-care staff proceeded to attempt to provide care or assist after the veteran initially verbally refused care. For example, a veteran who had a high risk of falling attempted to get out of bed and get up on his own and initially refused staff assistance.

When staff attempted to assist regardless of his refusal, the veteran became physically combative (Veteran 1102). In another case, when staff asked a veteran to get up to allow staff to perform his care activities several times during the day, he consistently refused. When the staff went into provide care, he then passively resisted and cursed the staff, which made the care more difficult and ultimately involved two staff members (Veteran 1209). The physical and/or verbal aggressive symptoms consistently worsened when the staff continued to provide unsolicited care despite veterans' ongoing aggressive behaviors. A veteran attempted to hit one nursing assistant who was providing care for his activities of daily living. When the nursing assistant continued to provide care, he spit on her and began shouting derogatory remarks. The nursing assistant asked another staff member to provide assistance, and the veteran continued to shout and strike at the nursing assistants and hit one (Veteran 1221).

Aggressive behaviors were also observed when their care was not provided in the manner that the veterans wished. For example, when a veteran asked for nursing staff to perform a task and it was not done in her timeframe, the cards described the Veteran as berating staff, yelling out, and at times throwing herself on the floor, crying and being inconsolable (Veteran 1332). As another example, when a nursing assistant brought a lunch tray over to the veteran, the card reported the veteran yelling "don't put that [expletive] tray there [his side table]" and attempted to throw the lunch tray. When the nursing assistant bent down to prevent the tray from falling to the ground, the veteran spit on her (Veteran 1262). Additionally, physical and/or verbal aggression was observed

when staff pointed out the deficits during the care process, which might result in veterans' frustration or other unpleasant feelings. A veteran cursed at staff when staff stated, "you need the lift, and you can't stand" or staff offered assistance in changing his briefs stating, "I can see your pants are wet" (Veteran 1044). When staff or his wife attempted to explain needs for assistance with activities of daily living, another veteran cried, punched in the air, beat his fists, repeatedly questioning "why I can't go home" and asserting that he is functionally independent (Veteran 1233).

3.3.2 Interpersonal Interactions That Hinder Self-Direction Trigger Aggressive Behaviors

Verbal and/or physical aggressive behaviors arose when interpersonal interactions with others including staff, family members, and other residents hindered veterans exercising autonomy and independence. Veterans became physically and/or verbally aggressive when their wishes and preferences were not honored and incorporated into their daily life through interpersonal interactions with staff. A veteran frequently yelled, cursed, and called staff when he was told "he cannot do something he wants to do, or when he was asked to do something he does not want to do." These aggressive behaviors occurred when a veteran asked to leave the unsecured unit and was told that he could not (Veteran 1305). Another veteran cursed, complaining loudly about being "abandoned" and then refused to participate in activities on the unit and to take medications, when some staff told him he could not call his wife as he wished to do (Veteran 1029). As another example, when a veteran tried to exercise autonomy trying to be helpful by

adjusting things on the unit and moving other veterans in wheelchairs around, staff attempted to redirect him, and thereafter the veteran became verbally and physical aggressive (Veteran 1328).

Aggressive behaviors arose when a veteran could not control interactions with family members or other veterans. When the family left the CLC at the conclusion of the visit, the veteran could not talk with his wife, or the wife did not answer his telephone call, the veteran repeatedly used the call light and tried to hit staff (Veteran 1197).

Aggressive behaviors were also observed during negative interactions with other veterans living in the CLCs. A veteran exhibited yelling, cursing, and calling other veterans names when other veterans got in his space, or when he thought other veterans were talking about him behind his back (Veteran 1305). Another veteran was also verbally aggressive when he identified problems with their behaviors or attitudes while interacting with other veterans (Veteran 1047).

3.3.3 Unmet Physiological Needs and Emotional Distress Trigger Non-Aggressive Behaviors

Physical and verbal non-aggressive agitation arose as a method that veterans used to express physiological (unmet) needs or needs for personal care. When one veteran voiced somatic complaints such as feeling cold, constipation, trouble with his eyes as well as intrusive thoughts of traumatic memory, he approached staff with repetitive questions about finances and going home with worried facial expressions (Veteran 1117). Another veteran screamed until care was completed and yelled “we have to get out of

here” repeatedly, when he lay in bed in need of care such as perineal care and a bed bath (Veteran 1039).

Emotional distress also manifested as non-aggressive behaviors. When a veteran worried about personal belongings, her dog, and whether or not she would be able to go home independently, she often became suspicious of staff, and could not self-soothe or be soothed by others, she moved independently around the room without assistance, paced, talked loudly (Veteran 1273). When another veteran was worried and nervous and wanted to rest and feel calm, he called out, paced up and down the hallway, lay in the floor in the middle of the hallway, and repeatedly asked for medicine so he could go to sleep (Veteran 1242).

3.3.4 Inappropriate Stimulation from Social and Physical Environments Triggers Non-Aggressive Behaviors

Non-aggressive behaviors arose when veterans were inappropriately stimulated from social and physical environments. Lack of opportunities to engage in personally relevant and meaningful activities leading to lack of stimulation trigger non-aggressive behaviors. For example, prior to the behavior occurring, a veteran was sitting in the dayroom in the company of others. At other times, the veteran was alone in his bedroom. He made continuous loud statements such as “I’m sick! I’m sick!” or “I want to go back!” When the resident was ambulatory, he paced up and down the hall saying, “I want to go home!” The symptoms were reduced when staff began providing more ample private time in his room based on information received from his wife, which indicated

that he historically preferred to be in a room alone at home; and activities including watching western movies and hand crafting, which had been pleasant events for him (Veteran 1274). Another veteran who often stated “I’m just a country boy, and I like being outdoors” refused to engage in activities. He was sitting alone in a dark room with his head down and not wearing his hearing aids. Self-isolation decreased and interaction with others increased when he was invited to the afternoon outings and encouraged to sit on his favorite rocking chair on the patio wearing hearing aid and glasses (Veteran 1326).

Non-aggressive behaviors also arose when veterans were overstimulated by the physical and/or social environment. For example, a veteran started yelling loudly without cursing or threatening of others, when he was kept up too long sitting in a small day room with loud noises while staff brought multiple residents into the small room for the group activity and became tired (Veteran 1210). When another veteran who was legally blind and hearing impaired was sitting in the busy dining room where staff and other veterans were coming and going and walking by, staff were assisting others at times and answering the telephone. He was unable to identify what activity was going on around him, and exhibited yodeling, tongue-rolling, and strange noises, calling out “nurse, nurse, nurse” (Veteran 1246).

3.3.5 Restrictive Organizational Culture of Care Influences the Conceptualization of Behavioral Symptoms

New behavioral symptom categories emerged from the data. These categories were based on behaviors that staff identified as challenging behavioral symptoms

targeted for the STAR-VA program which did not fall into any behavioral symptom categories developed from the literature. The behaviors included ambulating independently with the aim of self-care to resolve physiological basic needs. These behaviors were identified as challenging given the care team assessment of the veterans' functional limitation. For example, when a veteran, who was at a high risk for falling and had impaired communication ability, returned to the bedroom after a trip to the dining room or hallway observation, he attempted to independently transfer from the chair to a bed or entered the bathroom without assistance (Veteran 1192). When another veteran was in his room by himself and wanted to get some water, he walked down the hall and carried a pitcher of water without care and not asking for help (Veteran 1288). The behaviors also included helping behaviors with the aim of contributing to the CLC community. For example, when a veteran spent time in a room or in a quiet area, he attempted to assist other residents by providing condiments, beverages, napkins, and other items with limited recognition that others did not want help (Veteran 1013). These new behavioral categories conceptualized as "challenging" and considered to be modified arose from the caregivers' perspectives given their risk assessment for harmful consequences to the veteran themselves and other residents rather than accounting for the (un)met needs of veterans with dementia. It also suggests that a pervasive organizational culture of care that prioritizes safety regulations that prevent veterans from being injured (e.g., falling) over veterans' roles in self-care or as a contributing member of the

community is one factor that shapes how staff perceive the behaviors of veterans with dementia and orient staff' strategies toward the behaviors.

3.4 Discussion

The purpose of this study was to explore how BSD are manifested among veterans receiving care in VA CLCs in the context of personal, interpersonal, and environmental factors. The framework analysis method offered a systematic approach to identifying patterns that linked triggers with specific types of behavioral symptoms as follows: the direct-care approach triggered some forms of rejection of care; negative social interaction with others including direct-care staff, family members, and other residents tended to be related to physical and/or verbal aggressive behaviors; and physical unmet needs, emotional distress, and inappropriate stimulation from social and physical environments tended to be related to non-aggressive behaviors.

Rejection of care, agitation, and aggression have not been clearly differentiated in the literature, nor in the measurement of BSD (Volicer et al., 2007). The Cohen-Mansfield Agitation Inventory used agitation as an umbrella term that refers to a wide range of BSD that encompass physical aggressive, physical non-aggressive, verbal aggressive, and verbal non-aggressive behaviors (Cohen-Mansfield et al., 1989). The International Psychogeriatric Association (IPA)'s provisional consensus on agitation in cognitive disorders also includes verbal and physical aggression as manifestation of agitation (Cummings et al., 2015). In contrast to this unidimensional concept of BSD, our findings demonstrated that they are heterogeneous. Consistent with findings of Volicer et

al. (2007) and Volicer and Galik (2018), non-aggressive behaviors occur when people with dementia are solitary and unoccupied; rejection of care and aggression involves interaction with other people and directs toward others; and rejection of care is particularly invoked by the approaches to direct care used by staff.

Furthermore, our preliminary results on the pattern of the association between specific types of triggers and type of behavioral symptoms during our analysis aligned with Wehry's (2015) differentiating scheme between agitation and aggression among people with dementia, and this distinction informed our ongoing data analysis. Wehry (2015) proposed that while agitation is an expression that “something is wrong with me. Do something!”, aggression is an expression for “something is wrong with you. STOP! Leave me alone” (pp. 40, 43). Considered through this model, our findings show that aggressive behavioral symptoms with or without rejection of care were mainly associated with interpersonal triggers including unsolicited direct-care (e.g., abrupt initiation of care and continuous provision of care despite veterans’ verbal refusal of care), staff instructions that were highly directive, and negative interpersonal relationships with others that hinder veterans exercising autonomy and independence. In contrast, most of the non-aggressive behaviors were associated with intrapersonal triggers such as physiological (unmet) and emotional distress, and boredom or discomfort from inappropriate stimulation from social and physical environments. This is also consistent with findings from a prior observational study showing discomfort was significantly associated with manifestation of verbally agitated behaviors such as constant requests for

attention, complaining, and screaming, and boredom and sensory deprivation tended to contribute to physical non-aggressive behaviors (Cohen-Mansfield et al., 2015). Thus, failing to distinguish rejection of care, agitation, and aggression can be problematic, as they seem to have distinct clusters of triggers.

We also found that the verbal refusal of care escalated to combativeness towards staff when direct-care staff proceeded to attempt to provide care or assistance without respecting the veteran's verbal refusal of care. The concepts of proactive aggression versus reactive aggression can be applied to understand the meaning of BSD. While proactive aggression is characterized by involving calculation of potential benefits versus harms, planning, and premeditation, reactive aggression is defined by being impulsive and unplanned and defensive themselves from the perceived threats (Bushman & Anderson, 2001; Miller & Lynam, 2006; Volicer & Galik, 2018). Proactive aggression is considered rare in persons with moderate to severe dementia given the impairment of executive dysfunction, thus most aggressive behavior in persons with dementia is considered reactive (Paschali et al., 2018; Volicer & Galik, 2018). However, as Bushman and Anderson (2001) warned, too rigid a distinction between the two concepts can lead to failure of understanding complex phenomena of human aggression, and these different motives can be mixed in the manifestation of BSD. For example, the initial verbal refusal of care or passive resistance toward staff might involve proactive motives. The behaviors might be exhibited to express that they do not want help from others that does not take into account their needs and preferences, thus defending themselves from the unwanted

interaction. When staff do not stop initiating care provision despite veterans' refusal, the veteran may perceive the care as a threat and become angry and impulsive, thereby the proactive rejection of care escalates to reactive/hostile combativeness directed toward staff. Thus, healthcare providers and caregivers need to understand the underlying reasons why persons with dementia reject the care and identify the discrepancies between preferences of persons with dementia and the care initiated by caregivers. Staff should employ this person-centered approach as early as possible in care to prevent aggression and related sequelae such as persons with dementia not receiving necessary basic care or placing themselves and caregivers at risk for injuries.

The ecological model (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006), which proposes that human behaviors both shape and are shaped by multiple levels of influences that are embedded into a nested structure, provides a helpful framework through which the findings can be interpreted. Four domains of triggers emerged from the current study and encompass four levels--intrapersonal, interpersonal, immediate environmental, and larger organizational level. The triggers for behavioral symptoms may arise in a complex manner involving multiple sources of trigger and thereby contribute to BSD. For example, intrapersonal factors related to vision and hearing impairment interplayed with an overstimulating environment contributed to non-aggressive behaviors. Thus, using the ecological framework to categorize behavioral triggers provides a more holistic way to understand behavioral symptom manifestations. This holistic approach using the ecological model is also a way to integrate and extend

findings from previous studies, which have focused on one type of symptom at a time such as disruptive vocalization or have tested interventions primarily targeting a single layer of influence such as music therapy, environmental modification, or structured recreational activities (Beck et al., 2011; Majic et al., 2012; Scales et al., 2018; Whall et al., 2008). Since the multi-level triggers are interrelated from the intrapersonal level to the larger organizational level, interventions that only target one level of trigger and/or one individual symptom are unlikely to address behavioral symptoms resulting from the entangled multiple factors embedded in the nested structure of persons with dementia and therefore will be less likely to have a long-term effect on BSD.

We noted that some behavioral symptoms that staff identified as challenging could be construed as a normal response to an overly restrictive culture of care. Labeling the behaviors among people with dementia as behavioral symptoms from the deterministic biomedical view of dementia has been criticized, as the approach reduces opportunities to address situations related to intrapersonal, interpersonal, and environmental needs of people with dementia (Caspi, 2013; Dupuis et al., 2012; Macaulay, 2018). A previous study revealed the pervasive biomedical view of dementia from which nursing home residents' behaviors were filtered by assessing whether or not the resident had a diagnosis of dementia and was pathologized and problematized as "challenging" (Dupuis et al., 2012). In line with that study, our study shows that the behavioral "symptoms" such as ambulation without staff assistance for voiding or helping others could be construed as a normal human response in people without

cognitive impairment to which staff need to adapt. The organizational culture that shapes the staff perspectives on the provision of care influences how staff conceptualize and attach meaning to behaviors (Kales et al., 2015).

Our findings have several implications for research and practice. First, our findings highlight the importance of differentiating rejection of care, non-aggressive behaviors, and aggressive behaviors, as different modifiable triggers are associated with these different types of behavioral symptoms, and therefore distinct care strategies are required. The findings suggest that development of new typologies of behavioral symptoms that take into account context and provide more fine-grained description are needed. The new typologies that connect situational triggers to behavioral manifestations may be more practical for caregivers and healthcare providers in developing person-centered non-pharmacological interventions. Along with the refinement of BSD typologies, training programs and practice guidelines need to be developed for helping direct-care staff such as nursing assistants interpret the BSD and recognize needs and preferences of veterans with dementia and for facilitating implementation of interdisciplinary person-centered strategies. These additional supports for caregivers hold potential not only to reduce the adverse outcomes of BSD, but also to improve quality of life and well-being of veterans with dementia.

Once we differentiate the individual behavioral symptoms relating to the triggers, it is also important to recognize that behavioral symptoms co-occur in the presence of multiple triggers, and staff will also need to understand the temporal relationships of BSD

(e.g., unresolved unmet needs associated with initial behaviors may result in other types of behavioral symptoms). In recognition of the multilevel nature of behavioral symptoms and their triggers and guided by the ecological model, development of multi-level interventions that address and affect more than one level of influence to maximize the effect of the interventions should be promoted. The STAR-VA program provides a clear example of how a multi-level intervention can be implemented. Using the multi-component, person-centered, problem-solving process, CLC staff participating in the program learned how to modify their own behaviors, the daily activities, and the environment, and previous research showed the decrease in frequency and severity of the BSD (Karel et al., 2016; Karlin et al., 2014). The Describe, Investigate, Create, Evaluate (DICE) approach, which targets the multi-level influences encompassing person, caregiver, social and physical environment, and cultural factors, is also aligned with the ecological model (Kales et al., 2014).

3.4.1 Strengths and Limitations

A key strength of this study is that we analyzed a relatively large dataset for a qualitative study from a multi-site program, so the application of the findings is likely to be more broadly generalizable than if the program had only been implemented in one location. Also, the data were obtained through the collaboration of an interdisciplinary STAR-VA team that included all members that were involved in veteran care. The triangulation via use of different types of informants makes the data more reliable and reflective of the larger organizational culture rather than a single discipline only.

Although the STAR-VA purposively selected veterans for participation, our stratified random sampling for the present study from the larger dataset along with a large sample can reduce the likelihood of selection bias (Shenton, 2004).

Despite the relatively large sample size and multi-site data collection, the findings represent only a starting point for understanding the patterns of a diverse set of triggers and behavioral symptoms among veterans with dementia. Other potential confounding factors may not have been taken into account that influence the relationship between triggers and BSD in this study. Given that CLCs vary substantially, the methodological limitations of this study may underestimate the effect of different organizational and environmental features. Further research needs to account for organizational and environmental features (e.g., staffing, routines of personal care, staff values, lighting, and structured activities). Moreover, the CLCs that participated in the STAR-VA intervention had higher rates of disruptive behavior reports, related staff injury, and comorbid psychiatric disorders compared to the other CLCs that did not participate in the intervention. Veterans selected as training cases were also the most concerning to the team. Thus, the severe level of BSD and the comorbid illnesses as well as the organizational differences limit the generalizability of our findings to other veterans with dementia. Further research is also required to examine the effect of veterans' sociodemographic (e.g., gender, age, and combat exposure) and clinical characteristics (e.g., dementia stage, mental disorders, prescribed medications, and functional status) and their interaction with physical and social environmental factors on BSD.

3.5 Conclusion

This paper has explored how BSD are manifested among veterans receiving care in CLCs in the context of personal, interpersonal/social, and environmental factors. Failing to distinguish rejection of care, agitation, and aggressive behaviors can be problematic, as they seem to have distinct clusters of triggers. Our findings also indicate that behavioral symptoms can be classified with their triggers rather than the behavior itself so as to better understand the context and address the triggers. Using the socio-ecological framework to categorize behavioral triggers provides a more holistic approach to understand BSD, as symptoms seem to arise in a complex manner involving multiple sources of triggers. Taking a person-centered approach to understanding BSD has important implications for how we classify and treat the symptoms and thus improve outcomes for veterans with dementia.

4. Background Factors, Interpersonal Triggers, Rejection of Care, and Aggression in Older Veterans with Dementia with and without PTSD

4.1 Background

Rejection of care and aggression are among the most distressing symptoms experienced by persons with dementia and their caregivers, and they represent one of the major barriers to providing high quality of care for persons with dementia in residential long-term care settings (Chappell & Penning, 1996; Konno et al., 2014; Willumsen et al., 2012). Rejection of care in dementia refers to behaviors that interfere with the provision of care that is necessary to achieve one's goals for health and well-being and manifests with various verbal and physical behaviors such as verbal refusal, argumentative behaviors, physical resistance, and physical aggression (Ishii et al., 2012; Mahoney et al., 1999; Saliba & Buchanan, 2008). Aggression refers to any threatening and hostile behavior directed toward other persons or objects, or towards individuals with dementia themselves, and encompasses verbal and physical behaviors such as hitting, kicking, and verbal threats (Ryden, 1988; Whall et al., 2008).

Rejection of care and aggression have adverse consequences for both persons with dementia and their caregivers in residential long-term care settings. These behaviors often result in increased use of psychotropic drugs and physical restraints (Nijk et al., 2009; Selbaek et al., 2007) and place persons with dementia and caregivers at risk for injuries (de Jonghe-Rouleau et al., 2005; Kunik, Snow, Davila, McNeese, et al., 2010).

These behaviors also are associated with increased burden and decreased quality of life of caregivers (Hart et al., 2003; Kunik, Snow, Davila, McNeese, et al., 2010; Samus et al., 2005).

4.1.1 Theoretical Framework

The need-driven dementia-compromised behavior (NDB) model has been used extensively in both clinical practice and research to understand how behavioral symptoms arise and to guide their treatment (Algase et al., 1996). The NDB model views behavioral symptoms of dementia as both functional responses to unmet needs of persons living with dementia, and a means of expressing those unmet needs, thus, they represent meaningful indicators for caregivers to identify unmet needs and establish care plans that address the unmet needs (Algase et al., 1996; Kolanowski, 1999). In the NDB model, behaviors arise from two interacting types of factors--background and proximal factors. Background factors consist of individual characteristics including sociodemographic characteristics, personal underlying health status, functional status, psychosocial factors (e.g., comorbid psychiatric disorders, premorbid personality, behavioral response to stress) and are considered relatively stable and not frequently changeable. Proximal factors consist of fluctuating and changing states of physiological and psychological unmet needs and situational and immediate social and physical environmental conditions that trigger occurrence of behaviors in at-risk individuals (Algase et al., 1996; Kolanowski, 1999).

Based on the main propositions of the NDB model, background and proximal factors are hypothesized to have direct effects on behaviors, and background factors to

have indirect effects on behaviors through proximal factors. Additionally, background factors can alter or affect an individual's abilities and how they experience and interact with their environment (social and physical), thus placing individuals with dementia at increased risk for exhibiting the behaviors. In other words, background factors can moderate the effects of proximal factors on the behavioral symptoms of dementia (Algase et al., 2007).

