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It Takes a Village: An Examination of Social Relationships and Mental Health

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by

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Abstract

Social relationships are impactful to mental health and well-being, both positively and negatively. Different sources of support vary in their ability to meet our needs and ultimately influence our well-being. While research has examined aspects of supportive and harmful social relationships and mental health, much of this work is cross-sectional or limited to a single source of support. This dissertation aimed to better elucidate the relationship between social relationships and mental health by integrating multiple theoretical perspectives and multiple sources of support, in a series of three empirical studies to order to inform theory and interventions targeting mental health of high-risk groups.

Veterans are at increased risk of suicide relative to their civilian counterparts (Office of Mental Health and Suicide Prevention, 2018). Study 1 examined an acute indicator of suicide risk, agitation, and its temporal associations with social support from spouse, family, and friends over a 9-month period using three-wave cross-lagged panel models in a sample of employed veterans (SERVe; Hammer et al., 2017). Results revealed preliminary support for a reciprocal association between agitation and some sources of support, with directionality of cross-lagged effects varying across sources. Agitation was impacted by one's relationships with family, whereas family support predicted subsequent agitation. For coupled veterans, spousal support predicted subsequent agitation. Social support from friends was not related to agitation longitudinally, illuminating nuances in the temporal associations between agitation and social support from spouse, family, and friends.

Marital transitions, widowhood or divorce, are incredibly stressful for older adults and have long-term impacts on mental health and well-being (Lin et al., 2019; Sasson & Umberson, 2014). Study 2 also took a longitudinal approach to examining social relationships and mental health by examining support and strain from multiple sources (spouse, family, friends, and children) as predictors of depressive symptom trajectories prior to and following a marital transition using latent piecewise growth curve modeling. Social strain did not emerge as a significant predictor of depressive symptom trajectories post-marital transition. Social support from spouse was related to more difficult mental health recoveries after transition, whereas social support from friends was related to a quicker adjustment. These results provide additional evidence for the importance of a strong friend network to mitigate the detrimental effects of marital transitions on mental health among older adults adjusting to widowhood or divorce.

Military-connected individuals are at increased risk for mental health disorders and adverse behavioral health outcomes (Mohr et al., 2018; Office of Mental Health and Suicide Prevention, 2018; Steenkamp et al., 2015) but are less likely to seek help for mental health problems than physical health problems (Britt, 2000). Previous research indicates that social support, mental health stigma, and organizational barriers to care impact service member behavioral health and treatment seeking for many military-connected individuals (Coleman et al., 2017). Study 3 aimed to elucidate the interactive effects of social relationships and suicide risk factors on behavioral health care utilization, utilizing a sample of active-duty soldiers who participated in the Resilience-Supportive Leadership Training (RESULT) study. Main effects models revealed that

perceived partner responsiveness, stigma, and barriers to care were all associated with less frequent behavioral health treatment use. For coupled participants, perceived partner responsiveness attenuated the effects of stigma and barriers to care on treatment use, evidenced by results of moderation models. Study 3 findings highlight the important role spouses play in the process of treatment seeking and utilization among this high-risk sample. Taken together, this series of studies provides evidence for the importance of including distinct sources of social support when examining the interactive effects of mental health and social relationships over time, ultimately informing future interventions targeting social relationships to improve mental health and as inform barriers and facilitators to seeking behavioral health care.

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Our individual relationships are an untapped resource—a source of healing hiding in plain sight. They can help us live healthier, more productive, and more fulfilled lives. Answer that phone call from a friend. Make time to share a meal. Listen without the distraction of your phone. Perform an act of service. Express yourself authentically. The keys to human connection are simple, but extraordinarily powerful.

– US Surgeon General, 2023

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CHAPTER I. INTRODUCTION

Depression is the leading cause of disability worldwide, with over 300 million people estimated to be living with depression (World Health Organization [WHO], 2017) with substantial global increases over recent decades (Liu et al., 2020) and into the COVID-19 pandemic (WHO, 2022). Other mental health disorders, such an anxiety, are also highly prevalent, with over 250 million people worldwide estimated to live with anxiety disorders (WHO, 2017). Times of increased stress and adversity exacerbate mental health symptoms (Ingram & Luxton, 2005), and certain groups are at increased risk for mental health disorders. For example, military-connected individuals, such as U.S. veterans, experienced a 25.9% increase of in rates of suicide from 2005 to 2016 (Office of Mental Health and Suicide Prevention, 2018). Mental health encompasses an individual's emotional, social, and psychological well-being (WHO, 2017), including not only the absence of negative symptoms or disorders but also the presence of positive functioning and flourishing (e.g., Ryff & Singer, 1998). Due to increasing global trends in common mental health disorders (e.g., Liu et al., 2020), it is crucial to elucidate key factors implicated in mental health and well-being in high-risk samples to inform intervention and prevention approaches and promote thriving.

Another increasing threat to mental health and well-being is an epidemic of loneliness and isolation (Murthy, 2023). Social belongingness, one's feeling of connection to others, is a fundamental human need (Baumeister & Leary, 1995) and quality social relationships are crucial beneficial for both mental health (Prati & Pietrantoni, 2010) and physical health (Holt-Lunstad et al., 2010; Holt-Lunstad, 2018). For fundamental belongingness needs to be met, social networks must be stable and

social interactions must be frequent and marked by affective concern (Baumeister & Leary, 1995). Unmet belonginess needs have adverse consequences if they remain unmet for long periods of time, which can ultimately lead to a desire for suicide if thwarted belongingness co-occurs with a perceived sense of burdensomeness (e.g., the interpersonal theory of suicide; Joiner, 2005; Van Orden et al., 2010). Numerous aspects of social relationships and social connection are relevant for mental health, with predominant focus on social support, the perception that one's close others will be available and help in effective ways in times of stress (Lakey & Orehek, 2011).

An integrated conceptual model representing the cyclical relationship between social support and mental health is presented in Figure 1.1, including treatment use as a focal outcome. Social support is a significant contributor to mental health and psychological well-being (Cohen & Wills, 1985; Lakey & Orehek, 2011; Pietromonaco & Collins, 2017), and mental health is a significant contributor to perceptions and experiences of social support (e.g., interpersonal theory of depression; Hames et al., 2013). Additionally, both factors are prominent predictors of mental health treatment utilization (Adler et al., 2020; Greene-Shortridge et al., 2007; Welsh et al., 2015; Zinzow et al., 2013), although the effects of these factors on treatment depend upon organizational barriers to care and stigmatizing attitudes regarding mental health and treatment (e.g., Greene-Shortridge et al., 2007). Different components of this conceptual model are investigated in the present dissertation.

Multiple theoretical perspectives address the association between social relationships and mental health (e.g., Lakey & Orehek, 2011), along with potential

explanatory mechanisms and modifying factors that further explain why social relationships are impactful for physical and mental health (e.g., Pietromonaco & Collins, 2017; Thoits, 2011). In their landmark review of social support functions, Cohen and Wills (1985) described both a main effect model of social support on health and well-being and a buffering model, with the effect of social support acting as a buffer on the association between stress and health. Evidence for moderating effects of social support on stress-related mental health outcomes have been somewhat inconsistent, however, and there have been robust main effects found between perceived social support and one's mental health (Lakey & Orehek, 2011). Relational Regulation Theory (Lakey & Orehek, 2011) extends upon this work to suggest that social relationships serve as a tool for us to regulate our affect, cognition, and behavior through ordinary social interactions and conversations, ultimately affecting mental health. Social connection and disconnection are also thought to lead to numerous intrapersonal mediators, including health behaviors and psychosocial and emotional pathways, ultimately predicting one's mental and physical health (Pietromonaco & Collins, 2017).

Previous work also provides evidence for a cyclical process occurring such that, poor mental health leads to maladaptive social behaviors (e.g., Joiner, 2000; Hames et al., 2013), which in turn degrades the quality of one's social exchanges ultimately leading to decreases in perceived availability and quality of support, which in turn exacerbates poor mental health, and so on. Alternatively, when experiencing few mental health symptoms, this should, in turn reduce occurrence of maladaptive social behavior, increase experiences of positive exchanges, which ultimately increases perceptions of social

support quality and availability, bolstering mental health. Additionally, both mental health and social support motivate mental health treatment use, which ultimately interact with stigma and organizational barriers to care to predict treatment utilization. What is less clear is in what ways this process depends upon characteristics of the source of support, such as the closeness of relationship (e.g., central and peripheral ties, Fingerman, 2009), how well-matched needs and provided support are (Cutrona & Russell, 1990), and how much direct experience support providers have with relevant situational stressors (Thoits, 2011).

The most effective support providers or sources of social regulation should be those best matched with the needs and preferences of the individual in need of support (Cutrona & Russell, 1990; Lakey & Orehek, 2011). Compatibility of support with an individual's needs depends upon the source of support, with an important distinction being a support provider's direct experience with stressors the support recipient is facing. Thoits (2011) distinguishes between similar others (members of one's secondary social network, e.g., peers and supervisors), who have relevant experience with the specific stressful situation an individual is facing, and significant others (e.g., intimates including spouse, family, and friends), who may not have relevant personal experience but are in a position to provide consistent, sympathetic, and caring support. Similar others can provide tailored advice and support from a place of mutual understanding and role model healthy coping strategies, whereas in times of increased stress, support attempts from significant others may inadvertently come off as generic or misguided due to their lack of familiarity with the stressor. The most beneficial support then is hypothesized to come

from support providers who are both significant and similar others, for example members of dual-military couples.

Low levels of social support have been found to be harmful for subsequent mental health symptoms among people with depression, bipolar disorder, and anxiety disorders (Wang et al., 2018). Unmet social support needs have been demonstrated to lead to worse depressive symptoms (Rankin et al., 2018). Negative social exchanges, or social conflict, are detrimental to psychological well-being when measured from specific sources; however, in previous work social support was only beneficial for well-being when measured from one's general social network (Abbey et al., 1985). Other work on the chronicity of depression over time also highlights the interactive effects of negative social experiences and mental health symptoms, proposing that depressed individuals behave in socially maladaptive ways, including excessive reassurance seeking and negative feedback seeking, ultimately leading to interpersonal problems for depressed individuals, which, in turn, perpetuates chronicity of depressive symptoms and increases duration of depressive episodes (Joiner, 2000; Hames et al., 2013). These behaviors put depressed individuals at an increased risk of social rejection, ultimately leading to worse mental health (Joiner, 2000). More work is needed to parse the effects of distinct sources of social support and strain on mental health over time.

The effects of social support on mental health are likely intensified in times of stress, as previous work on social support and stress-buffering effects suggests that social relationships should have the strongest buffering effects during times of greater stress and adversity (e.g., Cohen & Wills, 1985). Research that examined the effects of social

support or social strain from specific connections (e.g., one's friends, coworkers, or family members) has demonstrated there are distinct effects relative to global measures of support (Abbey et al., 1985; Skomorovsky, 2014). Specific sources may be better suited to address the specific support needs required by a given situation based on their own previous experiences (e.g., Thoits, 2011), with compatibility of support needs and perceived support having differential impacts on well-being (Cutrona & Russell, 1990; Lakey & Cohen, 2000).

To highlight the effects of different sources and aspects of social relationships during times of increased stress and adversity, the present dissertation utilized three high-risk samples. Military-connected individuals are at increased risk of adverse behavioral health outcomes (Office of Mental Health and Suicide Prevention, 2018; Steenkamp et al., 2015); therefore, Study 1 utilized a sample of post-9/11 US veterans and Study 3 utilized an active-duty sample of Army service members. As some life events can also be exceptionally stressful and detrimental for mental health (Kristiansen et al., 2019), Study 2 comprised a sample of older adults who experienced a marital transition (widowhood or divorce). Regardless of the source of stress, quality social relationships should be impactful on mental health and long-term outcomes as they allow for more effective social regulation (Lakey & Orehek, 2011) and coping (Thoits, 2011), leading to improved mental health over time.

Although samples in Study 1, 2, and 3 have clear distinctions on demographic characteristics like age (Study 1: range = 21 to 68 years, M = 38.9 years, SD = 9.3 years; Study 2 range: 52 to 91 years, M = 64.1 years, SD = 8.4 years; Study 3: range = 18 to 54

years, *M* = 25.27 years, *SD* = 5.4 years) and gender (Study 1: 88.5% male; Study 2: 41.6% male; Study 3: 62.9% male), social support has been demonstrated to be important factor for mental health during times of stress in previous research across the life course and for both men and women (Eagle et al., 2019; Skomorovsky, 2014; Wang et al., 2018). This dissertation aims to further elucidate the interaction between social relationships and mental health by integrating multiple theoretical perspectives in a series of three studies to inform theory and future interventions targeting mental health of high-risk groups.

Chapter II Overview: Three-Wave Cross-lagged Panel Models of Agitation and Perceived Social Support in a Sample of Employed Veterans

Social relationships are a crucial component of depression and suicide risk (Coyne, 1976; Joiner, 2000; Joiner, 2005). The interpersonal theory of suicide (Joiner, 2005; Van Orden, et al., 2010) proposed that thwarted belongingness, characterized by loneliness and a perceived lack of reciprocal close relationships, and perceived burdensomeness, the misperception that one is a burden on close others, jointly predict one's desire for suicide. One's desire for suicide then depends on capability for suicide to predict lethal suicidal behavior (Van Orden et al., 2010). Relevant aspects of this theory are consistent with broader theoretical framing (e.g., Pietromonaco & Collins, 2017), as the interpersonal theory of suicide specifies a detrimental way in which social relationships can directly affect mental health, with potentially lethal outcomes at extreme levels of thwarted belonginess and burdensomeness.

In addition to affecting mental health, social relationships can also be affected by mental health. The interpersonal theory of depression (Coyne, 1976), later expanded upon by Joiner (2000), elucidated interpersonal explanations for the chronic nature of depression. Depressed individuals are hypothesized to socially engage in maladaptive ways which produce interpersonal problems, which, in turn, perpetuate depressive symptoms and increase duration and chronicity of depressive episodes (Joiner, 2000; Hames et al., 2013). Two specific rejection-eliciting behaviors in which depressed individuals are hypothesized to engage include excessive reassurance-seeking (Joiner et al., 1999; Joiner, & Schmidt, 1998) and negative feedback-seeking (Joiner, 2000). Excessive reassurance-seeking occurs when an individual turns to social connections to seek excessive reassurance of self-worth (Joiner et al., 1999), whereas negative feedback-seeking is when an individual seeks social feedback that confirms and reinforces their negative self-concept (Joiner, 2000). Both behaviors are possible explanatory factors for the chronicity of depression, as they put depressed individuals at an increased risk of social rejection, ultimately leading to worsened mental health (Joiner, 2000). While the interactive effects of close relationships and social support on depression (Chou & Chi, 2003; Patten et al., 2010), suicidal ideation (Du et al., 2020; Endo et al., 2014), and psychological distress (Mizuno et al., 2019) have been examined over time, one suicide risk factor that has yet to be examined in relation to social support longitudinally is agitation, an indicator of acute suicide risk (Ribeiro et al., 2011) that has a moderate association with suicidal behavior (Rogers et al., 2016).

What is unclear is whether agitation is an outcome of thwarted belongingness (e.g., Van Orden et al., 2010), whether social support providers respond to higher levels of agitation by withdrawing social support – similarly to responses to social rejection seen in response to negative feedback seeking and excessive reassurance seeking (Hames et al., 2013) – or whether a combination of these are present providing evidence for a bidirectional association between agitation and social support. Given theoretical justification for an association between interpersonal relationships and mental health (Lakey & Orehek, 2011; Van Orden et al., 2010), mental health and social relationships (Coyne, 1976; Hames et al., 2013; Joiner, 2000), and the lack of research on the link between agitation and social relationships, Study 1 aimed to investigate the temporal associations between agitation and social support. Illuminating the temporal associations between these suicide risk factors, agitation and social disconnection, allows for a better understanding of the interplay between these factors and provides preliminary evidence for directionality between agitation and social factors. As research has yet to examine agitation prospectively, Study 1 aimed to provide evidence for whether agitation temporally precedes perceived social support from family, friends, and spouse. Social relationships and social support providers have been implicated in facilitating treatment seeking (Britt et al., 2020a) and may be sensitive to agitation presented by veterans. While depressed individuals may be more likely to act in socially maladaptive ways which elicit social rejection (Hames et al., 2013; Joiner, 2000), research has yet to consider whether agitation may function similarly to depressive symptoms in this context. Future efforts aimed at reducing behavioral health symptoms, including agitation, will

benefit from having a better understanding of the ways in which different sources of support impact experiences of agitation in a high-risk sample.

Chapter III Overview: Social Support and Social Strain as Predictors of Depressive Symptom Trajectories Following a Marital Transition

Social support has important protective effects during stressful periods (Cohen & Wills, 1985). Marital transitions (MTs), including divorce and widowhood, are stressful events and are detrimental for psychological health (Jadhav & Weir, 2018; Lin et al., 2019; Sasson & Umberson, 2014; Xu et al., 2020). Recent theoretical (Lin & Brown, 2020) and empirical work (Lin et al., 2019) shows that a large decline in mental health and well-being occurs immediately after a MT, followed by more gradual improvement over a protracted period; however, there is heterogeneity in recovery trajectories (Chen et al., 2020). Social support should buffer some of the detrimental effects of stress and adversity on psychological well-being and mental health (Cohen & Wills, 1985; Lakey & Orehek, 2011). While some aspects of social relationships and social support from various sources have been examined in relation to psychological health after MTs (e.g., Amato & Hohmann-Marriott, 2007; Gustavson et al., 2014), research has yet to examine social support and social strain as potential explanations for variability in recovery trajectories following divorce and widowhood.

Literature examining the impact of widowhood and divorce suggests that both experiences lead to short-term declines in mental health and well-being with far-reaching long-term impacts on one's mental health that may take a period of years to reach a full recovery (Kristiansen et al., 2019). Social support and social strain independently impact

mental health, such that social strain may overpower the beneficial effects of social support (Newsom et al., 2005). Additionally, different relationships across a person's social network (e.g., spouse, friends, family) can provide different levels of support given their degree of experience with relevant stressors (Thoits, 2011). Although some aspects of social support have been examined in relation to psychological health after MTs (Amato & Hohmann-Marriott, 2007; Gustavson et al., 2014), the influence of social support and social strain have yet to be investigated as explanations for variability in depression trajectories following MTs. It is important to extend previous cross-sectional work linking social support and strain to mental health recoveries to longitudinal approaches which capture the supportive nature of one's social environment prior to transition and follow recoveries over multiple years. Study 2 aimed to investigate support and social strain from spouses, children, family, and friends as predictors of depressive symptoms trajectories following divorce or widowhood using piecewise latent growth curve models. Extending previous work to include explanatory factors for differences in recovery, specifically social factors, identifies targets for interventions supporting older adults as they adjust to marital transitions. By illuminating which sources of support are related to mental health recovery from MTs, individuals lacking necessary sources of informal supports can be targeted for more formal supports and additional resources when they experience MTs in late life.

Chapter IV Overview: An Examination of Interactive Risk and Protective Factors Related to Behavioral Health and Behavioral Health Service-Seeking in an Active-Duty Sample

Military-connected individuals are at increased risk for mental health disorders and adverse behavioral health outcomes (behavioral health specifically refers to both mental health and substance use disorders; American Medical Association, 2021), including post-traumatic stress disorder (PTSD; Steenkamp et al., 2015), suicide (Office of Mental Health and Suicide Prevention, 2018), and hazardous alcohol use (Bray et al., 2013; Mohr et al., 2018). Military-connected individuals are less likely to seek help for a mental health problem than they are for a physical health problem (Britt, 2000), although behavioral health care has been demonstrated to be beneficial in treating numerous mental health disorders, including PTSD (Kitchiner et al., 2019). Due to the prevalence of adverse behavioral health outcomes among service members, Study 3 examined the interaction between social facilitators and barriers to behavioral health care utilization in a sample of active-duty US Army service members.

Numerous barriers to behavioral health treatment have been identified in previous theoretical and empirical work, including stigma and organizational barriers to care (Coleman et al., 2017; Greene-Shortridge et al., 2007). Behavioral health stigma, negative stereotypes and attitudes regarding individuals with behavioral health disorders and related treatment (Greene-Shortridge et al., 2007), can be a salient obstacle to treatment seeking among military personnel (Coleman et al., 2017). These stigmatizing attitudes are reinforced by aspects of military culture and training, including expectations of self-reliance, stoicism, and “toughing it out” (Abraham et al., 2017; Ben-Zeev et al., 2012; Britt et al., 2018), which discourage military personnel from seeking needed care. These attitudes regarding treatment seeking are shaped not only by military culture, but

also by leadership (Cheung et al., 2016) and peers (True et al., 2015). In theoretical work regarding stigma and treatment seeking, stigma is predicted to moderate the association between development of behavioral health symptoms and seeking behavioral health treatment (Green-Shortridge et al., 2007). Other barriers include concerns over potential career consequences, especially salient for those in certain positions such as pilots (Britt et al., 2018). Behavioral health stigma, alongside more tangible obstacles like long wait times (Adler et al., 2020), contribute to the disparity between treatment need and treatment utilization among military personnel.

Social relationships are important facilitators of behavioral health and treatment seeking and can minimize the impact of barriers to care. Previous research demonstrates social support is beneficial for behavioral health and treatment seeking of military personnel (Adler et al., 2020; Welsh et al., 2015; Zinzow et al., 2013). Different sources of support likely have differential impacts on behavioral health, as effectiveness of support depends on the compatibility between support needs and support provided (e.g., Cutrona & Russell, 1990; Lakey & Orehek, 2011) and on the support provider's relevant experiences with the specific stressor the service member is facing (Thoits, 2011). Spousal and romantic relationships serve an important role for treatment seeking, as they are unique providers of social support for behavioral health (e.g., Walen & Lachman, 2000) and can assist service members in identifying their need for treatment (Adler et al., 2020; Rafferty et al., 2019), but most lack direct experience serving in the military.

Social relationships in the workplace are also highly impactful for mental health (Hammer et al., 2022). Peers serve a unique role as social support providers as they share

a military identity and cultural understanding. Unit support predicted perceptions of mental health stigma and barriers to care and attitudes toward treatment seeking among military personnel (Britt et al., 2020b). Supervisors specifically also play an important role in contributing to the mental health of subordinates. Resource utilization theory postulates that supervisors are crucial facilitators between employees and behavioral health resources, ultimately leading to improved behavioral health outcomes (Dimoff & Kelloway, 2016). Previous work found evidence for beneficial effects of supervisor support on daily well-being (Mohr et al., 2021) and for treatment seeking (Adler et al., 2020; Cheung et al., 2016). Research has yet to examine the direct effects of specific behavioral health supportive supervisor behaviors (e.g., instrumental support, role modeling and stigma reducing behaviors) on behavioral health service use, let alone their interactive effects with stigma and barriers to care.