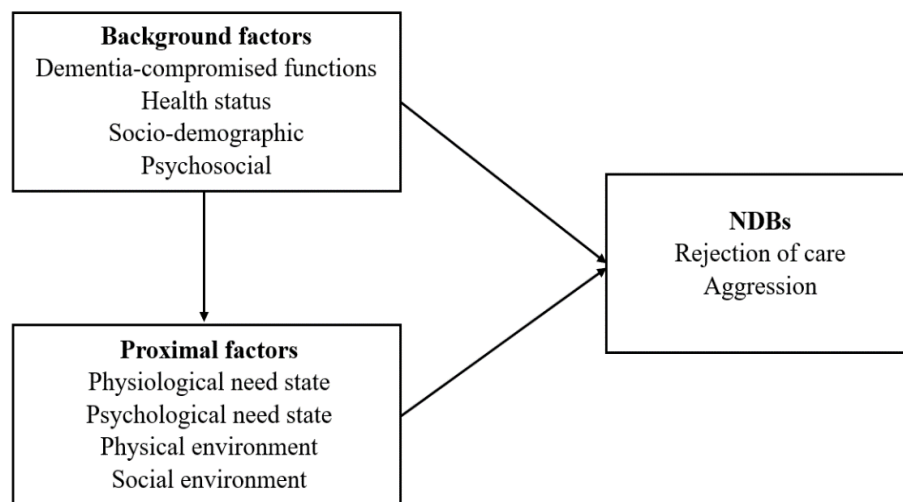


Figure 3: Need-driven dementia-compromised behavior (NDB) model (Algase et al., 1996) applied to current study

Background factors that have been shown to affect rejection of care and aggression included premorbid personality, depression, functional status, and cognitive status (Kolanowski et al., 2017; Kunik et al., 2003; Kunik, Snow, Davila, Steele, et al., 2010; Morgan et al., 2012). Empirical studies have demonstrated that interpersonal

factors, including caregiver burden, the quality of the relationship between persons with dementia and caregivers, communication approaches used by caregivers, and lack of meaningful social interactions each plays a crucial role in rejection of care and aggression. The results from the qualitative analysis of Chapter 3, which analyzed a 20% sample of STAR-VA participants, also indicate that interpersonal triggers, including interactions with caregivers and others are the most common precursors to rejection of care and aggression, while intrapersonal and environmental triggers are associated with non-aggressive behaviors. However, exactly how interpersonal factors as a proximal factor interact with other background factors and consequently trigger the occurrence of behavioral symptoms of rejection of care and aggression still remains unclear within the NDB model.

The NDB model also recognizes the salient influence of earlier life experience as a background factor that dynamically interact with proximal factors in current life circumstances and results in behavioral symptoms of dementia (Algase et al., 1996). For older veterans, military service and related factors are among the most important background factors. Yet, they have been overlooked and seldom been measured in prior studies on behavioral symptoms of dementia. Military service is a common and influential life event among older adults who were born early in the 20th century, and has long-term consequences on physical, psychological, social functioning and well-being in later life (Settersten, 2006; Settersten & Patterson, 2006; Spiro et al., 2016b). Posttraumatic stress disorder (PTSD) is one of the most common sequelae of military

service during wartime, particularly among those who are exposed to combat (Yaffe et al., 2010a). In Vietnam veterans, a lifetime prevalence of combat-related PTSD was 20% to 30% (Dohrenwend et al., 2006). Almost five decades after being exposed to combat in World War II and the Korean War, a significant minority of older veterans had a diagnosis of PTSD with a prevalence rate of 12% (Spiro et al., 1994). PTSD can be a chronic disorder with its symptom severity fluctuating over an individual's lifespan. Furthermore, the symptoms that were absent or well controlled in earlier life can develop after decades in older adults who are challenged by current additional stressors (Averill & Beck, 2000; Lapp et al., 2011).

A complex bidirectional relationship between dementia and PTSD throughout one's life has been suggested (Desmarais et al., 2020). Recent studies indicate that veterans with PTSD are nearly twice as likely to develop dementia compared to those without PTSD (Meziab et al., 2014; Qureshi et al., 2010b; Yaffe et al., 2010a). Emergence of new or delayed-onset PTSD and worsening symptoms of PTSD were also found among people with dementia who had a history of early-life trauma (Desmarais et al., 2020). These lifelong complex relationships between PTSD and dementia also suggest that the features of behavioral symptoms of dementia may differ between veterans with and without PTSD. Cook et al. (2003) suggests that the threshold for response to trauma-related stimuli may be lowered in veterans who have co-occurring dementia and PTSD. PTSD related to traumatic life events such as combat exposure may make it more likely that veterans with dementia will exhibit behavioral symptoms of

dementia, particularly in the presence of current interpersonal or environmental triggers (American Psychiatric Association, 2016; Cook et al., 2003).

Veterans with co-occurring dementia and PTSD living in residential long-term care settings are more likely to encounter a range of trauma-related interpersonal and environmental triggers. The range of triggers in the immediate environment encompasses both physical and social stimuli from the close proximity of other residents and caregivers. Residents in this setting live in close quarters, where they are exposed to bedridden patients, delirious residents' moaning, shouting, and noxious scents. In addition, caregiver ethnicity may evoke wartime memories, and caregiver behavior such as speaking loudly, being impatient, and the use of authority or control can aggravate symptoms. Perceived loss of control over the environment (e.g., temperature or light) and daily routines and activities can also be a trigger of behavioral symptoms of dementia. When veterans with dementia who have a trauma experience in their earlier life and current PTSD feel threatened and unsafe in this setting, defensive and impulsive behaviors can be exacerbated and manifested with rejection of care and aggression (Carlson et al., 2008; Cook et al., 2003).

Furthermore, veterans with dementia and PTSD may particularly be vulnerable to interpersonal triggers. Previous longitudinal studies showed that persisting symptoms of PTSD in veterans are associated with poorer social and interpersonal functioning (Koenen et al., 2008; Sheffler et al., 2015). Veterans with PTSD are also likely to have difficulty in self-disclosure and diminished expressiveness related to the emotional

numbing symptoms of PTSD, which may result in increased distress within interpersonal relationships (Campbell & Renshaw, 2013). This lasting effect of PTSD on social and interpersonal functioning suggests that it would be helpful to investigate the influence of PTSD on the relationships of behavioral symptoms of rejection of care and aggression with interpersonal triggers and other background factors in veterans with co-occurring dementia and PTSD. Yet, PTSD has barely been considered and measured in attempts to understand behavioral symptoms such as rejection of care and aggression in older veterans with dementia. Altogether, it is necessary to investigate how PTSD influences rejection of care and aggression in order to guide clinical practice for older veterans with co-occurring dementia and PTSD living in residential long-term care settings.

4.2. Research Question and Aims

4.2.1 Research Question

Does the pattern of relationships among background factors, proximal factors (interpersonal trigger), and behavioral symptoms of rejection of care and aggression differ between veterans with and without PTSD?

4.2.2 Aims

To answer the question, we aimed to test hypothesized pathways between background factors, interpersonal triggers, rejection of care, and aggression, and then to explore the moderating effect of PTSD on the hypothesized pathways in veterans with dementia with and without co-occurring PTSD.

4.3 Hypothesized Model

Building upon the NDB model and a review of the literature, the model specified in Figure 4 was proposed for the current study. We conceptualized comorbid PTSD as a background factor since the pervasive influence of PTSD on one's lifespan is an enduring characteristic of a veteran that places him at risk for behavioral symptoms of dementia and can be thought of as an indicator of an earlier traumatic event. Interpersonal triggers are considered a proximal factor related to behavioral symptoms of dementia. Having a history of PTSD diagnosis was assessed through a chart review at baseline before the behavioral symptoms of dementia and their triggers were observed during the STAR-VA program, and current symptoms of PTSD were not measured. Thus, comorbid PTSD identified at baseline represents an underlying health condition or psychosocial background factor.

We hypothesized that both interpersonal triggers and background factors (i.e. age, marital status, education level, a history of combat exposure, cognitive and functional status, and anxiety and depression) have direct effects on rejection of care and aggression. We also hypothesized that background factors have indirect effects on rejection of care and aggression via interpersonal triggers. The correlations between rejection of care and aggression and among several background factors are also hypothesized as depicted in Figure 4.

Based on the propositions of the NDB model, the background factor of comorbid PTSD is hypothesized to moderate the effect of proximal factors and their relationship

with other background factors on the occurrence of behaviors. Understanding whether these relationships among background and proximal factors would help to identify individuals with dementia who are at greater risk for displaying certain types of behaviors.

A base model was developed to examine whether different causal processes underlie the relationships among background and proximal factors and behavioral outcomes between two groups with and without PTSD. Since no studies have been conducted to examine the moderating effect of PTSD on the underlying mechanisms associated with interpersonal triggers and its interaction with other background factors and behavioral outcomes of rejection of care and aggression, there was not enough empirical justification to specify individual pathways on which PTSD will potentially act as a moderator. Therefore, we did not include any specific interaction terms of PTSD within this model. Moreover, incorporating the variable of PTSD as a predictor variable within the base model and modelling all the potential interaction terms to test the moderation effect may have resulted in overfitting a complex model with random errors. Instead we chose to compare this base model with a model that included comorbid PTSD as a classifying variable that grouped samples to two groups—veterans with and without PTSD. Comparing the two models (one for veterans with PTSD and the other for those without PTSD) would allow us to examine different causal processes that may be present in the two groups, including potential indirect effects, the effect of combat exposure, and other variables in the NDB model (Richiardi et al., 2013).

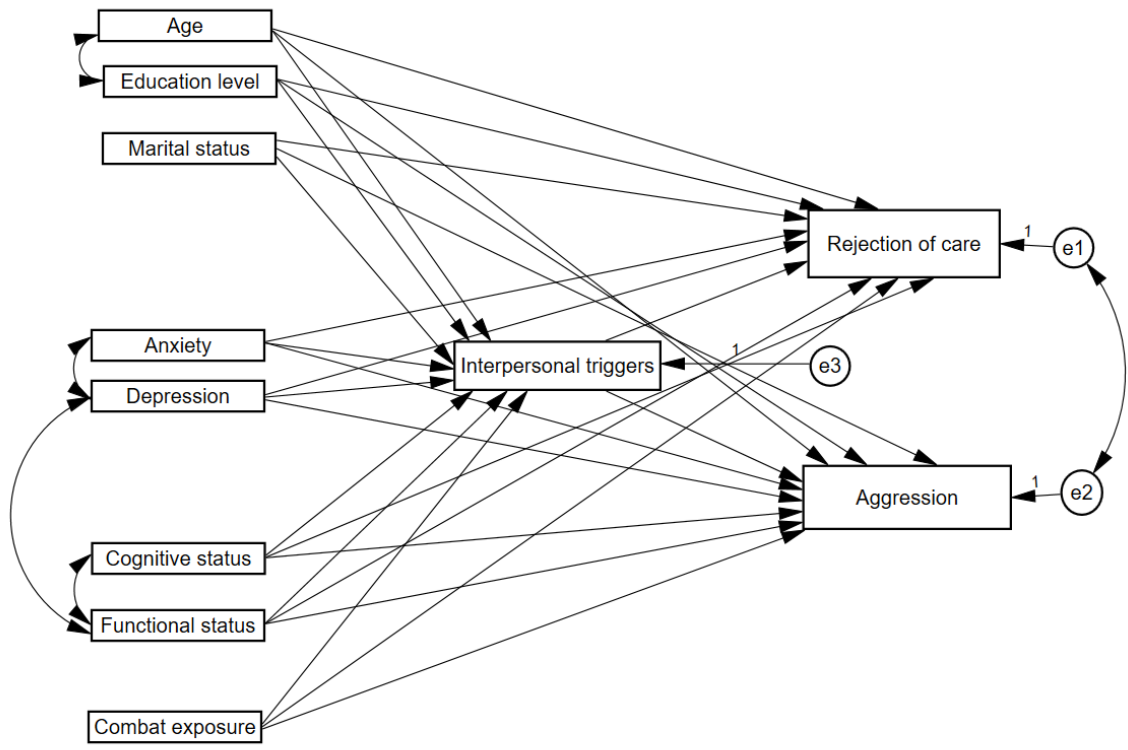


Figure 4: The hypothesized structural equation model

4.4 Methods

This is a secondary analysis of data from a training program evaluation of the intervention on managing behavioral symptoms of dementia known as STAR-VA (Karel et al., 2016; Karlin et al., 2014). A mixed methods approach was employed to integrate quantitative data measured by standardized measures and text data that captured the interdisciplinary care team’s observations of behavioral symptoms and their circumstances derived from the STAR-VA dataset. Specifically, after converting text data to categorical variables for statistical inferences, we implemented structural equation

modeling (SEM) for simultaneous testing of multiple hypothesized paths (Bollen & Long, 1992) and compared the patterns of relationships among variables between veterans with and without PTSD.

4.4.1 Data Source

The STAR-VA intervention, adapted from the Staff Training in Assisted Living Residences (STAR) program for implementation with veterans with dementia living in VA nursing homes (called “Community Living Centers [CLCs]”), is an interdisciplinary, multicomponent psychosocial intervention for managing behavioral symptoms of dementia (Karel et al., 2016; Karlin et al., 2014). The STAR-VA evaluation dataset contains a combination of standardized measures of veterans’ clinical characteristics and text data that captured the care team’s observations of behavioral symptom characteristics, along with the antecedents, consequences, severity, and frequency of the behaviors. In STAR-VA, mental health providers (psychologists or psychiatric providers) called behavioral coordinators and registered nurse (RN) champions served as a leadership dyad and implemented the STAR-VA intervention with the CLC interdisciplinary staff, engaged in in-person or virtual training sessions, and participated in program evaluation activities. As a core component of the STAR-VA intervention, CLC mental health providers and/or registered nurse champions completed weekly behavioral assessment and care planning cards, hereinafter referred to as ABC cards. The ABC cards provided a structured approach to identifying and modifying intrapersonal, interpersonal, and/or environmental **A**ctivators and **C**onsequences of **B**ehaviors by responding to the following

open-ended structured questions: “what happened just before the behavior?” “what was the resident doing?” “who was present?” “where was this happening?” “when was this happening?” “what happened just after behaviors?” A more detailed description about STAR-VA and the study procedure can be found elsewhere (Karel et al., 2016; Karlin et al., 2014).

4.4.2 Participants and Setting

CLCs were selected for the STAR-VA intervention if they cared for veterans with behavioral symptoms of dementia, had a mental health provider integrated into the interdisciplinary team, and support from nurses, the facility, and leadership to implement the interventions. Veterans living in VA CLCs were enrolled in STAR-VA if they had a diagnosis of dementia and a dementia-related behavior that was distressing to the veteran, other CLC residents, family, or staff. Veterans were excluded if they were having behaviors directly related to delirium, acute medical illness, acute medical illness, acute psychotic symptoms, or a recent traumatic brain injury; having active primary serious mental illness diagnoses such as schizophrenia-related disorder or bipolar disorder; or receiving end-of-life care. STAR-VA is an ongoing intervention and training program and still being implemented at VA CLCs. From 2013 to 2016, 76 CLCs participated in the STAR-VA training program, and 315 veterans living in the CLCs were participants in the training program. The data from the 315 veterans who participated in the 2013-2016 STAR-VA program were included in the current analysis.

4.4.3 Measures

Socio-demographics: Socio-demographic variables including age, sex, race, education level, war era, and combat exposure were obtained using a Veteran Demographic/Background Information Questionnaire completed by the behavioral coordinators, with input from the interdisciplinary team and through the review of VA medical records.

Cognitive status: The Blessed Orientation-Memory-Concentration test was administered to evaluate cognitive functioning at baseline (BOMC; Meiran et al., 1996). The BOMC consists of six items assessing orientation (year, month, and time of day), memory (delayed recall of a simple sentence), and concentration (counting backward from 20 to 1; saying the months of the year backward). A weighted score of 10 or greater reveals signs related to cognitive impairment. BOMC has been validated with well-established psychometric properties (Katzman et al., 1983; Wade & Vergis, 1999). Cronbach's α measured for the BOMC in our sample was 0.75, which indicates an acceptable internal consistency.

Functional status: The Functional Assessment Staging Tool (FAST) was administered to assess functional status (Reisberg, 1988). The FAST, a unidimensional scale, measures an individual's overall functioning based on a rater's observations consisting of seven items. On a scale of 1 to 7, a score of 1 indicates no functional impairment and 7 indicates severe impairment.

Depression: The Cornell Scale for Depression in Dementia (CSDD) was used to assess level of depressive symptoms at baseline (Alexopoulos et al., 1988). The CSDD is a 19-item questionnaire based on semi-structured interviews with the veteran and another reliable informant. The measure consists of 19 items in five areas: four items for mood, four for behavior disturbances, three for physical signs of depression, four for cyclic functions, and four for disturbances in ideation. A three-point Likert scale was used to indicate the severity of symptoms (0 = absence of symptoms, 1 = mild or intermittent symptoms, and 2 = severe symptoms). A total score of eight or greater suggests significant symptoms of depression. In our sample, Cronbach's α for CSDD was 0.83, which indicates good internal consistency.

Anxiety: The Rating Anxiety in Dementia (RAID) was utilized to assess the level of anxiety symptoms at baseline (Shankar et al., 1999). The RAID is an 18-item Likert scale questionnaire based on participant observation, an interview, and an informant report. This measure contains four subsets that measure worry in five questions, apprehension and vigilance in four questions, motor tension in four questions, and autonomic hypersensitivity in five questions. Item response ranges from 0 to 3 (0 = absence of symptoms, 1 = mild or intermittent symptoms, 2 = moderate symptoms, and 3 = severe symptoms). A total score of 11 or greater suggests significant symptoms of anxiety. In our sample, Cronbach's α for CSDD was 0.94, which demonstrates good internal consistency.

PTSD: Behavioral Coordinators also assessed whether the veteran has a diagnosis of PTSD through medical chart review or with input from all available informants as part of the Demographic/Background Information questionnaire.

Interpersonal triggers, rejection of care, and aggression: Text data derived from written responses to open-ended structured questions on the ABC cards were evaluated to determine whether interpersonal relationships were a triggering factor in a given veteran's behavioral symptom manifestation, and to classify the behavioral symptom as an episode of rejection of care, aggression, or both. We excluded any cases if the target behaviors were completely different between cards, or if the information on the cards for the case was too limited to allow interpretation. Although in most cases behavioral symptoms and triggers did not vary between cards, we reviewed the initial as well as last card in detail for this analysis to capture the information comprehensively. For cases where the initial or last card had key information missing, we used information from the remaining cards.

We used the initial assessment card for this analysis as the behavioral symptoms tended to have improved while the intervention was being implemented to reduce those symptoms. For cases where the initial card had key information missing, we used the next card available. The text data coded during the qualitative analysis was converted into the categorical variables (i.e., data transformation) for statistical inference. A detailed description of our data transformation process is described in the Data Analysis section.

4.4.4 Data Analysis

Data analysis using a mixed methods approach that integrates the qualitative and quantitative data was conducted in three phases. We first converted qualitative data into categorical variables, then combined them with existing quantitative data, and finally conducted statistical analyses to achieve study aims (Sandelowski et al., 2006).

4.4.4.1 Phase 1-Coding

During the first phase, qualitative coding of text data for the 315 cases obtained from STAR-VA ABC Cards was conducted using Nvivo software (QSR International, 2015). We used a set of a priori codes developed from the qualitative study of manifestations of behavioral symptoms of dementia and contextual triggers using a stratified random sample of 66 veterans by the presence of PTSD and combat exposure from the same dataset described in Chapter 3. The a priori codes were developed based on a review of literature, and the codes for interpersonal triggers, rejection of care, and physical and verbal aggression and their operational definitions are provided in Appendix D (Tables 18 and 19). The coding team consisted of three coders: a PhD student in Nursing with clinical experience with older adults with dementia as a RN (BK), a PhD-level clinical nurse researcher (ESM), and a masters-level RN who has clinical experience in VA CLCs (LG). A PhD-level psychologist with expertise in geriatric mental health (MJK) served as a consultant throughout the coding and analysis process. Each case was coded by two coders using a combination of a priori and data-driven codes. Coders engaged in peer debriefing on a weekly basis to discuss new codes identified from

the individual coding process and refined the code book. Discrepancies on applied codes between coders were reviewed and discussed until the discrepancies were reconciled during the weekly debriefing sessions.

4.4.4.2 Phase 2-Data transformation

During the second phase, we converted coded text data into quantitative data, which is known as “data transformation.” This step aims to put the text data into a form amenable to statistical assimilation with numerical data, thereby allowing for statistical inferences (Onwuegbuzie & Teddlie, 2003; Sandelowski, 2001; Sandelowski et al., 2011). The presence of rejection of care, aggression (physical and/or verbal), and interpersonal triggers were converted into each dichotomous variable that represents whether the veteran exhibited rejection of care (no = 0 vs. yes = 1), aggression (no = 0 vs. yes = 1), and had interpersonal triggers (no = 0 vs. yes = 1). For example, if there was any text data that was coded with the code of “rejection of care” on the ABC Card for a veteran, the categorical variable for rejection of care was coded as “1” for the sample.

4.4.4.3 Phase 3-Statistical analysis

We created a new dataset that incorporated both the categorical variables converted from the text data and the existing quantitative data. The descriptive and bivariate analyses were performed using statistical package IBM SPSS version 26 (IBM Corp, 2019). Missing data analyses and imputation procedures were conducted. The rate of missing data across variables ranged from 2.5% to 23.2% (presented in Table 4), and Little’s test (1988) indicated that the missing pattern was missing completely at random

($\chi^2 = 574.681$, $df = 553$, $p = .253$). Therefore, an expectation-maximization (EM) algorithm was used to impute missing values.

Analysis of Moment Structures (AMOS) version 26 software was used to conduct SEM analyses. Bootstrapping was implemented to address the issues of unstable standard error estimation resulting from the small sample and the non-normality of dichotomous variables (Efron & Tibshirani, 1993). The model fit was assessed by following goodness-of-fit indices: χ^2 statistic with its p-value (desired p-value > .05), goodness-of-fit index (GFI; desired value > .90), normed fit index (NFI; desired value > .90), comparative fit index (CFI; desired value > .90), incremental fit index (IFI; desired value > .90), relative fit index (RFI; desired value > .90), and root-mean-square error of approximation (RMSEA; desired value < .08; Hu & Bentler, 1999). After identifying a final base SEM model, a multi-group SEM was conducted to examine the moderation effect of PTSD on the pathways by testing the invariance of the pathways across the two groups (PTSD vs. No PTSD). In the multi-group SEM, equality constraints were imposed on the pathways in the constrained model, and the data for both groups were simultaneously analyzed to obtain efficient estimates. In the unconstrained model, the pathways were allowed to vary across the two groups. The nested χ^2 statistic was used to compare the fit between constrained and unconstrained models. Our criterion for determining presence of a moderation effect was as follows: If the unconstrained model yielded a better model fit, it would suggest that the hypothesized pathways were moderated by PTSD. In other words, if the strengths of pathways among the variables in the model were statistically

significantly different between two groups, then a moderation effect was said to exist (Byrne, 2004).

4.5 Results

This study included 315 veterans who participated in the STAR-VA intervention from 2013 to 2016. The mean age of the veterans was 78.9 years ($SD = 10.44$), and the majority of veterans were white males. Of 315, 25% ($n=78$) of veterans had a PTSD diagnosis. Veterans who had a diagnosis of PTSD tend to be in a younger age group and had significantly greater functional impairment and more severe symptoms of depression compared to those without PTSD. Table 9 presents participant characteristics by two groups. Correlations among the study variables are shown in Table 10.

Table 9: Characteristics of veterans who participated in STAR-VA by presence of PTSD

Variables	Total (n=315)	PTSD group (n=78)	No PTSD group (n=220)	p-value
Age, % (n)				<.001
50-59	2.9 (8)	0.0 (0)	3.9 (8)	
60-69	17.4 (48)	36.6 (26)	10.7 (22)	
70-79	21.7 (60)	22.5 (16)	21.5 (44)	
80-89	26.8 (74)	14.1 (10)	31.2 (64)	
90 or above	31.2 (86)	26.8 (19)	32.7 (67)	
Sex, % (n)				1.000
Male	96.3 (287)	96.2 (75)	96.4 (212)	
Female	3.7 (11)	3.8 (3)	3.6 (8)	
Race, % (n)				1.000
White	75.8 (225)	75.3 (58)	75.9 (167)	
Other race	24.2 (72)	24.7 (19)	24.1 (53)	
Marital status, % (n)				.214
Married/Partnered	39.0 (115)	44.9 (35)	36.9 (80)	
Not married	61.0 (180)	55.1 (43)	63.1 (137)	
Education level, % (n)				.325
High school or less	60.1 (161)	55.1 (38)	61.8 (123)	
Some college or above	39.9 (107)	44.9 (31)	38.2 (76)	
Combat exposure, %				< .001
Having combat exposure	56.9 (136)	84.9 (62)	44.6 (74)	
No combat exposure	43.1 (103)	15.1 (11)	55.4 (92)	
BOMC, <i>mean (SD)</i>	21.4 (7.43)	21.9 (7.42)	21.1 (7.35)	.417
FAST, <i>mean (SD)</i>	5.8 (.78)	6.0 (.75)	5.8 (.79)	.041
CSDD, <i>mean (SD)</i>	10.1 (5.55)	11.4 (6.10)	9.8 (5.34)	.027
RAID, <i>mean (SD)</i>	11.3 (7.10)	12.8 (6.53)	10.9 (7.30)	.059

Note. BOMC, Blessed Orientation-Memory-Concentration; FAST, Functional Assessment Staging Tool; CSDD, Cornell Scale for Depression in Dementia; RAID, Rating Anxiety in Dementia; p-value was presented for chi-square tests for categorical variables and for t-test for continuous variables.

Table 10: Correlations among study variables (N=315)

	1	2	3	4	5	6	7	8	9	10	11	12	Missing (%)
1. Age ^a	1	-.048	-.158**	-.005	-.176**	.069	-.005	.006	.037	.010	.031	-.024	10.2
2. Marital status ^b		1	-.011	.113	.072	.088	.080	.055	.053	.035	-.025	.104	5.4
3. Education level ^b			1	-.066	.060	-.133*	-.095	-.016	.057	.085	-.010	.031	14.3
4. Combat exposure ^b				1	.375**	.157*	.118	.141*	.143*	-.044	-.027	-.048	23.2
5. PTSD ^b					1	.049	.119*	.130*	.115	.048	.105	.057	5.4
6. Cognitive status ^c						1	.294**	-.026	-.045	.003	.093	.024	7.6
7. Functional status ^c							1	.136*	.002	.127*	.157**	.172**	7.9
8. Depression ^c								1	.644**	.128**	.208**	.052	5.7
9. Anxiety ^c									1	.025	.010	.064	11.7
10. Interpersonal triggers ^b										1	.346**	.207**	6.3
11. Rejection of care ^b											1	.072	2.5
12. Aggressive behavior ^b												1	2.5

Note. Unimputed dataset was used for correlational analyses; Spearman coefficients are presented for correlations of the ordinal age variable indicated with ^a with all other variables; point-biserial coefficients are presented for correlations between binary variables indicated with ^b and continuous variables indicated with ^c; Pearson coefficients are presented for correlations among continuous variables indicated with ^c; * $p < .05$ (2-tailed); ** $p < .01$ (2-tailed)

4.5.1 Structural Equation Model

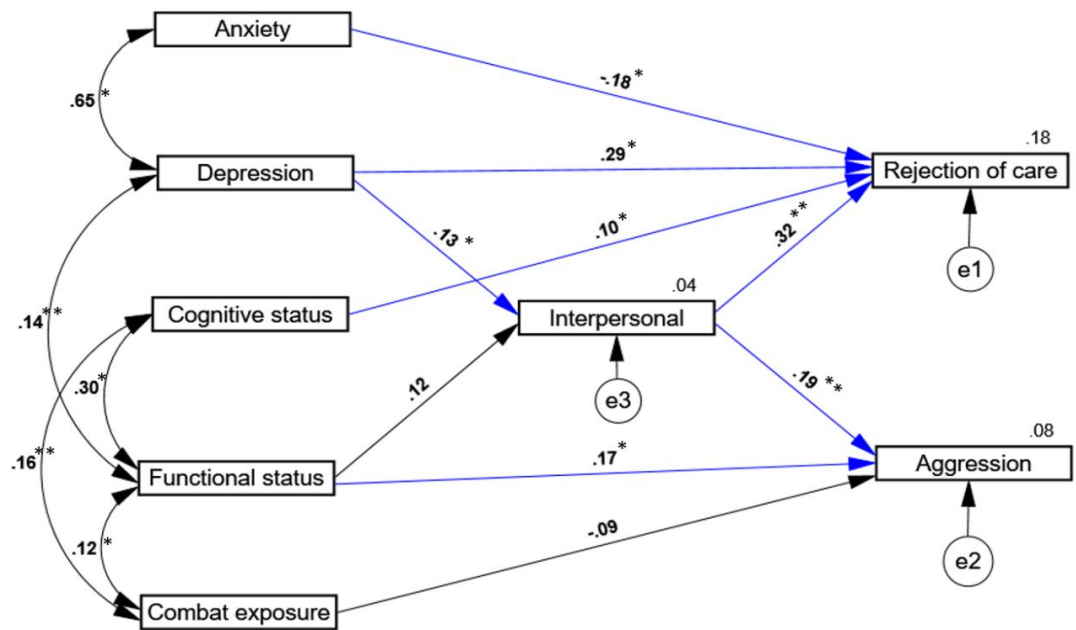
The proposed hypothesized model (Figure 4.2) did not result in an ideal fit to the data ($\chi^2 = 42.830$, $df = 24$, $p = .010$; GFI = .976; NFI = .887; IFI = .947; RFI = .742; CFI = .942; RMSEA = .050). For example, the chi-square test was significant, and several path coefficients were nonsignificant. The model fit of the hypothesized model had room for improvement. Thus, we employed a stepwise model generation strategy (MacCallum, 1995) to improve goodness of fit, by dropping the nonsignificant coefficients, keeping and adding substantively meaningful and justifiable pathways. In addition, two significant residual correlations (i.e., combat exposure with cognitive and functional status) were added beyond those originally hypothesized, and 16 paths and two residual correlations with non-significant coefficients were dropped. Figure 5 represents the final fitted parsimonious model with more satisfactory and robust fit indices ($\chi^2 = 16.861$, $df = 14$, $p = .264$; GFI = .987; NFI = .950; IFI = .991; RFI = .901; CFI = .991; RMSEA = .026).

4.5.1.1 Direct and indirect effects on rejection of care

As shown in Figure 5, there were four statistically significant direct paths to rejection of care: from interpersonal triggers ($\beta = .32$, $p = .005$), depression ($\beta = .29$, $p = .018$), anxiety ($\beta = -.18$, $p = .023$), and cognitive status ($\beta = .10$, $p = .049$). The path of indirect effect of depression to rejection of care through interpersonal triggers was also statistically significant ($\alpha \times \beta = .13 \times .32 = .04$, $p = .012$). Neither functional status nor combat exposure had significant direct or indirect effects on rejection of care.

4.5.1.2 Direct and indirect effects on aggression

Figure 5 also demonstrates that there were two statistically significant direct paths to aggression: one from interpersonal triggers ($\beta = .19, p = .009$) and the other from functional status ($\beta = .17, p = .011$). Functional status also had a significant indirect effect on aggression through interpersonal triggers ($\alpha \times \beta = .12 \times .19 = .02, p = .035$). The indirect path connecting depression and aggression via interpersonal triggers was also significant ($\alpha \times \beta = .13 \times .19 = .03, p = .005$). Anxiety, cognitive status, and combat exposure were not associated with aggression.



Note. Results are presented as standardized beta coefficients; blue lines are significant paths; $*p < .05$; $**p < .001$

Figure 5: Final structural equation model.

4.5.2 Invariant Model

The final model was tested using multi-group SEM with equality constraints on the path coefficients across the two groups, in order to test the moderating effect of PTSD on the hypothesized paths. The model fit indexes for the invariance model with equal path coefficients were $\chi^2 = 37.955$, $df = 37$, $p = .426$; GFI = .972; NFI = .895; IFI = .997; RFI = .842; CFI = .997; RMSEA = .009, which shows that the constrained model fit the data better when compared to the unconstrained model (See Table 11). In other words, the unconstrained and constrained models were not statistically different ($\chi^2 = 6.413$, $df = 9$, $p = .698$). Thus, the overall model was not moderated by PTSD.

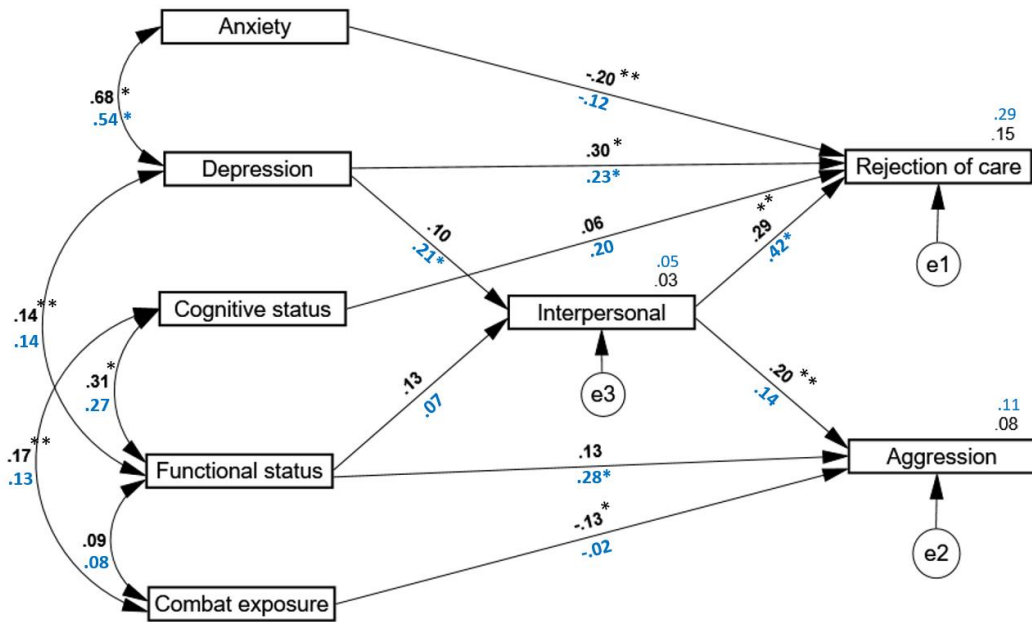
Table 11: Comparison between unconstraint and constraint model

Model	χ^2	df	p	GFI	NFI	IFI	RFI	CFI	RMSEA
Unconstrained	31.542	28	.294	.976	.913	.989	.826	.988	.020
Constrained weights	37.955	37	.426	.972	.895	.997	.842	.997	.009

Note. GFI, goodness of fit index; NFI, normed fit index; IFI, incremental fit index; RFI, relative fit index; CFI, comparative fit index; RMSEA, root mean square error of approximation.

Although the full model was not moderated by PTSD as a whole, not all estimates of the direct and indirect relationships were consistent between the two groups (see Figure 6). Thus, we explored the potential moderating effect of PTSD on partial pathways by evaluating two separate models—one for each group and examined similarities and differences among the pathways between the two groups. Tables 12 and

13 present the path estimates to compare the direct and indirect effects of variables on rejection of care and aggression between two groups.



Note. Values in black are the standardized beta coefficients for No PTSD group; values in blue are standardized beta coefficients for PTSD group; *p < .05; **p < .01

Figure 6: Multigroup SEM model.

Table 12: Direct and indirect effects of variables on rejection of care by PTSD

Background and proximal factors	PTSD group		No PTSD group	
	Direct effect	Indirect effect	Direct effect	Indirect effect
Proximal factor				
Interpersonal triggers	.42 (.087)*	–	.29 (.054)**	–
Background factors				
Cognitive status	.20 (.094)	–	.06 (.066)	–
Functional status	–	.03 (.056)	–	.04 (.019)*
Anxiety	-.12 (.116)	–	-.20 (.088)**	–
Depression	.23 (.115)*	.09 (.041)**	.30 (.087)*	.03
Combat exposure	–	–	–	–

Note. Indirect effect parameters represent the indirect effects of background factors via interpersonal triggers; results are presented as standardized beta coefficients with standard errors in parenthesis; *p < .05; **p < .01

Table 13: Direct and indirect effects of variables on aggression by PTSD

Background and proximal factors	PTSD group		No PTSD group	
	Direct effect	Indirect effect	Direct effect	Indirect effect
Proximal factor				
Interpersonal triggers	.14 (.123)	–	.20 (.070)*	–
Background factors				
Cognitive status	–	–	–	–
Functional status	.28 (.125)*	.01 (.023)	.13 (.072)	.03 (.017)*
Anxiety	–	–	–	–
Depression	–	.03 (.032)	–	.02 (.013)
Combat exposure	-.02 (.110)	–	-.13 (.065)	–

Note. Indirect effect parameters represent the indirect effect of background factors via interpersonal triggers; results are presented as standardized beta coefficients with standard errors in parenthesis; *p < .05; **p < .01

4.5.2.1 Comparison of direct and indirect effects on rejection of care between PTSD and No PTSD groups

As shown in Figure 6, in both groups, there were significant direct effects on rejection of care from interpersonal triggers, but the magnitude was greater in veterans with PTSD ($\beta = .42, p = .014$) compared to those without PTSD ($\beta = .29, p = .008$). In both groups, depression also had a direct effect on rejection of care ($\beta = .23, p = .018$ for the PTSD group; $\beta = .30, p = .012$ for the No PTSD group). While anxiety was not a statistically significant factor on rejection of care in PTSD group ($\beta = -.12, p = .257$), anxiety had a significant negative relationship with rejection of care among veterans without PTSD ($\beta = -.20, p = .007$). While there was no significant relationship between depression and interpersonal triggers in the group without PTSD, depression had a statistically significant association with interpersonal triggers ($\beta = .21, p = .015$) and had a significant indirect effect on rejection of care via interpersonal triggers in the PTSD group ($\beta = .09, p = .009$). While functional status had no significant direct effect on rejection of care in either group, a significant indirect effect of functional status via interpersonal triggers was found only in the No PTSD group ($\beta = .04, p = .041$).

4.5.2.2 Comparison of direct and indirect effects on aggression between PTSD and No PTSD groups

While there was no statistically significant effect of interpersonal triggers on aggression in the PTSD group, interpersonal triggers had a significant direct effect on aggression only in the group without PTSD ($\beta = .20, p = .009$). While there was no statistically significant relationship between functional status and aggression in the No

PTSD group, functional status had a significant direct effect on aggression only in the PTSD group ($\beta = .28, p = .044$). While there was no significant direct effect of functional status in both groups, the indirect effect of functional status via interpersonal triggers on aggression was statistically significant only in the No PTSD group ($\beta = .03, p = .036$). Combat exposure had a statistically significant negative relationship with aggression only in the No PTSD group ($\beta = -.13, p = .048$).

4.6 Discussion

The purpose of this study was to explicate the relationships among background factors and interpersonal triggers (proximal factors) and the behavioral symptoms of rejection of care and aggression in veterans with dementia with and without PTSD using the NDB framework as a guide. We also sought to examine the moderating effect of PTSD on pathways hypothesized by the NDB model and to explore how specific pathways are similar or different between veterans with dementia with and without PTSD. The multi-group SEM revealed that PTSD overall does not moderate the pathways among the variables as hypothesized. However, when we conducted a multi-group analysis, our study found both similarities and differences between the two groups with respect to how background factors and interpersonal triggers (proximal factors) relate to behavioral symptoms. Both direct and indirect effects of background and proximal factors on rejection of care and aggression differed among the two groups, which suggests that these behavioral symptoms may have different mechanisms depending upon whether or not PTSD is present. While in both PTSD and No PTSD groups, interpersonal

triggers (proximal factors) and the depression (background factor) had direct effects on rejection of care, the magnitude of effect for interpersonal triggers was much greater among those with PTSD. Depression also had a greater direct effect among veterans without PTSD compared to those with PTSD. For aggression, while background factors such as functional status play a greater role than interpersonal triggers in aggression among veterans with PTSD, interpersonal triggers exerted a greater direct and mediating effect on aggression among those without PTSD.

The direct association of depression with rejection of care is consistent with previous studies (Galindo-Garre et al., 2015; Volicer, Van der Steen, & Frijters, 2009). However, in this current study, in veterans with PTSD, depression was also indirectly associated with rejection of care through interpersonal triggers but not in those without PTSD. The reason for this variability between two groups regarding the mediating effect of interpersonal triggers is unclear. One potential explanation is that individuals with depression are more likely to have interpersonal hypersensitivity, that is, to be overly sensitive to the behavior and feelings of others (Wilhelm et al., 2004). Coupled with hyperarousal, which is a common symptom of PTSD, veterans with PTSD and depression may have more difficulty tolerating caregiver approaches that veterans interpret as intrusive, uncaring, or threatening and thereby exhibit rejection of care. The fact that veterans with PTSD had more severe symptoms of those without PTSD support this interpretation. As our study demonstrated the indirect or mediated effect of depression through interpersonal triggers, future post hoc analyses are needed to explore the specific

types of interpersonal triggers and to what extent the interpersonal triggers mediate the relationship between depressive symptoms and rejection of care after controlling for covariates.

Previous studies have demonstrated that both depression and interpersonal relationships are significant factors influencing aggressive behaviors among people with dementia (Cipriani et al., 2011; Galindo-Garre et al., 2015; Kunik, Snow, Davila, Steele, et al., 2010). Contrary to the direct relationships between depression and aggressive symptoms in the previous studies and our hypothesis, our study showed that there was no direct effect of depression. Instead, depression had an indirect or mediated effect through interpersonal triggers on aggression in the model for all veterans with and without PTSD. This result is similar to one other study that modeled causes of aggressive behaviors in people with dementia, and found that depression had an indirect relationship to aggressive symptoms that was mediated by caregiver burden (Morgan et al., 2013). On the other hand, the multi-group analysis revealed that depression had neither a direct nor indirect relationship through interpersonal triggers with aggression in both veterans with and without PTSD. While depression was significantly associated with interpersonal triggers in the veterans with PTSD, interpersonal triggers did not significantly affect aggression in the PTSD group. This indicates that interpersonal triggers are not a predictor for aggression in veterans with PTSD.

The significant association between functional status and aggression in the base model for all veterans was consistent with previous studies conducted in residents with

dementia living in long-term care settings (Lyketsos et al., 1999) and in community-dwelling people with dementia (Eustace et al., 2001). Individuals with dementia may exhibit aggression as a result of frustration when they are aware of their inability to perform certain tasks (Eustace et al., 2001). Another possible explanation for the relationship is the aphasia that frequently occurs in moderate and severe dementia (Volicer, 2019). Welsh et al. (1996) found that impairment in language expression significantly correlated with aggression among people with dementia living in the community or residential care settings. They suggested that individuals with dementia who have difficulty with verbal communication often express their needs via aggressive behaviors (Welsh et al., 1996). They also proposed that individuals with dementia whose communication ability is inadequate to self-express are prone to experience frustration, which can lead to less sophisticated expression of their feelings that can be misperceived by others as verbal aggression, or, if not interpreted as an unmet need, result in physical aggression.

The mediating effect of interpersonal triggers on the relationship between functional status and aggression can be explained by the fact that people with greater functional decline require extensive assistance from caregivers to carry out their activities of daily living, and aggressive behaviors often occur in this context (Lyketsos et al., 1999). Furthermore, veterans with impaired cognitive function may misunderstand their caregivers' intention and perceive the care as a threat, thus resulting in defensive aggression (Volicer, 2019). However, in our multi-group analysis, while functional status

exerted a direct effect on aggression only in veterans with PTSD, the indirect effect of functional status on rejection of care and aggression through interpersonal triggers was found only in veterans without PTSD. The explanation for our findings that suggest different underlying mechanisms of aggression between two groups is unclear. One possible explanation could lie in the group differences on functional status as measured by the FAST rating. In our sample, veterans with PTSD had more severe functional impairment than veterans without PTSD. Perhaps, while functional impairment has an indirect effect through interpersonal triggers on rejection of care and aggression in individuals with moderate impairment in functional status, functional status does not interact with interpersonal triggers when the level of impairment is severe. Importantly, it also indicates that interpersonal triggers are not always linked to aggression.

Anxiety was negatively associated with rejection of care in the model for all veterans. One possible explanation for the negative relationship between anxiety and rejection of care is that rejection of care, aggression, and non-aggressive behaviors are different and separate behavioral syndromes that have different clusters of triggers. Previous studies found that while rejection of care and aggression tend to be invoked by interaction with others, non-aggressive behaviors that do not involve rejection of care are more likely to be triggered by intrapersonal factors such as emotional distress, discomforts, and sensory deprivation (Cohen-Mansfield et al., 2015; Volicer et al., 2007). Perhaps, in our study, veterans with more severe anxiety symptoms measured at baseline

were more likely to have emotional distress or discomforts (intrapersonal proximal factor), which are associated with non-aggressive behaviors not included in our analysis.

However, the multi-group analysis revealed that the negative association was statistically significant only in veterans without PTSD. The non-significant result in the PTSD group may be explained by the high correlation between anxiety and depression. That is, the rejection of care in PTSD might more largely be explained by the relationships of depression and interpersonal triggers compared to the effect of anxiety. Although it was not within the scope of the current study, future research is needed to include non-aggressive behaviors that do not involve rejection of care and examine the different underlying mechanisms of behavioral symptoms of rejection of care, non-aggressive, and aggressive behaviors.

Being exposed to combat itself was not a predictor for aggression in the base model. However, in the multi-group model, combat exposure was negatively related to aggression in the No PTSD group. Veterans who were exposed to combat but who did not develop PTSD or whose symptoms of PTSD were well-controlled were less likely to exhibit aggression compared to those without combat exposure. Perhaps resilience developed in response to combat exposure had a long-term protective effect and made them less prone to aggressive behavior (Aldwin et al., 1994; Park et al., 2008; Park et al., 2012). The small size of path estimates can be explained by the high correlation between combat exposure and PTSD, which indicates that the overall model was more largely explained by PTSD rather than by combat exposure. Future research with larger samples

that would permit further multi-group subdivisions by PTSD and combat exposure would allow further examination of this conjecture.