As different sources of social support are likely to vary in the degree to which they buffer the effects of stigma and barriers to care on treatment seeking, due to their varying quality and compatibility of support from different sources, it is important to examine the interactive effects of different sources of social support and mental health stigma on behavioral health care utilization to inform and tailor intervention and prevention efforts. To investigate these facilitators and barriers to behavioral health care, a secondary data analysis was conducted utilizing data from the baseline assessment of the Resilience-Supportive Leadership Training (RESULT) study. RESULT included a leadership intervention aimed at improving resilience supportive behaviors of Army

leaders. Prior to the leader training, a baseline survey collection occurred and included data from $N = 2{,}185$ active-duty soldiers.

Different sources of support were expected to interact significantly with stigma and barriers to care, with varying magnitude, such that social support should minimize the detrimental effects of barriers on treatment seeking in this population. Supervisors are well-poised to connect their subordinates to available workplace resources (Dimoff & Kelloway, 2016), thus it is likely they function as a prominent facilitator of treatment seeking by reducing perceived organizational barriers to care. Unit members have direct experience with stressors service members are facing and therefore may provide tailored support and role model adaptive responses to specific stressors (Thoits, 2011), but also may perpetuate stigma regarding treatment seeking (True et al., 2015). For married service members, spouses have unique perspectives on the service member's daily emotional well-being and behavioral health symptoms exhibited by service members and can communicate treatment need to service members (Rafferty et al., 2019). Findings from this study aimed to inform future intervention work targeting service member behavioral health service utilization as different sources appear to be better suited to overcoming barriers than others.

Summary and Significance

Depression is the leading cause of disability worldwide (WHO, 2017) and has been increasing in prevalence in recent decades (Liu et al., 2020; WHO, 2022). Mental health symptoms have negative downstream consequences across multiple domains, including romantic relationships, work, and physical health (Kessler, 2012). Social

connection has the potential to be beneficial for health and well-being when it is compatible with support needs (Thoits, 2011) and promotes regulation of thoughts, emotions, and behavior (Lakey & Orehek, 2011), but thwarted belongingness can lead to an increased risk of adverse mental health outcomes, such as desire for suicide (Joiner, 2005; Van Orden et al., 2010). Social functioning also appears to be affected by mental health symptomology, whereas individuals with depression engage in socially maladaptive ways which elicit social rejection, erode social support, and ultimately perpetuate the chronicity of depression over time (Hames et al., 2013; Joiner, 2000).

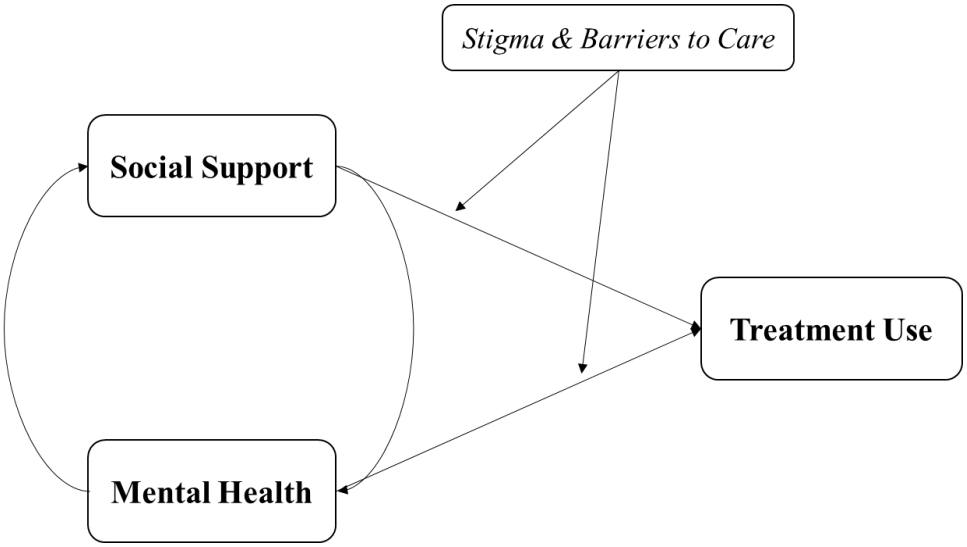
Times of increased stress and adversity are also detrimental for mental health and well-being (Ingram & Luxton, 2005). Therefore, the present dissertation utilized three samples facing high levels of stress, in occupations or experiencing events associated with increased adverse mental health outcomes, to examine the roles of different sources of social support and strain (e.g., spouse, family, friends, children, supervisor, peers) as they relate to mental health outcomes and treatment seeking. Different sources of social support should have varied effectiveness depending upon the nature of the relationship the support recipient has with the source of support (Thoits, 2011). As similar others with shared experiences are in a position to provide tailored advice and role model healthy coping behaviors (Thoits, 2011), their support is especially crucial in times of increased stress or adversity. Study 3 expanded upon previous research to examine the interactive effects of specific sources of social support and stigma and barriers to care on behavioral health treatment seeking. Social support has been hypothesized to be most beneficial when it is compatible, or well-matched, with support needs (Cutrona & Russell, 1990;

Lakey & Cohen, 2000). Much of the work examining the effects of social support on mental health has focused on global measures of support, therefore the present dissertation extended previous work by including multiple sources of support to examine their effects across different contexts.

The present dissertation elucidated the distinct effects of different sources of social support on mental health, as well as the interactive effects of different sources on stigma and barriers to care as they predicted treatment utilization. For interventions aimed at increasing utilization of behavioral health treatment, findings from the present study provided evidence for the moderating effects of PPR, informing approaches to specifically target spouses and romantic partners as they help attenuate the effects of barriers to care and stigma. Taken together, this series of studies provides new insights into the ways in which social relationships can be beneficial for one's mental health and facilitate treatment-seeking to improve mental health among high-risk groups.

Figure 1.1

Integrated Conceptual Model of Focal Constructs in the Present Dissertation



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CHAPTER II. MANUSCRIPT I. THREE-WAVE CROSS-LAGGED PANEL MODELS OF AGITATION AND PERCEIVED SOCIAL SUPPORT IN A SAMPLE OF EMPLOYED VETERANS

Abstract

Introduction. Social relationships are implicated in mental health and well-being. While some aspects of mental health have been examined over time, agitation has yet to be examined over time alongside social support from multiple sources.

Method. This study examined agitation and its temporal associations with social support from spouse, family, and friends, over a nine-month period using three-wave cross-lagged panel models in a sample of employed veterans from the Study for Employment Retention of Veterans (SERVe; Hammer et al., 2017).

Results. Results revealed stability of agitation across a nine-month period. Agitation was affected by multiple sources of support in independent CLPMs, specifically, agitation was impacted by one's relationships with spouse over three months ($\beta^* = -.11$, $SE = .05$, $p < .05$) and family over six months ($\beta^* = -.21$, $SE = .07$, $p < .05$). Social support from friends was not related to agitation longitudinally.

Conclusion. This study provided support for the stability of agitation and illuminated nuances in the temporal associations between agitation and social support from various sources. Results highlight the importance of examining these factors over time and targeting family and spousal support in future interventions targeting service member mental health.

Introduction

Suicide rates in the United States (US) have increased almost 30% since 1999 (Centers for Disease Control and Prevention, 2018), making it one of the leading causes of death in the US (Xu et al., 2018) and worldwide (World Health Organization, 2017). This problem is especially salient for veterans of the US Armed Forces, as their rates of suicide increased 25.9% from 2005 to 2016 (Office of Mental Health and Suicide Prevention, 2018). Compared to their civilian counterparts, veterans had a 1.5 times greater risk of suicide in 2020, controlling for gender and age (Office of Mental Health and Suicide Prevention, 2022). Suicide was a leading cause of death among veterans, the 13th leading cause overall, but the second leading cause for veterans under 45 years old (Office of Mental Health and Suicide Prevention, 2022). These rates have remained relatively stable among US veterans, or declined slightly, since the start of the COVID-19 pandemic (Doran et al., 2022), with no significant changes seen in rates of deaths by suicide, and slight declines in rates of suicide attempts (Doran et al., 2022) and suicidal ideation (Nichter et al., 2021). Prevalence of adverse mental health outcomes among military personnel have spurred a need for better understanding of suicidal behavior, mental health, and risk factors with the goal of improving mental health and preventing suicide.

Recent research on suicide risk has increasingly focused on high arousal emotional states such as agitation, an acute risk factor for suicide characterized by mental anguish and emotional turmoil (Ribeiro et al., 2011). In previous work, mental disorders most strongly associated with suicidal ideation and previous suicide attempts were those characterized by agitation and poor impulse control (Nock et al., 2010). Agitation is

distinct from depression (Bryan et al., 2014) and has a moderate, positive association with suicide attempts and death by suicide (Rogers et al., 2016). Most research on agitation, however, has been cross-sectional and can be strengthened by examining the stability of agitation and related factors over time. Work that has examined a longitudinal outcome of agitation has implicated agitation in predicting mental health service use among Army recruiter candidates (Hom et al., 2016). Agitation, insomnia symptoms, and hopelessness were found to be significant predictors of service members having a mental health visit 18 months later (Hom et al., 2016). This indicates that agitation can be motivating for military-connected individuals to seek treatment, above the effects of depressive symptoms and sleep problems. Agitation is an important factor to research on its own, as this work can inform interventions targeting treatment-seeking for military-connected individuals.

Social Relationships, Agitation, and Suicide Risk

Impact of Social Relationships on Mental Health and Suicide Risk. Social relationships are theorized to be a crucial component of mental health and suicide risk (Lakey & Orehek, 2011; Pietromonaco & Collins, 2017; Van Orden et al., 2010). Among US veterans during the first 10 months of the COVID-19 pandemic, lack of social support and declining quality of relationships during the pandemic were significant risk factors for new-onset suicidal ideation (Nichter et al., 2021). Pietromonaco and Collins (2017) proposed a framework linking close relationships to physical and mental health. Social connection and disconnection are thought to lead to physical and mental health through numerous intrapersonal mediators, including health behaviors and psychosocial

and emotional pathways. The interpersonal theory of suicide (Joiner, 2005; Van Orden, et al., 2010) proposed that thwarted belongingness, characterized by loneliness and a perceived lack of reciprocal close relationships, and perceived burdensomeness, the misperception that one is a burden on close others, lead to desire for suicide. Additionally, relational regulation theory (RRT; Lakey & Orehek, 2011) explains that social relationships allow for people to regulate their thoughts, feelings, and behaviors, directly effecting their mental health. Together, these theories substantiate the impact of social relationships and social support on mental health and suicide-related factors.

Among the characteristics or functions of social relationship, perceived social support, often measured in reference to one's general social network, has been shown to have beneficial effects for mental health and psychological well-being (Eagle et al., 2019; Skomorovsky, 2014; Wang et al., 2018). Research that has examined the effects of social support or social strain from specific connections (e.g., one's friends, coworkers, or family members), demonstrates there are distinct effects relative to global measures of support (Abbey et al., 1985; Skomorovsky, 2014). Specific sources may be better suited to address the specific support needs required by the situation, with compatibility of support needs and perceived support likely having differential impacts on well-being (e.g., stress-support matching hypothesis; Cutrona & Russell, 1990; Lakey & Cohen, 2000). Different sources of social support vary in the degree to which they have relevant experience with stressors an individual is facing, impacting the effectiveness of provided support (Thoits, 2011). Similar others (members of one's secondary social network) are in a unique position of providing support from a place of empathetic understanding, can

deliver advice tailored to the specific stressor veterans are facing, and role model adaptive responses (Thoits, 2011). Support efforts from significant others (intimates including spouse and family, who do not have direct experience with the stressor) provide valuable instrumental support and provisions of practical aid (Thoits, 2011), but support attempts have the potential to backfire and come off as generic or misguided if support providers do not have relevant experience with the specific stressor.

Previous research using military samples has also demonstrated beneficial yet distinct effects of different sources of support. Strong relationships with peers and family buffer some of the negative consequences of combat exposure, according to a review of research on military service members and veterans (Selby et al., 2010). Other work using military samples has suggested specific sources of support have distinct effects on mental health symptoms. Among Marine recruits, the effects of stress exposure on post-traumatic stress was moderated by military support and civilian support (e.g., from friends and family; Smith et al., 2013b). While both sources were significant moderators, their directions differed such that at high levels of military support the effect of stress exposure on post-traumatic stress symptoms was reduced, whereas at high levels of civilian support from family there was a stronger association between stress and post-traumatic stress symptoms. Specific sources of support have also been found to be beneficial for treatment-seeking, such that previous qualitative research found social support and leader support both helped facilitate soldiers' behavioral health treatment seeking (Zinzow et al., 2013).

Previous work on drinking motives, drinking behavior, and post-traumatic stress among veterans has found moderating effects of perceived social support from friends and family on the association between certain drinking motivations and alcohol consumption (McCabe et al., 2019). The effects of post-traumatic stress symptoms on drinking behavior was mediated by drinking motives, specifically those which focus on modifying one's internal state, with distinct moderation effects from social support from family and friends on the indirect effects of these models. Social support from friends significantly moderated mediation models linking post-traumatic stress symptoms, coping motives, and drinking behavior, such that perceiving greater support from friends attenuated this indirect effect (McCabe et al., 2019). Models testing social support from family as a moderator, alternatively, found that numerous drinking behaviors, including number of drinks consumed, heavy episodic drinking, and hazardous drinking, were associated with larger indirect effects, indicating complex influences of different sources of support on maladaptive coping behaviors among veterans. This research was cross-sectional, therefore longitudinal research is needed to parse apart the effects of different sources of support over time.

Although other aspects of mental health have been examined as outcomes of social factors, such as depression (Chou & Chi, 2003; Patten et al., 2010) and psychological distress (Mizuno et al., 2019), agitation has yet to be examined as an outcome of social support. If agitation functions similarly to other risk factors for suicide, it is likely that a lack of social support and poor-quality relationships will impact subsequent agitation, especially in high-risk groups like US veterans. Veterans likely

experience differential impacts of different sources of support on well-being and coping (McCabe et al., 2019; Selby et al., 2010; Smith et al., 2013b), and the effectiveness of social support depends on how well-matched support provision is with support needs (Cutrona & Russell, 1990). It is important for work to examine the effects of different sources of support to illuminate distinctions in their temporal associations with agitation.

Impact of Mental Health on Social Relationships. In addition to affecting mental health, social relationships can also be affected by mental health. The interpersonal theory of depression (Coyne, 1976), later expanded upon by Joiner (2000), elucidated interpersonal explanations for the chronic nature of depression. Depressed individuals are hypothesized to socially engage in maladaptive ways which produce interpersonal problems, which, in turn, perpetuate depressive symptoms and increase duration of depressive episodes (Joiner, 2000; Hames et al., 2013). Two specific rejection-eliciting behaviors depressed individuals are hypothesized to engage in include excessive reassurance seeking (Joiner et al., 1999; Joiner, & Schmidt, 1998) and negative feedback seeking (Joiner, 2000). Excessive reassurance seeking occurs when an individual turns to social connections to seek excessive reassurance of self-worth (Joiner et al., 1999), whereas negative feedback seeking is when an individual seeks social feedback that confirms and reinforces their negative self-concept (Joiner, 2000). Both behaviors are considered possible mechanisms for the chronicity of depression as these behaviors put depressed individuals at an increased risk of social rejection, ultimately leading to worse mental health (Joiner, 2000).

While the interactive effects of close relationships and social support on depression (Chou & Chi, 2003; Patten et al., 2010), suicidal ideation (Du et al., 2021; Endo et al., 2014), and psychological distress (Mizuno et al., 2019) have been examined over time, agitation has yet to be examined in relation to social support longitudinally. Previous work investigating psychological distress has found that perceived social support predicted psychological distress through coping self-efficacy in a sample of combat veterans (Smith et al., 2013a), suggesting social support facilitates coping and regulation, consistent with RRT (Lakey & Orehek, 2011). Longitudinal research examining the effects of perceived organizational support, the degree to which an individual believes their organization cares about their well-being, demonstrated that stigma partially mediated the association between organizational support and subsequent PTSD symptoms in a military sample (Kelley et al., 2014). Previous research has revealed that these aspects of mental health both influence and are influenced by social support over time, agitation has yet to be examined as an outcome of social support longitudinally in a veteran sample.

Present Study

Research on agitation has been predominantly cross-sectional (Rogers et al., 2016) and there is a need for more longitudinal research to understand related social factors and their interplay with agitation. While social support has been examined in relation to some outcomes among veterans (McCabe et al., 2019; Smith et al., 2013a), agitation has yet to be examined longitudinally alongside social support. It is unclear whether agitation is an outcome of low social support and thwarted belongingness, as

would be suggested by the interpersonal theory of suicide (Van Orden et al., 2010), or whether agitation is an antecedent of reductions in social support in response to behavioral changes that occur when an individual is highly agitated (e.g., hand wringing, physical displays of emotional turmoil, negative feedback seeking; Hames et al., 2013), or whether associations are bidirectional and reflect both of these processes. Much research that has examined factors associated with veteran social support focus on a single source of support (e.g., one's spouse) or a global measure of social support, but these sources are likely to have differential impacts on agitation over time, as they often do for other indicators of mental health (Cutrona & Russell, 1990; Smith et al., 2013b; Thoits, 2011).

Given previous theory explaining associations between mental health and social relationships (Coyne, 1976; Hames et al., 2013; Joiner, 2000), and the lack of research on the link between agitation specifically, the present study aims to investigate the temporal associations between agitation and social support from multiple sources in a sample of employed veterans. It is expected that results will reveal a bidirectional association between agitation and social support from different sources (e.g., both directions of cross-paths will be significant), as there is theoretical justification to support the effects of social support on mental health and suicide-related factors (Pietromonaco & Collins, 2017; Van Orden et al., 2010) as well as for the effects of mental health on social relationships and social support (Hames et al., 2013), and empirical support for bidirectional associations between other mental health indicators like depression (Patten et al., 2010), suicidal ideation (Du et al., 2021; Endo et al., 2014), and psychological

distress (Mizuno et al., 2019). Ultimately, these findings aim to inform future interventions targeting the mental health, suicide risk, and social relationships of veterans and military-connected individuals, specifically by revealing the potential role different social support providers can play in supporting veterans and promoting their mental health.

Materials & Methods

Participants and Procedures

Participants ($N = 497$) were recruited from 35 organizations across Oregon and Southwest Washington, USA to participate in the Study for the Employment Retention of Veterans (SERVe; Hammer et al., 2017). The SERVe project was a Randomized Controlled Trial (RCT) funded by the Department of Defense that evaluated the effectiveness of a veteran-supportive supervisor training that aimed to train supervisors to better support their veteran employees as they transition to the civilian workforce (VSST; Hammer et al., 2019). All participants were currently employed and working at least 20 hours a week. Participants were required to have served in any branch of the US military after 9/11. Veterans completed a baseline survey, the supervisor intervention was implemented, then participants completed three-month and nine-month follow-up surveys. All measures were included every wave, which were completed online via Qualtrics©2013 (Provo, Utah). All research activities in the current study were approved and overseen by Portland State University's IRB, and the U.S. Army Medical Research and Materiel Command, Human Research Protection Office.

The average age of veterans in the study was 38.9 years (*SD* = 9.3, range = 21 to 68), and 88.5% of the sample was male. Most of the participants were married (82%), white (86%), and had on average one child (*M* = 1.17, *SD* = 1.23). Most of the participants were separated active duty (47.7%) or separated from National Guard or Reserves (34.7%), but a smaller portion were still active in the National Guard or Reserves (17.6%). Additionally, veterans had been separated from the military and average of 6.20 years (*SD* = 3.51), and most had deployed at least once (87.9%).

Measures

Agitation. The Brief Agitation Measure (BAM; Ribeiro et al., 2011) was used to measure self-reported agitation in the last week. This three-item measure included the items "I want to crawl out of my skin," "I feel so stirred up inside I want to scream," and "I feel a lot of emotional turmoil in my gut." These items were rated on a 7-point Likert scale ranging from 1 (Not True At All) to 7 (Certainly True). At all three waves BAM had good internal reliability, baseline $\alpha = .89$, three-month $\alpha = .91$, and nine-month $\alpha = .88$.

Perceived Partner Responsiveness. Perceived partner responsiveness (PPR), a measure of one's perception of their partner's support and relationship quality, was assessed using three items (Laurenceau et al., 1998; O'Neill et al., 2020) asked to partnered participants. Participants were asked to rate the degree to which their spouse/partner made them feel "accepted," "understood," and "cared for" on a Likert-type scale that ranged from 1 (not at all) to 7 (very much). This measure had good reliability across waves, baseline $\alpha = .93$, three-month $\alpha = .93$, and nine-month $\alpha = .92$.

Perceived Social Support from Family and Friends. Perceived social support was measured using a 14-item short form (Rice & Longabaugh, 1996), with two 7-item subscales, adapted from the Perceived Social Support Scale (Procidano & Heller, 1983). Participants responded to one subscale with items in reference to one's family, and another in reference to one's friends on a scale from 1 (strongly disagree) to 5 (strongly agree). Items included: "my [friends/family] give me the moral support I need" and "my [friends/family] are sensitive to my personal needs." Both subscales showed good reliability across waves, family: baseline $\alpha = .93$, three-month $\alpha = .91$, and nine-month $\alpha = .90$; friends: baseline $\alpha = .92$, three-month $\alpha = .92$, and nine-month $\alpha = .93$.

Demographics and Covariates. Participants reported their gender (male = 0, female = 1), age in years, educational attainment (1 = less than high school to 5 = graduate study in progress/completed), relationship length in years (if partnered), and race/ethnicity (0 = nonwhite, 1 = white). Two dummy codes were computed to indicate whether the participant was separated active duty (SAD), separated National Guard/Reservists (NG/R), or active NG/R, with SAD coded as the reference group. These were used as covariates in cross-lagged panel models. As this is part of a larger intervention study which occurred between the baseline and three-month surveys, intervention effects were taken into account in SEM analyses, described further in the analysis plan.