Our findings have important implications for practice. The findings on the critical role of interpersonal triggers as an independent and mediating factor on the behaviors emphasize that the psychosocial interventions should emphasize interpersonal approaches to care for those with BSD. For example, staff training programs that involve communication skills (verbal and non-verbal) and person-centered care approaches that incorporate veterans' needs and preferences can be developed and implemented (Scales et al., 2018). Healthcare providers should consider a cognitive-linguistic stimulation intervention for improving communication ability of veterans with dementia (Moyle et al., 2013) and massage therapy for non-verbal communication before personal care is initiated (Woodward, 2013). Provision of meaningful activities that create opportunities for social interaction and self-expression may improve depressive symptoms and interpersonal relationships (Konno et al., 2014; Scales et al., 2018; Volicer, 2019).

Additionally, although there was no significant moderating effect of PTSD on the overall model, findings from this study should alert clinicians to be aware that the underlying mechanisms of behavioral symptoms of rejection of care and aggression between veterans with dementia and with and without PTSD may differ. Particularly, our multi-group analysis revealed that PTSD moderated the paths among depression, interpersonal triggers, and rejection of care, and that depression also had indirect effects on the occurrence of rejection of care, mediated through interpersonal triggers in veterans

with PTSD. These findings suggest that among veterans with PTSD and depression, ensuring that needed care is received may be particularly challenging, as the depression increases the likelihood that interpersonal triggers will occur, and those triggers are more highly associated with care rejection than in those without PTSD. Although cognitive and functional decline are not reversible or curable as dementia progresses, both depression and the interpersonal factors associated with care refusal are potentially modifiable. These findings imply that individualized multi-component interventions are particularly important to prevent the negative consequences of these behaviors among veterans with dementia and PTSD who have one or more co-occurring psychiatric disorders.

Our findings also carry implications for trauma-informed care mandated by the Center for Medicare and Medicaid Services (CMS) in 2019 for Medicare and Medicaid-certified nursing homes. Stakeholders and healthcare providers have increasingly recognized the pervasive influence of earlier life trauma on lives of individuals and developed several approaches to create cultures that are sensitive to trauma and provide safe environments to prevent re-traumatization among residents with known and unknown trauma history (Dinnen et al., 2014; LeadingAge Maryland, 2019). Our study provides empirical evidence to further these efforts to enhance trauma-informed care. The first step toward providing trauma-informed dementia care would be staff training programs to facilitate building relationships with residents and family members, upon which staff can assess how residents' life history including traumatic events shapes current preferences, needs, and challenges and incorporate them into care.

This study particularly emphasizes the importance of being sensitive to trauma that may affect interpersonal relationships with veterans with dementia. Future research also needs to examine the impact of physical environment triggers as proximal factors that can potentially re-traumatize veterans with co-occurring dementia and PTSD, consequently resulting in behavioral symptoms. The different features of causal relational pathways between veterans with and without PTSD demonstrated in this study also raise the issue of whether a lack of information about PTSD and lifetime trauma history may result in inappropriate or inefficient care approaches. Strategies that increase clinicians' vigilance to assessing potential PTSD and trauma history among veterans who cannot provide detailed information need to be developed.

The findings from this study should be interpreted in light of several limitations. First, our use of the dichotomized variable of PTSD diagnosis identified by STAR-VA behavioral coordinators through chart review is one important limitation. Given we were not able to measure PTSD on a standardized scale due to the nature of secondary data analysis, no information was available as to the specific type of event that invoked the PTSD, onset, chronicity, duration, and the symptom severity of PTSD. Furthermore, there was a likelihood of underdiagnosis or misdiagnosis of PTSD. Our non-significant results on the moderating effect of PTSD on the overall model might be attributed to the limited information regarding the nature of trauma (e.g., severity and types) and multi-dimensional symptoms of PTSD. For example, the moderating effect of PTSD on the overall model might be statistically significant only among veterans with severe PTSD

symptoms. Future studies should assess severity of combat exposure and PTSD using a standardized dimensional scale such as Combat Exposure Scale (CES) (Keane et al., 1989) and the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5) (Weathers et al., 2018).

A nonprobability sample limits the generalizability of results. Participants in the parent study were a sample of convenience (i.e., those recruited from CLCs where there were supports from a registered nurse and leadership in implementing and continuing the intervention), which can cause a selection bias. The fact that the majority of participants in STAR-VA were white men also makes it difficult to generalize findings to members of racial or ethnic minority groups or women veterans. Furthermore, the cross-sectional design of this study limits the causal inferences about the relationships among variables. Longitudinal studies are needed to further explore the trajectories of interrelationships among background factors, interpersonal triggers, and behavioral symptoms, which are needed to reveal the underlying mechanisms of the behavioral symptoms of rejection of care and aggression. Due to the nature of secondary data analysis, information on interpersonal triggers and behavioral symptoms were limited to the text data that described the context of behavior occurrence only for the intervention period. Lastly, we were not able to account for all potential contributors to behavioral symptoms theorized by the NDB model (e.g., premorbid personality, medical conditions, and environmental and organizational factors). Future studies should also account for prescribed medication such as antipsychotics or antidepressant and ongoing treatment for BSD or co-occurring

psychiatric disorders including PTSD, which can be important confounding factors. In addition, future studies should focus on examining the effects of intrapersonal triggers such as pain and sleep disorders and environmental triggers such as noise, crowding, and lights. Additional studies should also examine non-aggressive behaviors such as repetitive calling or wandering in order to better understand potential different behavioral responses to the presence of intrapersonal, interpersonal, and environmental triggers between veterans with and without PTSD.

4.7 Conclusion

The current study investigated whether PTSD moderates the interrelationships among background factors, interpersonal triggers, rejection of care, and aggression among veterans with dementia living in residential long-term care settings. While no moderation effect of PTSD on the overall model was found, our study identified similar and distinct patterns of relationships among background factors and interpersonal triggers to rejection of care and aggression between veterans with dementia and with and without PTSD. Interpersonal triggers were a significant factor that influenced rejection of care and aggression in both veterans with dementia with and without PTSD, which emphasizes the importance of developing and implementing psychosocial interventions that improve interpersonal relationships. The findings from this study on the mediating role of interpersonal triggers between depression and rejection of care have implications for developing targeted interventions for veterans with dementia with PTSD who have greater depressive symptoms. Our study was exploratory, using a secondary data analysis

approach and should be confirmed by future studies designed to examine the causal relationships using a longitudinal design.

5. Conclusion

Dementia is a public health priority that affects over 5 million U.S. residents and roughly 50 million people worldwide (Hebert et al., 2013; Prince et al., 2015). Against the backdrop of great heterogeneity of diverse symptoms, behavioral symptoms are increasingly recognized as the most challenging clinical feature of dementia since they cause considerable distress and are a strong predictor of adverse outcomes. As discussed in the previous chapters, behavioral symptoms of dementia have significant impact on persons with dementia themselves, their caregivers, and healthcare providers, and have great social and economic impact (Allegri et al., 2006; Herrmann et al., 2006; Kales et al., 2015; Kunik, Snow, Davila, McNeese, et al., 2010; O'Brien & Caro, 2001; Wancata et al., 2003).

The need-driven dementia-compromised behavior (NDB) model has reconceptualized biomedical perspectives on behavioral symptoms of dementia to regard symptoms as the most integrated means of expression of unmet needs centered on a person with dementia. The NDB model integrates the biophysical and psychosocial aspects of behavioral symptoms into both background factors—characteristics of persons with dementia that place them at risk for behavioral symptoms and proximal factors—contextual conditions that trigger behavioral symptoms for at-risk individuals. In the NDB model, behavioral symptoms of dementia are viewed as arising from the dynamic interactions of the two factors (Algase et al., 1996). While this model has provided unique guidance for understanding the biopsychosocial underpinning of behavioral

symptoms of dementia that incorporate the influence of earlier life experiences and the here-and-now circumstances (Penrod et al., 2007), the causal relational paths among a range of background and proximal factors and behavioral outcomes remain unclear. A clearer understanding of the underlying mechanisms of behavioral symptoms of dementia through demonstrating potential mediating and moderating effects of various factors is needed to enhance the individualized approach to person-centered care.

Military service-related factors such as combat exposure and PTSD are important background factors as a means of understanding and treating behavioral symptoms of dementia in veterans. However, they have been overlooked and seldom been measured in prior studies. The pervasive influence and impact of PTSD may also present unique psychosocial needs, preferences, and challenges in veterans with dementia living in residential long-term care settings. Coupled with cognitive, functional, and emotional impairment, PTSD may increase affected individuals' vulnerability to proximal factors that trigger behavioral symptoms of dementia. In turn, the features of behavioral symptoms of dementia may differ between veterans with dementia with and without PTSD.

The past 30 years of research on behavioral symptoms of dementia has advanced scientific knowledge by identifying various mechanisms that have laid the foundation for non-pharmacological psychosocial interventions. However, this research has largely overlooked the opportunity to investigate how the needs of military veterans may influence behavioral symptoms of dementia, including those needs associated with co-

occurring PTSD. Given the growing cohort of older veterans with co-occurring dementia and PTSD and the unique challenges presented by the comorbid conditions, research on behavioral symptoms of dementia among the veteran population with and without PTSD is critical.

Thus, this dissertation aimed to provide a better understanding of behavioral symptoms of dementia among veterans with and without PTSD. To achieve this aim, we first synthesized the current understanding of neurocognitive and psychiatric comorbidities of PTSD among older veterans. We then explicated the relationships among background factors, proximal factors, and behavioral symptoms of dementia in veterans with dementia with and without PTSD using the NDB framework as a guide. The findings of this dissertation will both better equip caregivers and healthcare providers who care for veterans to manage behavioral symptoms of dementia, and will also provide valuable insights to researchers to support development of effective interventions individualized to veterans with dementia and co-occurring psychiatric disorders, particularly PTSD. A summary of findings for each chapter are highlighted below, followed by implications for future research, practice, and policy.

5.1 Summary of Findings

5.1.1 Neurocognitive and Psychiatric Comorbidities of Posttraumatic Stress Disorder Among Older Veterans: A Systematic Review

Given the paucity of attention to the relationship between PTSD and behavioral symptoms of dementia as well as the comorbidities of PTSD and dementia among older

veterans, this dissertation began with a systematic literature review of a broad range of neurocognitive and psychiatric comorbidities of PTSD. Specifically, the purpose of this systematic review was to examine the prevalence, incidence, and patterns of neurocognitive and psychiatric comorbidities of PTSD among older veterans. This systematic review provides necessary understanding of the unique features of neurocognitive and psychiatric comorbidities among older veterans with PTSD and critically evaluates the methodological limitations of existing evidence and identifies gaps in knowledge to provide a focus for future research.

This systematic review showed that PTSD often co-occurs with one or more neurocognitive and psychiatric disorders. Depressive disorder was the most prevalent comorbid psychiatric disorder with PTSD, followed by anxiety and substance use disorder, and the incidence of developing dementia was about two times higher in veterans with PTSD than those without PTSD. Factors associated with neurocognitive and psychiatric comorbidities of PTSD included age, combat-related exposure, clinical conditions, health-related and psychosocial outcomes. A descending trend in successively older age groups in the prevalence of comorbidities was found, and more severe trauma or stress was associated with an increased risk for dementia and severity of behavioral symptoms of dementia among veterans with PTSD. Regarding health outcomes, presence of comorbid conditions was associated with greater symptom severity of both disorders, greater healthcare utilization, injury-related mortality such as an accident or suicide, poorer life satisfaction, and reduced quality of life. The systematic review highlights the

need to investigate comorbid neurocognitive and psychiatric disorders among older veterans with PTSD in order to develop interventions that are individualized to older veterans with PTSD who are subtyped by comorbid disorders.

This systematic review of original research also revealed a substantial gap in the literature with regards to the behavioral symptoms among veterans with co-occurring dementia and PTSD. Of ten studies that investigated dementia as a neurocognitive comorbidity of PTSD and were included in this review, only two studies examined behavioral symptoms of dementia in older veterans with PTSD, and the findings of the studies were incomplete as they performed only bivariate analyses and did not account for covariates. Thus, the findings for this systematic review uncovered more questions on behavioral symptoms of dementia in veterans with dementia and PTSD and lent justification to conduct the subsequent studies of this dissertation (Chapter 3 and 4). Additionally, findings of this review guided the design of chapters 3 and 4 with regards to selection of study variables and informed interpretation of the study results for the cases that have multiple co-occurring disorders including dementia, PTSD, depressive disorder, and/or anxiety disorders.

5.1.2 Manifestation of Behavioral Symptoms among Veterans with Dementia: A Qualitative Analysis of Data from STAR-VA

Before we investigated the influence of PTSD on behavioral symptoms in veterans with dementia, a qualitative study was conducted to generate contextualized accounts of behavioral symptoms of dementia. Using data derived from the STAR-VA

training program evaluation, we described how behavioral symptoms of dementia are manifested among veterans receiving care in CLCs, in the context of personal, interpersonal/social, and environmental factors that trigger the symptoms. Using a framework analysis approach, we identified patterns that linked the triggers with the specific types of behavioral symptoms manifested as follows:

- (1) Staff members' direct-care approach often triggered some form of rejection of care;
- (2) Social interactions with others within and beyond CLCs that interfered with veterans exercising autonomy and independence tended to be related to the aggression; and
- (3) intrapersonal unmet needs (physical and/or emotional) and inappropriate stimulation from environment related to non-aggressive behaviors.

These findings help to disentangle and clarify more complex patterns regarding the associations between specific types of proximal factors and specific types of behavioral symptoms of dementia within the NDB model, and may lead to novel approaches to designing and implementing plans of care to prevent or treat BSD.

A criticism that has recently been raised regarding research on behavioral symptoms of dementia is that agitation, aggression, rejection of care, and other individual behavioral symptoms, which have different etiologies, have been called and measured under the umbrella term of agitation or behavioral and psychological symptoms of dementia

(Volicer, 2019; Volicer & Galik, 2018). The findings of this qualitative study lent support to this growing argument and indicated that failing to differentiate those behaviors can be problematic, as they seem to have different clusters of triggers.

Additionally, we also found that the organizational culture of care shaped staff values and influenced how staff conceptualize and attach the meaning to behavioral symptoms of dementia. For example, within the organizational culture of care that prioritizes safety regulations over a veteran's role in self-care or as a contributing member of the community, independent ambulation without staff assistance and helping behaviors for other residents were conceptualized as challenging behavioral symptoms. This underscores the importance of considering the broad organizational culture as a target for person-centered interventions for behavioral symptoms and well-being for veterans with dementia. More research is needed to provide evidence on how culture change movements in nursing homes can be implemented and sustained to promote self-determination and respect for the personal values of residents with dementia and incorporate them into care (Koren, 2010).

This study also strengthens the clinical applicability of the NDB model by drawing attention to the influence of supportive relationships as a proximal factor affecting behavioral outcomes. Relationships are an essential element of person-centered care (Koren, 2010), and therefore this finding provides new empirical justification for taking a person-centered approach to care. The findings on aggressive behaviors as an expression of interpersonal unmet needs, and on non-aggressive behaviors as an

expression of intrapersonal and environmental unmet needs both emphasize the relational aspects of a broad range of unmet needs of persons with dementia. The timely assessment and provision of care or social services that will fulfill their needs and ultimately prevent behavioral symptoms can be achieved through supportive relationships with persons with dementia. As such, interpersonal relationships are one of the proximal factors that not only can be modified to prevent triggering rejection of care and aggressive behaviors, but also need to be enhanced to strengthen caregivers' assessment of intrapersonal and environmental triggers and consequently prevent and manage the non-aggressive behaviors. This extends the role of interpersonal relationships as a proximal factor in the NDB model in providing person-centered care.

Moreover, the findings from this study highlight the need for refinement of the NDB model. Specifically, as currently conceptualized, the NDB model accommodates only one proximal factor. We found a range of behavioral triggers that operate at multiple levels to trigger behavioral symptoms of dementia. This observation can be situated in an ecological model (Bronfenbrenner, 1977; Bronfenbrenner & Morris, 2006).

Characterizing triggers at multiple interacting levels within the over-arching term of proximal factor will enhance the utility of the NDB model in research and practice. The multi-level proximal factors could help further research that will clarify the pattern between specific types of triggers and types of behavioral outcomes. Moreover, it will facilitate development and testing of multi-level interventions for addressing the co-

occurring behavioral symptoms that arise from an interrelated range of multi-level triggers.

5.1.3 Background Factors, Interpersonal Triggers, Rejection of Care, and Aggression in Older Veterans with Dementia with and without PTSD

Along with a review of relevant literature, findings gleaned from Chapter 3 informed the specific aims and research design for the study conducted in Chapter 4. The most distinct pattern that arose from the qualitative analysis in Chapter 3 was the linkage of interpersonal triggers to behavioral symptoms of rejection of care and aggression. Accordingly, we focused on one specific type of proximal factors (interpersonal triggers) and two types of behavioral symptoms (rejection of care, and aggression) for Chapter 4, which aimed to explicate the relationships among background factors, interpersonal triggers, and the behavioral symptoms of rejection of care and aggression in older veterans with dementia with and without PTSD using the NDB model as a guide. Informed by results of previous qualitative study in Chapter 3, we coded the presence or absence of interpersonal triggers and behavioral symptoms rejection of care and aggression that were observed by STAR-VA clinicians and interdisciplinary staff. Using the coded data and the existing quantitative data derived from the STAR-VA dataset, multi-group structural equation modeling (SEM) was performed to address the study aim and demonstrated a number of interrelationships among background factors, interpersonal triggers, and behavioral symptoms of rejection of care and aggression.

Primarily, the interpersonal triggers functioned as proximal factors that mediate the relationship between specific background factors such as comorbid depression and functional status and behavioral symptoms of rejection of care and aggression. Although the multi-group analysis revealed that the hypothesized model as a whole was not moderated by PTSD, not all estimates of the direct and indirect relationships were consistent between veterans with and without PTSD. Along with different features on the hypothesized pathways between the two groups, a potential PTSD-moderated mediating effect of interpersonal triggers on the relationship between depression and rejection of care was found. The differential direct and indirect effects of background and proximal factors on the behavioral outcomes between veterans with and without PTSD suggest that these behavioral symptoms may have different mechanisms depending upon whether or not PTSD is present. Thus, developing a highly individualized approach tailored to the veterans who are subtyped by comorbid PTSD and other co-occurring psychiatric symptoms would be a key to person-centered care to address the unique care needs and thereby reduces adverse outcomes of behavioral symptoms of dementia. The findings from this study on the mediating effect of interpersonal triggers on the relationship between depression and rejection of care in veterans with PTSD reinforced the importance of identifying and modifying problematic interpersonal triggers as a key target for interventions for veterans with dementia and occurring PTSD who exhibit rejection of care.

The findings from Chapter 4 on the interplay of background and proximal factors as potential predictor, moderator, and mediator influences on behavioral outcomes also contribute to strengthening the NDB model. These findings elucidate the complex interrelationships among various factors in the NDB model and reveal the mechanisms of behavioral symptoms of rejection of care and aggression in relation to the interpersonal triggers and their relationships with background factors. The new insights regarding possible mechanisms of behavioral symptoms of dementia uncovered in this study will improve the utility of the NDB model in providing the individualized care that addresses interpersonal unmet needs of persons with dementia and minimizes the limitations caused by background factors in a holistic manner.

5.2 Implications for Research

There are a number of implications for future research to fill the gap in the literature. Based on the findings from Chapter 3 and a review of literature, we argued that agitation, aggression, and rejection of care are co-occurring, but have distinct determinants, contextual triggers, and consequences (Choi et al., 2017; Volicer, 2019; Volicer & Galik, 2018). However, it is still unknown how different behavioral symptoms commonly co-occur in these subgroups, and how interpersonal and environmental triggers interact with specific background factors to result in the co-occurring behaviors, and in what context another type of behavioral symptom may occur as a consequence of the unmet needs related to the initial behavioral symptoms. Thus, research on trajectories of behavioral symptoms of dementia over time would be the next step to explain these

questions. Combining the interdisciplinary observations of behavioral symptoms with electronic health record (EHR) data would provide richer information on trajectories of behavioral symptoms of dementia over time. Future longitudinal observational studies that will be more explicitly designed for the temporal relationships would provide more robust answers to these inquiries.

Results from Chapter 4 uncovered a potential underlying mechanism of rejection of care and aggression in veterans with dementia and with and without PTSD. This study highlighted the importance of interpersonal triggers in combination with other background factors to influence behavioral outcomes. Future studies could use an explanatory sequential mixed methods approach that incorporates further qualitative analysis of text data from ABC cards to explain the current quantitative results. More in-depth understanding regarding what types of interpersonal triggers were related to behavioral outcomes in relation to specific background factors is needed. Moreover, future research should incorporate standardized dimensional scales that account for types of stressors that invoked the PTSD (e.g., military combat, sexual abuse, community violence, traumatic grief, and natural disaster), the severity of trauma exposure, onset, chronicity, duration, and the symptom severity of PTSD.

A longitudinal study that examines the trajectories of interrelationships about background factors, proximal factors, and behavioral symptoms of dementia over time, and how PTSD influences the trajectories over time would provide more conclusive results about the causal nature of the relationships. Moreover, from the perspectives of

person-centered care and the NDB framework, behavioral symptoms of dementia are attributed to the confluence and interaction of bio-psycho-social factors embedded in an individual person with dementia within social and physical environments. Thus, the trajectories of behavioral symptoms over time vary between individuals, conditioned by the different characteristics of the individual persons. Disaggregating within-individual variation from between-individual variation in trajectories of behavioral symptoms of dementia as well as understanding the factors that cause the heterogeneity of patterns of symptoms will allow for predicting adverse trajectories and events for each person with dementia (George et al., 1998; Henly et al., 2011). Thus, findings from future longitudinal trajectory research would allow clinicians to anticipate individuals at risk for adverse trajectories and inform development of individualized interventions that target the time point at which certain intervention will be the most effective (Henly et al., 2011).

5.3 Implication for Practice

Findings from this dissertation have implications for nurses, mental health providers, and other direct-care staff who care for veterans with dementia in residential long-term care settings. With regard to the findings from Chapter 3, providers and caregivers should be aware of the importance of differentiating rejection of care, agitation, aggression, and other types of behavioral symptoms, as their etiology and contextual triggers are different and therefore distinct care strategies tailored to the individual with dementia and the context of the behavioral symptoms are required. As such, in practice, behavioral symptoms need to be classified with their triggers rather than the behavior

itself so as to better understand the context and address triggers. To facilitate this approach, new contextual and descriptive typologies or labels of behavioral symptoms that closely connect situational triggers to behavioral manifestations are needed. The new typologies will be a particularly practical approach to help caregivers who provide direct care for veterans with dementia to identify modifiable triggers, communicate with healthcare providers and other disciplines in the interdisciplinary team, and develop care plans that will be person-centered and individualized to address the triggers and background factors embedded in the individual with dementia.

Once we know the distinctive features of each behavioral symptom for facilitating individualized person-centered care, a holistic approach to understand behavioral symptoms of dementia is also required for healthcare providers as well as direct-care staff as data gleaned from Chapter 3 and 4 showed that symptoms arise in a complex manner involving multiple sources of triggers and background factors. Interdisciplinary care teams should be aware that interventions targeting only a single layer of influence on behavioral symptoms are unlikely to yield the most favorable outcomes, since multiple types of triggers interplay with each other and contribute to the occurrence of behavioral symptoms of dementia. Thus, it is necessary to develop care plans in a more holistic way.

Relatedly, this dissertation highlights the value of interdisciplinary and interprofessional collaborative endeavors to develop and implement the individualized multi-component, multi-level interventions designed to prevent the negative consequences of behavioral symptoms of dementia and improve the wellbeing of

veterans with dementia and co-occurring PTSD. As such, interdisciplinary staff training programs are essential to leverage knowledge, skills, and roles of every discipline and all level of staff for the common goal of preventing negative consequences of behavioral symptoms of dementia and for promoting well-being among veterans with dementia and their caregivers. Moreover, within the interdisciplinary team in residential long-term care settings, direct-care staff who closely care for residents are in a prime position to assess the contextual triggers and changes in cognitive, functional, and emotional status, deliver the individualized person-centered care in day-to-day care, and monitor trajectories of behavioral symptoms of dementia and their responses to the care approaches. Therefore, strengthening direct-care staff's observational skills and promoting their active engagement in the interdisciplinary care planning activities would be critical to leverage their critical roles in interdisciplinary care practice for veterans with complex comorbid conditions.

From the findings of Chapter 3 and 4, the critical role of interpersonal triggers (proximal factors) as an independent and mediating factor on the behavioral symptoms of rejection of care and aggression emphasizes that the psychosocial interventions should incorporate a focus on an interpersonal approach to care. As suggested in the previous chapters, staff training programs that focus on development of verbal and non-verbal communication skills and a person-centered care approach that respects and incorporates veterans' needs and preferences are essential in the interpersonal approach to care.

Furthermore, findings from Chapter 4 underscore the importance of considering individualized interventions particularly for veterans with dementia and co-occurring PTSD. Providers and caregivers should be aware that veterans with dementia with co-occurring PTSD and depression are more vulnerable to interpersonal triggers, and ensuring that needed care is received may be particularly challenging. The mechanisms of behavioral symptoms found from this current study guided by the NDB model would help inform a more comprehensive assessment of veterans with dementia at risk for specific types of behavioral symptoms based on the background factors including comorbid illnesses. The individualized plan of care would then be designed to meet each individual veteran's unique biopsychosocial needs that account for their earlier life history and current life circumstances and continuously evaluate their responses to the care approach for the evolving care plans. This individual person-centered care will prevent them from being exposed to the triggers (proximal factors).

5.4 Implications for Policy

Since November 2019, the Center for Medicare and Medicaid Services (CMS) has mandated trauma-informed care for Medicare and Medicaid-registered nursing homes in order to strengthen the provision of person-centered care to residents. CMS and stakeholders recognized the pervasive influence and impact of trauma on individuals and communities, and how the trauma in earlier life can shape the affected individuals' needs, preferences, and values across their lifespan that include their later life in nursing homes. The recognition has led to the development and implementation of several approaches for

residents with trauma living in nursing homes as follows: assessing the experience of trauma exposure even for persons who have not been diagnosed with PTSD, providing trauma-specific treatment and other necessary psychological and social support services, and creating a culture that is sensitive to the trauma and safe and supportive environments that mitigate triggers that may cause re-traumatization (Dinnen et al., 2014; LeadingAge Maryland, 2019). However, in terms of research and practice, the status of trauma-informed care for older adults in nursing homes is in its infancy. As the findings of Chapter 4 on the influence of PTSD on behavioral symptoms of dementia indicated, more attention should be given to the vulnerable population with co-occurring dementia and PTSD living in residential long-term care settings. The CMS should partner with stakeholders such as the Veterans Health Administration and other community nursing homes who care for veterans with PTSD and/or trauma exposure to make a commitment to increase staff training programs for trauma-informed care, launch community initiatives that help staff recognize the significance of military trauma in dementia care, assess facilitators and barriers to implementing trauma-informed care in care settings, and facilitate research on trauma-informed care for veterans with dementia and PTSD as well as those with dementia who have not been diagnosed with PTSD but have trauma exposure.

5.5 Conclusion

This dissertation provides new insights into the behavioral symptoms of dementia in veterans with dementia with and without PTSD living in residential long-term care

settings. The contextualized accounts of behavioral symptoms of dementia demonstrated that behavioral symptoms of dementia are heterogeneous, with different clusters of triggers that are multi-level, thereby warranting interdisciplinary, multi-level person-centered interventions. The findings from this dissertation extend the NDB model by explicating previously untested pathways among background factors, proximal factors, and behavioral symptoms of dementia; demonstrating the direct and mediating effect of interpersonal triggers as a proximal factor and the direct and indirect effect of background factors on specific types of behavioral symptoms of dementia; and identifying potential specific pathways through which PTSD may enact its moderating role. The new knowledge generated from the empirical studies provides a scientific foundation for developing individualized person-centered care to addressing behavioral symptoms of dementia for veterans with dementia and co-occurring PTSD and other psychiatric disorders. Lastly, we hope that this dissertation can be an evidence for bringing the attention of policy makers and stakeholders to these vulnerable populations with multi-comorbidity that adds another layer of complexity to care and need for more systematic and policy-level efforts for implementing trauma-informed care in residential long-term care settings.

Appendix A: Database Search Strategy

Table 14: PubMed search trail (updated 10/4/2018)

Search #	MeSH Terms and Key Words	Articles Revealed
#1	"stress disorders, post-traumatic"[MeSH Terms] OR "post-traumatic stress disorders"[All Fields] OR "ptsd"[All Fields] OR "post-traumatic stress disorder"[All Fields] OR "posttraumatic stress disorder"[All Fields] OR "posttraumatic stress disorders"[All Fields]	39320
#2	"veterans"[MeSH Terms] OR "veterans"[All Fields] OR "veteran"[All Fields] OR "military personnel"[MeSH Terms] OR "military"[All Fields]	282677
#3	"Aged"[Mesh] OR elderly[tiab] OR aged[tiab] OR senior[tiab] OR "older adult"[tiab] OR "older adults"[tiab]	3276124
#4	"Mental disorders"[MESH] OR Psychiatric[tiab] OR psychological[tiab] OR psychosocial[tiab] OR "mental health"[tiab] OR Neurologic[tiab] OR cognitive[tiab] OR neuropsychological[tiab] OR Mental[tiab] OR Behavior[tiab] OR Anxiety[tiab] OR Bipolar[tiab] OR Dissociative[tiab] OR Mood[tiab] OR Neurocognitive[tiab] OR Cognition[tiab] OR Dementia[tiab] OR Delirium[tiab] OR amnestic[tiab] OR amnesia[tiab] OR Personality[tiab] OR affective[tiab] OR Sleep[tiab] OR Somatoform[tiab] OR Alcohol[tiab] OR "Substance abuse" [tiab] OR "substance use" [tiab] OR depressive[tiab] OR depression[tiab] OR panic[tiab] OR phobia*[tiab] OR "obsessive-compulsive disorder" [tiab] OR schizophren*[tiab] OR paranoid[tiab] OR psychotic[tiab]	2708279
#5	#1 AND #2 AND #3 AND #4	1382
#6	#5 NOT ((Editorial[ptyp] OR Letter[ptyp] OR Comment[ptyp] OR Case reports[ptyp]))))	1318
#7	#6 AND English[lang])	1292

Table 15: CINAHL search trail (updated 10/4/2018)

Search #	Subject Headings (MH) and Key Words	Articles Revealed
S1	(TI (PTSD OR "posttraumatic stress disorder" OR "post-traumatic stress disorder" OR "posttraumatic stress disorders" OR "post-traumatic stress disorders") OR AB (PTSD OR "posttraumatic stress disorder" OR "post-traumatic stress disorder" OR "posttraumatic stress disorders" OR "post-traumatic stress disorders") OR MH "Stress Disorders, Post-Traumatic")	21,297
S2	(TI (veterans OR veteran OR military) OR AB (veterans OR veteran OR military) OR MH "Military Personnel+" OR MH "Veterans+")	40,639
S3	TI (elderly OR aged OR senior OR "older adult" OR "older adults") OR AB (elderly OR aged OR senior OR "older adult" OR "older adults") OR (MH "Aged+")	812,776
S4	(MH "Mental disorders+" OR TI (Psychiatric OR psychological OR psychosocial OR mental health OR Neurologic OR cognitive OR neuropsychological OR Mental OR Behavior OR Anxiety OR Bipolar OR Dissociative OR Mood OR Neurocognitive OR Cognition OR Dementia OR Delirium OR amnestic OR amnesia OR Personality OR affective OR Sleep OR Somatoform OR Alcohol OR "Substance abuse" OR "substance use" OR depressive OR depression OR panic OR phobia* OR "obsessive-compulsive disorder" OR schizophren* OR paranoid OR psychotic) OR AB (Psychiatric OR psychological OR psychosocial OR mental health OR Neurologic OR cognitive OR neuropsychological OR Mental OR Behavior OR Anxiety OR Bipolar OR Dissociative OR Mood OR Neurocognitive OR Cognition OR Dementia OR Delirium OR amnestic OR amnesia OR Personality OR affective OR Sleep OR Somatoform OR Alcohol OR "Substance abuse" OR "substance use" OR depressive OR depression OR panic OR phobia* OR "obsessive-compulsive disorder" OR schizophren* OR paranoid OR psychotic))	898,136
S5	S1 AND S2 AND S3 AND S4	639
S6	#5 NOT PT (Abstract OR Book Chapter OR Book review OR case study OR commentary OR Editorial OR Letter OR Masters Thesis OR Pamphlet OR Pamphlet Chapter	598

	OR Poetry)	
S7	S6 AND LA English	596

Table 16: PsycINFO search trail (updated 10/4/2018)

Search #	Subject Headings (MH) and Key Words	Articles Revealed
S1	(TI (PTSD OR "posttraumatic stress disorder" OR "post-traumatic stress disorder" OR "posttraumatic stress disorders" OR "post-traumatic stress disorders") OR AB (PTSD OR "posttraumatic stress disorder" OR "post-traumatic stress disorder" OR "posttraumatic stress disorders" OR "post-traumatic stress disorders") OR (DE "Posttraumatic Stress Disorder"))	39,693
S2	(TI (veterans OR veteran OR military) OR AB (veterans OR veteran OR military) OR DE "Military Veterans" OR DE "Military Personnel" OR DE "Air Force Personnel" OR DE "Army Personnel" OR DE "Coast Guard Personnel" OR DE "Commissioned Officers" OR DE "Enlisted Military Personnel" OR DE "Marine Personnel" OR DE "National Guard Personnel" OR DE "Navy Personnel")	46,486
S3	TI (elderly OR aged OR senior OR "older adult" OR "older adults") OR AB (elderly OR aged OR senior OR "older adult" OR "older adults")	334,923
S4	(DE "Mental Disorders" OR DE "Adjustment Disorders" OR DE "Affective Disorders" OR DE "Alexithymia" OR DE "Anxiety Disorders" OR DE "Autism Spectrum Disorders" OR DE "Chronic Mental Illness" OR DE "Dementia" OR DE "Dissociative Disorders" OR DE "Eating Disorders" OR DE "Elective Mutism" OR DE "Factitious Disorders" OR DE "Gender Identity Disorder" OR DE "Hoarding Disorder" OR DE "Hysteria" OR DE "Impulse Control Disorders" OR DE "Koro" OR DE "Mental Disorders due to General Medical Conditions" OR DE "Neurosis" OR DE "Paraphilias" OR DE "Personality Disorders" OR DE "Pseudodementia" OR DE "Psychosis" OR DE "Schizoaffective Disorder" OR TI (Psychiatric OR psychological OR psychosocial OR mental health OR Neurologic OR cognitive OR neuropsychological OR Mental OR Behavior OR Anxiety OR Bipolar OR Dissociative OR Mood OR Neurocognitive OR Cognition OR Dementia OR Delirium OR amnestic OR amnesia OR Personality OR affective OR Sleep OR Somatoform OR Alcohol OR	2,121,371

“Substance abuse” OR “substance use” OR depressive
 OR depression OR panic OR phobia* OR “obsessive-
 compulsive disorder” OR schizophren* OR paranoid OR
 psychotic) OR AB (Psychiatric OR psychological OR
 psychosocial OR mental health OR Neurologic OR
 cognitive OR neuropsychological OR Mental OR
 Behavior OR Anxiety OR Bipolar OR Dissociative OR
 Mood OR Neurocognitive OR Cognition OR Dementia
 OR Delirium OR amnesic OR amnesia OR Personality
 OR affective OR Sleep OR Somatoform OR Alcohol OR
 “Substance abuse” OR “substance use” OR depressive
 OR depression OR panic OR phobia* OR “obsessive-
 compulsive disorder” OR schizophren* OR paranoid OR
 psychotic))

S5	S1 AND S2 AND S3 AND S4	345
S6	S5 AND (ZZ "journal article")	304
S7	S6 AND LA English	296

Appendix B: Quality Appraisal for Studies Included in Systematic Review

Table 17: Quality appraisal for observational cohort and cross-sectional studies (N=24)

First author (year)	1. Clarity of research question /objective	2. Clarity of study population	3. Participation rate of eligible persons (≥ 50%)	4. Subjects selection from the similar populations/ Uniformly application of inclusion and exclusion criteria	5. Sample size justification, power description, or variance and effect estimates	6. Exposures measured prior to the outcomes being measured	7. Sufficient timeframe
Ball (2009)	Yes	Yes	Yes	Yes	No	Yes	Yes
Bhattarai (2018)	Yes	Yes	NA	Yes	Yes	No	No
Blow (1992)	Yes	Yes	NA	Yes	No	No	No
Bohnert (2013)	Yes	Yes	NA	Yes	Yes	Yes	Yes
Chen (2018)	Yes	Yes	NA	Yes	No	Yes	Yes
Clark (2018)	Yes	Yes	No	Yes	No	No	No
Hart (2008)	Yes	Yes	NR	Yes	No	No	No
Hovens (1992)	Yes	Yes	Yes	Yes	No	No	No
Hyer (1999)	Yes	Yes	NR	Yes	No	No	No
Ikin (2010)	Yes	Yes	Yes	Yes	Yes	No	No
Kidson (1993)	Yes	Yes	NR	Yes	No	No	No
Kilbourne (2004)	Yes	Yes	NA	Yes	No	No	No
King (2015)	Yes	Yes	NA	Yes	No	Yes	Yes
Lu (2012)	Yes	Yes	NA	Yes	No	Yes	Yes
Marmar (2015)	Yes	Yes	Yes	Yes	Yes	No	No
Mawanda (2017)	Yes	Yes	NA	Yes	No	No	Yes

First author (year)	1. Clarity of research question /objective	2. Clarity of study population	3. Participation rate of eligible persons ($\geq 50\%$)	4. Subjects selection from the similar populations/ Uniformly application of inclusion and exclusion criteria	5. Sample size justification, power description, or variance and effect estimates	6. Exposures measured prior to the outcomes being measured	7. Sufficient timeframe
Meziab (2014)	Yes	Yes	NA	Yes	No	Yes	Yes
Qureshi (2010)	Yes	Yes	NA	Yes	No	Yes	Yes
Roughead (2017)	Yes	Yes	NA	Yes	No	Yes	Yes
Sajatovic (2006)	Yes	Yes	NA	Yes	No	Yes	Yes
Schlenger (2016)	Yes	Yes	Yes	Yes	No	No	Yes
Sutker (1993)	Yes	Yes	NR	Yes	No	No	No
Verma (2001)	Yes	Yes	NA	Yes	No	Yes	Yes
Yaffe (2010)	Yes	Yes	NA	Yes	No	Yes	Yes

Table 17 continued

First author (year)	8. Different levels of the exposures	9. Exposure measures (clear definition, validity, reliability)	10. Exposure assessment over time (≥ 2)	11. Outcome measures (clear definition, validity, reliability)	12. Outcome assessors blinded to the exposure status	13. Loss to follow-up after baseline (< 20%)	14. Confounding variables measured and statistical adjusted
Ball (2009)	NA	Yes	No	Yes	No	Yes	No
Bhattarai (2018)	NA	Yes	No	Yes	No	NA	Yes
Blow (1992)	NA	Yes	No	Yes	No	NA	No
Bohnert (2013)	NA	Yes	No	Yes	No	NA	Yes
Chen (2018)	NA	Yes	No	Yes	No	NA	Yes
Clark (2018)	NA	Yes	No	Yes	No	No	No
Hart (2008)	NA	Yes	No	Yes	No	NA	No
Hovens (1992)	NA	Yes	No	Yes	No	NA	No
Hyer (1999)	Yes	Yes	No	Yes	No	NR	No
Ikin (2010)	NA	Yes	No	Yes	No	NA	Yes
Kidson (1993)	NA	Yes	No	Yes	No	NA	No
Kilbourne (2004)	NA	Yes	No	Yes	No	NA	No
King (2015)	NA	Yes	No	Yes	No	NA	No
Lu (2012)	NA	Yes	No	No	NA	NA	Yes
Marmar (2015)	Yes	Yes	No	Yes	No	NA	No
Mawanda (2017)	NA	Yes	No	Yes	No	NA	Yes
Meziab (2014)	NA	Yes	No	Yes	No	NA	Yes
Qureshi (2010)	NA	Yes	No	Yes	NA	NA	Yes
Roughead (2017)	Yes	Yes	No	Yes	No	NA	Yes
Sajatovic (2006)	NA	Yes	No	Yes	No	NA	Yes

First author (year)	8. Different levels of the exposures	9. Exposure measures (clear definition, validity, reliability)	10. Exposure assessment over time (≥ 2)	11. Outcome measures (clear definition, validity, reliability)	12. Outcome assessors blinded to the exposure status	13. Loss to follow-up after baseline (< 20%)	14. Confounding variables measured and statistical adjusted
Schlenger (2016)	Yes	Yes	Yes	Yes	No	No	No
Sutker (1993)	NA	Yes	No	No	No	NA	No
Verma (2001)	NA	Yes	No	Yes	No	Yes	No
Yaffe (2010)	NA	Yes	No	Yes	No	NA	Yes

Abbreviation. NA = not applicable; NR = not reported

Appendix C: STAR-VA ABC Card

STAR-VA ABC CARD – Assessment		STAR-VA ABC CARD – GET ACTIVE	
Date: xx/xx/xxxx MH Provider ID: xxx Resident ID: xxx			
<div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #4a86e8; color: white; width: 60px; margin: 0 auto;"> <div style="font-size: 24px; font-weight: bold; text-align: center;">A</div> <div style="font-size: 8px; text-align: center;">Activator</div> </div>	<p style="color: red; font-size: 10px;">What happened just before B?</p>	<div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #4a86e8; color: white; width: 60px; margin: 0 auto;"> <div style="font-size: 24px; font-weight: bold; text-align: center;">A</div> <div style="font-size: 8px; text-align: center;">Activator</div> </div>	<p style="color: red; font-size: 10px;">Change the A.</p> <p style="font-size: 8px;">How will you change your approach?</p> <p style="font-size: 8px;">How will you change the environment?</p>
<div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #4a86e8; color: white; width: 60px; margin: 0 auto;"> <div style="font-size: 24px; font-weight: bold; text-align: center;">B</div> <div style="font-size: 8px; text-align: center;">Behavior</div> </div>	<p style="color: red; font-size: 10px;">What was the resident doing?</p> <p style="color: red; font-size: 10px;">Who was present?</p> <p style="color: red; font-size: 10px;">Where was this happening?</p> <p style="color: red; font-size: 10px;">When was this happening?</p>	<div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #4a86e8; color: white; width: 60px; margin: 0 auto;"> <div style="font-size: 24px; font-weight: bold; text-align: center;">B</div> <div style="font-size: 8px; text-align: center;">Behavior</div> </div>	<p style="color: red; font-size: 10px;">Change the B.</p> <p style="font-size: 8px;">What is the desired GOAL behavior?</p>
<div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #4a86e8; color: white; width: 60px; margin: 0 auto;"> <div style="font-size: 24px; font-weight: bold; text-align: center;">C</div> <div style="font-size: 8px; text-align: center;">Consequence</div> </div>	<p style="color: red; font-size: 10px;">What happened just after B?</p>	<div style="border: 1px solid black; border-radius: 15px; padding: 10px; background-color: #4a86e8; color: white; width: 60px; margin: 0 auto;"> <div style="font-size: 24px; font-weight: bold; text-align: center;">C</div> <div style="font-size: 8px; text-align: center;">Consequence</div> </div>	<p style="color: red; font-size: 10px;">Change the C.</p> <p style="font-size: 8px;">What will you do when that happens?</p> <p style="font-size: 8px;">What will you do if that does not happen?</p>
<p style="color: red; font-size: 10px;">Please Rate Behavior (check correct box):</p> <p>Severity: 4 = Extreme 3 = Very 2 = Moderate 1 = Mild 0 = Not at all</p> <p style="text-align: center;"> <input type="checkbox"/>4 <input type="checkbox"/>3 <input type="checkbox"/>2 <input type="checkbox"/>1 <input type="checkbox"/>0 </p> <p>Frequency: 4 = Daily 3 = 3-6/wk 2 = 1-2/wk 1 = Not in past wk 0 = Never</p> <p style="text-align: center;"> <input type="checkbox"/>4 <input type="checkbox"/>3 <input type="checkbox"/>2 <input type="checkbox"/>1 <input type="checkbox"/>0 </p>		<p style="font-size: 8px; color: blue;">Who else needs to be involved?</p> <p style="font-size: 8px; color: blue;">What is the pleasant event identified?</p>	

Appendix D: Codebook for Qualitative Coding

Table 18: Codebook for behavioral symptoms of dementia

Parent code	Child code	Operational definition
Interpersonal triggers	Direct-care approach	Behavioral symptoms are exhibited in the context of personal care processes that involve physical or verbal interactions between an individual and his or her caregiver(s) during personal care such as bathing or feeding (Ishii et al., 2012).
	Other social interaction	Social contact and interactions with others that meet the individual’s psychosocial needs for engagement and connectedness are described (Ishii et al., 2012). This code captures elements such as ward ambience, connections with peers, stability of relationships, any interpersonal relationships with staff other than during the personal care, family members, other residents, and others. For example, this code can be used for absence of social interaction/communication that meets veteran feel a sense of belonging or continuity (e.g., lack of personal 1:1 interaction with staff or family members), or presence of social interaction that makes veteran feel don’t belonging, disconnected, stressed out, or confused (e.g., a roommate yelling to veteran, personal interaction with a roommate whom veteran dislike).
Triggers not clearly identified		When we cannot identify any triggers due to the poor quality of staff assessment, we will use this code. Note that we will not use this code with other codes for triggers at the same time.