Analysis Overview

Descriptive statistics were computed using IBM SPSS Statistics Version 28. Dropout patterns were investigated and the most common dropout pattern was

participants who completed only baseline and three-month waves (n = 83, 16.80%), followed by participants who only completed the baseline wave (n = 53, 10.73%), and those who were missing only three-month (n = 4, 0.81%). To investigate factors related to missingness, a variable was computed to indicate whether participants completed all waves or not and bivariate correlations were computed with covariates. Participants were more likely to complete all waves if they were more educated (r = .12, p = .011), white (r = .14, p = .003), older (r = .16, p = .001), in longer relationships (r =.10, p = .044), and reported greater PPR (r =.12, p = .027). Intraclass correlation coefficients (ICCs) were also computed for main measures to investigate possible clustering by organization and were overall quite small (all ICCs < .03, see Table D1 in Appendix D for all ICCs) and although they have the potential to bias standard errors (Barcikowski, 1981), they are not expected to have large impacts, therefore multilevel approaches were not used. Because data were collected as part of a larger intervention study (Hammer et al., 2019), standardized residuals were computed for each item from the measures used in the CLPM as predicted by intervention condition. This allowed for intervention effects to be accounted for while also standardizing items prior to being used in subsequent analyses.

Structural equation modeling (SEM) was used to estimate models in Mplus Version 8.5 (Muthén & Muthén, 2019). Missing data estimation (FIML) was utilized in SEM analyses as it has been found to produce more accurate standard errors and fit statistics than listwise deletion (Yuan & Bentler, 2000), as listwise deletion assumes normally distributed data and missing completely at random missing data patterns (MCAR), which are often violated in practice. Due to mild to moderate skew and

kurtosis, FIML for missing data with robust standard errors and scaled chi-square and fit statistics (MLR estimator in Mplus) were used in SEM analyses in order to adequately correct standard errors and fit statistics given sufficient sample size (Yuan & Bentler, 2000). Prior to analysis of CLPM models, CFAs of main study measures, agitation, PPR, social support from friends, and social support from family, were conducted to investigate measurement models across waves.

Social support from friends, social support from family, and perceived partner responsiveness were tested in separate cross-lagged panel models with agitation, first testing two-wave models (Model 1a, baseline to three-month and Model 1b, three-month to nine-month), testing a three-wave model (Model 2), then the three-wave model adjusted for covariates (Model 3). Covariates included gender, age, education, race/ethnicity, and two dummy codes distinguishing SAD, SNG, and ANG. Correlated errors were specified between the same items in measures across waves. Cross-lagged panel models are intended to investigate evidence for temporal precedence when working with non-experimental designs and panel survey data (Kenny, 2005; Kenny & Harackiewicz, 1979; Newsom, 2016), as associations between variables account for baseline levels of both variables. The stability of each construct is revealed in the autocorrelations between the baseline and follow-up measures of the same construct. Standardized cross-lagged effects are examined to better understand temporal sequencing of measures.

Results

Preliminary Analyses

Descriptive Statistics. Means, standard deviations, and bivariate correlations between main study measures and covariates are presented in Table 2.1. Bivariate correlations revealed negative associations between agitation at each wave and PPR, social support from family, social support from friends, age, education, and relationship length, such that greater social support, older age, greater education, and longer relationships were associated with lower levels of agitation.

Confirmatory Factor Analyses. In order to evaluate measures used in CLPM models, single-factor CFAs were computed for each measure at each wave with detailed results reported in Tables D2-D5. As both agitation and PPR were three item measures, only standardized loadings are reported as models are just identified. Standardized loadings can provide valuable information about the internal reliability of the measure and values above .4 are often considered of acceptable magnitude (e.g., Comrey & Lee, 1992). Standardized loadings were all well above acceptable range ($\beta^* = .73\text{-}.94$) and significant for agitation across all waves. PPR was also a three-item measure with high standardized loadings in CFAs of each wave ($\beta^* = .84\text{-}.95$).

Social support from family and social support from friends were also investigated with CFAs. Fit indices mostly indicated good fit of the social support from family factor across waves, with significant chi-square tests of model fit in all 3 waves, (baseline $\chi^2(14) = 57.40$, $p < .001$, 3-month $\chi^2(14) = 44.70$, $p < .001$, 9-month $\chi^2(14) = 67.44$, $p < .001$), RMSEA values were just above acceptable fit values recommended by Hu & Bentler (1999) (baseline = .079, three-month = .073, and nine-month = .103), however both CFI (baseline = .987, three-month = .989, and nine-month = .974) and SRMR

(baseline = .015, three-month = .019, and nine-month = .025) indicated good model fit. Standardized loadings were high for items 1-6 (β* = .80-.94), where item seven had borderline standardized loadings but was retained to keep this measure consistent with the social support from the friends subscale.

Similar to social support from family, social support from friends had mixed support for good model fit, with significant chi-square tests of model fit as expected (baseline $\chi^2(14) = 85.45$, $p < .001$, three-month $\chi^2(14) = 46.04$, $p < .001$, and nine-month = 79.71, $p < .001$), RMSEA values outside the range of good fit (baseline = .102, three-month = .074, and nine-month = .115), but both CFI (baseline = .971, three-month = .985, and nine-month = .965) and SRMR (baseline = .026, three-month = .019, and nine-month = .027) values indicated good fit across waves. All standardized loadings were of acceptable magnitude (β* = .68-.90). Due to results of CFAs, factor models were retained and utilized in subsequent CLPMs.

Cross-Lagged Panel Model Results

Agitation and Perceived Partner Responsiveness. Full results from CLPMs investigating agitation and PPR are presented in Table 2.2. All models had good fit according to Hu and Bentler (1999) guidelines (RMSEA range = .034-.053, CFI range = .974-.982, and SRMR range = .035-.047). Models all had significant chi-square tests of model fit, however this measure is sensitive to sample size. First, a two-wave CLPM was computed with agitation and PPR from baseline to three-month (Model 1a), providing evidence for stability of both constructs over time, agitation autocorrelation: β* = .74, *SE* = .09, $p < .001$, PPR autocorrelation: β* = .78, *SE* = .08, $p < .001$. Due to the difference

in length of lags between waves, Model 1b was tested to investigate the same two-wave CLPM with three-month and nine-month waves in order to investigate possible differences between lag duration. Similar to Model 1a, autocorrelations in Model 1b were significant and positive, with similar magnitude for PPR (β* = .83, *SE* = .09, $p < .001$) but a reduction in magnitude seen for agitation (β* = .57, *SE* = .07, $p < .001$). When these waves were incorporated into the same model (Model 2), the pattern of results did not change, with significant stability paths but non-significant cross-paths. When covariates were incorporated in Model 3, a cross-path emerged as significant, such that baseline PPR was negatively associated with three-month agitation (β* = -.11, *SE* = .05, $p = .046$). Results of this set of models provide support for the stability of agitation and PPR over all three waves. Additionally, PPR appears to be beneficial for subsequent agitation when measured three months later, but not over a longer lag (e.g., six months), and only when adjusted for covariates.

Agitation and Perceived Social Support from Friends. Full results from CLPMs investigating agitation and friend support are presented in Table 2.3. All models had good fit (RMSEA range = .031-.046, CFI range = .948-.985, and SRMR range = .036-.049). Results of Model 1a, a two-wave CLPM over three months, provided evidence for stability of agitation (β* = .75, *SE* = .09, $p < .001$) and social support from friends (β* = .66, *SE* = .06, $p < .001$), but no cross-paths were significant. This pattern of results was consistent with Model 1b, with similar magnitude of stability (agitation: β* = .63, *SE* = .07, $p < .001$; social support from friends: β* = .73, *SE* = .06, $p < .001$). When incorporated into a three-wave model, Model 2, results are consistent with Model 1a and

1b. When adjusted for covariates, there are no changes in the pattern of results. Results of this set of models indicate that both agitation and social support from friends are stable over time, yet do not appear to mutually influence each other over and above the effects of baseline agitation and support.

Agitation and Perceived Social Support from Family. Full model results of CLPMs of agitation and social support from family are presented in Table 2.4. All models including social support from family had good model fit according to Hu and Bentler (1999) recommendations, (RMSEA range = .034-.053, CFI range = .974-.982, SRMR range = .035-.047). Model 1a, testing a two-wave CLPM between baseline and three-month waves, had significant autocorrelations indicating stability over three months (agitation: $\beta^* = .75$, $SE = .09$, $p < .001$; social support from family: $\beta^* = .70$, $SE = .06$, $p < .001$). Additionally, baseline agitation was negatively related to three-month social support from family, $\beta^* = -.10$, $SE = .06$, $p = .047$, indicating that participants who reported higher levels of baseline agitation received less social support from family three months later. Model 1b, testing the same model as 1a but over a six-month lag, also had evidence of stability (agitation: $\beta^* = .59$, $SE = .07$, $p < .001$; social support from family: $\beta^* = .73$, $SE = .06$, $p < .001$), however the opposite cross-path from that found to be significant in model 1a was significant in this model. Social support from family at three months was negatively and significantly associated with nine-month agitation, $\beta^* = -.14$, $SE = .05$, $p = .034$. In Model 2, all three waves are included in the same model and the pattern of results is consistent with Model 1a and Model 1b, including significant cross-paths.

When covariates were incorporated in Model 3, the path between baseline agitation and three-month family support was no longer significant (β* = -.08, *SE* = .07 *p* = .176), but the path between three-month social support from family and nine-month agitation remained significant and increased slightly in magnitude (β* = -.21, *SE* = .06, *p* = .002). Stability paths were significant and of similar magnitude to unconditional models (baseline to three-month: agitation: β* = .80, *SE* = .09, $p < .001$; social support from family: β* = .66, *SE* = .08, $p < .001$; three-month to nine-month; agitation: β* = .58, *SE* = .08, $p < .001$; social support from family: β* = .69, *SE* = .07, $p < .001$). Results of these models suggest a robust association between three-month social support from family and nine-month agitation, but not when measured at a shorter lag length, indicating the effects of family support on agitation may take numerous months for the benefits to be measurable, while effects of baseline agitation on three-month social support were no longer significant when covariates were added and thus appear to be a less robust effect.

Discussion

This study was the first to examine agitation and social support from multiple sources in a community veteran sample utilizing longitudinal SEM. Social relationships and agitation have previously been identified as acute warning signs for suicide (e.g., Rudd et al., 2006), but their stability and temporal associations had not yet been examined, especially in a veteran sample. Results indicated that agitation, partner responsiveness, social support from friends and family were all stable over the nine-month study period. The effects of different sources of support varied in their temporal

associations with agitation. Additionally, effects appear to vary according to length of lags between waves, as three months separated first and second waves, whereas six months separated second and third waves. Agitation was impacted by one's perceived spouse responsiveness over three months and family over six months. Social support from friends was not related to agitation longitudinally regardless of measurement interval.

Results suggest that if a veteran is experiencing high levels of agitation they are likely to continue to report high agitation levels months later. This has important implications for interventions targeting agitation and mental health, as this supports the persistence of emotional states like agitation over a nine-month period, indicating that there may be a substantial window of time to identify at-risk individuals and to intervene. Military-connected individuals are more likely to seek help for physical health issues than mental health issues (Britt, 2000). This can be at least partially attributed to stigma around mental illness and help-seeking, which has been identified as a substantial barrier to seeking mental health care among veterans and military connected individuals (Coleman et al., 2017). While longitudinal research on agitation is limited, what has been done has suggested that among military samples, both social support (Zinzow et al., 2013) and agitation (Hom et al., 2016) predictor future mental health visits. Thus, it is possible that stability of agitation and social support over time may lead to greater opportunity for veterans to be motivated to pursue mental health visits, be screened for agitation and other known suicide risk factors, receive necessary professional support, and access resources.

Agitation was impacted by partner responsiveness over three-months and social support from family over six-months, demonstrating the beneficial effects of spousal and family support on subsequent agitation. RRT suggests social relationships benefit mental health and well-being as they serve as a tool to help us regulate emotions, thoughts, and behaviors (Lakey & Orehek, 2011). Findings from the present study are mostly consistent with research demonstrating the beneficial effects of social support and close relationships on mental health using general measures of support on well-being (Eagle et al., 2019; Skomorovsky, 2014; Wang et al., 2018), with the exception of friend support. Other work using a veteran sample demonstrated that social support predicted coping efficacy, which, in turn, predicted psychological distress (Smith et al., 2013a). Findings from the present study are consistent with the notion that specific sources of social support facilitate coping and emotion regulation, ultimately promoting mental health and treatment seeking.

Findings revealed that veterans who were more agitated at baseline perceived significantly less social support from family three months later. It is possible that agitation may function similarly to depression as described by the interpersonal theory of depression (Coyne, 1976; Joiner et al., 1999; Joiner, 2000). Agitation may lead to poorer social functioning, which may illicit social rejection, leading to reduced support quality. Alternatively, it is possible that received family support remains consistent, but veterans who are experiencing poorer mental health may experience variations in their perceptions of family support, as previous research has indicated that receipt and perception of social support are overlapping but distinct (Haber et al., 2007; Smith et al., 2013a). Future

research should examine whether agitation and perceived social support from multiple sources may be associated with negative feedback seeking and excessive reassurance seeking. The temporal association between agitation and subsequent family support was only found without covariates, and this suggests family members may be withdrawing from veteran family members in response to their agitation, these effects appear to be at least partially explained by covariates. The effects of agitation on social relationships should be examined in future work to see if agitation may be socially maladaptive for family relationships or social functioning more broadly.

The present study is not without limitations. When utilizing a cross-lagged approach to investigating temporal associations, having incorrect lags between waves may bias cross-lagged estimates (Newsom, 2016), thus it is possible that the length of lags in the present study may be biased. Associations between agitation and social support may be stronger or significant if examined at shorter intervals, as evidenced by the differences in magnitude of stability of agitation seen over three- versus six-month lags, and future work should examine this. There also are limitations to the generalizability of results because the sample utilized is a majority male and white sample. Although these sample characteristics may reflect the overall gender breakdown of U.S. Veterans (Department of Defense, 2017), it limits generalizability to female veterans and minority veterans. Female veterans also have especially high rates of suicide compared to their civilian counterparts (Office of Suicide Prevention, 2016), such that female veterans had a 250 percent higher rate of suicide than their civilian counterparts. Thus, it is especially important that future research focuses on experiences of female veterans.

In conclusion, social support and social relationships have been shown to be impactful to mental health and well-being in previous research (Eagle et al., 2019; Skomorovsky, 2014; Wang et al., 2018) and results of the present study provide additional evidence to support this. The present study utilized SEM over three waves of data in a sample of employed veterans to investigate temporal associations between agitation and social support from spouse, family, and friends, and has noteworthy implications for suicide prevention strategies with veterans that target social connectedness. This present study informs current suicide prevention efforts as agitation and social support were stable over a nine-month period, this suggests a months-long window to intervene, which could allow for more high-risk veterans to be identified or seek treatment. While evidence for a bidirectional association between these factors was inconclusive, what was found continues to highlight the importance of social relationships, specifically from spouse and family, for veterans as they manage their mental health and well-being in civilian life.

Table 2.1

Correlations and Descriptive Statistics

	Mean	*SD*	1.	2.	3.	4.	5.
1. Baseline Agitation	-.029	.74	--				
2. 3-Month Agitation	.002	.92	.78***	--			
3. 9-Month Agitation	.061	.69	.67***	.64***	--		
4. Baseline PPR	-.041	.91	-.38***	-.41***	-.35***	--	
5. 3-Month PPR	-.070	1.00	-.39***	-.49***	-.41***	.83***	--
6. 9-Month PPR	-.001	1.05	-.39***	-.40***	-.49***	.81***	.81***
7. Baseline SSfr	.082	.89	-.37***	-.30***	-.27***	.37***	.33***
8. 3-Month SSfr	.208	.87	-.29***	-.35***	-.25***	.33***	.42***
9. 9-Month SSfr	.138	.87	-.28***	-.29***	-.35***	.32***	.35***
10. Baseline SSfm	-.074	.81	-.29***	-.25***	-.32***	.57***	.51***
11. 3-Month SSfm	.063	.84	-.28***	-.34***	-.39***	.48***	.63***
12. 9-Month SSfm	-.114	.76	-.32***	-.33***	-.41***	.53***	.55***
13. Gender	.138	.35	.06	.05	.06	.03	.02
14. Age	38.86	9.30	-.23***	-.19***	-.21***	.02	-.01
15. Education	3.72	.80	-.21***	-.15**	-.09	-.10*	.08
16. Rel Length	11.52	8.37	-.20***	-.17**	-.16**	.04	-.02
17. White	.860	.35	-.02	0.00	.01	-.03	-.04
18. SAD_SNG	.348	.48	-.04	-.04	.01	-.07	-.10*
19. SAD_ANG	.185	.39	-.11*	-.09	-.06	.13**	.17***

	6.	7.	8.	9.	10.	11.	12.
6. 9-Month PPR	--						
7. Baseline SSfr	.31***	--					
8. 3-Month SSfr	.35***	66***	--				
9. 9-Month SSfr	.40***	.63***	.77***	--			
10. Baseline SSfm	.49***	.46***	.38***	.38***	--		
11. 3-Month SSfm	.53***	.36***	.51***	.44***	.67***	--	
12. 9-Month SSfm	.66***	.37***	.40***	.53***	.72***	.70***	--
13. Gender	.09*	.06	.17**	.10	.02	.02	-.02
14. Age	.01	.04	.003	.02	-.02	-.03	.02
15. Education	.07	.11*	.06	0.00	.09	.12*	.06
16. Rel Length	.02	.03	.04	.02	.01	.02	.07
17. White	-.01	-.04	-.01	.003	-.05	-.02	-.04
18. SAD_SNG	-.09	.04	.03	.01	-.04	.01	-.06
19. SAD_ANG	.10*	.19***	.15**	.09	.12**	.16***	-.06

	13.	14.	15.	16.	17.	18.
13. Gender	--					
14. Age	-.13**	--				
15. Education	.09	.19***	--			
16. Rel Length	-.05	.61***	.03	--		
17. White	-.11	.04	.01	.06	--	
18. SAD_SNG	-.08	.20***	.06	.13*	.04	--
19. SAD_ANG	-.01	-.04	.12*	.02	.03	-.35***

Note. Agitation, PPR, SSfr, and SSfm are all latent variables with results presented from Mplus. SSfr = social support from friends, SSfm = social support from family, PPR = perceived partner responsiveness, SAD = separated Active Duty, SNG = separated National Guard/reserves, ANG = active National Guard/reserves.

Table 2.2

Results of CLPM of Agitation and Perceived Partner Responsiveness Over 3 Waves, Unconstrained

	3-Month Agitation			3-Month PPR			9-Month Agitation			9-Month PPR		
	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*
Model 1a												
Baseline Agitation	.84***	.09	.74	-.09	.07	-.07	--	--	--	--	--	--
Baseline PPR	-.07	.05	-.07	.82***	.08	.78	--	--	--	--	--	--
Model 1b												
3-Month Agitation	--	--	--	--	--	--	.49***	.07	.57	.05	.08	.04
3-Month PPR	--	--	--	--	--	--	-.13	.07	-.16	.90***	.09	.83
Model 2												
Baseline Agitation	.87***	.09	.77	-.08	.07	-.06	--	--	--	--	--	--
Baseline PPR	-.04	.05	-.05	.84***	.08	.80	--	--	--	--	--	--
3-Month Agitation	--	--	--	--	--	--	.52***	.07	.61	.05	.08	.04
3-Month PPR	--	--	--	--	--	--	-.12	.07	-.17	.92***	.09	.86
Model 3												
Baseline Agitation	.89***	.10	.77	-.09	.07	-.07	--	--	--	--	--	--
Baseline PPR	-.10*	.05	-.11	.90***	.06	.82	--	--	--	--	--	--
3-Month Agitation	--	--	--	--	--	--	.49***	.08	.60	.06	.09	.05
3-Month PPR	--	--	--	--	--	--	-.08	.06	-.12	.91***	.09	.87
Gender	.01	.10	.01	-.02	.11	-.01	.04	.10	.02	.22*	.10	.07
Age	-.00	.004	-.02	.001	.01	.01	-.01	.01	-.10	.002	.01	.02
Education	.04	.04	.04	-.02	.04	-.02	.03	.05	.03	-.004	.05	-.003
Relationship Length	0.0	.004	.003	-.01	.01	-.07	-.001	.004	-.02	.004	.01	.03
White	.04	.10	.02	-.05	.11	-.02	.02	.09	.01	.09	.11	.03
SAD_SNG	-.03	.07	-.02	-.05	.09	-.02	.07	.09	.05	-.04	.11	-.02
SAD_ANG	-.07	.07	-.003	.14	.09	.06	.03	.09	.02	-.12	.09	-.05

Note. Model 1 $N = 494$, Model 2 $N = 494$, Model 3 $N = 399$. PPR = perceived partner responsiveness, SAD = separated Active Duty, SNG = separated National Guard/reserves, ANG = active National Guard/reserves.

Table 2.3

Results of CLPM of Agitation and Social Support from Friends Over 3 Waves, Unconstrained

	3-Month Agitation			3-Month SSfr			9-Month Agitation			9-Month SSfr		
	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*
Model 1a												
Baseline Agitation	.85***	.09	.75	-.05	.06	-.05	--	--	--	--	--	--
Baseline SSfr	-.05	.05	-.05	.66***	.06	.66	--	--	--	--	--	--
Model 1b												
3-Month Agitation	--	--	--	--	--	--	.54***	.07	.63	-.04	.06	.04
3-Month SSfr	--	--	--	--	--	--	-.02	.05	-.03	.80***	.06	.73
Model 2												
Baseline Agitation	.88***	.09	.78	-.04	.07	-.03	--	--	--	--	--	--
Baseline SSfr	-.05	.05	-.05	.67***	.06	.68	--	--	--	--	--	--
3-Month Agitation	--	--	--	--	--	--	.58***	.08	.70	-.04	.06	.04
3-Month SSfr	--	--	--	--	--	--	-.003	.05	-.004	.81***	.06	.79
Model 3												
Baseline Agitation	.93***	.09	.82	-.08	.07	-.07	--	--	--	--	--	--
Baseline SSfr	-.01	.05	-.01	.64***	.07	.65	--	--	--	--	--	--
3-Month Agitation	--	--	--	--	--	--	.53***	.09	.67	-.04	.07	-.04
3-Month SSfr	--	--	--	--	--	--	-.02	.05	-.02	.78***	.06	.80
Gender	.004	.10	.002	.38**	.11	.15	.03	.11	.02	-.06	.10	-.03
Age	-.001	.004	-.01	-.003	.01	-.03	-.01	.01	-.08	.01	.01	.05
Education	.04	.03	.04	-.05	.05	-.04	.04	.05	.05	-.06	.04	-.06
Relationship Length	0.0	.004	.002	.003	.01	.02	-.001	.004	-.02	-.01	.01	-.05
White	.04	.10	.02	.09	.11	.03	.05	.09	.03	.02	.12	.01
SAD_SNG	-.01	.07	-.004	.05	.08	.03	.07	.09	.05	-.05	.08	-.03
SAD_ANG	-.01	.08	-.01	.06	.11	.03	.02	.09	.01	-.07	.10	-.03

Note. Model 1 $N = 494$, Model 2 $N = 494$, Model 3 $N = 399$.