Table 19: Codebook for rejection of care and aggression

Code	Operational definition
<i>Rejection of Care</i>	<p>Any behaviors with which persons with dementia withstand or oppose a caregiver’s efforts for caregiving (e.g., personal care, ADL care, diagnostic/medical procedures, and chronic disease care; Mahoney et al., 1999). For example, behaviors that prevents or interferes with the caregiver performing or assisting with ADLs including bathing, toileting, and grooming (Potts, Richie, & Kaas, 1996).</p> <ul style="list-style-type: none"> • We will not use this code for behaviors that do not comply with safety precaution or re-direction just for the moment of behavior occurrence. • Resistance of care can manifest as verbal refusal, argumentative behaviors, body positioning, gestures, or physical resistance, and it can escalate into combative or physically aggressive behaviors (Bridges-Parlet, Knopman, & Thompson, 1994; Ishii et al., 2012). Thus, resistance to care and aggression can be simultaneously coded.
<i>Aggressive behavior</i>	<p>Any physical or verbal behavior that has the effect of harming or repelling others such as hitting, kicking, and verbal threats (Ryden, 1988).</p> <ul style="list-style-type: none"> • Use child codes of “physical aggressive” and “verbal aggressive” for the following specific behaviors according to the Cohen-Mansfield (1991)
Physical aggressive behavior	<p>Hitting (including self) - physical abuse, striking others, pinching others, banging self/furniture</p> <p>Kicking - striking forcefully with feet at people or objects</p> <p>Pushing - forcefully thrusting, shoving, moving putting pressure against another</p> <p>Scratching - clawing, scraping with fingernails either other people or self</p> <p>Tearing things or destroying property - shredding, ripping, breaking, stomping on something</p> <p>Grabbing onto people or things inappropriately - snatching, seizing roughly, taking firmly, or yanking</p> <p>Biting - chomping, gnashing, gnawing, either other people or self</p> <p>Aggressive spitting (including while feeding) - spitting onto floor, other people, etc.; does not include uncontrollable salivating, or spitting into tissue, toilet, or onto ground outside</p>

Code	Operational definition
	<p>Throwing things - hurling objects, violently tossing objects up in air, tipping off surfaces, flinging, dumping food</p> <p>Making physical sexual advances or exposing genitals - touching a person in an inappropriate sexual way, rubbing genital area, inappropriate masturbation (when not alone in own room or bathroom), unwanted fondling or kissing</p> <p>Hurting self or other - burning self or other, cutting self or other, touching self or other with harmful objects, etc.</p>
Verbal aggressive	<p>Cursing or verbal aggression - only when using words; swearing, use of obscenity, profanity, unkind speech or criticism, verbal anger, verbal combativeness. Does not include unintelligible noises (rated under screaming or strange noises)</p> <p>Making verbal sexual advances - sexual propositions, sexual innuendo, or “dirty” talk</p> <p>Screaming - shouting, piercing howl, making loud shrills</p>

References

- Adams, R. E., Urosevich, T. G., Hoffman, S. N., Kirchner, H. L., Hyacinthe, J. C., Figley, C. R., . . . Boscarino, J. A. (2017). Social Support, Help-Seeking, and Mental Health Outcomes Among Veterans in Non-VA Facilities: Results from the Veterans' Health Study. *Military behavioral health, 5*(4), 393-405. doi:10.1080/21635781.2017.1333067
- Ahmadi, N., Hajsadeghi, F., Mirshkarlo, H. B., Budoff, M., Yehuda, R., & Ebrahimi, R. (2011). Post-traumatic stress disorder, coronary atherosclerosis, and mortality. *American Journal of Cardiology, 108*(1), 29-33. doi:10.1016/j.amjcard.2011.02.340
- Aldwin, C. M., Levenson, M. R., & Spiro, A., 3rd. (1994). Vulnerability and resilience to combat exposure: can stress have lifelong effects? *Psychology and Aging, 9*(1), 34-44. doi:10.1037//0882-7974.9.1.34
- Alexopoulos, G. S., Abrams, R. C., Young, R. C., & Shamoian, C. A. (1988). Cornell scale for depression in dementia. *Biological Psychiatry, 23*(3), 271-284.
- Algase, D. L., Beck, C., Kolanowski, A., Whall, A., Berent, S., Richards, K., & Beattie, E. (1996). Need-driven dementia-compromised behavior: An alternative view of disruptive behavior. *American Journal of Alzheimer's Disease, 11*(6), 10-19. doi:10.1177/153331759601100603
- Algase, D. L., Yao, L., Beel-Bates, C. A., & Song, J.-A. (2007). *Theoretical models of wandering*. New York, NY: Springer Pub. Co.
- Allegri, R. F., Sarasola, D., Serrano, C. M., Taragano, F. E., Arizaga, R. L., Butman, J., & Loñ, L. (2006). Neuropsychiatric symptoms as a predictor of caregiver burden in Alzheimer's disease. *Neuropsychiatric Disease and Treatment, 2*(1), 105.
- Alzheimer's Association. (2017). Alzheimer's Disease Facts and Figures. Retrieved from https://www.alz.org/documents_custom/2017-facts-and-figures.pdf
- American Psychiatric Association. (2016). *The American Psychiatric Association practice guideline on the use of antipsychotics to treat agitation or psychosis in patients with dementia [electronic resource]*. Arlington, VA: American Psychiatric Association.
- Averill, P. M., & Beck, J. G. (2000). Posttraumatic stress disorder in older adults: a conceptual review. *Journal of Anxiety Disorders, 14*(2), 133-156.

- Ball, V. L., Hudson, S., Davila, J., Morgan, R., Walder, A., Graham, D. P., . . . Kunik, M. E. (2009). Post-traumatic stress disorder and prediction of aggression in persons with dementia. *International Journal of Geriatric Psychiatry*, *24*(11), 1285-1290. doi:10.1002/gps.2258
- Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*(6), 1173-1182. doi:10.1037/0022-3514.51.6.1173
- Beck, C., Richards, K., Lambert, C., Doan, R., Landes, R. D., Whall, A., . . . Feldman, Z. (2011). Factors associated with problematic vocalizations in nursing home residents with dementia. *The Gerontologist*, *51*(3), 389-405. doi:10.1093/geront/gnq129
- Bhattarai, J. (2018). *Depression and PTSD as predictors of dementia and other cognitive disorders among veterans based on race and sex*. (78), ProQuest Information & Learning, Retrieved from <https://search.ebscohost.com/login.aspx?direct=true&db=psych&AN=2017-43828-055&site=ehost-live&scope=site> Available from EBSCOhost psych database.
- Blow, F. C., Cook, C. A., Booth, B. M., Falcon, S. P., & Friedman, M. J. (1992). Age-related psychiatric comorbidities and level of functioning in alcoholic veterans seeking outpatient treatment. *Hospital Community Psychiatry*, *43*(10), 990-995.
- Bohnert, K. M., Ilgen, M. A., Rosen, C. S., Desai, R. A., Austin, K., & Blow, F. C. (2013). The association between substance use disorders and mortality among a cohort of Veterans with posttraumatic stress disorder: variation by age cohort and mortality type. *Drug and Alcohol Dependence*, *128*(1-2), 98-103. doi:10.1016/j.drugalcdep.2012.08.015
- Bollen, K. A., & Long, J. S. (1992). Tests for structural equation models: Introduction. *Sociological Methods & Research*, *21*(2), 123-131.
- Böttche, M., Kuwert, P., & Knaevelsrud, C. (2012). Posttraumatic stress disorder in older adults: an overview of characteristics and treatment approaches. *International journal of geriatric psychiatry*, *27*(3), 230-239.
- Boustani, M., Zimmerman, S., Williams, C. S., Gruber-Baldini, A. L., Watson, L., Reed, P. S., & Sloane, P. D. (2005). Characteristics Associated With Behavioral Symptoms

Related to Dementia in Long-Term Care Residents. *The Gerontologist*, 45(suppl_1), 56-61. doi:10.1093/geront/45.suppl_1.56

- Brady, K. T., Killeen, T. K., Brewerton, T., & Lucerini, S. (2000). Comorbidity of psychiatric disorders and posttraumatic stress disorder. *Journal of Clinical Psychiatry*, 61, 22-32.
- Bramer, W., & Bain, P. (2017). Updating search strategies for systematic reviews using EndNote. *Journal of the Medical Library Association : Journal of the Medical Library Association*, 105(3), 285-289. doi:10.5195/jmla.2017.183
- Breslau, N. (2009). The epidemiology of trauma, PTSD, and other posttrauma disorders. *Trauma Violence Abuse*, 10(3), 198-210. doi:10.1177/1524838009334448
- Bridges-Parlet, S., Knopman, D., & Thompson, T. (1994). A descriptive study of physically aggressive behavior in dementia by direct observation. *Journal of the American Geriatrics Society*, 42(2), 192-197.
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32(7), 513.
- Bronfenbrenner, U., & Morris, P. A. (2006). The bioecological model of human development. In E. M. L. D. William (Ed.), *Handbook of child psychology (6th edition, pp. 793-828)*. Hoboken, NJ: John Wiley & Sons Inc.
- Brownie, S., & Nancarrow, S. (2013). Effects of person-centered care on residents and staff in aged-care facilities: a systematic review. *Clinical Interventions in Aging*, 8, 1.
- Bushman, B. J., & Anderson, C. A. (2001). Is it time to pull the plug on hostile versus instrumental aggression dichotomy? *Psychological Review*, 108(1), 273-279. doi:10.1037/0033-295X.108.1.273
- Busuttil, W. (2004). Presentations and management of post traumatic stress disorder and the elderly: a need for investigation. *International Journal of Geriatric Psychiatry*, 19(5), 429-439.
- Byrne, B. M. (2004). Testing for multigroup invariance using AMOS graphics: A road less traveled. *Structural equation modeling*, 11(2), 272-300.

- Campbell, S. B., & Renshaw, K. D. (2013). PTSD symptoms, disclosure, and relationship distress: Explorations of mediation and associations over time. *Journal of Anxiety Disorders, 27*(5), 494-502. doi:<https://doi.org/10.1016/j.janxdis.2013.06.007>
- Carlson, E. B., Lauderdale, S., Hawkins, J., & Sheikh, J. I. (2008). Posttraumatic stress and aggression among veterans in long-term care. *Journal of Geriatric Psychiatry and Neurology, 21*(1), 61-71.
- Carroll, E. M., Rueger, D. B., Foy, D. W., & Donahoe, C. P. (1985). Vietnam combat veterans with posttraumatic stress disorder: analysis of marital and cohabitating adjustment. *Journal of Abnormal Psychology, 94*(3), 329.
- Caspi, E. (2013). Time for change: persons with dementia and "behavioral expressions," not "behavior symptoms". *Journal of the American Medical Directors Association, 14*(10), 768-769. doi:10.1016/j.jamda.2013.05.019
- Center for medicare and medicaid services. (2018). Annual wellness visit. Retrieved from https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/awv_chart_icn905706.pdf
- Cerejeira, J., Lagarto, L., & Mukaetova-Ladinska, E. B. (2012). Behavioral and psychological symptoms of dementia. *Frontiers in Neurology, 3*, 73-73. doi:10.3389/fneur.2012.00073
- Chappell, N. L., & Penning, M. (1996). Behavioural problems and distress among caregivers of people with dementia. *Ageing & Society, 16*(1), 57-73.
- Chen, J. A., Owens, M. D., Browne, K. C., & Williams, E. C. (2018). Alcohol-related and mental health care for patients with unhealthy alcohol use and posttraumatic stress disorder in a National Veterans Affairs cohort. *Journal of Substance Abuse Treatment, 85*, 1-9. doi:10.1016/j.jsat.2017.11.007
- Choi, S. S. W., Budhathoki, C., & Gitlin, L. N. (2017). Co-Occurrence and Predictors of Three Commonly Occurring Behavioral Symptoms in Dementia: Agitation, Aggression, and Rejection of Care. *American Journal of Geriatric Psychiatry, 25*(5), 459-468. doi:10.1016/j.jagp.2016.10.013
- Cipriani, G., Vedovello, M., Nuti, A., & Di Fiorino, M. (2011). Aggressive behavior in patients with dementia: correlates and management. *Geriatric & Gerontology International, 11*(4), 408-413. doi:10.1111/j.1447-0594.2011.00730.x

- Clark, G., Rouse, S., Spangler, H., & Moye, J. (2018). Providing Mental Health Care for the Complex Older Veteran: Implications for Social Work Practice. *Health Soc Work, 43*(1), 7-14. doi:10.1093/hsw/hlx046
- Clyburn, L. D., Stones, M. J., Hadjistavropoulos, T., & Tuokko, H. (2000). Predicting caregiver burden and depression in Alzheimer's disease. *Journals Of Gerontology Series B, 55*(1), S2-S13.
- Cohen-Mansfield, J. (1991). Instruction manual for the Cohen-Mansfield Agitation Inventory (CMAI) Retrieved January, 12, 2010, from [https://www.pdx.edu/ioa/sites/www.pdx.edu.ioa/files/CMAI_Manual%20\(1\).pdf](https://www.pdx.edu/ioa/sites/www.pdx.edu.ioa/files/CMAI_Manual%20(1).pdf)
- Cohen-Mansfield, J. (2000). Theoretical Frameworks for Behavioral Problems in Dementia. *Alzheimer's Care Today, 1*(4), 8‐21.
- Cohen-Mansfield, J. (2001). Nonpharmacologic interventions for inappropriate behaviors in dementia: a review, summary, and critique. *American Journal of Geriatric Psychiatry, 9*(4), 361-381.
- Cohen-Mansfield, J., Dakheel-Ali, M., Marx, M. S., Thein, K., & Regier, N. G. (2015). Which unmet needs contribute to behavior problems in persons with advanced dementia? *Psychiatry Research, 228*(1), 59-64. doi:10.1016/j.psychres.2015.03.043
- Cohen-Mansfield, J., Marx, M. S., & Rosenthal, A. S. (1989). A description of agitation in a nursing home. *Journal of Gerontology, 44*(3), M77-84.
- Colello, K. J., & Panangala, S. V. (2016). *Long-Term Care Services for Veterans*. Retrieved from <https://www.hSDL.org/?view&did=797216>
- Cook, J. M., Elhai, J. D., Cassidy, E. L., Ruzek, J. I., Ram, G. D., & Sheikh, J. I. (2005). Assessment of trauma exposure and post-traumatic stress in long-term care veterans: preliminary data on psychometrics and post-traumatic stress disorder prevalence. *Military Medicine, 170*(10), 862-866.
- Cook, J. M., & Niederehe, G. (2007). Trauma in older adults. *Handbook of PTSD: Science and practice, 252-276*.
- Cook, J. M., Ruzek, J. I., & Cassidy, E. (2003). Practical geriatrics: possible association of posttraumatic stress disorder with cognitive impairment among older adults. *Psychiatric Services, 54*(9), 1223-1225.

- Crabtree, B. F., & Miller, W. F. (1992). A template approach to text analysis: Developing and using codebooks. In B. F. Crabtree & W. L. Miller (Eds.), *Research methods for primary care, Vol. 3. Doing qualitative research* (p. 93–109). Sage Publications, Inc.
- Creamer, M., Burgess, P., & McFarlane, A. (2001). Post-traumatic stress disorder: findings from the Australian National Survey of Mental Health and Well-being. *Psychological medicine, 31*(07), 1237-1247.
- Cummings, J., Mintzer, J., Brodaty, H., Sano, M., Banerjee, S., Devanand, D. P., . . . Zhong, K. (2015). Agitation in cognitive disorders: International Psychogeriatric Association provisional consensus clinical and research definition. *International Psychogeriatrics, 27*(1), 7-17. doi:10.1017/s1041610214001963
- Curyto, K. J., McCurry, S. M., Luci, K., Karlin, B. E., Teri, L., & Karel, M. J. (2017). Managing Challenging Behaviors of Dementia in Veterans: Identifying and Changing Activators and Consequences Using STAR-VA. *Journal of Gerontological Nursing, 43*(2), 33-43. doi:10.3928/00989134-20160930-01
- Davidson, J. R., Hughes, D., Blazer, D. G., & George, L. K. (1991). Post-traumatic stress disorder in the community: an epidemiological study. *Psychological medicine, 21*(03), 713-721.
- Davidson, J. R., Kudler, H. S., Saunders, W. B., & Smith, R. D. (1990). Symptom and comorbidity patterns in World War II and Vietnam veterans with posttraumatic stress disorder. *Comprehensive Psychiatry, 31*(2), 162-170.
- Davis, D. H. (2004). Dementia: sociological and philosophical constructions. *Social Science and Medicine, 58*(2), 369-378.
- Davison, E. H., Pless, A. P., Gugliucci, M. R., King, L. A., King, D. W., Salgado, D. M., . . . Bachrach, P. (2006). Late-life emergence of early-life trauma the phenomenon of late-onset stress symptomatology among aging combat veterans. *Research on Aging, 28*(1), 84-114.
- de Jonghe-Rouleau, A. P., Pot, A. M., & de Jonghe, J. F. (2005). Self-injurious behaviour in nursing home residents with dementia. *International Journal of Geriatric Psychiatry, 20*(7), 651-657. doi:10.1002/gps.1337
- de Vugt, M. E., Stevens, F., Aalten, P., Lousberg, R., Jaspers, N., & Verhey, F. R. (2005). A prospective study of the effects of behavioral symptoms on the

- institutionalization of patients with dementia. *International Psychogeriatrics*, 17(4), 577-589. doi:10.1017/s1041610205002292
- Desmarais, P., Weidman, D., Wassef, A., Bruneau, M.-A., Friedland, J., Bajsarowicz, P., . . . Nguyen, Q. D. (2020). The interplay between post-traumatic stress disorder and dementia: a systematic review. *The American Journal of Geriatric Psychiatry*, 28(1), 48-60.
- Dewing, J. (2008). Personhood and dementia: revisiting Tom Kitwood's ideas. *International Journal of Older People Nursing*, 3(1), 3-13. doi:10.1111/j.1748-3743.2007.00103.x
- Diniz, B. S., Butters, M. A., Albert, S. M., Dew, M. A., & Reynolds, C. F., 3rd. (2013). Late-life depression and risk of vascular dementia and Alzheimer's disease: systematic review and meta-analysis of community-based cohort studies. *The British Journal of Psychiatry*, 202(5), 329-335. doi:10.1192/bjp.bp.112.118307
- Dinnen, S., Kane, V., & Cook, J. M. (2014). Trauma-informed care: A paradigm shift needed for services with homeless veterans. *Professional case management*, 19(4), 161-170.
- Dinnen, S., Simiola, V., & Cook, J. M. (2015). Post-traumatic stress disorder in older adults: a systematic review of the psychotherapy treatment literature. *Ageing & mental health*, 19(2), 144-150.
- Dohrenwend, B. P., Turner, J. B., Turse, N. A., Adams, B. G., Koenen, K. C., & Marshall, R. (2006). The psychological risks of Vietnam for U.S. veterans: a revisit with new data and methods. *Science (New York, N.Y.)*, 313(5789), 979-982. doi:10.1126/science.1128944
- Downs, M. (1997). The Emergence of the Person in Dementia Research. *Ageing and Society*, 17(5), 597-607. doi:undefined
- Dupuis, S. L., Wiersma, E., & Loiselle, L. (2012). Pathologizing behavior: Meanings of behaviors in dementia care. *Journal of Aging Studies*, 26(2), 162-173. doi:https://doi.org/10.1016/j.jaging.2011.12.001
- Efron, B., & Tibshirani, R. (1993). *An introduction to the bootstrap*: New York : Chapman & Hall, c1993.

- Elder Jr, G. H., & Clipp, E. C. (1988). Combat experience, comradeship, and psychological health. In *Human adaptation to extreme stress* (pp. 131-156). Boston, MA: Springer.
- Eustace, A., Kidd, N., Greene, E., Fallon, C., Bhraïn, S. N., Cunningham, C., . . . Lawlor, B. (2001). Verbal aggression in Alzheimer's disease. Clinical, functional and neuropsychological correlates. *International Journal of Geriatric Psychiatry, 16*(9), 858-861.
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods, 5*(1), 80-92.
- Flanagan, J. C., Teer, A., Beylotte, F. M., Killeen, T. K., & Back, S. E. (2014). Correlates of Recent and Lifetime Aggression among Veterans with Co-Occurring PTSD and Substance Use Disorders. *Mental health and substance use: dual diagnosis, 7*(4), 315.
- Gale, N. K., Heath, G., Cameron, E., Rashid, S., & Redwood, S. (2013). Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Medical Research Methodology, 13*(1), 117. doi:10.1186/1471-2288-13-117
- Galindo-Garre, F., Volicer, L., & van der Steen, J. T. (2015). Factors Related to Rejection of Care and Behaviors Directed towards Others: A Longitudinal Study in Nursing Home Residents with Dementia. *Dementia and Geriatric Cognitive Disorders Extra, 5*(1), 123-134. doi:10.1159/000369158
- Garrard, J. (2014). *Health sciences literature review made easy: the matrix method*. Burlington, MA: Jones & Bartlett Learning.
- George, L., Clipp, E., Elder, J., GH, & Pieper, C. (1998). Trajectories of Health in Aging Populations. In W. Gesler, D. Rabiner, & G. DeFrieze (Eds.), *Rural Health and Aging Research: Theory, Methods and Practical Applications*. Amityville, New York Baywood Publishing.
- Gitlin, L. N., Winter, L., Vause Earland, T., Adel Herge, E., Chernett, N. L., Piersol, C. V., & Burke, J. P. (2009). The Tailored Activity Program to Reduce Behavioral Symptoms in Individuals With Dementia: Feasibility, Acceptability, and Replication Potential. *The Gerontologist, 49*(3), 428-439. doi:10.1093/geront/gnp087

- Greenberg, M. S., Tanev, K., Marin, M. F., & Pitman, R. K. (2014). Stress, PTSD, and dementia. *Alzheimers Dement*, 10(3 Suppl), S155-165. doi:10.1016/j.jalz.2014.04.008
- Gros, D. F., Flanagan, J. C., Korte, K. J., Mills, A. C., Brady, K. T., & Back, S. E. (2016). Relations among social support, PTSD symptoms, and substance use in veterans. *Psychology of Addictive Behaviors*, 30(7), 764-770. doi:10.1037/adb0000205
- Gum, A. M., King-Kallimanis, B., & Kohn, R. (2009). Prevalence of mood, anxiety, and substance-abuse disorders for older Americans in the national comorbidity survey-replication. *American Journal of Geriatric Psychiatry*, 17(9), 769-781. doi:10.1097/JGP.0b013e3181ad4f5a
- Hall, G. R., & Buckwalter, K. C. (1987). Progressively lowered stress threshold: a conceptual model for care of adults with Alzheimer's disease. *Archives of Psychiatric Nursing*, 1(6), 399-406.
- Hart, D. J., Craig, D., Compton, S. A., Critchlow, S., Kerrigan, B. M., McIlroy, S. P., & Passmore, A. P. (2003). A retrospective study of the behavioural and psychological symptoms of mid and late phase Alzheimer's disease. *International Journal of Geriatric Psychiatry*, 18(11), 1037-1042. doi:10.1002/gps.1013
- Hart, J., Jr., Kimbrell, T., Fauver, P., Cherry, B. J., Pitcock, J., Booe, L. Q., . . . Freeman, T. W. (2008). Cognitive dysfunctions associated with PTSD: evidence from World War II prisoners of war. *Journal of Neuropsychiatry and Clinical Neurosciences*, 20(3), 309-316. doi:10.1176/appi.neuropsych.20.3.309
- Hebert, L. E., Weuve, J., Scherr, P. A., & Evans, D. A. (2013). Alzheimer disease in the United States (2010-2050) estimated using the 2010 census. *Neurology*, 80(19), 1778-1783. doi:10.1212/WNL.0b013e31828726f5
- Hegel, M. T., Unützer, J., Tang, L., Areán, P. A., Katon, W., Noël, P. H., . . . Lin, E. H. (2005). Impact of comorbid panic and posttraumatic stress disorder on outcomes of collaborative care for late-life depression in primary care. *The American Journal of Geriatric Psychiatry*, 13(1), 48-58.
- Henly, S. J., Wyman, J. F., & Findorff, M. J. (2011). Health and Illness Over Time: The Trajectory Perspective in Nursing Science. *Nursing research*, 60(3 Suppl), S5-S14. doi:10.1097/NNR.0b013e318216dfd3
- Herrmann, N., Lanctot, K. L., Sambrook, R., Lesnikova, N., Hebert, R., McCracken, P., . . . Nguyen, E. (2006). The contribution of neuropsychiatric symptoms to the cost of

dementia care. *International Journal of Geriatric Psychiatry*, 21(10), 972-976.
doi:10.1002/gps.1594

Hovens, J. E., Op den Velde, W., Falger, P. R., Schouten, E. G., De Groen, J. H., & Van Duijn, H. (1992). Anxiety, depression and anger in Dutch Resistance veterans from World War II. *Psychother Psychosom*, 57(4), 172-179.

Hsieh, H.-F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, 15(9), 1277-1288.

Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, 6(1), 1-55.

Hyer, L., Stanger, E., & Boudewyns, P. (1999). The interaction of posttraumatic stress disorder and depression among older combat veterans. *Journal of Clinical Psychology*, 55(9), 1073-1083.

IBM Corp. (2019). IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.

Ikin, J. F., Creamer, M. C., Sim, M. R., & McKenzie, D. P. (2010). Comorbidity of PTSD and depression in Korean War veterans: prevalence, predictors, and impairment. *Journal of Affective Disorder*, 125(1-3), 279-286. doi:10.1016/j.jad.2009.12.005

Ishii, S., Streim, J. E., & Saliba, D. (2012). A conceptual framework for rejection of care behaviors: review of literature and analysis of role of dementia severity. *Journal of the American Medical Directors Association*, 13(1), 11-23.e11-12.
doi:10.1016/j.jamda.2010.11.004

Kales, H. C., Gitlin, L. N., & Lyketsos, C. G. (2014). Management of neuropsychiatric symptoms of dementia in clinical settings: recommendations from a multidisciplinary expert panel. *Journal of the American Geriatrics Society*, 62(4), 762-769. doi:10.1111/jgs.12730

Kales, H. C., Gitlin, L. N., & Lyketsos, C. G. (2015). Assessment and management of behavioral and psychological symptoms of dementia. *BMJ*, 350, h369.
doi:10.1136/bmj.h369

Kang, H. K., Natelson, B. H., Mahan, C. M., Lee, K. Y., & Murphy, F. M. (2003). Post-traumatic stress disorder and chronic fatigue syndrome-like illness among gulf

- war veterans: A population-based survey of 30,000 veterans. *American Journal of Epidemiology*, 157(2), 141-148. doi:10.1093/aje/kwf187
- Karel, M. J., Teri, L., McConnell, E., Visnic, S., & Karlin, B. E. (2015). Effectiveness of Expanded Implementation of STAR-VA for Managing Dementia-Related Behaviors Among Veterans. *The Gerontologist*. doi:10.1093/geront/gnv068
- Karel, M. J., Teri, L., McConnell, E., Visnic, S., & Karlin, B. E. (2016). Effectiveness of expanded implementation of STAR-VA for managing dementia-related behaviors among veterans. *The Gerontologist*, 56(1), 126-134.
- Karl, A., Schaefer, M., Malta, L. S., Dorfel, D., Rohleder, N., & Werner, A. (2006). A meta-analysis of structural brain abnormalities in PTSD. *Neuroscience & Biobehavioral Reviews*, 30(7), 1004-1031. doi:10.1016/j.neubiorev.2006.03.004
- Karlin, B. E., Teri, L., McGee, J. S., Sutherland, E. S., Asghar-Ali, A., Crocker, S. M., Smith, T. L., Curyto, K., Drexler, M., & Karel, M. J. . (2017). *STAR-VA Intervention for Managing Challenging Behaviors in VA Community Living Center Residents with Dementia: Manual for STAR-VA Behavioral Coordinators and Nurse Champions*. Washington, DC: US. Retrieved from https://www.mentalhealth.va.gov/healthcare-providers/docs/STAR-VA_Manual.pdf
- Karlin, B. E., Visnic, S., McGee, J. S., & Teri, L. (2014). Results from the multisite implementation of STAR-VA: a multicomponent psychosocial intervention for managing challenging dementia-related behaviors of veterans. *Psychological Services*, 11(2), 200-208. doi:10.1037/a0033683
- Katzman, R., Brown, T., Fuld, P., Peck, A., Schechter, R., & Schimmel, H. (1983). Validation of a short Orientation-Memory-Concentration Test of cognitive impairment. *American Journal of Psychiatry*, 140(6), 734-739. doi:10.1176/ajp.140.6.734
- Keane, T. M., Fairbank, J. A., Caddell, J. M., Zimering, R. T., Taylor, K. L., & Mora, C. A. (1989). Clinical evaluation of a measure to assess combat exposure. *Psychological Assessment: A Journal of Consulting and Clinical Psychology*, 1(1), 53.
- Keane, T. M., Scott, W. O., Chavoya, G. A., Lamparski, D. M., & Fairbank, J. A. (1985). Social support in Vietnam veterans with posttraumatic stress disorder: a comparative analysis. *Journal of Consulting and Clinical Psychology*, 53(1), 95.

- Kessler, R. C., Sonnega, A., Bromet, E., Hughes, M., & Nelson, C. B. (1995). Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of general psychiatry*, 52(12), 1048-1060.
- Kidson, M. A., Douglas, J. C., & Holwill, B. J. (1993). Post-traumatic stress disorder in Australian World War II veterans attending a psychiatric outpatient clinic. *Medical Journal of Australia*, 158(8), 563-566.
- Kilbourne, A. M., Haas, G. L., Mulsant, B. H., Bauer, M. S., & Pincus, H. A. (2004). Concurrent psychiatric diagnoses by age and race among persons with bipolar disorder. *Psychiatric Services*, 55(8), 931-933. doi:10.1176/appi.ps.55.8.931
- King, P. R., Vair, C. L., Wade, M., Gass, J., Wray, L. O., Kusche, A., . . . Chang, J. (2015). Outpatient health care utilization in a sample of cognitively impaired veterans receiving care in VHA geriatric evaluation and management clinics. *Psychological Services*, 12(1), 66-72. doi:10.1037/ser0000015
- Kitwood, T. (1990). The Dialectics of Dementia - With Particular Reference to Alzheimer's Disease. *Ageing and Society*, 10(2), 177.
- Kitwood, T. (1997a). *Dementia reconsidered : the person comes first*. Buckingham [England] ; Philadelphia: Open University Press.
- Kitwood, T. (1997b). The experience of dementia. *Aging & Mental Health*, 1(1), 13-22.
- Koenen, K. C., Stellman, S. D., Sommer, J. F., Jr., & Stellman, J. M. (2008). Persisting posttraumatic stress disorder symptoms and their relationship to functioning in Vietnam veterans: a 14-year follow-up. *Journal of Traumatic Stress*, 21(1), 49-57. doi:10.1002/jts.20304
- Kogan, A. C., Wilber, K., & Mosqueda, L. (2016). Person-Centered Care for Older Adults with Chronic Conditions and Functional Impairment: A Systematic Literature Review. *Journal of the American Geriatrics Society*, 64(1).
- Kolanowski, A. (1999). An overview of the need-driven dementia-compromised behavior model. *Journal of Gerontological Nursing*, 25(9), 7-9.
- Kolanowski, A., Boltz, M., Galik, E., Gitlin, L. N., Kales, H. C., Resnick, B., . . . Scerpella, D. (2017). Determinants of behavioral and psychological symptoms of dementia: A scoping review of the evidence. *Nursing Outlook*, 65(5), 515-529. doi:10.1016/j.outlook.2017.06.006

- Kolanowski, A., Litaker, M., & Buettner, L. (2005). Efficacy of Theory-Based Activities for Behavioral Symptoms of Dementia. *Nursing Research, 54*(4), 219-228.
- Konno, R., Kang, H. S., & Makimoto, K. (2014). A best-evidence review of intervention studies for minimizing resistance-to-care behaviours for older adults with dementia in nursing homes. *Journal of Advanced Nursing, 70*(10), 2167-2180. doi:10.1111/jan.12432
- Koren, M. J. (2010). Person-centered care for nursing home residents: The culture-change movement. *Health Affairs, 29*(2), 312-317.
- Kunik, M. E., Martinez, M., Snow, A. L., Beck, C. K., Cody, M., Rapp, C. G., . . . Hamilton, J. D. (2003). Determinants of behavioral symptoms in dementia patients. *Clinical Gerontologist, 26*(3-4), 83-89.
- Kunik, M. E., Snow, A. L., Davila, J. A., McNeese, T., Steele, A. B., Balasubramanyam, V., . . . Morgan, R. O. (2010). Consequences of aggressive behavior in patients with dementia. *Journal of Neuropsychiatry and Clinical Neurosciences, 22*(1), 40-47. doi:10.1176/appi.neuropsych.22.1.40
- Kunik, M. E., Snow, A. L., Davila, J. A., Steele, A. B., Balasubramanyam, V., Doody, R. S., . . . Morgan, R. O. (2010). Causes of aggressive behavior in patients with dementia. *The Journal of Clinical Psychiatry, 71*(9), 1145-1152. doi:10.4088/JCP.08m04703oli
- Langan, J., Mercer, S. W., & Smith, D. J. (2013). Multimorbidity and mental health: can psychiatry rise to the challenge? *British Journal of Psychiatry, 202*, 391-393. doi:10.1192/bjp.bp.112.123943
- Lapp, L. K., Agbokou, C., & Ferreri, F. (2011). PTSD in the elderly: the interaction between trauma and aging. *International Psychogeriatrics, 23*(6), 858-868.
- Lawlor, B. (2002). Managing behavioural and psychological symptoms in dementia. *British Journal of Psychiatry, 181*, 463-465.
- LeadingAge Maryland. (2019). Implementing Trauma-Informed Care: A Guidebook. Retrieved February 09, 2020, from LeadingAge Maryland <https://www.leadingage.org/sites/default/files/RFA%20Guidebook.pdf>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry* (Vol. 75): Sage.

- Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American statistical Association*, 83(404), 1198-1202.
- Lu, M. W., Carlson, K. F., Duckart, J. P., & Dobscha, S. K. (2012). The effects of age on initiation of mental health treatment after positive PTSD screens among Veterans Affairs primary care patients. *General Hospital Psychiatry*, 34(6), 654-659. doi:10.1016/j.genhosppsych.2012.07.002
- Lupien, S. J., de Leon, M., de Santi, S., Convit, A., Tarshish, C., Nair, N. P., . . . Meaney, M. J. (1998). Cortisol levels during human aging predict hippocampal atrophy and memory deficits. *Nat Neurosciences*, 1(1), 69-73. doi:10.1038/271
- Lyketsos, C. G. (2007). Neuropsychiatric symptoms (behavioral and psychological symptoms of dementia) and the development of dementia treatments. *International Psychogeriatrics*, 19(3), 409-420. doi:10.1017/S104161020700484X
- Lyketsos, C. G., Carrillo, M. C., Ryan, J. M., Khachaturian, A. S., Trzepacz, P., Amatniek, J., . . . Miller, D. S. (2011). Neuropsychiatric symptoms in Alzheimer's disease. *Alzheimer's & Dementia*, 7(5), 532-539. doi:10.1016/j.jalz.2011.05.2410
- Lyketsos, C. G., Steele, C., Galik, E., Rosenblatt, A., Steinberg, M., Warren, A., & Sheppard, J.-M. (1999). Physical aggression in dementia patients and its relationship to depression. *American Journal of Psychiatry*, 156(1), 66-71.
- Macaulay, S. (2018). The Broken Lens of BPSD: Why We Need to Rethink the Way We Label the Behavior of People Who Live With Alzheimer Disease. *Journal of the American Medical Directors Association*, 19(2), 177-180. doi:10.1016/j.jamda.2017.11.009
- MacCallum, R. C. (1995). Model specification: Procedures, strategies, and related issues. In R. Hoyle (Ed.), *Structural equation modeling: Concepts, issues, and applications*. (pp. 16-36). Thousand Oaks, CA, US: Sage Publications, Inc.
- MacLean, A., & Elder Jr, G. H. (2007). Military service in the life course. *Sociology*, 33(1), 175.
- Magruder, K. M., & Yeager, D. E. (2009). The prevalence of PTSD across war eras and the effect of deployment on PTSD: A systematic review and meta-analysis. *Psychiatric Annals*, 39(8), 778-788. doi:10.3928/00485713-20090728-04

- Mahoney, E. K., Hurley, A. C., Volicer, L., Bell, M., Gianotis, P., Hartshorn, M., . . . Warden, V. (1999). Development and testing of the Resistiveness to Care Scale. *Research in Nursing and Health*, 22(1), 27-38.
- Majic, T., Pluta, J. P., Mell, T., Treusch, Y., Gutzmann, H., & Rapp, M. A. (2012). Correlates of agitation and depression in nursing home residents with dementia. *International Psychogeriatrics*, 24(11), 1779-1789. doi:10.1017/s104161021200066x
- Malloy, D. C., & Hadjistavropoulos, T. (2004). The problem of pain management among persons with dementia, personhood, and the ontology of relationships. *Nursing Philosophy*, 5(2), 147-159.
- Marmar, C. R., Schlenger, W., Henn-Haase, C., Qian, M., Purchia, E., Li, M., . . . Kulka, R. A. (2015). Course of Posttraumatic Stress Disorder 40 Years After the Vietnam War: Findings From the National Vietnam Veterans Longitudinal Study. *JAMA Psychiatry*, 72(9), 875-881. doi:10.1001/jamapsychiatry.2015.0803
- Mawanda, F., Wallace, R. B., McCoy, K., & Abrams, T. E. (2017). PTSD, Psychotropic Medication Use, and the Risk of Dementia Among US Veterans: A Retrospective Cohort Study. *Journal of the American Geriatrics Society*, 65(5), 1043-1050. doi:10.1111/jgs.14756
- McLeod, D. S., Koenen, K. C., Meyer, J. M., Lyons, M. J., Eisen, S., True, W., & Goldberg, J. (2001). Genetic and environmental influences on the relationship among combat exposure, posttraumatic stress disorder symptoms, and alcohol use. *Journal of Traumatic Stress*, 14(2), 259-275. doi:10.1023/a:1011157800050
- Meiran, N., Stuss, D. T., Guzman, D. A., Lafleche, G., & Willmer, J. (1996). Diagnosis of dementia. Methods for interpretation of scores of 5 neuropsychological tests. *Archives of Neurology*, 53(10), 1043-1054. doi:10.1001/archneur.1996.00550100129022
- Mery, G., Wodchis, W. P., Bierman, A. S., & Laberge, M. (2013). Caring for people with multiple chronic conditions: a necessary intervention in ontario Vol 2. https://tspace.library.utoronto.ca/bitstream/1807/87372/1/Mery%20et%20al_2013_Caring%20for%20People%20with%20Multiple.pdf
- Meziab, O., Kirby, K. A., Williams, B., Yaffe, K., Byers, A. L., & Barnes, D. E. (2014). Prisoner of war status, posttraumatic stress disorder, and dementia in older veterans. *Alzheimers Dement*, 10(3 Suppl), S236-241. doi:10.1016/j.jalz.2014.04.004

- Middleton, J. I., Stewart, N. J., & Richardson, J. S. (1999). Caregiver distress. Related to disruptive behaviors on special care units versus traditional long-term care units. *Journal of Gerontological Nursing, 25*(3), 11-19.
- Miller, J. D., & Lynam, D. R. (2006). Reactive and proactive aggression: Similarities and differences. *Personality and Individual Differences, 41*(8), 1469-1480.
doi:<https://doi.org/10.1016/j.paid.2006.06.004>
- Mitchell, G., & Agnelli, J. (2015). Person-centred care for people with dementia: Kitwood reconsidered. *Nursing Standard (2014+), 30*(7), 46.
doi:<http://dx.doi.org/10.7748/ns.30.7.46.s47>
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ, 339*.
doi:10.1136/bmj.b2535
- Mojtabai, R. (2007). Americans' attitudes toward mental health treatment seeking: 1990-2003. *Psychiatr Serv, 58*(5), 642-651. doi:10.1176/ps.2007.58.5.642
- Morgan, R. O., Sail, K. R., Snow, A. L., Davila, J. A., Fouladi, N. N., & Kunik, M. E. (2012). Modeling Causes of Aggressive Behavior in Patients With Dementia. *The Gerontologist, 53*(5), 738-747. doi:10.1093/geront/gns129
- Morgan, R. O., Sail, K. R., Snow, A. L., Davila, J. A., Fouladi, N. N., & Kunik, M. E. (2013). Modeling causes of aggressive behavior in patients with dementia. *The Gerontologist, 53*(5), 738-747.
- Moye, J. (1997). PTSD in Long Term Care. *Clinical gerontologist, 18*(2), 84-88.
- Moye, J., & Rouse, S. J. (2014). Posttraumatic Stress in Older Adults: When Medical Diagnoses or Treatments Cause Traumatic Stress. *Clinics in geriatric medicine, 30*(3), 577-589. doi:10.1016/j.cger.2014.04.006
- Moyle, W., Murfield, J. E., O'Dwyer, S., & Van Wyk, S. (2013). The effect of massage on agitated behaviours in older people with dementia: a literature review. *Journal of Clinical Nursing, 22*(5-6), 601-610.
- National Center for Veterans Analysis and Statistics. (2018). Profile of Veterans: 2016 Retrieved from https://www.va.gov/vetdata/docs/SpecialReports/Profile_of_Veterans_2016.pdf

- National Institute of Health. (2014). Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. Retrieved from <https://www.nhlbi.nih.gov/health-pro/guidelines/in-develop/cardiovascular-risk-reduction/tools/cohort>
- National Quality Forum. (2012). Multiple Chronic Conditions Measurement Framework. Retrieved from http://www.qualityforum.org/Projects/Multiple_Chronic_Conditions_Measurement_Framework.aspx
- Nijk, R. M., Zuidema, S. U., & Koopmans, R. T. (2009). Prevalence and correlates of psychotropic drug use in Dutch nursing-home patients with dementia. *International Psychogeriatrics, 21*(3), 485-493. doi:10.1017/s1041610209008916
- North, C. S., Suris, A. M., Smith, R. P., & King, R. V. (2016). The evolution of PTSD criteria across editions of DSM. *Annals of Clinical Psychiatry, 28*(3), 197-208.
- O'Brien, J. A., & Caro, J. J. (2001). Alzheimer's disease and other dementia in nursing homes: levels of management and cost. *International Psychogeriatrics, 13*(03), 347-358.
- O'Toole, B. I., & Catts, S. V. (2017). The Course and Correlates of Combat-Related PTSD in Australian Vietnam Veterans in the Three Decades After the War. *Journal of Traumatic Stress, 30*(1), 27-35. doi:10.1002/jts.22160
- Onwuegbuzie, A. J., & Teddlie, C. (2003). A framework for analyzing data in mixed methods research. *Handbook of mixed methods in social and behavioral research, 2*, 397-430.
- Osei-Boamah, E., Pilkins, B. J., & Gambert, S. R. (2013). Prevention and screening of post-traumatic stress disorder in older adults. *Clinical Geriatrics, 21*(7).
- Park, C. L., Aldwin, C. M., Fenster, J. R., & Snyder, L. B. (2008). Pathways to posttraumatic growth versus posttraumatic stress: coping and emotional reactions following the September 11, 2001, terrorist attacks. *American Journal of Orthopsychiatry, 78*(3), 300-312. doi:10.1037/a0014054
- Park, C. L., Kaiser, A. P., Spiro, A., 3rd, King, D. W., & King, L. A. (2012). Does Wartime Captivity Affect Late-life Mental Health? A Study of Vietnam-era Repatriated Prisoners of War. *Research in Human Development, 9*(3), 191-209. doi:10.1080/15427609.2012.705554

- Paschali, M., Kamp, D., Reichmann, C., Jaenner, M., Lange-Asschenfeldt, C., & Supprian, T. (2018). A systematic evaluation of impulsive-aggressive behavior in psychogeriatric inpatients using the staff observation aggression scale-revision (SOAS-R). *International Psychogeriatrics*, 30(1), 61-68. doi:10.1017/s1041610217001600
- Patton, M. Q. (1990). *Qualitative evaluation and research methods (2nd ed.)*. Newbury Park, CA: SAGE Publications, inc.
- Penrod, J., Yu, F., Kolanowski, A., Fick, D. M., Loeb, S. J., & Hupcey, J. E. (2007). Reframing person-centered nursing care for persons with dementia. *Research and Theory for Nursing Practice*, 21(1), 57-72. doi:10.1891/rtnpij-v21i1a007
- Pietrzak, R. H., Goldstein, R. B., Southwick, S. M., & Grant, B. F. (2011). Prevalence and Axis I comorbidity of full and partial posttraumatic stress disorder in the United States: Results from Wave 2 of the National Epidemiologic Survey on Alcohol and Related Conditions. *Journal of Anxiety Disorders*, 25(3), 456-465. doi:https://doi.org/10.1016/j.janxdis.2010.11.010
- Pope, C., Ziebland, S., & Mays, N. (2000). Qualitative research in health care. Analysing qualitative data. *BMJ*, 320(7227), 114-116.
- Potts, H. W., Richie, M. F., & Kaas, M. J. (1996). Resistance to care. *Journal of Gerontological Nursing*, 22(11), 11-16.
- Prince, M., Wimo, A., Guerchet, M., Ali, G., Wu, Y., & Prina, M. (2015). World Alzheimer Report 2015. The Global Impact of Dementia: An analysis of prevalence, incidence, cost and trends. Retrieved February 09, 2020, from Alzheimer's Disease International, <https://www.alz.co.uk/research/WorldAlzheimerReport2015.pdf>
- QSR International. (2015). NVivo qualitative data analysis Software, Version 11: QSR International Pty Ltd. Retrieved from <http://www.qsrinternational.com/nvivo/what-is-nvivo>
- Qureshi, S. U., Kimbrell, T., Pyne, J. M., Magruder, K. M., Hudson, T. J., Petersen, N. J., . . . Kunik, M. E. (2010a). Greater prevalence and incidence of dementia in older veterans with posttraumatic stress disorder. *Journal of American Geriatric Society*, 58(9), 1627-1633. doi:10.1111/j.1532-5415.2010.02977.x