SSfr = social support from friends, SAD = separated Active Duty, SNG = separated National Guard/reserves, ANG = active National Guard/reserves.

Table 2.4

Results of CLPM of Agitation and Social Support from Family Over 3 Waves, Unconstrained

	3-Month Agitation			3-Month SSfm			9-Month Agitation			9-Month SSfm		
	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*
Model 1a												
Baseline Agitation	.84***	.09	.75	-.12*	.06	-.10	--	--	--	--	--	--
Baseline SSfm	-.08	.05	-.09	.70***	.06	.70	--	--	--	--	--	--
Model 1b												
3-Month Agitation	--	--	--	--	--	--	.50***	.07	.59	-.08	.05	-.08
3-Month SSfm	--	--	--	--	--	--	-.11*	.05	-.14	.70***	.06	.73
Model 2												
Baseline Agitation	.85***	.08	.76	-.12*	.07	-.10	--	--	--	--	--	--
Baseline SSfm	-.09	.05	-.09	.71***	.06	.71	--	--	--	--	--	--
3-Month Agitation	--	--	--	--	--	--	.52***	.07	.62	-.08	.05	-.08
3-Month SSfm	--	--	--	--	--	--	-.10*	.05	-.13	.72***	.06	.75
Model 3												
Baseline Agitation	.92***	.09	.80	-.09	.07	-.08	--	--	--	--	--	--
Baseline SSfm	-.03	.06	-.03	.68***	.08	.66	--	--	--	--	--	--
3-Month Agitation	--	--	--	--	--	--	.47***	.08	.58	-.09	.06	-.10
3-Month SSfm	--	--	--	--	--	--	-.17**	.06	-.21	.63***	.07	.69
Gender	.01	.10	.004	.01	.12	.01	.04	.09	.02	-.08	.10	-.04
Age	-.001	.004	-.02	-.01	.01	-.06	-.01	.01	-.12	0.001	.01	.01
Education	.04	.04	.04	.03	.04	.03	.04	.05	.05	-.02	.04	-.02
Relationship Length	0.0	.004	.004	.002	.01	.02	0.0	.004	-.01	.01	.01	.05
White	.05	.10	.02	.02	.10	.01	.02	.08	.01	-.06	.11	-.03
SAD_SNG	-.01	.08	-.01	.12	.08	.07	.09	.09	.06	-.16*	.08	-.10
SAD_ANG	-.01	.08	-.004	.19*	.09	.09	.05	.09	.03	-.18	.10	-.09

Note. Model 1 N = 494, Model 2 N = 494, Model 3 N = 399. SSfm = social support from family, SAD = separated Active Duty, SNG = separated National Guard/reserves, ANG = active National Guard/reserves.

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CHAPTER III. MANUSCRIPT II. SOCIAL SUPPORT AND SOCIAL STRAIN AS PREDICTORS OF DEPRESSIVE SYMPTOM TRAJECTORIES FOLLOWING A MARITAL TRANSITION

Abstract

Objectives. Studies demonstrate that marital transitions (like divorce and widowhood) are stressful events that can impact older adults' mental health. This study investigated which social support and social strain factors relate to trajectories of depressive symptoms following a marital transition. *Method.* Depressive symptoms were measured over ten years in the Health and Retirement Study (HRS, 2006-2016; N = 377, mean age = 67.55 years). Piecewise latent growth curve models tested whether social support and strain measured prior to transition predicted post-transition depressive symptoms trajectories, after controlling for age, sex, race/ethnicity, education, wealth, and chronic conditions. *Results.* On average, depressive symptoms decreased following a martial transition ($\alpha_{Post\text{-}MT}$ = -.12, SE = .04, p = .001) reflecting a general pattern of recovery. Of the multiple sources of social support and strain (spouse, family, friends, children), only social support from spouse and social support from friends was associated with recovery trajectories (spouse: β = .35, SE = .12, p = .003; friends: (β = -.24, SE = .10, p = .02). *Discussion.* Results highlight the importance of social support from friends in aiding the mental health recovery of older adults experiencing a marital transition. Those who reported the most support from their spouse prior to marital transition experienced a more difficult mental health recovery, suggesting they may be possible avenues for formal support interventions.

Social Support and Social Strain as Predictors of Depressive Symptom Trajectories Following a Marital Transition

Marital transitions (MTs), including divorce and widowhood, are stressful experiences, particularly in late life. The rates of divorce among adults aged 50 years and older have been increasing (Brown & Lin, 2012), in line with cultural shifts around marriage, divorce, cohabitation, and changes in women's participation in the labor force (Raley & Sweeny, 2020). As divorce becomes more common among older adults, there has been increasing interest in distinguishing between various kinds of MTs older adults may experience and moving beyond a historical focus on widowhood (e.g., Lin & Brown, 2020). Literature examining the impacts of both widowhood and divorce suggests that both experiences lead to short-term declines in mental health and well-being with far-reaching long-term impacts on one's mental health that may take a period of years to reach a full recovery (Kristiansen et al., 2019), with significant heterogeneity in recovery trajectories (Sbarra, 2015). To identify who is at greatest risk of a difficult mental health recovery from spousal loss, it is important to understand possible explanations for heterogeneity in recoveries, such as differences in the quality of social relationships.

Social relationships can be a source of social support, which can promote and protect health and well-being, as well as a source of social strain, which can have detrimental effects on physical (Newsom et al., 2022) and psychological health (Rook, 2015). Social support and social strain independently impact mental health, such that social strain may overpower the beneficial effects of social support (Newsom et al., 2005). Additionally, different relationships across a person's social network (e.g., spouse,

friends, family) can provide different levels of support given their degree of experience with relevant stressors (Thoits, 2011). Although some aspects of different forms of social support have been examined in relation to psychological health after MTs (Amato & Hohmann-Marriott, 2007; Gustavson et al., 2014), the influence of social support and social strain have yet to be investigated as explanations for variability in depression trajectories after MTs.

Mental Health Trajectories Before and After a Marital Transition

A meta-analysis of cross-sectional research found depression occurs most frequently the first month after widowhood, with a pooled prevalence estimate of 38.2% the first month, and a lower pooled prevalence estimate of 10.5% for those who experienced widowhood 2-5 years prior. These findings show a gradual adjustment to widowhood over several years, with a minority still experiencing depressive symptoms up to 5 years later (Kristiansen et al., 2019). Other work (e.g., Umberson et al., 1992) found that older adults who experienced MTs are at increased risk of mental health difficulty (specifically, higher depression) relative to their older adult counterparts who did not experience a transition (i.e., those who remained single or married). These point-in-time studies, however, cannot provide insights into the course of recovery as longitudinal data can.

Although divorce and widowhood are often measured as discrete transitions, they are, in fact, discrete representations of an unfolding process which begins prior to transition and continues long after. One approach to examining these unfolding processes is to estimate trajectories of mental health and well-being leading up to and following

divorce and widowhood (e.g., Lin et al., 2019; Sasson & Umberson, 2014), allowing for an understanding of the average recovery rate and individual variation, as well as associations between level and rate of change over time. Research examining the trajectories of mental health surrounding widowhood has demonstrated that, consistent with cross-sectional findings, older adults tend to experience an acute short-term reduction in mental health followed by a gradual recovery. Sasson and Umberson (2014) examined depressive symptoms following widowhood among older adults using 8 waves of data from the Health and Retirement Study (HRS). Increases in depressive symptoms were present immediately after widowhood, followed by a gradual decrease in symptoms over multiple years. Similar patterns of recovery have been documented among adults surrounding their divorce (Lorenz et al; 2006).

Recent work on mental health recovery after MTs among older adults has modeled these trajectories simultaneously to assess similarities and distinctions in the mental health effects of divorce and widowhood. Lin and colleagues (2019) jointly examined mental health trajectories of divorced and widowed adults using HRS data (Heeringa & Conner, 1995). Results indicated similar patterns of initial increase in depressive symptoms with a gradual decrease that occurs over a multi-year period, ultimately returning to pre-transition levels of depressive symptoms. In response to these results (Lin et al., 2019), the convalescence model (Lin & Brown, 2020) was proposed to reconcile existing theoretical perspectives. The convalescence model integrates both acute and chronic strain explanations to identify an immediate increase in depressive

symptoms, followed by a long-term, multi-year, adjustment period before returning to baseline levels of depressive symptoms after MTs.

Social Support and Social Strain and Marital Transition Recovery

While most people ultimately show long-term resilience in their recoveries from a MT, a subset of people experience far more serious mental and physical health outcomes in response to partner loss (e.g., Sbarra, 2015). Social and emotional explanations have been examined for this heterogeneity in recovery experiences following MTs, as the spousal relationship is an especially important source of emotional support for older adults (Dykstra & de Jong-Gierveld, 2004). There is inherent change in one's social network resulting from a MT (Isherwood et al., 2012), implicating the social context as a predictor of mental health recoveries from MTs. Low levels of social support have been found to be harmful for mental health symptoms among people with depression, bipolar disorder, and anxiety disorders (Wang et al., 2018). Unmet social support needs also have been demonstrated to lead to worse depressive symptoms (Rankin et al., 2018).

Social support and social relationships can be beneficial during times of stress or adversity (e.g., stress buffering hypothesis; Cohen & Wills, 1985). Relational Regulation Theory (RRT; Lakey & Orehek, 2011) suggests that social relationships serve as a tool to regulate emotions, thoughts, and behavior through ordinary social interactions and conversations, ultimately affecting mental health. Previous work has implicated heightened emotional reactivity as a mediator linking divorce with subsequent depression, consistent with other work on widowhood which revealed a similar effect among widows (Umberson et al., 1992). How beneficial social support is for mental

health is theorized to be dependent on how well-matched perceived support is with the individual support needs and preferences of the support recipient (Lakey & Orehek, 2011; Cutrona & Russell, 1990). Previous research has demonstrated variability in the strength of benefits from social support in older adults across different sources of social support and strain and specific outcomes (Bookwala et al., 2014; Li et al., 2014; Okabayashi et al., 2004). These differing effects of support and strain from distinct sources may be due to differing abilities in the support provider's ability to impart emotion regulation, as these sources likely vary in their degree of closeness with the support recipient (Li et al., 2014).

Less research has assessed effects of different sources of support in the context of MTs. Previous research found that having a family confidante after MT was associated with fewer somatic depressive symptoms, whereas friend support was not directly predictive of depressive symptoms (Bookwala et al., 2014). Significant moderation effects were found such that widowed older adults without a friend confidante experienced the greatest depressive symptoms relative to widows with friends and those who were continually married (Bookwala et al., 2014). Although this study provides insight into distinct effects of friends and family, only two time points were examined, and social connections were only measured after transition.

Negative social exchanges, or interpersonal conflict, have been shown to be detrimental to psychological well-being of older adults (Rook, 2015) and to their self-rated health (Newsom et al., 2022). Negative social exchanges may be especially salient and have detrimental effects on psychological health (Newsom et al., 2005). Whether

negative exchanges are predictive of poorer mental health may depend on the context. Previous work has found that individuals in poor quality and more distressing relationships reported increases in happiness following divorce, whereas those with higher quality marital relationships experienced decreases in happiness (Amato & Hohmann-Marriott, 2007).

In a longitudinal study of older adults, social strain and social support have been found to have independent effects on mental health, such that the effect of negative social exchanges on psychological well-being is stronger than the beneficial effects of social support (Newsom et al., 2005). Social strain was also examined alongside social support in the context of MTs (Tucker et al., 2022), showing that changes in depressive symptoms between two waves of HRS data were predicted by both spousal strain and social strain from others (a combination of family, friends, and children). Significant moderation effects of social support were also found, revealing that relative to their married counterparts, divorced participants experienced decreases in depressive symptoms at low levels of support and increases in depressive symptoms at high levels of support. While this study highlights the short-term effects of social support and strain, it is important examine how these factors affect depression trajectories in the longer term, given previous work demonstrates a longer recovery period after MTs (Kristiansen et al., 2019).

Contributions to the Literature

Research modeling recovery processes over time has provided important insights into adjustment patterns after stressful experiences (Lin & Brown, 2020). These

processes are dynamically unfolding, thus explicitly modeling both the period before and after MT allows for a comparison of these trajectories. Piecewise growth curves are well suited for tracking changes in depression symptomatology before and after MT.

Although social support has been examined alongside social strain in relation to mental health of older adults who have experienced MTs (Tucker et al., 2022), studies have yet to include support and strain as independent predictors of long-term trajectories of depressive symptoms, to draw distinctions in the effects of different sources of support and strain in recovery from a stressful experience. Although their independent effects on mental health have been demonstrated in prior work (Bookwala et al., 2014; Li et al., 2014; Okabayashi et al., 2004), independent sources of support and strain have not been investigated as predictors of rate of recovery from MTs specified in the convalescence model (Lin & Brown, 2020). As social support and strain were measured prior to transition, the social context prior to transition can be estimated as predictors of subsequent mental health trajectories.

This study aims to investigate trajectories of depressive symptoms following divorce or widowhood using piecewise latent growth curve models, as well as examine predictors of recovery including social support and social strain from spouses, children, family, and friends. We hypothesized that unconditional depressive symptom trajectories will be consistent with the trajectories specified in the convalescence model (Lin & Brown, 2020), a gradual multi-year adjustment period. Social support from family, friends, and children are hypothesized to be beneficial for depressive symptom trajectories, leading to quicker recoveries. Social strain from family, friends, and children

are predicted to be detrimental to mental health recoveries, leading to slower recoveries. Social support and strain from spouses, however, are thought to have opposite effects as a MT includes an inherent loss in this source of both support and strain, therefore the loss of a supportive spouse is expected to be detrimental, whereas the loss of a spouse that is a source of strain may lead to faster recoveries.

Method

Sample

Participants in the HRS (Heeringa & Conner, 1995) who reported a single MT (divorce or widowhood) occurring between 2006 to 2016 and were age 51 or above were eligible for inclusion in the present analysis ($N = 377$). Participants who reported experiencing a MT more than two years prior to the wave of measurement were excluded to restrict variation in time since transition. Participants who did not report race/ethnicity or selected the "other" race category were also excluded due to small sample sizes for these groups. Participants with two or fewer measurements of the depressive symptom index over the course of the study were also excluded to assist in model estimation as this amount of missing data prevented model convergence but was resolved once this change was made.

Participants were 58.4% female, 52.8% divorced, mostly Non-Hispanic White (70.65%), followed by 19.02% Non-Hispanic Black and 10.33% Hispanic. Participants had an average of 12.30 years of education ($SD = 3.64$). At wave of MT, on average, participants were 67.55 years old ($SD = 8.91$), had 2.57 chronic conditions ($SD = 1.57$), and had a median net worth of $100,000 ($SD = $827,089.85$).

Design

Depressive symptoms were assessed biennially across 10 years from 2006 to 2016 (i.e., across six waves) as part of the HRS core survey (Heeringa & Connor, 1995). 2006 was selected as the baseline wave in this study because it was the first wave the social support and social strain measures were included in the leave-behind questionnaire. The leave-behind questionnaire is a psychosocial survey administered to a random rotating subsection (50%) of the core sample every other wave (Smith et al., 2017). Therefore, measures of social support from the wave immediately prior to MT were used when available, and when unavailable, measures of social support two waves prior were used, so predictors temporally precede outcomes, capturing the social context prior to transition recovery.

Measures

Depression. Depressive symptoms were measured using 8 items from the Center for Epidemiologic Studies – Depression Scale (CES-D; Radloff, 1977) adapted by Steffick and colleagues (2000) and Santor and Coyne (1997). Participants rated whether they experienced numerous symptoms over the past week. The item "I felt lonely" was excluded due to overlap with social support and strain measures and to be consistent with the shortened CES-D (Santor & Coyne, 1997). The final 7 items included: "I felt depressed," "I felt that everything I did was an effort," "I enjoyed life" (reverse scored), "I could not get going," "I was happy" (reverse scored), "I felt sad," and "My sleep was restless." Depression scale scores range from 0-7 indicating the number of depressive symptoms participants endorse experiencing. Cronbach's alpha for each wave ranged

from $\alpha = .79$ (2006 and 2008) to $\alpha = .81$ (2012 and 2014) indicating acceptable reliability.

Social Support and Social Strain. Social support and social strain were assessed from multiple sources separately (spouse, children, family, and friends) on a scale from 1 (*a lot*) to 4 (*not at all*). Items were reverse coded, therefore higher scores indicated greater support or strain. These measures were assessed in the leave-behind questionnaire (Clarke et al., 2008; Smith et al., 2017). Social support was measured using three items referencing each source, including "How much do they really understand how you feel about things?", and social strain was assessed with four items, including "How much do they criticize you?", also asked about each source. Cronbach's alphas for each measure, calculated at wave of transition, suggest reliable measures from each source, (support: spouse $\alpha = .85$, children $\alpha = .87$, friends $\alpha = .82$, and family $\alpha = .86$; strain: spouse $\alpha = .81$, children $\alpha = .81$, friends $\alpha = .74$, and family $\alpha = .79$). A confirmatory factor analysis was conducted, and results suggested a good fit to the data and acceptable standardized loadings (details available in supplemental materials).

Covariates. Covariates included potentially confounding factors related to depressive symptoms following MT. Covariates included type of MT (widowed = 0, divorced = 1), sex (male = 0, female = 1), age at wave of MT, years of education, race/ethnicity (two dummy variables to differentiate between non-Hispanic White, non-Hispanic Black, and Hispanic participants with non-Hispanic White as the reference group), and net worth at wave of MT (in $10,000 units). Number of chronic conditions at MT was measured using a count of seven self-reported, physician-diagnosed chronic

conditions (high blood pressure, diabetes, cancer, lung disease, heart disease, stroke, arthritis) and the Telephone Interview for Cognitive Status (TICS)-assessed cognitive impairment, a measurement approach consistent with a large body of previous work (Cezard et al., 2021).

Analysis Overview

Baseline (2006) sample weights and sampling design adjustments appropriate for the HRS were used in all analyses (Heeringa & Conner, 1995). Participants with zero weights at baseline were excluded. Analyses were conducted using Mplus version 8.5 (Muthén & Muthén, 1998-2017). FIML for missing data with robust standard errors and scaled chi-square and fit statistics (Yuan & Bentler, 2000) were used to adjust standard errors and fit statistics.

In order to examine depressive symptom trajectories prior to and after the timing of a participant's MT, individually-varying time codes were created for each participant and were used as growth curve loadings (Muthén & Muthén, 2018; Newsom, 2015) for pre-transition slope and post-transition slope (see Supplemental Table E1 for time codes). Codes were specified such that the intercept factor represented depressive symptoms at wave immediately after transition. Model specification was based on recommendations by Sterba (2014) for piecewise growth curves with individually-varying time points. Standardized results and traditional indices of model fit are not available when individually-varying time codes are used in Mplus. Therefore, only unstandardized coefficients are reported and Akaike's information criterion (AIC; Akaike et al., 1973),

Bayesian information criterion (BIC; Schwarz, 1978) and sample-size adjusted BIC (ABIC; Sclove, 1987) are reported for model fit.

Three models were tested to investigate changes in depressive symptoms before and after a MT: Model 1, an unconditional piecewise latent growth curve model of depressive symptoms (see Figure 3.1); Model 2, piecewise growth curve of depression with covariates; and Model 3 which examined the association between latent factors of social support and social strain from separate sources (e.g., one factor for spouse social support and another for spouse social strain) as predictors of latent growth curve factors to investigate the relationship between social support and social strain and depressive symptoms at wave of MT, pre-transition slope, and post-transition slope.

All covariates, except dummy codes, were mean-centered to aid in interpretation of the intercept value. Additional analyses are presented in supplemental analyses which explore race/ethnicity effects with alternate coding for race/ethnicity dummy codes (see Supplemental Tables E2 and E3). Social support and social strain factors from each source were set to have means of 0 and variances of 1 to standardize and center these predictors. Analyses investigating attrition are also presented in supplemental materials.

Results

Descriptive Analyses

Table 3.1 presents means, standard deviations, and correlations for the variables used in the model, including covariates. Results of correlations indicated higher baseline depressive symptoms were associated with lower social support from children, more social strain from children and friends, female gender, less education, and more chronic conditions at transition.

Piecewise Growth Curve of Depressive Symptom Slopes

Model 1: Unconditional

An unconditional piecewise latent growth curve model of depressive symptoms was tested that estimated separate slopes for before and after a MT. Results are displayed in the first row of Table 3.2. The average intercept was 1.65, indicating that on average participants were reporting less than two depressive symptoms at the time of transition. The intercept variance was significant (ψ_{00}= 2.38, *SE* = .42, $p < .001$) indicating depressive symptom levels at wave of MT varied across individuals. There was not a significant trend in depressive symptoms leading up to a MT ($\alpha_{Pre\text{-}MT}$ = -.004, *SE* = .04, $p = .91$), but there was a significant negative slope after a MT ($\alpha_{Post\text{-}MT}$ = -.12, *SE* = .04, $p = .001$), indicating stable depressive symptoms prior to MT and a decline in depressive symptoms following MT. Post-MT slope variance was approaching significance, $\psi_{Post\text{-}MT} = .04$, *SE* = .02, $p = .06$, but pre-MT slope did not vary significantly, $\psi_{Pre\text{-}MT} = .04$, *SE* = .03, $p = .14$.

Model 2: Covariates

A conditional growth curve was computed to investigate change in depressive symptoms before and after MT with covariates. The intercept was 1.75, which varied significantly across individuals ($\psi_{00} = 1.93$, *SE* = .30, $p < .001$). Neither the variance of slope before nor the variance of the slope after transition was significant, $\psi_{Pre\text{-}MT} = .03$, *SE* = .03, $p = .22$, and $\psi_{Post\text{-}MT} = .04$, *SE* = 03, $p = .12$. Pre-transition slope remained nonsignificant ($\alpha_{Pre\text{-}MT}$ = -.01, *SE* = .04, $p = .74$), and post-MT slope remained significant and negative ($\alpha_{Post\text{-}MT}$ = -.13, *SE* = .04, $p = .002$), indicating no change prior to transition

and a decline in depressive symptoms after transition. Participants who were younger (β = -.04, *SE* = .02, *p* = .02) and had more chronic disease (β = .34, *SE* = .11, *p* =.001) reported more depressive symptoms at wave of transition, but no other covariates were significant predictors of depression at the time of transition. Those who eventually divorced were more likely to decline in depressive symptoms prior to divorce than widowed individuals, (β = -.19, *SE* = .06, *p* = .002), but no other covariates predicted pre-MT slope.

Model 3: Full Structural Model of Social Support and Social Strain as Predictors of Slopes

When social support and social strain predictors were included in the model, results indicated that spousal social support was associated with a slower recovery, (β = .35, *SE* = .12, *p* = .003), whereas social support from friends was associated with a faster recovery (β = -.24, *SE* = .10, *p* = .02). Social strain was not significantly related to depression trajectories from any sources.

Discussion

This study examined social relationship predictors of changes before and after MTs, taking a novel approach that used a piecewise growth curve analysis to compare trajectories of depressive symptomatology prior to and following divorce or widowhood. Results indicated that depressive symptomatology levels remained constant prior to MT and followed a downward trajectory after transition. As with prior studies, we found increases in depressive symptoms immediately following divorce or widowhood (Kristiansen et al., 2019; Lorenz et al., 2006; Sbarra et al., 2014), and depressive

symptoms declined as part of the recovery process (Lorenz et al., 2006; Stroebe et al., 1988). Results from the present study indicated widowhood and divorce did not have equivalent recovery trajectories following the transition event. Those experiencing divorce had less negative slopes, and, thus, slower recovery after transition than those experiencing widowhood. These findings differ from the results reported by Lin and colleagues (2019), who examined changes in depressive symptoms after MT and found quicker improvement in depression among those who divorced than those who were widowed. These analyses, however, utilized only partially-overlapping waves of the HRS as the present study, different analytic approaches, and different subsamples as they included participants who were continuously married and those with multiple transitions. This may partially explain differences in findings across studies. Our findings further support the convalesce model proposed by Lin and Brown (2020) that argues that there is an emotional recovery process after divorce as there is with widowhood.

The goal of the present study was to add to existing knowledge by exploring how social support and strain from different sources prior to MT impact recovery. The observed difference between widowed and divorced in depressive symptomatology following MT remained, after controlling for sociodemographics, health, social support, and social strain, suggesting that the findings of the overall pattern of slower recovery from depression among divorced individuals is robust. Counter to some prior studies (Umberson et al., 1992), we found no significant effect for sex on changes in depressive symptomatology after MT. There also were no effects of other sociodemographic factors, such as age, education, net worth, race, or ethnicity, on changes in depressive

symptomatology. More health conditions, however, were associated with greater depression immediately following MT, as indicated by the significant effect on the intercept. It is possible that multimorbidity may make recovery from MTs more difficult, as chronic conditions in combination with depression relate to poorer functional status (Botoseneanu et al., 2023). These adults may be particularly vulnerable for more difficult recoveries.

An important strength of this study is the investigation of how prior supportive environment, particularly from the spouse, impacted post-transition adjustment. Although some previous work found no association between spousal quality and post-divorce adjustment (Ye et al., 2018), other work has found significant effects of marital quality on recoveries following MTs (Amato & Hohmann-Marriott, 2007; Coyne & DeLongis, 1986). Our follow-up analyses, reported in supplemental materials, showed that those with high levels of spousal support prior to MT experienced slower decreases in depressive symptomatology after MT, whereas those with higher levels of support from friends experienced faster declines in depressive symptomatology after MT. The negative impact of spousal support observed in our study most likely reflects the fact that higher reported spousal support meant that there was a critical supportive role played by the spouse prior to transition, thus leading to a more difficult recovery following MT. Interestingly, our results showed that strain with the spouse did not have an independent relationship to post-transition adjustment once support was controlled, as some other studies have also reported (Amato & Hohmann-Marriott, 2007; Coyne & DeLongis, 1986; Gustavson et al., 2014). These studies have suggested that poor quality

relationships are associated with emotional well-being, although both studies were over a shorter period of follow-up. Understanding the social context prior to the transition appears to be critical for illuminating how divorce or widowhood affects adjustment for those who have greater support or experience greater strain in the spousal relationships.

There were no effects on changes in post-MT depressive symptomatology for child or family support, suggesting that, in this context, friendship support was more important for aiding recovery than familial sources. The beneficial effects of friendship support suggest that the existing friendship support network is the most important resource and may be a critical factor in determining the resilience of some people experiencing loss or divorce (Bonanno et al., 2005; Infurna & Luthar, 2017). Our results also suggested that strain with friends, family, or children did not impact post-transition adjustment above effects of support. The independent effects of support and strain are infrequently examined in this context, therefore results inform development of interventions to aid adjustment to MTs in later life.

It is important to note several limitations of this study. Although the sample was drawn from a nationally-representative panel which oversamples Hispanics, the final analytic sample is comprised mostly of White, non-Hispanic participants. The sample was limited to those individuals who were initially married and experienced a single MT and we did not examine continuously married or single participants as comparisons. It is likely that age and length of marriage are highly correlated and it would be difficult to disentangle these two factors. Additionally, depressive symptom trajectories after MT should be tested in future research with greater statistical power as it is possible this

would capture patterns of recovery predicted by Lin & Brown (2020). Because the leave-behind survey was collected every four years, reports of support may have been up to four years prior to the transition, although the average length of time was likely to be approximately two years, leading to potential variability in the accuracy of the state of social relationships near to the time of the transition. Menaghan and Lieberman (1986), using a follow-up comparison approach rather than examining trajectories, reported that the impact of divorce on depression only appeared four years later, however, underscoring the need for more continuous and long-term follow-up of changes after MT.

There are several potential implications for interventions and future research. The present findings suggest that divorce has potentially damaging long-term effects, which seem to be longer lasting than widowhood. The positive implications, however, are that a stronger friendship network may be important to mitigating these lasting effects, suggesting that social support interventions for divorce in middle and later life (as well as widowhood) are likely to be a valuable clinical and policy resource. Many studies have suggested that there are important health consequences that stem from the stress of MTs in middle and later life (Kiecolt-Glaser, 2018; Lorenz et al., 2006), thus, upstream interventions that address depressive symptomatology and depression may prevent additional health consequences. A similar examination of long-term trajectories of health after MT also may reveal short and long-term changes. Ultimately, results of the present study highlight the important role of different social support providers in supporting mental health recoveries after a late life MT.

Study II Tables

Table 3.1

Descriptive Statistics and Bivariate Correlations

	Mean	SD	N	1.	2.	3.	4.
1. 2006 Depressive Symptoms	1.61	1.97	377	--			
2. Social Support from Spouse	3.07	0.87	140	-.15	--		
3. Social Strain from Spouse	2.32	0.80	140	.15	-.65***	--	
4. Social Support from Children	3.24	0.79	204	-.20**	.10	-.08	--
5. Social Strain from Children	1.76	0.70	205	.16*	-.25**	.37***	-.46***
6. Social Support from Friends	3.24	0.70	203	.11	.16	.07	.31***
7. Social Strain from Friends	1.43	0.49	203	.14*	-.11	.18*	-.26***
8. Social Support from Family	2.93	0.91	205	-.03	.10	-.15	.41***
9. Social Strain from Family	1.66	0.65	205	.08	-.15	.24**	-.27***
10. Widowed v. Divorced	.53	0.50	377	-.03	-.18*	.27**	-.29***
11. Female	.58	0.49	377	.11*	-.03	.09	.16*
12. Age at MT	67.55	8.90	318	-.03	.19	-.22*	.23**
13. Education	12.30	3.64	377	-.28***	-.06	.03	-.02
14. Net Worth at MT	348,082	827,090	377	-.10	-.03	.06	.11
15. NH Black v. NH White	.19	0.39	368	-.04	-.15	.08	-.001
16. Hispanic v. NH White	.10	0.30	368	.09	.11	-.11	.02
17. Chronic Conditions at MT	2.57	1.57	377	.34***	-.08	.01	.001

	5.	6.	7.	8.	9.	10.	11.
6. Social Support from Friends	-.15*	--					
7. Social Strain from Friends	.50***	-.19**	--				
8. Social Support from Family	-.20**	.33***	-.18*	--			
9. Social Strain from Family	.58***	-.12	.50***	-.24***	--		
10. Widowed v. Divorced	.19**	-.02	.16*	-.18*	.17*	--	
11. Female	.07	.26***	-.16*	.21**	-.01	-.15**	--
12. Age at MT	-.27***	-.01	-.15	.04	-.24**	-.45***	-.05
13. Education	.09	-.02	-.12	-.05	.08	.18***	-.05
14. Net Worth at MT	-.06	.02	-.09	.02	-.05	-.06	-.03
15. NH Black v. NH White	.18*	-.03	.19**	.08	.09	-.08	.06
16. Hispanic v. NH White	-.14*	.01	-.01	.07	-.02	-.07	.07
17. Chronic Conditions at MT	-.06	.10	.05	-.06	-.06	-.20***	-.01

	12.	13.	14.	15.	16.	17.
13. Education	-.15**	--				
14. Net Worth at MT	.15**	.25***	--			
15. NH Black v. NH White	-.08	.01	-.15**	--		
16. Hispanic v. NH White	.05	-.42***	-.12*	-.16**	--	
17. Chronic Conditions at MT	.37***	-.33***	-.14**	.10	.06	--

Note. Using composites of social support/strain measures at wave of MT, not latent factors as they are used in the full structural model, $N = 377$. * $p < .05$, ** $p < .01$, *** $p < .001$. MT = Marital Transition, NH = Non-Hispanic.

Table 3.2

Social Support and Social Strain as Predictors of Depressive Symptom Trajectories Following a Marital Transition

	Dependent Variables		
	Intercept	Pre-MT Slope	Post-MT Slope
Model 1			
Average	1.65***	-0.004	-0.12**
Model 2			
Average	1.75***	-0.01	-0.13**
Widowed v. Divorced	-0.36	-.19**	0.18*
Female	0.23	-0.05	0.11
Age at MT	-0.04*	0.001	.004
Education	-0.07	0.003	0.01
Net Worth at MT	0.00	0.00	0.00
NH Black v. NH White	-0.46	0.02	0.03
Hispanic v. NH White	-0.45	-0.12	0.10
Chronic Conditions at MT	0.34**	-0.01	-0.002
Model 3			
Average	1.77***	-0.02	-0.14**
Social Support from Spouse	-0.09	0.07	0.35**
Social Strain from Spouse	0.60	0.20	0.15
Social Support from Children	-0.32	-0.09	0.01
Social Strain from Children	0.40	-0.08	0.06
Social Support from Friends	0.17	0.03	-0.24*
Social Strain from Friends	-0.14	-0.26	-0.09
Social Support from Family	0.06	-0.03	0.07
Social Strain from Family	-0.04	-0.01	0.02
Widowed v. Divorced	-0.50	-0.19**	0.20*
Female	0.07	-0.08	0.13*
Age at MT	-0.03	0.00	0.002
Education	-0.09	0.003	0.01
Net Worth at MT	0.00	0.00	0.00
NH Black v. NH White	-0.61*	0.08	0.08
Hispanic v. NH White	-0.42	-0.11	0.07
Chronic Conditions at MT	0.31**	-0.01	0.01

Note. All coefficients are unstandardized values. MT = marital transition or wave of marital transition, NH = Non-Hispanic. Widowed v. divorced: widowed = 0, divorced = 1. * $p < .05$, ** $p < .01$, *** $p < .001$. Model 1 $N = 377$, Model 2 $N = 361$, Model 3 $N = 361$.

Study II Figures

Figure 3.1

Depressive Symptoms Growth Curve Model with Individually-Varying Time Codes

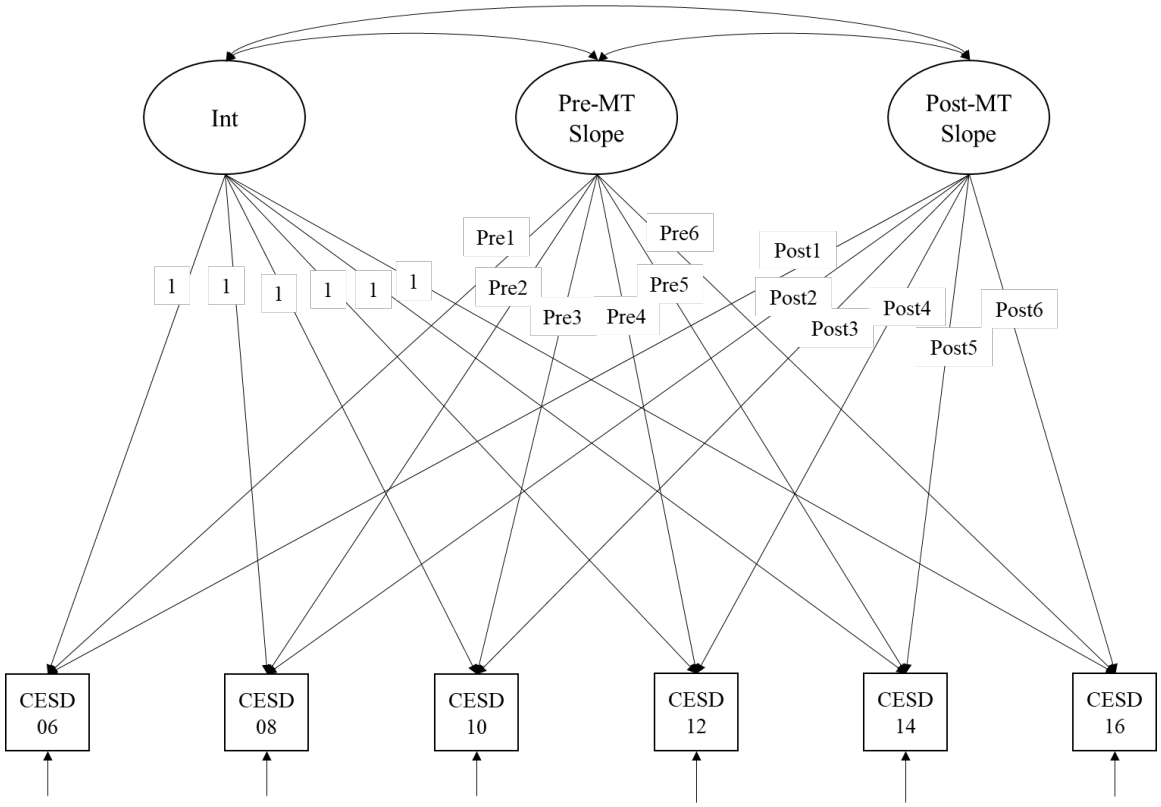


Figure 3.2

Simple Slopes of Post-MT Depressive Symptom Slopes at Low (-1 SD), Mean, and High (+1 SD) Levels of Social Support from Spouse

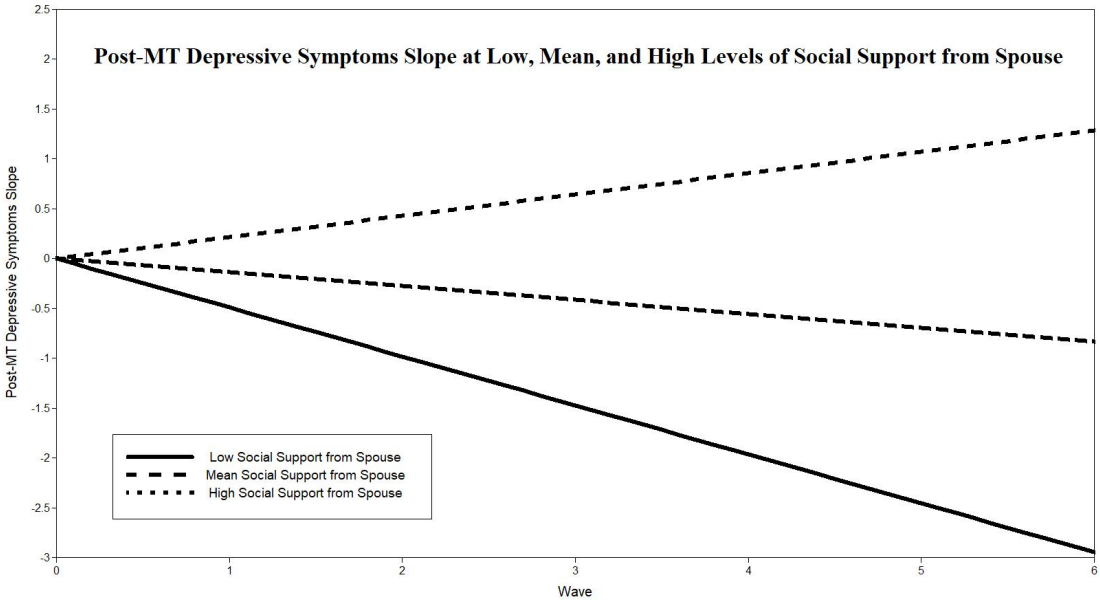
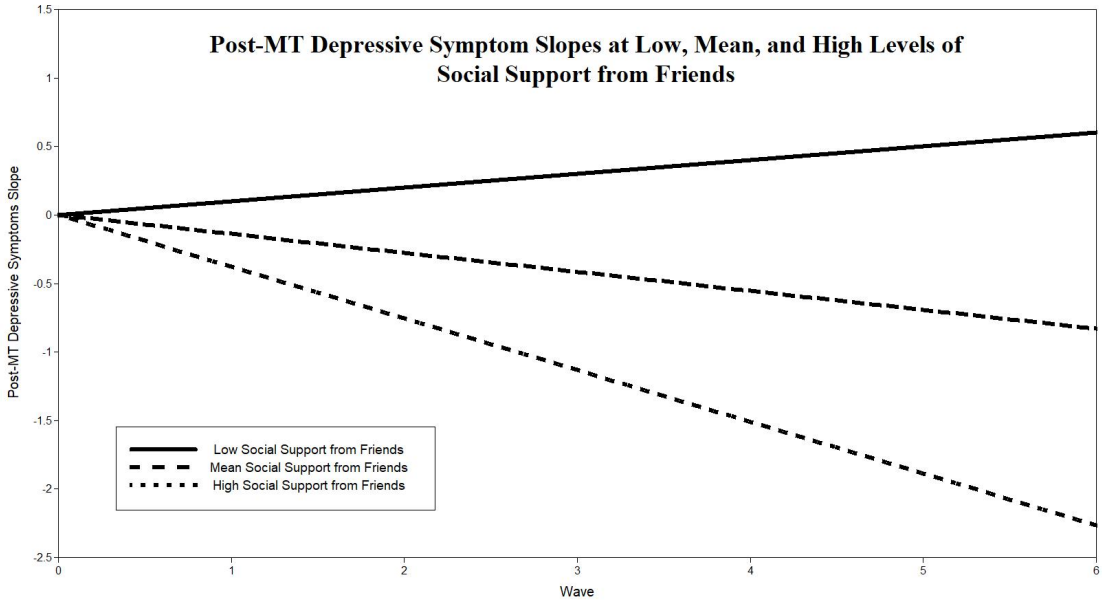


Figure 3.3

Simple Slopes of Post-MT Depressive Symptom Slopes at Low (-1 SD), Mean, and High (+1 SD) Levels of Social Support from Friends



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CHAPTER IV. MANUSCRIPT III. AN EXAMINATION OF INTERACTIVE RISK AND PROTECTIVE FACTORS RELATED TO BEHAVIORAL HEALTH SERVICE-SEEKING IN AN ACTIVE-DUTY SAMPLE

Abstract

Active-duty service members are at increased risk for adverse behavioral health outcomes (Bray et al., 2013; Gromatsky et al., 2022; Mohr et al., 2018; Steenkamp et al., 2015), yet many are resistant to utilizing professional behavioral health services (Hoge et al., 2004). Previous research has examined behavioral health stigma, organizational barriers, and social support facilitators to treatment seeking (Britt et al., 2020b), although their interactive effects have yet to be examined in the active-duty military context. The present study conducted secondary data analysis of data collected as a part of the Resilience-Supportive Leadership Training (RESULT) study to examine the interactive effects of barriers and social facilitators of behavioral health treatment utilization. Specifically, the interactive effects of support from romantic partners, peers, and leaders were examined as moderators of behavioral health stigma and organizational barriers on behavioral health service use frequency. Results revealed the importance of partner responsiveness, such that poor perceived partner responsiveness (PPR) was associated with increased frequency of behavioral health treatment use. However, PPR helped attenuate the obstacles of barriers to care and stigma in moderation models. Military unit support and supervisor support were not related to behavioral health treatment use when controlling for psychological distress. The present study illuminated the distinct roles that different sources of social support play in overcoming the effects of behavioral health

stigma and organizational barriers to care, specifically romantic partners, ultimately informing future prevention and intervention approaches aiming to increase treatment utilization among this high-risk population.

Introduction

Military-connected individuals are at increased risk for adverse behavioral health outcomes (behavioral health specifically refers to both mental health and substance use disorders; American Medical Association, 2021). This includes post-traumatic stress disorder (PTSD; Steenkamp et al., 2015), suicide (Office of Mental Health and Suicide Prevention, 2018), hazardous alcohol use (Bray et al., 2013; Mohr et al., 2018), and nonsuicidal self-injury (Gromatsky et al., 2022). Army personnel are at increased risk for injury and chronic health problems (Army Public Health Center, 2020) and high levels of combat exposure increases risk of poor behavioral health outcomes (Castro & Adler, 2011; Hoge et al., 2004). Although these adverse experiences are prevalent, military personnel are generally resistant to seeking treatment for physical health problems (Britt et al., 2020a), and are even less likely to seek help for a behavioral health problem (Britt, 2000). One study of Army combat soldiers found that of those who screened positive for a behavioral disorder, only 23 to 40 percent sought care for that disorder (Hoge et al., 2004). Although behavioral health treatment has been demonstrated to be beneficial in treating numerous behavioral health disorders (Hofmann et al., 2012; Kitchiner et al., 2019) and receiving treatment earlier in the course of experiencing symptoms is beneficial for long-term recovery (e.g., Boulos & Zamorski, 2015), there is still underutilization of these services among this population.

Numerous barriers are present for SMs seeking behavioral health treatment seeking (Champion & Skinner, 2008; Hochbaum & Rosenstock, 1952). For certain military careers (e.g., pilots), seeking professional help for behavioral health disorders can directly impact career progression (Britt et al., 2018). Other work found associations

between seeking treatment for behavioral health needs and discharge among Air Force (Ghahramanlou-Holloway et al., 2019) and Marine service members (Ghahramanlou-Holloway et al., 2018). Career consequences for seeking behavioral health treatment are not inevitable; even amongst positions with some of the strictest requirements regarding behavioral health, most Army aviation personnel returned to service after diagnosis of behavioral health disorders (Britt et al., 2018). The perceived threat of career consequences, however, still shape service member perceptions regarding treatment seeking, demonstrated by previous work which found over half of service members who met cutoffs for psychiatric problems reported career concerns as a barrier for treatment seeking (Heyman et al., 2022).