- Qureshi, S. U., Kimbrell, T., Pyne, J. M., Magruder, K. M., Hudson, T. J., Petersen, N. J., . . . Kunik, M. E. (2010b). Greater Prevalence and Incidence of Dementia in Older Veterans with Posttraumatic Stress Disorder: [See editorial comments by Dr. Soo Borson, pp 1797-1798]. *Journal of the American Geriatrics Society*, 58(9), 1627-1633.
- Reisberg, B. (1988). Functional assessment staging (FAST). *Psychopharmacology Bulletin*, 24(4), 653-659.
- Reus, V. I., Fochtmann, L. J., Eyler, A. E., Hilty, D. M., Horvitz-Lennon, M., Jibson, M. D., . . . Yager, J. (2016). The American Psychiatric Association Practice Guideline on the Use of Antipsychotics to Treat Agitation or Psychosis in Patients With Dementia. *American Journal of Psychiatry*, 173(5), 543-546.
doi:10.1176/appi.ajp.2015.173501
- Reynolds, K., Pietrzak, R. H., El-Gabalawy, R., Mackenzie, C. S., & Sareen, J. (2015). Prevalence of psychiatric disorders in U.S. older adults: findings from a nationally representative survey. *World Psychiatry*, 14(1), 74-81.
doi:10.1002/wps.20193
- Richiardi, L., Bellocco, R., & Zugna, D. (2013). Mediation analysis in epidemiology: methods, interpretation and bias. *International Journal of Epidemiology*, 42(5), 1511-1519. doi:10.1093/ije/dyt127
- Rijken, M., Struckmann, V., van der Heide, I., Hujala, A., Barbabella, F., van Ginneken, E., & Schellevis, F. (2017). *European Observatory Policy Briefs*. In Vol. Policy Brief, No. 23. E. Richardson & E. Van Ginneken (Eds.), *How to improve care for people with multimorbidity in Europe?* Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK464548/>
- Roughead, E. E., Pratt, N. L., Kalisch Ellett, L. M., Ramsay, E. N., Barratt, J. D., Morris, P., & Killer, G. (2017). Posttraumatic Stress Disorder, Antipsychotic Use and Risk of Dementia in Veterans. *Journal of American Geriatric Society*, 65(7), 1521-1526.
doi:10.1111/jgs.14837
- Ryden, M. B. (1988). Aggressive behavior in persons with dementia who live in the community. *Alzheimer Disease and Associated Disorders*, 2(4), 342-355.
- Sajatovic, M., Blow, F. C., & Ignacio, R. V. (2006). Psychiatric comorbidity in older adults with bipolar disorder. *International Journal of Geriatric Psychiatry*, 21(6), 582-587.
doi:10.1002/gps.1527

- Saliba, D., & Buchanan, J. (2008). Development & Validation of a Revised Nursing Home Assessment Tool: MDS 3.0. Retrieved January 28, 2020
<https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/NursingHomeQualityInits/downloads/MDS30FinalReport.pdf>
- Samus, Q. M., Rosenblatt, A., Steele, C., Baker, A., Harper, M., Brandt, J., . . . Lyketsos, C. G. (2005). The association of neuropsychiatric symptoms and environment with quality of life in assisted living residents with dementia. *The Gerontologist, 45 Spec No 1*(1), 19-26. doi:10.1093/geront/45.suppl_1.19
- Sandelowski, M. (2001). Real qualitative researchers do not count: The use of numbers in qualitative research. *Research in Nursing and Health, 24*(3), 230-240. doi:10.1002/nur.1025
- Sandelowski, M., Voils, C. I., & Barroso, J. (2006). Defining and designing mixed research synthesis studies. *Research in the schools: a nationally refereed journal sponsored by the Mid-South Educational Research Association and the University of Alabama, 13*(1), 29.
- Sandelowski, M., Voils, C. I., & Knafl, G. (2011). On Quantitizing. In (Vol. 3, pp. 208-222). Thousand Oaks: SAGE Publications, Inc.
- SAS Institute Inc. (2014). SAS [computer program] Version 9.4. Cary, NC.
- Scales, K., Zimmerman, S., & Miller, S. J. (2018). Evidence-Based Nonpharmacological Practices to Address Behavioral and Psychological Symptoms of Dementia. *The Gerontologist, 58*(suppl_1), S88-S102. doi:10.1093/geront/gnx167
- Schlenger, W. E., Mulvaney-Day, N., Williams, C. S., Kulka, R. A., Corry, N. H., Mauch, D., . . . Marmar, C. R. (2016). PTSD and Use of Outpatient General Medical Services Among Veterans of the Vietnam War. *Psychiatric Services, 67*(5), 543-550. doi:10.1176/appi.ps.201400576
- Seitz, D., Purandare, N., & Conn, D. (2010). Prevalence of psychiatric disorders among older adults in long-term care homes: a systematic review. *International Psychogeriatrics, 22*(7), 1025-1039. doi:10.1017/s1041610210000608
- Selbaek, G., Engedal, K., & Bergh, S. (2013). The prevalence and course of neuropsychiatric symptoms in nursing home patients with dementia: a systematic review. *Journal of the American Medical Directors Association, 14*(3), 161-169. doi:10.1016/j.jamda.2012.09.027

- Selbaek, G., Kirkevold, O., & Engedal, K. (2007). The prevalence of psychiatric symptoms and behavioural disturbances and the use of psychotropic drugs in Norwegian nursing homes. *International Journal of Geriatric Psychiatry*, 22(9), 843-849. doi:10.1002/gps.1749
- Settersten, R. A. (2006). When Nations Call: How Wartime Military Service Matters for the Life Course and Aging. *Research on Aging*, 28(1), 12-36. doi:10.1177/0164027505281577
- Settersten, R. A., & Patterson, R. S. (2006). Military Service, the Life Course, and Aging: An Introduction. *Research on Aging*, 28(1), 5-11. doi:10.1177/0164027505281579
- Shankar, K., Walker, M., Frost, D., & Orrell, M. (1999). The development of a valid and reliable scale for rating anxiety in dementia (RAID). *Aging & Mental Health*, 3(1), 39-49.
- Sheffler, J. L., Rushing, N. C., Stanley, I. H., & Sachs-Ericsson, N. J. (2015). The long-term impact of combat exposure on health, interpersonal, and economic domains of functioning. *Aging & Mental Health*, 1-11.
- Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for information*, 22(2), 63-75.
- Sibener, L., Zaganjor, I., Snyder, H. M., Bain, L. J., Egge, R., & Carrillo, M. C. (2014). Alzheimer's Disease prevalence, costs, and prevention for military personnel and veterans. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association*, 10(3), S105-S110. doi:10.1016/j.jalz.2014.04.011
- Smith, M., Hall, G. R., Gerdner, L., & Buckwalter, K. C. (2006). Application of the Progressively Lowered Stress Threshold Model across the continuum of care. *Nursing Clinics of North America*, 41(1), 57-81, vi. doi:10.1016/j.cnur.2005.09.006
- Smith, S. M., Goldstein, R. B., & Grant, B. F. (2016). The association between post-traumatic stress disorder and lifetime dsm-5 psychiatric disorders among veterans: Data from the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III). *Journal of Psychiatric Research*, 82, 16-22. doi:10.1016/j.jpsychires.2016.06.022
- Spiro, A., Schnurr, P. P., & Aldwin, C. M. (1994). Combat-related posttraumatic stress disorder symptoms in older men. *Psychology and aging*, 9(1), 17.

- Spiro, A., Schnurr, P. P., & Aldwin, C. M. (1997a). A life-span perspective on the effects of military service. *Journal of Geriatric Psychiatry, 30*, 91-128.
- Spiro, A., Schnurr, P. P., & Aldwin, C. M. (1997b). A life-span perspective on the effects of military service. *Journal of Geriatric Psychiatry, 30*(1), 91-128.
- Spiro, A., Settersten, R. A., & Aldwin, C. M. (2016a). Long-term Outcomes of Military Service in Aging and the Life Course: A Positive Re-envisioning. *The Gerontologist, 56*(1), 5-13. doi:10.1093/geront/gnv093
- Spiro, A., Settersten, R. A., & Aldwin, C. M. (2016b). Long-term Outcomes of Military Service in Aging and the Life Course: A Positive Re-envisioning. *The Gerontologist, 56*(1), 5-13. doi:10.1093/geront/gnv093
- Spore, D. L., Horgas, A. L., Smyer, M. A., & Marks, L. N. (1992). The relationship of antipsychotic drug use, behavior, and diagnoses among nursing home residents. *Journal of Aging and Health, 4*(4), 514-535.
- Stein-Parbury, J., Chenoweth, L., Jeon, Y. H., Brodaty, H., Haas, M., & Norman, R. (2012). Implementing Person-Centered Care in Residential Dementia Care. *Clinical Gerontologist, 35*(5), 404-424. doi:10.1080/07317115.2012.702654
- Steinberg, M., Shao, H., Zandi, P., Lyketsos, C. G., Welsh-Bohmer, K. A., Norton, M. C., . . . Tschanz, J. T. (2008). Point and 5-year period prevalence of neuropsychiatric symptoms in dementia: the Cache County Study. *International Journal of Geriatric Psychiatry, 23*(2), 170-177. doi:10.1002/gps.1858
- Sullivan, J. L., Engle, R. L., Tyler, D., Afable, M. K., Gormley, K., Shwartz, M., . . . Parker, V. A. (2018). Is Variation in Resident-Centered Care and Quality Performance Related to Health System Factors in Veterans Health Administration Nursing Homes? *Inquiry, 55*, 46958018787031. doi:10.1177/0046958018787031
- Sullivan, J. L., Weinburg, D. B., Gidmark, S., Engle, R. L., Parker, V. A., & Tyler, D. A. (2019). Collaborative capacity and patient-centered care in the Veterans' Health Administration Community Living Centers. *International Journal of Care Coordination, 22*(2), 90-99.
- Sutker, P. B., Allain, A. N., Jr., & Winstead, D. K. (1993). Psychopathology and psychiatric diagnoses of World War II Pacific theater prisoner of war survivors and combat veterans. *American Journal of Psychiatry, 150*(2), 240-245. doi:10.1176/ajp.150.2.240

- Sutker, P. B., Winstead, D. K., Galina, Z. H., & Allain, A. N. (1991). Cognitive Deficits and Psychopathology Among Former Prisoners of War and Combat Veterans of the Korean Conflict. *American Journal of Psychiatry*, *14*, e7-72.
- Tanielian, T. L., & Jacox, L. (2008). *Invisible wounds of war : psychological and cognitive injuries, their consequences, and services to assist recovery*. Santa Monica, CA: RAND Cooperation
- Teri, L., Huda, P., Gibbons, L., Young, H., & van Leynseele, J. (2005). STAR: a dementia-specific training program for staff in assisted living residences. *The Gerontologist*, *45*(5), 686-693.
- The Office of the Assistant Deputy Under Secretary for Health for Policy and Planning (ADUSH/PP). (2013). *Projections of the Prevalence and Incidence of Dementia Including Alzheimer's Disease for the Total Veteran, Enrolled and Patient Populations Age 65 and Older* U.S. Department of Veterans Affairs Retrieved from https://www.va.gov/GERIATRICAL/docs/Methodology_Paper_Projections_of_the_Prevalence_and_Incidence_of_Dementias_v5_FINAL.pdf
- Thorp, S. R., Sones, H. M., & Cook, J. M. (2011). Posttraumatic stress disorder among older adults. *Cognitive behavior therapy with older adults: Innovations across care settings*, 189-217.
- United States Census Bureau. (2012). Statistical Abstracts of United States: 2012 Retrieved from <http://www.census.gov/library/publications/2011/compendia/statab/131ed.html>
- United States Census Bureau. (2017). FFF: Veterans Day 2017: Nov. 11. Retrieved from <https://www.census.gov/newsroom/facts-for-features/2017/veterans-day.html>
- Van Den Wijngaart, M., Vernooij-Dassen, M., & Felling, A. (2007). The influence of stressors, appraisal and personal conditions on the burden of spousal caregivers of persons with dementia. *Aging & Mental Health*, *11*(6), 626-636.
- Veitch, D. P., Friedl, K. E., & Weiner, M. W. (2013). Military risk factors for cognitive decline, dementia and Alzheimer's disease. *Current Alzheimer Research*, *10*(9), 907-930.
- Verma, S., Orengo, C. A., Maxwell, R., Kunik, M. E., Molinari, V. A., Vasterling, J. J., & Hale, D. D. (2001a). Contribution of PTSD/POW history to behavioral

- disturbances in dementia. *International Journal of Geriatric Psychiatry*, 16(4), 356-360.
- Verma, S., Orengo, C. A., Maxwell, R., Kunik, M. E., Molinari, V. A., Vasterling, J. J., & Hale, D. D. (2001b). Contribution of PTSD/POW history to behavioral disturbances in dementia. *International Journal of Geriatric Psychiatry*, 16(4), 356-360.
- VeteransAgainstAlzheimer's. (2017). *VeteransAgainstAlzheimer's Veterans and Alzheimer's: Meeting the Crisis Head On*. Retrieved from https://www.usagainstalzheimer.org/sites/default/files/USA2_Veterans%20Issue%20Brief_October%2010%202017.pdf
- Volicer, L. (2019). Review of Programs for Persons Facing Death with Dementia. *Healthcare (Basel)*, 7(2). doi:10.3390/healthcare7020062
- Volicer, L., Bass, E. A., & Luther, S. L. (2007). Agitation and Resistiveness to Care Are Two Separate Behavioral Syndromes of Dementia. *Journal of the American Medical Directors Association*, 8(8), 527-532. doi:10.1016/j.jamda.2007.05.005
- Volicer, L., & Galik, E. (2018). Agitation and Aggression Are 2 Different Syndromes in Persons With Dementia. *Journal of the American Medical Directors Association*, 19(12), 1035-1038. doi:10.1016/j.jamda.2018.07.014
- Volicer, L., Van der Steen, J. T., & Frijters, D. H. (2009). Modifiable factors related to abusive behaviors in nursing home residents with dementia. *Journal of the American Medical Directors Association*, 10(9), 617-622. doi:10.1016/j.jamda.2009.06.004
- Wade, D. T., & Vergis, E. (1999). The Short Orientation-Memory-Concentration Test: a study of its reliability and validity. *Clinical Rehabilitation*, 13(2), 164-170. doi:10.1191/026921599673848768
- Wallace, A. E., Weeks, W. B., Wang, S., Lee, A. F., & Kazis, L. E. (2006). Rural and urban disparities in health-related quality of life among veterans with psychiatric disorders. *Psychiatric Services*, 57(6), 851-856.
- Wancata, J., Windhaber, J., Krautgartner, M., & Alexandrowicz, R. (2003). The consequences of non-cognitive symptoms of dementia in medical hospital departments. *International Journal of Psychiatry in Medicine*, 33(3), 257-271.

- Weathers, F. W., Bovin, M. J., Lee, D. J., Sloan, D. M., Schnurr, P. P., Kaloupek, D. G., . . . Marx, B. P. (2018). The Clinician-Administered PTSD Scale for DSM-5 (CAPS-5): Development and initial psychometric evaluation in military veterans. *Psychological Assessment, 30*(3), 383-395. doi:10.1037/pas0000486
- Wehry, S. (Producer). (2015). Mental Health Issues in Nursing Homes [PowerPoint slides] Retrieved from <https://ltcombudsman.org/uploads/files/issues/Im-glad-you-asked.pdf>
- Weiner, M. W., Friedl, K. E., Pacifico, A., Chapman, J. C., Jaffee, M. S., Little, D. M., . . . Carrillo, M. C. (2013a). Military risk factors for Alzheimer's disease. *Alzheimers Dement, 9*(4), 445-451. doi:10.1016/j.jalz.2013.03.005
- Weiner, M. W., Friedl, K. E., Pacifico, A., Chapman, J. C., Jaffee, M. S., Little, D. M., . . . Carrillo, M. C. (2013b). Military risk factors for Alzheimer's disease. *Alzheimer's & Dementia: The Journal of the Alzheimer's Association, 9*(4), 445-451. doi:10.1016/j.jalz.2013.03.005
- Welsh, S. W., Corrigan, F. M., & Scott, M. (1996). Language impairment and aggression in Alzheimer's disease. *International Journal of Geriatric Psychiatry, 11*(3), 257-261. doi:10.1002/(sici)1099-1166(199603)11:3<257::Aid-gps330>3.0.Co;2-u
- Whall, A. L., Colling, K. B., Kolanowski, A., Kim, H., Son Hong, G.-R., DeCicco, B., . . . Beck, C. (2008). Factors associated with aggressive behavior among nursing home residents with dementia. *The Gerontologist, 48*(6), 721-731. doi:10.1093/geront/48.6.721
- Wilhelm, K., Boyce, P., & Brownhill, S. (2004). The relationship between interpersonal sensitivity, anxiety disorders and major depression. *Journal of Affective Disorders, 79*(1), 33-41. doi:[https://doi.org/10.1016/S0165-0327\(02\)00069-1](https://doi.org/10.1016/S0165-0327(02)00069-1)
- Williamson, V., Stevelink, S. A. M., Greenberg, K., & Greenberg, N. (2017). Prevalence of Mental Health Disorders in Elderly U.S. Military Veterans: A Meta-Analysis and Systematic Review. *American Journal of Geriatric Psychiatry, 25*(11), 1001-1011. doi:10.1016/j.jagp.2017.11.001
- Willumsen, T., Karlsen, L., Næss, R., & Bjørntvedt, S. (2012). Are the barriers to good oral hygiene in nursing homes within the nurses or the patients? *Gerodontology, 29*(2), e748-e755.

- Woodward, M. (2013). Aspects of communication in Alzheimer's disease: clinical features and treatment options. *International Psychogeriatrics*, 25(6), 877-885.
- Yaffe, K., Fox, P., Newcomer, R., Sands, L., Lindquist, K., Dane, K., & Covinsky, K. E. (2002). Patient and caregiver characteristics and nursing home placement in patients with dementia. *JAMA*, 287(16), 2090-2097.
- Yaffe, K., Vittinghoff, E., Lindquist, K., Barnes, D., Covinsky, K. E., Neylan, T., . . . Marmar, C. (2010a). Post-Traumatic Stress Disorder and Risk of Dementia among U.S. Veterans. *Archives of General Psychiatry*, 67(6), 608-613. doi:10.1001/archgenpsychiatry.2010.61
- Yaffe, K., Vittinghoff, E., Lindquist, K., Barnes, D., Covinsky, K. E., Neylan, T., . . . Marmar, C. (2010b). Posttraumatic stress disorder and risk of dementia among US veterans. *Arch Gen Psychiatry*, 67(6), 608-613. doi:10.1001/archgenpsychiatry.2010.61
- Yao, L. (2004). *Locomoting responses to environment in elders with dementia: A model construction and preliminary testing*. (Doctoral dissertation), University of Michigan, Ann Arbor. Retrieved from http://gateway.proquest.com/openurl?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:dissertation&res_dat=xri:pqm&rft_dat=xri:pqdiss:3137969
- Yehuda, R., Flory, J. D., Pratchett, L. C., Buxbaum, J., Ising, M., & Holsboer, F. (2010). Putative biological mechanisms for the association between early life adversity and the subsequent development of PTSD. *Psychopharmacology (Berl)*, 212(3), 405-417. doi:10.1007/s00213-010-1969-6
- Zuidema, S. U., de Jonghe, J. F., Verhey, F. R., & Koopmans, R. T. (2010). Environmental correlates of neuropsychiatric symptoms in nursing home patients with dementia. *International Journal of Geriatric Psychiatry*, 25(1), 14-22. doi:10.1002/gps.2292

Biography

Bada Kang was born in Korea. She earned a Bachelor of Science in Nursing from Yonsei University College of Nursing in 2010 and obtained her Master of Science degree in Adult Gerontology Primary Care Nurse Practitioner specialty in 2015 from New York University College of Nursing. Prior to her graduate studies, she worked as a registered nurse, mainly in neurological rehabilitation care. Bada attended Duke University (August 2015-May 2020), where she pursued her Doctorate of Philosophy in Nursing and the Global Health Doctoral Certificate from Duke Global Health Institute.

Bada was a recipient of the James B. Duke Fellowship from Duke University Graduate School, Duke University School of Nursing PhD Student Pilot Study Fund, and Duke Global Health Institute Doctoral Certificate Fieldwork Grants. She was awarded a Research Grant from the Gerontological Advanced Practice Nurses Association Foundation for her dissertation study and an Asian American/Pacific Islander Nurses Association scholarship. Bada was the first author on two published manuscripts and a co-author in two manuscripts:

- Kang, B., Xu, H., & McConnell, E. S. (2019). Neurocognitive and psychiatric comorbidities of posttraumatic stress disorder among older veterans: A systematic review. *International Journal of Geriatric Psychiatry, 34*(4), 522-538. doi:10.1002/gps.5055
- Kang, B., Scales, K., McConnell, E. S., Song, Y., Lepore, M., & Corazzini, K. (2020). Nursing Home Residents' Perspectives on Their Social Relationships. *Journal of Clinical Nursing*.
- Scales, K., Lepore, M., Anderson, R. A., McConnell, E. S., Song, Y., Kang, B., ... & Corazzini, K. N. (2019). Person-directed care planning in nursing homes: Resident, family, and staff perspectives. *Journal of Applied Gerontology, 38*(2), 183-206.
- Wei, S., McConnell, E. S., Wright-Freeman, K., Woodward, A., Kang, B., & Corazzini, K. N. (2019). Measurement of older adults' social networks using technologies in the context of health and social care: a scoping review protocol. *JBIR database of systematic reviews and implementation reports*.