Some aspects of military training and the culture of hypermasculinity (Abraham et al., 2017) perpetuate stigmatization, or negative attitudes and beliefs regarding behavioral health and treatment, including being expected to "tough it out" and not be a burden on your peers (Britt et al., 2018). Some organizational policies, like *don't ask don't tell,* encouraged secrecy and label avoidance for sexual and gender minority service members, paralleling a desire to avoid labels related to behavioral health disorders (Ben-Zeev et al., 2012). The effect of military socialization is not uniform for all service members (Abraham et al., 2017) and there are numerous ways in which these attitudes can be strengthened or reinforced, including through social norms (e.g., True et al., 2015). Leadership in the military can also perpetuate these stigmatizing attitudes toward behavioral health struggles, for example, one major general is quoted saying "I have now come to the conclusion that suicide is an absolutely selfish act. I am personally fed up

with soldiers who are choosing to take their own lives so that others can clean up their mess" (National Alliance on Mental Illness [NAMI], 2010, p.6). Attitudes regarding treatment seeking can also be influenced by a desire not to take resources away from someone perceived as being more in need of services than themselves (Goodby Vail et al., 2023). These stigmatizing attitudes are hurdles that a service member must overcome when experiencing behavioral health symptoms and seeking treatment.

Service members also have access to numerous potential facilitators to treatment seeking, a commonly reported facilitator is social support (Britt et al., 2020a; Cheung et al., 2016; Rafferty et al., 2019). Social support providers are in an important position to notice changes in service member behavior, directly communicate with service members, and encourage them to seek treatment (Rafferty et al., 2019). The effectiveness of support provision not only depends on how well-matched support needs are with the supportive behaviors enacted, but also on the source of support (Thoits, 2011). For married service members, spouses have unique perspectives on the service member's daily emotional well-being and behavioral health symptoms exhibited by service members (Rafferty et al., 2019), acting as frequent social regulation partners and sources of coping assistance (Thoits, 2011). Spouses are also in a position to provide direct instrumental support; but unless partners also have direct military experience, they likely do not have experience with the specific stressors service members are facing and therefore support attempts may be come off as generic or misguided (Thoits, 2011). Unit members have direct experience with stressors service members are facing and therefore can provide tailored support and role model adaptive responses to specific stressors (Thoits, 2011). Peers also influence

attitudes regarding treatment seeking and reinforce norms regarding behavioral health and help-seeking (Britt et al., 2020b; True et al., 2015). Unit support has previously been found to predict decreases in stigma, barriers to care, and increases in intentions to seek treatment (Britt et al., 2020b). Supervisors are in the distinct position of being able to connect their subordinates to different resources and are considered the "first line of defense" to identify increases in symptoms before they escalate and provide multiple forms of support including emotional and instrumental (e.g., Resource Utilization Theory; Dimoff & Kelloway, 2016); Therefore, supervisors are another potential buffer on the negative effects of stigma and barriers to care.

Sources of support, whether it be from spouses, supervisors or unit members, are often examined in relation to behavioral health and treatment seeking in isolation, which precludes the ability to make comparisons in magnitude of association across differences sources. Previous work examining the effects of social support measured in reference to one's social network on depressive symptoms show distinct effects from measures focusing on specific sources of support (Abbey et al., 1985; Skomorovsky, 2014). The effectiveness of social support is thought to depend upon the compatibility of support provided with support needs (Cutrona & Russell, 1990; Lakey & Cohen, 2000) and with the specific source of support (Thoits, 2011). While it is possible that certain social support providers facilitate treatment seeking (e.g., Rafferty et al., 2019), other work has suggested that an absence of quality social ties may be a motivator to treatment seeking as individuals may seek formal sources of support when informal sources are of low quality or absent (Graham et al., 2017).

Different sources of support may also be better poised to support service members. Thoits (2011) distinguishes between two categories of social support: significant others (e.g., intimates including spouse, family, and friends) who are in a position to provide consistent, sympathetic, and caring support, and similar others (members of one's secondary social network, e.g., peers and supervisors) who are in the position of someone with relevant experience with the specific stressful experience or situation an individual is facing, are able to provide advice and support from a place of mutual understanding. It is likely that distinctions seen in effects on behavioral health across different sources, whether support is from significant or similar others, are also present in predicting behavioral health treatment utilization.

The present study aims to inform future intervention and prevention efforts by examining the moderating effects of specific social factors on behavioral health stigma and barriers to care as they predict behavioral health service utilization among active-duty Army service members. Findings will illuminate distinctions in the effects of specific sources as they moderate the impact of stigma and barriers to care on treatment-seeking to better tailor interventions. Different sources should have distinct effects on stigma and barriers to care which can be leveraged for prevention efforts to encourage treatment utilization in this high-risk population.

Why People Seek Professional Behavioral Health Services: Theoretical Perspectives

Several theoretical perspectives inform the models tested in the present dissertation. Previous work distinguishes relevant predictors between factors that act as barriers and those that act as facilitators to behavioral health treatment (e.g., Britt et al.,

2020a). The current study examines the interactive effects of theoretically informed barriers and facilitators of behavioral health treatment utilization. Stigma and organizational barriers to care are focal barriers to treatment in the present study, consistent with theoretical work by Greene-Shortridge and colleagues (2007) which presents a model in which both societal stigma (perceptions of public beliefs regarding people with behavioral health disorders) and self-stigma (internalizations of beliefs regarding people with behavioral health disorders) act as moderators of behavioral health symptoms to treatment need, and organizational barriers to care acts as a moderator of treatment need and treatment utilization. These factors, behavioral health stigma and organizational barriers to care, are focal barriers in the present models.

Social relationships play an important role in predicting behavioral health symptoms (Lakey & Orehek, 2011) and in support of factors likely to encourage treatment seeking and utilization, such as social control and instrumental support (Thoits, 2011). Additionally, social connections influence norms and climate regarding treatment-seeking (Ajzen & Fishbein, 2005; Britt et al., 2020b; True et al., 2015) which influence barriers to care (Britt et al., 2020b) and are related to treatment use (Britt et al., 2011). The effectiveness of social support on behavioral health is thought to rely on the compatibility between the source of support, kind of support provided, and individual support needs (Thoits, 2011); therefore social support and specific behavioral-health supportive behaviors are modeled as moderators of barriers on treatment utilization.

Theoretical work modeling associations between attitudes, intentions, and behavior (theory of planned behavior; TPB; Ajzen & Fishbein, 2005) is one perspective

that can inform predictors of seeking behavioral health treatment (Adams et al., 2021; Britt et al., 2011). The TPB (Ajzen & Fishbein, 2005), which has previously been utilized in research predicting behavioral health service use for civilian (e.g., Adams et al., 2021) and military samples (Britt et al., 2011), proposed that behavioral intentions are predicted by attitudes, norms, and perceived control. The effects of intentions on actual behavior are moderated by actual control over the situation, as individuals can only engage in a desired behavior if they have control over the situation to a degree which allows them to engage in the behavior. In the present study, attitudes comprise a soldier's attitudes about behavioral health and behavioral health treatment. Previous research has indicated that service members' personal beliefs regarding treatment seeking were predictive of treatment seeking (Hamilton et al., 2015). Norms reflect the attitudes and behaviors of one's peers and close others related to behavioral health treatment, likely to be especially impactful in the military setting due to the strength of acculturation that occurs as part of military training. From basic training onward, norms and expectations regarding help-seeking, hypermasculinity, and stoicism are trained and reinforced (Abraham et al., 2017). These norms of self-reliance are often in direct conflict with treatment seeking (e.g., True et al., 2015) and are reported as primary barriers for service members seeking both physical and behavioral health services (Britt et al., 2020a). TPB describes an individual's perception of their ability to engage in a specific behavior, taking perceived barriers into account, as perceived behavioral control (Ajzen & Fishbein, 2005). Perceived control in this situation is shaped by one's perceptions of barriers to care and whether these are perceived to be insurmountable. One's actual control over the situation

and their ability to engage in the behavior is then determined by actual barriers to care, including availability of services and logistical availability (i.e., time and ability to get to services). The Transtheoretical Model (Prochaska & Velicer, 1997) also informs the present study, as it similarly breaks down the process of deciding to engage in a specific behavior into stages over time, reflecting the unfolding process of human behavior. The most effective strategy to target health behavior change for an individual depends upon which stage an individual is in of six stages of change (precontemplation, contemplation, preparation, action, maintenance, and termination). While a large body of work focuses specifically on the action stage, when behavior change occurs, this model encourages study of behavior and behavioral change to take a more holistic approach, including not only necessary steps prior to behavior change, but also the inclusion of the following maintenance phase when individuals attempt to continue engaging in the positive behavior (Prochaska & Velicer, 1997). The TPB (Ajzen & Fishbein, 2005) and Transtheoretical Model (Prochaska & Velicer, 1997) are useful frameworks for predicting when service members seek professional behavioral health services and inform the present dissertation.

Theoretical work specifically aimed at predicting health service utilization, Andersen's behavioral model of health service use (Andersen & Newman, 1973), is often used to predict when individuals will seek health services and has been extended to behavioral health services, which also informs the proposed dissertation. Numerous variations to this theory have been proposed since the original model (e.g., Andersen, 1995; Graham et al., 2017; Stiffman et al., 2001), but all comprise a combination of an

individual's predisposing characteristics (e.g., SES, health beliefs), enabling resources or facilitators (e.g., social support, financial resources), and perceived need for treatment as predictors of service use; however the configuration and specific characteristics and facilitators have varied across studies (Babitsch et al., 2012; Graham et al., 2017). Previous research on adults with depression indicate that treatment need and social support were both associated with behavioral health treatment utilization, thereby supporting the use of Andersen's model while researching behavioral health service use (Graham et al., 2017). Other qualitative work has also identified similar precipitating factors to behavioral health treatment, including recognizing one is in need of treatment and overcoming stigma and organizational barriers (Rafferty et al., 2019). These works provide multiple perspectives on treatment seeking for behavioral health symptoms.

Stigma and Organizational Barriers to Behavioral Health Care. Cultural and structural aspects of military service contribute to obstacles present when a service member needs formal behavioral health support (Rafferty et al., 2019). The Health Belief Model (Champion & Skinner, 2008; Hochbaum & Rosenstock, 1952) describes how individuals weigh perceived benefits against perceived barriers when determining whether to engage in a particular health action. Perceived behavioral health stigma (when one personally endorses stigmatizing cultural beliefs regarding people with behavioral health disorders) is a salient obstacle for many military-connected individuals seeking behavioral health care (Coleman et al., 2017). Greene-Shortridge and colleagues (2007) proposed a model describing how behavioral health stigma and barriers to care interfere with treatment seeking. When an individual develops behavioral health symptoms this is

thought to lead to an increased need for care which, in turn, predicts behavioral health care utilization. Both self-stigma and societal stigma of behavioral health disorders are theorized to moderate the association between developing behavioral health symptoms and seeking and receiving behavioral health care (Greene-Shortridge et al., 2007). Organizational barriers to care are theorized to moderate the association between need for care and care utilization.

Examining behavioral health stigma is highly relevant in military contexts, as military training and acculturation emphasize various beliefs which feed into stigma regarding seeking behavioral health treatment, such as hypermasculinity and self-reliance (Abraham et al., 2017). Military culture can have a strong impact on one's own stigmatizing attitudes regarding behavioral health and behavioral health treatment (Ben-Zeev et al., 2012; Greene-Shortridge et al., 2007) and is shaped and influenced by perceptions of their peers' stigmatizing beliefs (True et al., 2015). Concerns regarding treatment interfering with career progression (Heyman et al., 2022), discharge (Ghahramanlou-Holloway et al., 2018; Ghahramanlou-Holloway et al., 2019), and, for certain careers like pilots, career consequences (Britt et al., 2018); all act as barriers to care due to specific characteristics of the organization to which they belong. These factors have the potential to make service members feel as if they must balance the desire to seek necessary behavioral health treatment with potential social and career consequences (Sharp et al., 2015), regardless of whether there is a true risk of consequences in their individual situation. As the TPB predicts that perceived control is an important predictor of intention to engage in a specific behavior (Ajzen & Fishbein,

2005), perceptions of career consequences for seeking behavioral health treatment are likely to function as a barrier by reducing perceived control over one's behavioral health treatment options. Recent research provides empirical support for both stigma and barriers to care as prevalent obstacles to seeking and receiving behavioral health care in military samples (Britt et al., 2020a; Greene-Shortridge et al., 2007).

Social Relationships Facilitators of Behavioral Health and Treatment. Social relationships have beneficial effects for well-being in times of stress (e.g., Cohen & Wills, 1985), but also have the capability to have detrimental effects (Hames et al., 2013; Rook, 2015) depending on the nature of the relationship and interactions (Thoits, 2011). Social support can serve as a resource that can be utilized to cope with adverse circumstances, while a lack of social connection or social strain can result in isolation and loneliness, which has negative impacts on physical and behavioral health (e.g., Pietromonaco & Collins, 2017; Rook, 2015). Previous research also highlights the importance of social support for treatment seeking, with one study finding that following behavioral health needs, social support was the next strongest predictor of treatment seeking, specifically, less social connection was associated with increased service use (Graham et al., 2017). It is possible that when informal support is absent or not well-matched to support needs, individuals may turn to formal sources of support, like professional behavioral health services. Previous research reveals that social relationships play a complex role in treatment seeking, as they can function as a facilitator to treatment by providing quality support that functions as social control to encourage treatment

utilization and retention or a lack of support may motivate one to seek formal support to compensate for unmet support and social regulation needs.

Social support is theorized to facilitate people's ability to regulate their emotions, thoughts, and behaviors, ultimately predicting behavioral health symptoms (Lakey & Orehek, 2011). The degree to which social support is beneficial for behavioral health depends upon how compatible support needs are with support providers (Cutrona & Russell, 1990; Lakey & Orehek, 2011). Previous research has found distinct effects of specific sources (e.g., one's friends, coworkers, or family members) relative to global measures of support (Abbey et al., 1985; Skomorovsky, 2014). When in times of increased stress, similar others, or members of one's secondary social network, are in a position of empathetic understanding and can provide tailored advice to the specific stressor and role model adaptive responses (Thoits, 2011). Support efforts from significant others may backfire and have detrimental effects if they do not have previous experience with the specific stressor, but they also are in a position to provide valuable instrumental support and provisions of practical aid (Thoits, 2011). This is consistent with other work from the present dissertation, where different sources of social support were found to have differential effects on behavioral health recoveries from highly stressful life events (Study 2; Trubits et al., 2023). Social support from friends was an important predictor of behavioral health recovery, whereas support from children and family were not associated with recovery trajectories following marital transitions for older adults (Trubits et al., 2023). Social support from spouse, measured prior to marital transition, was associated with behavioral health recoveries such that better quality

support from spouse was associated with slower recoveries (Trubits et al., 2023). Having a diverse social network and support resources available to you provides an increased chance of finding a match between support needs and available support providers (Lakey & Orehek, 2011; Thoits, 2011).

Spouses and romantic partners play a unique role in supporting their partner's behavioral health (e.g., Walen & Lachman, 2000). Perceived partner responsiveness, whether one's spouse or partner makes them feel cared for and understood (e.g., Laurenceau et a., 1998), has been demonstrated to be an important predictor of a multitude of factors including well-being (Selcuk et al., 2016), sleep quality, and pain (O'Neill et al., 2020). As service members' significant others are important providers of emotionally-sustaining behaviors (Thoits, 2011) and social regulation (Lakey & Orehek, 2011), their support should be related not only to behavioral health treatment need, but also to treatment utilization. Previous qualitative work is consistent with this, as one service member reported: "I was talking to my wife I think, because she said that I had … I had massive issues" (Rafferty et al., 2019, p. 6) consistent with many service members in the same study who noted their spouse helped them identify their need for treatment. As spouses have a unique role in support provision for service members, it is important to consider their role in behavioral health treatment seeking in this population. Perceived partner responsiveness has yet to be examined as a specific predictor of behavioral health treatment seeking among service members and is important to consider as has been demonstrated to be beneficial for well-being (Selcuk et al., 2016) in previous work. It is possible that greater responsiveness is associated with a better understanding of one's

experiences and issues and need for treatment, or poorer responsiveness may be a motivating factor to seek other sources of support to meet their support needs, (e.g., Cutrona & Russell, 1990; Lakey & Orehek, 2011; Thoits, 2011).

Another important source of support for behavioral health and treatment is a service member's peers (Britt et al., 2020b). In civilian research, social relationships in the workplace are important sources of support for behavioral health (Hammer et al., 2022). Relationships with peers specifically are related to helping identify treatment need and promote continuation of treatment (Rafferty et al., 2019). Peers also shape normative beliefs regarding behavioral health and treatment seeking, which is especially important as seeing peers seek treatment helps normalize the behavior (e.g., Rafferty et al., 2019). A study of Army National Guard personnel found that service members perceived their peers as having more negative views in regard to treatment seeking than their own personal attitudes (Hamilton et al., 2015). A recent study examining the moderating effects of unit support on the association between behavioral health symptoms and service utilization indicated that when service members experience high levels of behavioral health symptoms, greater social support is associated with decreased service utilization (Russell et al., 2022), potentially because stigma may be perpetuated by one's unit or informal support may take place of formal supports. Britt and colleagues (2020b) examined the longitudinal effects of unit support on behavioral health symptoms and treatment seeking and found that a supportive unit climate in regard to behavioral health helped reduce stigmatizing attitudes and barriers to care.

Another important source of support from the workplace is one's supervisor (Hammer et al., 2022). Supervisor responsiveness has been identified as an important factor for managing stress in the workplace (McCabe et al., 2017). Supervisors are a crucial facilitator between employees and behavioral health resources, as proposed in Resource Utilization Theory (Dimoff & Kelloway, 2016). Resource Utilization Theory proposes that supervisors have a crucial role in supporting subordinates and connecting them to available resources (Dimoff & Kelloway, 2016). Leader attitudes also have an impact on perceptions of behavioral health stigma (Greene-Shortridge et al., 2007). Supervisors can have a powerful impact on norms and culture around treatment seeking by modeling behavior and being open about their own treatment utilization (Rafferty et al., 2019). Military leader support has been shown to be beneficial for behavioral health (Bessey et al., 2023) and daily well-being (Mohr et al., 2021). Recent research found bidirectional effects between depressive symptoms and leader support (Bessey et al., 2023), providing evidence for interactive effects between leader support and behavioral health symptoms. Qualitative work has also identified the crucial role that military leadership plays in establishing and reinforcing attitudes and communicating potential consequences service members may face if they receive behavioral health treatment (Cheung et al., 2016). Previous research investigating leader support specific to behavioral health found associations between stress-related leader support, behavioral health, and attitudes toward treatment seeking (Alder et al., 2014), with buffering effects present in the face of combat stressors.

Research has yet to examine the direct effects of behavioral health supportive supervisor behaviors (e.g., role modeling and stigma reducing behavior) on behavioral health service use and their potential buffering effects on stigma and barriers to care. Although evidence suggests supervisors are in a position to connect subordinates to available resources (Dimoff & Kelloway, 2016) and act in ways which help reduce the stigma around behavioral health treatment seeking (Cheung et al., 2016), these interactive effects have yet to be examined in an active-duty military context.

The Present Study

Many studies support the efficacy of different treatments for behavioral health disorders (Hofmann et al., 2012), yet most service members experiencing behavioral health symptoms do not seek treatment (Hoge et al., 2004). Previous research has found direct effects from stigma, organizational barriers to care, and social support on behavioral health and treatment seeking (Britt et al., 2020b; Cheung et al., 2016; Rafferty et al., 2019), but previous work has yet to examine the ways in which specific sources of social support moderate the effects of stigma and organizational barriers to care on treatment seeking. Social support from spouses and supervisors should directly lead to greater utilization of BH services, as effective social support providers help support recipients regulate their thoughts, actions, and emotions (Lakey & Orehek, 2011) ultimately increasing self-efficacy and reducing the effects of barriers on treatment utilization.

As service members commonly experience adverse behavioral health outcomes (Kitchiner et al., 2019; Mohr et al., 2018; Office of Mental Health and Suicide

Prevention, 2018), it is important to elucidate the interactive effects of social relationships and behavioral health stigma on behavioral health care utilization. The present study is a secondary data analysis of data from the baseline assessment of the Resilience-Supportive Leadership Training (RESULT) study and examines facilitators and barriers to utilization of behavioral health care (see Figure 4.1). The magnitude of effect of different sources of social support was expected to vary across sources of support. It was expected that social support, from spouse and supervisor, would facilitate more frequent utilization of behavioral health care and stigma and barriers would lead to less frequent treatment utilization. Peers appear to be contributors to behavioral health stigma (Britt et al., 2020b), leading to less frequent treatment use in this population. Additionally, social support should facilitate treatment seeking by buffering the effects of stigma and barriers to care, as would be demonstrated by significant interactions between social measures and barriers. It was also expected that these different sources would play distinct roles at different stages of seeking behavioral health treatment, as suggested by the Transtheoretical Model. Findings from the present study aim to inform future intervention work by elucidating interactive effects between focal social facilitators and barriers to care that have yet to be examined concurrently in an active-duty sample, ultimately aiming to increase the utilization of behavioral health services among active-duty service members.

Hypotheses

Hypothesis 1a. Behavioral health stigma will function as an obstacle to treatment utilization, demonstrated by a negative main effect of stigma and organizational barriers on treatment utilization.

Hypothesis 1b. Organizational barriers to care will also function as an obstacle to treatment and have a negative main effect with treatment utilization.

Hypothesis 1c. Perceived partner responsiveness (PPR) will act as a facilitator of treatment seeking, demonstrated by a positive main effect from PPR to treatment use frequency.

Hypothesis 1d. Unit support, both unit belonging and unit morale subscales, will reduce treatment use as demonstrated by a negative main effect on frequency of treatment utilization.

Hypothesis 1e. Supervisor behavioral health-supportive behaviors will act as a facilitator of behavioral health treatment seeking, demonstrated by a positive main effect on behavioral health service utilization.

Hypothesis 2a. Social measures, tested independently, are expected to interact with stigma to predict behavioral health service use. Social factors are hypothesized to attenuate or buffer some of the negative effects of stigma on behavioral health service use, reflected by significant moderation effects.

Hypothesis 2b. Social measures, tested independently, are also expected to buffer the effects of barriers to care predicting BH service use frequency, reflected by significant moderation effects.

Method

Participants and Procedures

The present study used data from the baseline survey of the RESULT study, a randomized controlled trial which evaluated a resilience-supportive leader training among active-duty service members. The RESULT training was an evidence-based training given to Army leaders aimed at improving their supportive behaviors toward their subordinates' behavioral health and resilience. The training highlights the important role of leaders in improving the behavioral health of their subordinates and included a subsequent behavior tracking exercise to reinforce supportive behaviors highlighted in the leader training. The baseline survey was given to both leaders and subordinates via Redcap and occurred prior to the leader training. Of the eligible sample population of 5,000 soldiers, 2,216 completed the baseline survey (44.3%). Participants who responded to the behavioral health service use item were included in the analytic sample (N = 2,185).

Participants were 25.3 years old on average (SD = 5.4 years, range = 18 to 54 years) and had been in the military for an average of 4.4 years (SD = 4.1 years, range = less than 1 year to 26 years). Soldiers had been in their current unit for an average of 9.9 months (SD = 4.2 years) and 17.7% reported having ever been deployed to a combat zone. The sample was mostly male (89.1%), most did not have any dependent children (68.9%), and 46.4% of the soldiers were married, 37.1% were single, 10.2% were in a committed relationship or cohabitating, and 5.6% were separated or divorced. Most participants had a high school diploma/GED (49.0%), or some college or technical school (30.6%), followed by those who completed college or technical school (16.0%), and

those with graduate study in progress or complete (4.1%). Approximately half of the sample was white (49.6%), followed by multiple/mixed race (29.0%), Black or African American (10.6%), Asian (4.8%), Native Hawaiian or Pacific Islander (2.5%), other (2.5%), American Indian or Alaskan Native (0.9%), and Latino or Hispanic participants (0.2%).

Measures

Behavioral Health Service Use Frequency. Frequency of use of behavioral health services was assessed using a single item, "How often have you used professional behavioral health services?" This item was adapted from a similar item asked in Hoge and colleagues (2004). Response options ranged from 0 (not at all), 1 (less than monthly), 2 (monthly), to 3 (more than once a month).

Behavioral Health Stigma and Barriers to Care. Perceived stigma and organizational barriers to care were measured using six items assessing perceived stigma and four items measuring of barriers to care (Britt et al., 2008). Participants were asked to rate their agreement with concerns related to seeking behavioral health treatment on a scale of 1 (Strongly disagree) to 5 (Strongly agree). Perceived stigma included items such as "It would be too embarrassing." and "I would be seen as weak." Barriers to care included items like "I don't know where to get help." And "I don't have adequate transportation." Both perceived stigma ($\alpha = .96$) and barriers to care ($\alpha = .80$) had good reliability.

Perceived Partner Responsiveness. Participants responded to three items regarding their perception of their current or most recent partner's responsiveness

(Laurenceau et a., 1998). Participants were asked to rate the degree to which their spouse/partner made them feel "accepted," "understood," and "cared for" on a Likert-type scale that ranged from 1 (not at all) to 7 (very much). This measure had good reliability (α = .95).

Team Cohesion. Aspects of relationships with one's platoon/unit were assessed using the three-item belonging and morale subscales of the Perceived Cohesion Scale (PCS; Chin et al., 1999). Participants rated six items on a 7-point Likert-type scale that ranged from 1 (strongly disagree) to 7 (strongly agree). The belonging subscale had good reliability (α = .98) and included items like "I feel that I belong to this group." The morale subscale also had good reliability (α = .95) and included items like "I am happy to be part of this group."

Supervisor Behavioral Health Supportive Behaviors. As supervisors play a crucial in the behavioral health and well-being of their subordinates (e.g., Bouleh et al., 2022), this measure was developed to assess perceptions of leader behaviors related to supporting behavioral health and reducing stigma of subordinates. These subscales were developed for the current project based on work related to a previously validated mental-health training for leaders, Mental Health Awareness Training (MHAT; Dimoff et al., 2016), and aligned with specific behaviors targeted in the RESULT training and behavior tracking. Four leader behaviors were included as subscales which subordinates rated on a Likert-type scale that ranged from 1 (strongly disagree) to 5 (strongly agree) in reference to their platoon leader. The emotional support subscale consisted of three items including "My platoon leader shows genuine concern for my behavioral health." The instrumental

support subscale also was three items including “My platoon leader adjusts my duties, when possible, to help me avoid conflicts with family responsibilities.” The role modeling and stigma reduction subscale was three items including “My platoon leader shares their healthy coping strategies.” Lastly, the warning sign recognition and response subscale was four items including “My platoon leader recognizes when I am not myself.” Each subscale demonstrated good reliability: emotional support ($\alpha = .93$), instrumental support ($\alpha = .93$), role modeling and stigma reduction ($\alpha = .93$), warning sign recognition and response ($\alpha = .95$). Supervisor support was modeled using a latent variable with means of each subscale as indicators.

Covariates. Several demographic covariates were selected as covariates due to their substantive relevance and significant bivariate correlations with main study measures. Demographic variables selected included age, gender, race, marital status, number of children, COVID-19-related concerns, and military characteristics including rank and duration of military service.

Psychological Distress. Psychological distress was measured using the six-item K6 (Kessler et al., 2002), used as a covariate to control for behavioral health symptoms. Participants reported how often they experienced six symptoms over the past 30 days on a 4-point Likert-type scale that ranged from 1 (none of the time) to 4 (most of the time). Items included “About how often did you feel hopeless?” and “About how often did you feel that everything was an effort?” (See Appendix C for complete list of measures). Cronbach’s alpha for psychological distress was .92 indicating good reliability.

Analysis Overview

Preliminary Analyses. Descriptive analyses were conducted using IBM SPSS Statistics (Version 28). Means, sample size, skew, kurtosis, and Cronbach's alphas are reported in Table 4.1 for all measures. Bivariate correlations between behavioral health service use, measures, and demographics are presented in Table 4.2.

Due to the hierarchical structure of the military, intraclass correlation coefficients (ICCs) were computed to determine whether multilevel modeling approaches would be necessary in SEM analyses. ICCs were computed with participants nested within both company and platoon. Values ranged from 0 to .03 (see Table 4.3 for individual measure ICCs), which are overall quite small, and although they have the potential to bias standard errors (Barcikowski, 1981), they are not expected to have large impacts, therefore multilevel modeling was not used in SEM analyses.

Differences between coupled and uncoupled participants on main study measures and demographics are presented in Table 4.4 due to the PPR measure being asked exclusively to coupled participants, therefore some SEM analyses only include coupled SMs.

Statistical Approaches. All analyses using SEM were conducted using Mplus version 8.9 (Muthén & Muthén, 1998-2017). Full information maximum likelihood (FIML) was used for missing data estimation. Due to mild to moderate skew and kurtosis of behavioral health service use frequency, all predictive analyses used FIML for missing data with robust standard errors and scaled chi-square and fit statistics as this approach produces less biased parameter estimates and more accurate standard errors than listwise deletion (MLR estimator in Mplus; Yuan & Bentler, 2000). For main effects models the

WLSMV estimator was used, as the behavioral health service use frequency item has four response options. In moderation models, behavioral health service use is declared as categorical but these analyses are unable to use the WLSMV estimator due to use of the XWITH command in Mplus, therefore interaction models use the MLR estimator.

Measurement Model Evaluation and Selection. Chi-square model fit statistics were reported alongside fit indices, including Comparative Fit Index (CFI) and Standardized Root Mean Square Residual (SRMR) which were interpreted according to Hu and Bentler (1999) recommendations. A series of confirmatory factor analyses (CFA) of all measures with three or greater items were computed prior to testing predictive models of behavioral health service use (see Table 4.7 and Figure 4.2). Model fit indices and standardized loadings were examined to determine inclusion in subsequent analyses. Factors with acceptable standardized loadings (e.g., > .4; Comrey & Lee, 1992) and model fit indices (e.g., Hu & Bentler, 1999) were used in predictive models of behavioral health service use.

Direct and Moderated Models of Behavioral Health Service Use. Main effects of barriers and social facilitators on behavioral health service use were estimated separately (Tables 4.6a-4.6f) then simultaneously (Figure 4.1a and Table 4.9). Models were all estimated unconditionally, then with psychological distress (to control for behavioral health symptoms), then with remaining covariates (covariates were grand mean centered unless they were dummy coded). Models with PPR only include coupled SMs.

Each social measure was then individually tested as moderators of the association between barriers (stigma or organizational barriers) and behavioral health service use (see Figure 4.1b, Tables 4.8a-d and Tables 4.9a-4.9d). Effects coding (Little et al., 2006) was used for latent variable predictors when used in moderation models. Interaction terms were created using the XWITH command in Mplus. Interaction models were estimated unconditionally, then with covariates. Significant interactions were probed using simple slopes analyses at -1 SD, mean, and +1 SD of the social moderator.

Results

Descriptives and Preliminary Analyses

Descriptives of main study measures are presented in Table 4.1 and correlations are presented in Table 4.2. These preliminary analyses revealed that, as expected, behavioral health (BH) service use frequency was skewed and kurtotic. Bivariate correlations revealed that BH service use frequency was significantly associated with lower PPR, unit morale and belonging, and supervisor behaviors and greater psychological distress, COVID concerns, and older age.

Additionally, to investigate differences between coupled and uncoupled participants, t-tests were computed with demographics and study measures (see Table 4.4). These revealed that coupled participants used BH services more frequently than their uncoupled counterparts, reported lower barriers to care, poorer supervisor supportive behaviors, and greater COVID concerns. Coupled participants were more likely to be older, have more children, are higher ranked and have longer military tenure than uncoupled SMs. Additional t-tests were computed to compare SMs who did or did

not use BH treatment (see Table 4.5). Findings revealed that those currently using BH services reported significantly lower PPR, unit belonging and morale, supervisor supportive behaviors, and concerns about COVID. Participants who were older, coupled, had more children, and had longer military tenure were more likely to use BH treatment. Gender differences were also investigated using t-tests (see Figure 4.6). Female SMs were more likely to be report greater frequency of BH service use, PPR, psychological distress, and COVID concerns, but less unit belonging and supervisor instrumental support than male SMs. Female SMs were more likely to be nonwhite, be higher ranked, and have less military tenure than male SMs.

Measurement Models

CFAs revealed that models fit mostly well, with fit indices suggesting good or acceptable model fit (see Table 4.7) according to Hu and Bentler (1999) recommendations. Examination of standardized loadings demonstrated adequate magnitude across all measures (e.g., Comrey & Lee, 1992) as they ranged from .53-.99. As all measures were deemed to have adequate fit, they were retained and utilized in structural models.

Structural Models: Main Effects

Stigma and Barriers to Care. To investigate direct effects of BH stigma and organizational barriers to care on BH service use frequency, main effects of each measure were individually tested. First unconditionally, then controlling for psychological distress, and lastly controlling for covariates (see Table 4.8a and Table 4.8b). When modeled unconditionally, neither stigma nor barriers to care were significantly related to

BH service use (stigma: β = .05, *SE* = .03, β* = .05, *p* = .06; barriers: β = .08, *SE* = .04, β* = .05, *p* = .07). When psychological distress was included in models, however, both stigma and barriers became significant and negative as expected (stigma: β = -.21, *SE* = .03, β* = -.22, *p* < .001; barriers: β = -.31, *SE* = .05, β* = -.21, *p* < .001). Psychological distress was associated with greater frequency of BH service use (β = .63, *SE* = .04, β* = .52, *p* < .001). Greater concerns regarding the COVID-19 pandemic were associated with greater BH service use (β = .22, SE = .03, β* = .19, *p* < .001). Female gender, lower rank, and greater military tenure were associated with greater frequency of BH service use (female: β = .35, *SE* = .10, β* = .10, *p* < .001; rank: β = -.05, *SE* = .02, β* = -.12, *p* = .002; tenure: β = .08, *SE* = .01, β* = .31, *p* < .001). This pattern of covariate results was consistent across subsequent models and thus their results is not reported in subsequent sections.

Social Protective Factors. Results of direct effects of PPR on BH symptoms are presented in Table 4.8c. In the unconditional model, greater PPR was associated with lower BH service use frequency (β = -.17, *SE* = .02, β* = .24, *p* < .001), indicating that SMs who report greater partner responsiveness use BH services less frequently. When controlling for psychological distress and other covariates, PPR remained negatively associated with BH service use (β = -.11, *SE* = .03, β* = -.15, *p* < .001).

Direct effects of unit belonging and morale are presented in Table 4.8d and Table 4.8e. Unconditional models revealed that when tested separately, both measures of unit support were negatively associated with BH service use frequency (belonging: β = -.11, *SE* = .02, β* = -.19, *p* < .001; morale: β = -.09, *SE* = .02, β* = -.16, *p* < .001). This

indicates that SMs with greater unit belonging and morale use BH services less frequently. When psychological distress was incorporated as a predictor, unit support measures were no longer associated with BH service use frequency (belonging: β = -.02, *SE* = .02, β* = -.03, *p* = .29; morale: β = -.01, *SE* = .02, β* = -.01, *p* = .86).

Direct effects of supervisor behavioral health-supported behaviors are presented in Table 4.8f. Similarly to unit support measures, although supervisor support was negatively associated with BH service use in unconditional models (β = -.12, *SE* = .03, β* = -.11, *p* < .001), indicating that greater supervisor support was associated with less frequent BH service use, when controlling for psychological distress supervisor support was no longer significantly associated with BH service use frequency (β = -.01, *SE* = .03, β* = .01, *p* = .91).

Simultaneous Models. When modeled with all social measures and barriers as simultaneous predictors (among coupled participants), PPR was the only significant predictor of BH service use frequency (PPR: β = -.16, *SE* = .03, β* = -.23, *p* < .001), with greater PPR associated with less frequent BH service use. When including covariates, PPR remains negatively associated with BH service use, but barriers to care emerged as significantly and negatively associated with BH service use frequency (β = -.21, *SE* = .09, β* = -.15, *p* = .02).

Structural Models: Interactive Effects

Behavioral Health Stigma. Results of interactive models of BH stigma by PPR are presented in Table 4.10a. PPR significantly moderated the effect of stigma in the unconditional model (β = .08, *SE* = .04, β* = .07, *p* = .02), and was marginally significant

in the conditional model (β = .07, *SE* = .04, β* = -.05, *p* = .07). Results of moderating effects of unit support are presented in Tables 4.8b and 4.8c. Both unit belonging and unit morale did not significantly interact with BH stigma in unconditional (belonging: β = -.03, *SE* = .03, β* = -.03, *p* = .23; morale: β = .01, *SE* = .03, β* = .01, *p* = .66) or conditional models (belonging: β = -.04, *SE* = .03, β* = -.03, *p* = .22; morale: β = -.01, *SE* = .03, β* = -.01, *p* = .81). Results of the interaction between supervisor support and BH stigma is presented in Table 4.10d. Supervisor support did not significantly moderate BH stigma in both unconditional (β = .01, *SE* = .02, β* = .01, *p* = .84) and conditional (β = -.01, *SE* = .02, β* = -.01, *p* = .78) models.

Barriers to Care. Moderating effects of PPR on barriers to care are presented in Table 4.11a. PPR significantly moderated barriers to care in both unconditional (β = .12, *SE* = .05, β* = .08, *p* = .02) and conditional models (β = .12, *SE* = .06, β* = .07, *p* = .03). Interactive effects of unit support measures and barriers to care are presented in Tables 4.11b and 4.11c. Neither unit support measure interacted significantly with barriers to care in unconditional (belonging: β = .03, *SE* = .04, β* = .02, *p* = .43; morale: β = .05, *SE* = .04, β* = .04, *p* = .14) or conditional models (belonging: β = .04, *SE* = .04, β* = .03, *p* = .28; morale: β = .05, *SE* = .04, β* = .04, *p* = .19). The moderating effects of supervisor support on barriers to care is presented in Table 4.11d. In the unconditional model, the interaction between supervisor support and barriers to care was marginally significant (β = .05, *SE* = .03, β* = .05, *p* = .07). In the conditional model, however, the interaction was no longer significant (β = .04, *SE* = .04, β* = .04, *p* = .18).

Follow-Up Tests: Simple Slopes. Simple slopes were computed to probe the moderating effects of PPR on both BH stigma and barriers to care at -1 *SD*, mean, and +1 *SD* of PPR among coupled SMs. As the interaction between PPR and stigma was significant in the unconditional model but marginally significant in the conditional model, simple slopes were computed to investigate the pattern of results but caution should be taken in interpretation of these findings, as the interaction was not robust to inclusion of covariates. Results revealed that the effect of stigma on BH service use was significant and negative at low (β = -.49, *SE* = 09, $p < .001$), mean (β = -.39, *SE* = .09, $p < .001$) and high (β = -.28, *SE* = .11, $p = .01$) levels of PPR (see Figure 4.3). The magnitude of the association between stigma and BH service use reduced in magnitude as PPR increased. Simple slopes analyses revealed that barriers to care were significantly and negatively associated with BH service use frequency at low (β = -.70, *SE* = .15, $p < .001$), mean (β = -.53, *SE* = .13, $p < .001$) and high (β = -.36, *SE* = .15, $p = .02$) levels of PPR (see Figure 4.4). Similar to results from stigma models, the magnitude of association between barriers and BH service use reduces as PPR increases. Simple slopes results indicate that PPR helps attenuate the detrimental effects of barriers on BH treatment use among coupled SMs.

Discussion

Active-Duty Service Members face high rates of adverse behavioral health outcomes including post-traumatic stress disorder (PTSD; Steenkamp et al., 2015), suicide (Office of Mental Health and Suicide Prevention, 2018), nonsuicidal self-injury (Gromatsky et al., 2022), and hazardous alcohol use (Bray et al., 2013; Mohr et al.,

2018). Although behavioral health services can be effective at improving these outcomes, soldiers do not seek care at the same rates for behavioral health problems as for physical health problems (Hoge et al., 2004). The present study aimed to elucidate social factors which facilitate behavioral health treatment seeking among active-duty service members and their buffering effects on stigma and barriers to care.

One's social context has been shown to be highly impactful for behavioral health (e.g., Lakey & Orehek, 2011), as it is theorized social support providers promote better behavioral health outcomes by supporting regulation of thoughts, feelings, and behaviors. Effective support providers who assist in regulation may increase self-efficacy (e.g., Feeney & Collins, 2015; Thoits, 2011), which should, in turn, increase an individual's capacity to seek treatment, and this is consistent with previous research which highlights the role of social support in treatment seeking (e.g., Cheung et a., 2016; Rafferty et al., 2019). Alternatively, by supporting regulation, effective social support may reduce the need for use of formal BH services. Results of the present study indicate these associations appear to be more complex than what is revealed by studying only main effects. Findings from the tests of interactions suggested that, as expected, PPR attenuated negative effects of stigma and barriers to care on BH service use frequency; however, main effects models suggested that a lack of adequate informal social support motivates seeking formal support through BH services. Supervisors and members of one's unit may be immediately impactful for BH symptoms (Lakey & Orehek, 2011; Han et al., 2014), which should, in turn, be a driver of treatment frequency (e.g., Zinzow et al., 2013).

Different sources of social support play distinct roles in influencing behavioral health treatment seeking. Having peers and leaders who are open about their own behavioral health and experiences receiving treatment should help mitigate the effects of behavioral health stigma in military populations, as previous work has demonstrated the effectiveness of contact with stigmatized groups to reduce behavioral health stigma (e.g., Corrigan & Penn, 1999) and the impact of unit norms and climate regarding behavioral health on stigma and perceived barriers to care (Britt et al., 2020b). Also, peers and leaders are similar others (e.g., Thoits, 2011) who have direct experience with many stressors service members are facing, and, therefore, they have the potential to help SMs overcome military-specific barriers to care. Results indicated, however, that unit and supervisor support were not significantly associated with BH service use above the effects of psychological distress.

Previous work demonstrates that unit norms and climate regarding behavioral health had direct effects on stigma and perceived barriers to care (Britt et al., 2020b), although findings of the present study did not find similar effects among unit belonging and unit morale. As the effects of unit belonging and morale were not significant above the effects of psychological distress, the present study results are consistent with other work which emphasizes the key role of BH symptoms as predictors of BH service use (Zinzow et al 2013). Members of one's unit did not emerge as effective targets for intervention aimed at increasing BH service use frequency in this population. Future research should examine whether unit support may predict BH service use over time as mediated by changes in attitudes regarding behavioral health stigma over time as it is

possible that the effects of one's unit requires longer periods of membership in one's unit that in the present sample.

Research on the importance of military leader behaviors relating specifically to behavioral health stigma and treatment (e.g., McGuffin et al., 2021) suggests supervisors should play a key role in BH symptoms and BH treatment use. Previous research has provided evidence for leader support as beneficial for behavioral health (Bessey et al., 2023) and daily well-being (Mohr et al., 2021), but supervisor support, specifically interactive effects with stigma and barriers in relation to BH, had not yet been examined when predicting BH treatment use. Findings from the present study suggest that leader support does not directly predict treatment use among SMs, highlighting psychological distress as a key predictor of BH service utilization. Whereas previous research demonstrates that mental health trainings for supervisors are beneficial for SM mental health (Mohr et al., 2023), the present study indicates these findings may not necessarily extend directly to BH treatment use. Previous research indicated that when service members experienced high levels of behavioral health symptoms, greater social support was associated with decreased service utilization (Russell et al., 2022). Future research can consider whether the effects of supervisor support on BH treatment use may depend upon factors such as severity of BH symptoms, gender, or specific experiences such as combat deployment.

Results of the present study ultimately highlight the critical role of spouses as facilitators of treatment utilization as they buffer the effects of stigma and barriers to care on treatment utilization frequency. Spouses have been implicated in previous research on

service member treatment seeking (Rafferty et al., 2019), results of the present study add support for the key role partners play as treatment facilitators in this population. Spouses are well-poised to notice changes in SM behavior, directly communicate with SMs, and encourage them to seek treatment (Rafferty et al., 2019). Somewhat paradoxically, findings of the present study also suggest that partners may serve as effective regulators and ultimately decrease treatment need by effectively meeting social regulation needs (e.g., Graham et al., 2017; Lakey & Orehek, 2011), as indicated by the negative direct effect between PPR and service use which indicated that those with greater PPR used BH services less frequently. The significant interaction between spousal support and barriers to care revealed that more responsive partners helped SMs overcome barriers to care more than those with less supportive partners. Taken together, results of the present study provide evidence for spouses of SMs as targets for intervention and prevention efforts, specifically to help reduce the impact of barriers to care and stigma. While greater PPR helped mitigate the effects of barriers to care on BH treatment use, having a partner who is less responsive was associated directly with increased BH treatment use.

Findings from the present study illuminate the complex and interactive effects between barriers and different social facilitators of behavioral health service use. Results inform theory regarding the effects of social support and behavioral health stigma and barriers to care by integrating theoretical perspectives on stigma and treatment seeking (Greene-Shortridge et al., 2007) with theoretical explanations for the role of social relationships in behavioral health and treatment seeking (Lakey & Orehek, 2011; Pietromonaco & Collins, 2017; Thoits, 2011) and work on health behavior change

(Prochaska & Velicer, 1997). Theoretical work on behavioral health stigma and barriers to care provides a useful perspective on the ways in which these factors can moderate an individual's progression from recognizing treatment need and making the steps to seek and continue treatment (Greene-Shortridge et al., 2007). When evaluating what motivates an individual to seek treatment, it is clear that severity of symptoms is a primary motivator (Zinzow et al., 2013) and a lack of supportive relationships also appears to be motivating treatment seeking, potentially as a way of coping with negative social exchanges an individual may be experiencing with peers, supervisors, or romantic partners.

Additionally, this study highlights a potential pathway with which relationships with romantic partners on influence behavioral health (e.g., Lakey & Orehek, 2011), specifically due to the ways in which they address barriers to care to facilitate treatment utilization, in turn benefitting long-term behavioral health outcomes (Hofmann et al., 2012; Kitchiner et al., 2019). One specific way in which marriage and romantic partnership may contribute to better mental health may be through the social control behaviors of spouses and partners specifically related to BH treatment utilization. While social control may encourage adaptive health behaviors, it also has the potential to lead to reduced feelings of self-efficacy (Rook, 2015). Future work can examine the particular ways spouses may reduce barriers to care, whether through positive or negative social control (Lewis & Rook, 1999) or with specific behaviors such as by providing childcare or transportation to in-person treatment.

Results have potential implications for interventions and clinicians who work with military personnel by informing which sources of support to target to facilitate behavioral health treatment seeking. Presence, or absence, of different sources of quality support, especially spousal relationships, may be effective targets for intervention for SMs. Intervention efforts can support SMs to strengthen existing connections or support service members to form new supportive connections. Other prevention and intervention efforts can aim to directly reduce barriers to care for military families including childcare or transportation. In the present study, spousal support emerged not only as a predictor of BH symptoms, but also as an important buffer of the negative effects of barriers to care and BH stigma. While there are general resources available for military spouses and families (e.g., Military OneSource), educational interventions can incorporate more specific information regarding accessing behavioral health care for spouses and SMs.

Although supervisor mental health-supportive trainings are effective in improving supervisor supportiveness of behavioral health and connecting subordinates to available resources (Dimoff & Kelloway, 2019), findings from the present study suggest that supervisor support specifically related to BH was not associated with BH service use above the effects of BH symptoms. Unit support also was not associated with BH service use above the effects of BH symptoms. Supervisor and unit support may be effective targets of intervention for BH symptoms, but spouses appear to be a more effective target for intervention specifically when targeting SM BH service use. Ultimately, responsibility for increasing behavioral health service utilization among military personnel falls not only to the personnel themselves, but also to their leaders, their peers,

and Army leadership, who each make distinct contributions to facilitators and barriers to behavioral health care (Cheung et al., 2016).

Limitations. The present study is limited by its cross-sectional design. Previous research has found that career concerns were lower among those who had already received treatment (Ganz et al., 2021) consistent with theoretical and empirical work suggest that receiving treatment will reduce perceptions of stigma and barriers to treatment (e.g., Greene-Shortridge et al., 2007). These findings indicate that the process of seeking, receiving, and maintaining treatment shapes attitudes regarding mental health in ways that cannot be fully captured at one time point, thus future research can address this limitation by examining the effects of different social relationships on trajectories of behavioral health symptoms over time, prior to and following receiving behavioral health treatment and at different steps along the path to receiving behavioral health treatment.

Another limitation is that the outcome measure is a single item capturing the frequency of service utilization and does not capture the intermediary step of intention to seek treatment. By focusing specifically on those who have already received behavioral health treatment, and their frequency of doing so, this includes those who do not need treatment with those who intend to seek treatment but have not yet received it yet. However, determining need for treatment is personal and multifaceted (e.g., Rafferty et al., 2019), and intention to seek treatment is likely impacted by not only one's attitudes regarding treatment but also perceived social norms and perceived control (e.g., Ajzen & Fishbein, 2005). Therefore, inclusion of participants presenting a wide range of reported symptoms in the current sample allows for a broader inclusion of treatment need,

illuminating the ways in which these facilitators and barriers function in a high stress environment. Future research will benefit from examining the ways in which different sources of social support with a more granular approach to the different steps required to seek treatment.

The highly gendered context of active-duty military service (82.7% of active-duty service members are male; US DoD, 2021), and the demographics of the present sample (e.g., 89% men), make it likely that results of the present study are more generalizable to male service members than for their female peers. There is a high prevalence of heterosexual couples (6.3% of individuals in the US Armed Services consider themselves LGB; RAND Corporation, 2021), but there is greater likelihood of adverse experiences among LGBT service members, including military sexual trauma (Gurung et al., 2018). It is, therefore, likely that the pattern of results related to perceived partner responsiveness seen in the present study may not apply to an active duty sample with greater gender diversity. Similarly, the benefits of having a responsive partner specifically on stigma and barriers to care as seen in the present study should be investigated in diverse couples.

It also is possible that there are different effects of spousal support for dual-military couples relative to service members with civilian spouses, although the present study does not include measures necessary to distinguish civilian and military spouses. Dual military couples are a small minority of military couples (7.0% of active-duty service members are in dual-military marriages, US DoD, 2021) that may face increased risk of adverse outcomes due to the added stress of navigating a system structured with single-earner families in mind (Smith & Segal, 2013). While it is possible that a military

spouse may be especially well-suited to facilitate overcoming barriers to care due to their familiarity with military systems and stressors (Thoits, 2011), it also is possible that having a military spouse may reinforce norms and attitudes regarding behavioral health stigma making treatment seeking less likely. Future research can include more detailed items regarding the spousal relationship and specific spousal characteristics when examining the role of spouses in treatment seeking in military personnel.

Strengths. A strength of the present study was that it included service members with a wide range of reported symptoms of numerous indicators of behavioral health, as research often relies on samples limited to participants exhibiting clinical levels of behavioral health disorders. Although experiencing high levels of behavioral health symptoms are associated with an individual's perceived need for behavioral health treatment (Randles & Finnegan, 2022), it also is true that individuals exhibiting a wide range of symptomatology can benefit from behavioral health treatment (Hofmann et al., 2012). Including a broader range of symptomatology likely captures more personnel who would benefit from treatment than sample recruitment which requires explicit disclosure of behavioral health disorder diagnoses. However, sample recruitment in the present study may have been biased by recruitment materials which explicitly mentioned that the supervisor training was specifically targeted toward resilience-supportive behaviors, although this is likely to increase the overall level of treatment need of the sample and, thus, increase statistical power to detect interaction effects. Additionally, the present study assessed whether or not the specific behavior of interest, receiving formal behavioral health services, was affected by these factors, moving beyond intentions to

seek treatment. It is likely there are additional organizational barriers to care that one might face after intending to seek treatment but not having yet received it in addition to those which may be specific to the active-duty context. Previous research on stigma in military populations has often focused on intention to seek treatment among those currently experiencing behavioral health symptoms (e.g., Sharp et al., 2015), thus a strength of this study is the use of frequency of behavioral health service utilization as the primary outcome. Additionally, sample sizes in studies on the effects on stigma and barriers to care and social support on behavioral health utilization are often small, thus the large sample size in the present study (N = 2,185) provides greater power to detect interactive effective amongst these predictors of interest.

Conclusion

Behavioral health needs are high among military service members (e.g., Office of Mental Health and Suicide Prevention, 2018), yet service members are often resistant to treatment seeking for both behavioral and physical health problems (Britt et al., 2020a). Previous research has provided evidence for the importance of behavioral health stigma (Clement et al., 2015) and social relationships (Graham et al., 2017) as predictors of behavioral health treatment seeking among military personnel, but their interactive effects had yet to be examined in a large active-duty sample (N = 2,185) using structural equation modeling, which are strengths of the present study. As treatment for behavioral health symptoms is effective in this population for prevalent behavioral health disorders, such as PTSD (e.g., Kitchiner et al., 2019), there is great value in illuminating which sources of social support have the greatest mitigating effects on behavioral health stigma

and barriers to care in this high-risk population. Specifically, the present study provides evidence for the important role spouses play as a lack of spousal support was directly related to more frequent BH service use among coupled SMs. In moderation models, PPR attenuated some of the detrimental effects of barriers to care and stigma on BH service use. Unit support and supervisor support were not associated with BH service use above the effects of psychological distress. Taken together, this pattern of results informs intervention and prevention efforts to address barriers to treatment seeking by highlighting the way in which lacking informal sources of support may motivate more frequent utilization of formal supports. Spouses may be especially effective at reducing the impact of impact of barriers to care, thus intervention efforts to increase uptake of behavioral health services will benefit from focusing on the important role of military spouses and romantic partners.

Study III Tables

Table 4.1
Descriptives of Measures

Variables	*N*	Mean	*SD*	Skew	Kurtosis	α
Behavioral Health Service Use Frequency	2185	.40	.80	2.07	3.39	--
Behavioral Health Symptoms						
Psychological Distress	2172	1.82	.81	.83	-.25	.92
Moderators						
Behavioral Health Stigma	2181	2.20	1.11	.65	-.39	.96
Barriers to Care	2181	2.08	.91	.56	-.14	.80
Perceived Partner Responsiveness	1232	5.93	1.51	-1.60	1.93	.95
Team Cohesion – Belonging	2167	5.40	1.68	-1.03	.33	.98
Team Cohesion – Morale	2167	5.00	1.80	-.69	-.47	.95
Supervisor Emotional Support	1964	3.87	1.01	-.71	.05	.93
Supervisor Instrumental Support	1965	3.78	1.02	-.57	-.10	.93
Role Modeling/Stigma Reduction	1981	3.91	.92	-.59	.03	.93
Warning Sign Recognition and Response	1978	3.72	1.03	-.56	-.09	.95

Note. Means, skew, and kurtosis are presented of observed, not latent, variables.

Table 4.2

Bivariate Correlations of Study Measures

	1.	2.	3.	4.	5.	6.
1. BH Service Use	--					
2. BH Stigma	.04	--				
3. Barriers to Care	.04	.69***	--			
4. PPR	-.21***	-.17***	-.19***	--		
5. Unit Belonging	-.16***	-.33***	-.32***		--	
6. Unit Morale	-.12***	-.31***	-.29***	.19***	.85***	--
7. Emotional Support	-.09***	-.29***	-.26***	.11***	.58***	.58***
8. Instrumental Support	-.09***	-.28***	-.25***	.11***	.58***	.58***
9. Role Modeling	-.08***	-.28***	-.26***	.12***	.59***	.58***
10. Warning Sign R&R	-.09***	-.28***	-.26***	.09**	.60***	.60***
11. Psychological Distress	.34***	.47***	.44***	-.25***	-.37***	-.34***
12. COVID Concerns	.16***	.21***	.21***	-.14***	-.19***	-.15***
13. Age	.13***	-.07**	-.11***	-.12***	-.01	-.03
14. Gender	.08***	-.02	-.09	-.06*	-.06*	-.01
15. White	-.01	.03	-.04	.09**	.05*	-.02
16. Coupled	.04*	-.05*	-.08***	.39***	.01	-.02
17. Number of Children	.09***	-.04	-.09***	-.08**	-.04	-.04
18. Rank	.04	-.07**	-.12***	.01	.08***	.03
19. Military Tenure	.18***	-.07***	-.12***	-.10***	-.01	-.06**

	7.	8.	9.	10.	11.	12.
7. Emotional Support	--					
8. Instrumental Support	.88***	--				
9. Role Modeling	.87***	.88***	--			
10. Warning Sign R&R	.89***	.88***	.88***	--		
11. Psychological Distress	-.23***	-.23***	-.22***	-.25***	--	
12. COVID Concerns	-.12***	-.13***	-.14***	-.12***	.31***	--
13. Age	-.02	-.03	-.06**	-.01	-.01	.11***
14. Gender	-.04	-.05*	-.05*	-.05*	.05*	.10***
15. White	.03	.04	.06*	.04	.01	-.13***
16. Coupled	-.04	-.03	-.04	-.04	-.03	.05*
17. Number of Children	-.02	-.02	-.05*	-.01	-.05*	.06**
18. Rank	-.03	-.03	-.05*	-.01	-.05**	.06*
19. Military Tenure	-.04	-.05*	-.07**	-.03	.01	.08***

	13.	14.	15.	16.	17.	18.
13. Age	--					
14. Gender	-.02	--				
15. White	-.04	-.14***	--			
16. Coupled	.33***	-.01	.03	--		
17. Number of Children	.49***	-.03	-.01	.39***	--	
18. Rank	.49***	.04	.11***	.19***	.19***	--
19. Military Tenure	.77***	-.05*	.05*	.27***	.49***	.53***

Note. BH = Behavioral Health, PPR = Perceived Partner Responsiveness, R&R = Recognition and Response. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 4.3
Intraclass Correlation Coefficients of Study Measures

Variables	ICC - Company	ICCs - Platoon
Behavioral Health Service Use Frequency	0	.004
Moderators		
Behavioral Health Stigma	0	.001
Barriers to Care	0	.002
Perceived Partner Responsiveness	0	0
Team Cohesion – Belonging	0	0
Team Cohesion – Morale	.001	0
Supervisor Emotional Support	.005	.003
Supervisor Instrumental Support	.004	.007
Role Modeling/Stigma Reduction	.009	.02
Warning Sign Recognition and Response	.003	0
Behavioral Health Symptoms		
Psychological Distress	0	0

Note. ICC = Intraclass Correlation Coefficient.

Table 4.4

Differences Between Coupled and Uncoupled Participants on Main Study Measures and Demographics

	Uncoupled		Coupled				
Variables	***M***	***SD***	***M***	***SD***	***t***	***df***	***p***
BH Service Use Frequency	.32	.74	.44	.82	-3.45	2096	< .001
Behavioral Health Stigma	2.25	1.08	2.15	1.13	1.84	2093	.07
Barriers to Care	2.16	.91	2.02	.91	3.46	2093	< .001
Team Cohesion – Belonging	5.39	1.65	5.37	1.71	.18	2080	.85
Team Cohesion – Morale	5.06	1.79	4.95	1.82	1.41	2080	.16
Supervisor Emotional Support	3.92	.98	3.83	1.03	1.99	1887	.047
Supervisor Instrumental Support	3.82	.99	3.75	1.04	1.46	1890	.15
Role Modeling/Stigma Reduction	3.96	.90	3.87	.94	2.62	1904	.02
Warning Sign R&R	3.77	.99	3.68	1.06	1.90	1901	.06
Psychological Distress	1.83	.82	1.81	.80	.57	2093	.57
COVID Concerns	1.90	.86	2.03	.94	-3.22	2090	.001
Age	22.92	3.93	26.87	5.66	-17.48	2064	< .001
Gender	.11	.31	.11	.31	-.07	2046	.47
White	.48	.50	.51	.50	-.96	2090	.34
Number of Children	.05	.27	.93	1.23	-19.03	1931	< .001
Rank	4.16	2.34	5.16	2.64	-8.91	2096	< .001
Military Tenure	2.91	2.75	5.32	4.41	-14.17	2089	< .001

Note. BH = Behavioral Health, R&R = Recognition and Response.

Table 4.5

Differences Between Participants Who Are and Are Not Using BH Treatment on Main Study Measures and Demographics

	BH Service Users		BH Service Nonusers				
Variables	***M***	***SD***	***M***	***SD***	***t***	***df***	***p***
Behavioral Health Stigma	2.27	1.17	2.17	1.10	1.82	2179	.07
Barriers to Care	2.15	.92	2.05	.91	2.23	2179	.03
PPR	5.41	1.73	6.13	1.36	-7.69	1230	< .001
Team Cohesion – Belonging	5.39	1.90	5.53	1.57	-6.56	2165	< .001
Team Cohesion – Morale	4.65	1.90	5.11	1.76	-5.14	2165	< .001
Supervisor Emotional Support	3.74	1.10	3.91	.98	-3.22	1962	.001
Supervisor Instrumental Support	3.66	1.12	3.82	.99	-2.90	1963	.004
Role Modeling/Stigma Reduction	3.80	.97	3.94	.90	-3.02	1979	.003
Warning Sign R&R	3.58	1.13	3.76	.99	-3.37	1976	< .001
Psychological Distress	2.25	.91	1.68	.72	14.83	2170	< .001
COVID Concerns	2.23	.95	1.91	.90	6.37	2096	< .001
Age	26.80	6.04	24.78	5.08	7.38	2069	< .001
Gender	.14	.35	.10	.30	2.79	2050	.01
White	.50	.50	.49	.50	.43	2094	.67
Coupled	.68	.47	.57	.50	4.77	2096	< .001
Number of Children	.85	1.24	.52	1.00	5.88	1934	< .001
Rank	5.06	2.82	4.69	2.53	2.82	2183	.01
Military Tenure	5.89	4.94	3.86	3.56	10.34	2174	< .001

Note. PPR = Perceived Partner Responsiveness, R&R = Recognition and Response.

Table 4.6

Differences Between Male and Female Participants on Main Study Measures and Demographics

	Male		Female				
Variables	***M***	***SD***	***M***	***SD***	***t***	***df***	***p***
BH Service Use Frequency	.37	.76	.57	.97	3.58	2050	< .001
Behavioral Health Stigma	2.17	1.11	2.13	1.08	-.71	2047	.48
Barriers to Care	2.06	.91	2.04	.86	-.36	2046	.72
PPR	5.98	1.47	5.68	1.69	-2.16	1205	.03
Team Cohesion – Belonging	5.44	1.66	5.14	1.84	-2.54	2035	.01
Team Cohesion – Morale	5.02	1.80	4.96	1.83	-.42	2033	.67
Supervisor Emotional Support	3.89	1.00	3.78	1.09	-1.50	1847	.14
Supervisor Instrumental Support	3.80	1.01	3.64	1.11	-2.11	1851	.04
Role Modeling/Stigma Reduction	3.93	.91	3.78	.99	-2.25	1863	.03
Warning Sign R&R	3.74	1.01	3.58	1.14	-1.99	1860	.047
Psychological Distress	1.80	.80	1.92	.84	2.04	2047	.04
COVID Concerns	1.94	.91	2.24	.91	4.58	2044	< .001
Age	25.31	5.38	25.00	5.55	-.80	2024	.42
White	.53	.50	.30	.46	-6.56	2046	< .001
Coupled	.60	.49	.60	.49	.07	2046	.95
Number of Children	.60	1.06	.51	.97	-1.21	1889	.23
Rank	4.72	2.45	5.07	3.35	1.95	2050	.05
Military Tenure	4.42	4.03	3.77	3.98	-2.27	2043	.02

Note. BH = Behavioral Health, PPR = Perceived Partner Responsiveness, R&R = Recognition and Response.

Table 4.7

Measurement Model Fit and Standardized Parameter Loadings of Individual CFAs

	N	**X_1**	**X_2**	**X_3**	**X_4**	**X_5**	**X_6**
BH Stigma	2183	.83	.89	.93	.87	.90	.88
Barriers to Care	2183	.60	.53	.84	.82	--	--
PPR	1246	.95	.89	.94	--	--	--
Unit Belonging	2183	.95	.99	.97	--	--	--
Unit Morale	2183	.92	.90	.96	--	--	--
Supervisor BH Support	1985	.94	.94	.93	.95	--	--
Psychological Distress	2176	.90	.91	.71	.73	.85	.69

	N	**$\chi^2(df)$**	**CFI**	**SRMR**
BH Stigma	2183	(9) = 360.61, $p < .001$	.97	.02
Barriers to Care	2183	(2) = 324.27, p < .001	.90	.07
PPR	1246	--	--	--
Unit Belonging	2183	--	--	--
Unit Morale	2183	--	--	--
Supervisor BH Support	1985	(2) = 2.94, p = .23	1.00	.002
Psychological Distress	2176	(9) = 538.78, $p < .001$	.94	.04

Note. Measures with only three indicators are just identified thus fit information is not available and therefore not presented. PPR = Perceived Partner Responsiveness, R&R = Recognition and Response, BH = Behavioral Health.

Table 4.8a

Direct Effects of Behavioral Health Stigma on Behavioral Health Service Use

	Behavioral Health Service Use			
Unconditional	β	*SE*	β*	*p*
Behavioral Health Stigma	.05	.03	.05	.06
Controlling for BH Symptoms				
Behavioral Health Stigma	-.21	.03	-.22	<.001
Psychological Distress	.63	.04	.52	< .001
With Covariates				
Behavioral Health Stigma	-.20	.03	.03	< .001
Psychological Distress	.62	.04		< .001
COVID Concerns	.22	.03	.19	< .001
Age	-.01	.01	-.06	.27
Gender	.35	.10	.10	< .001
White	.10	.07	.03	.12
Coupled	.11	.07	.05	.14
Number of Children	.02	.03	.02	.50
Rank	-.05	.02	-.12	.002
Military Tenure	.08	.01	.31	< .001

Note. Unconditional *N*: 2185, R^2: .003, Controlling for BH Symptoms *N*: 2185, R^2: .20, With Covariates *N*: 1857, R^2: .27.

Table 4.8b

Direct Effects of Barriers to Care on Behavioral Health Service Use

	Behavioral Health Service Use			
Unconditional	β	*SE*	β*	*p*
Barriers to Care	.08	.04	.05	.07
Controlling for BH Symptoms				
Barriers to Care	-.31	.05	-.21	< .001
Psychological Distress	.61	.04	.51	< .001
With Covariates				
Barriers to Care	-.31	.06	.03	< .001
Psychological Distress	.59	.04		< .001
COVID Concerns	.22	.03	.19	< .001
Age	-.01	.01	-.06	.27
Gender	.35	.10	.10	< .001
White	.10	.07	.05	.12
Coupled	.11	.07	.05	.14
Number of Children	.02	.03	.02	.50
Rank	-.05	.02	-.12	.002
Military Tenure	.08	.01	.31	< .001

Note. Unconditional *N*: 2185, R^2: .003, Controlling for BH Symptoms *N*: 2185, R^2: .20, With Covariates *N*: 1857, R^2: .27.

Table 4.8c

Direct Effects of Perceived Partner Responsiveness on Behavioral Health Service Use

	Behavioral Health Service Use			
Unconditional	β	*SE*	β*	*p*
Perceived Partner Responsiveness	-.17	.02	-.24	< .001
Controlling for BH Symptoms				
Perceived Partner Responsiveness	-.11	.02	-.15	< .001
Psychological Distress	.40	.04	.33	< .001
With Covariates				
PPR	-.11	.03	-.15	< .001
Psychological Distress	.39	.05	.28	< .001
COVID Concerns	.20	.04	.18	< .001
Age	-.02	.01	-.08	.18
Gender	.30	.12	.09	.01
White	.03	.03	.02	.68
Number of Children	.03	.03	.03	.39
Rank	-.06	.06	-.15	.001
Military Tenure	.08	.08	.33	< .001

Note. Results are reported for coupled participants. Unconditional *N*: 1249, R^2: .06, Controlling for BH Symptoms *N*: 1249, R^2: .16, With Covariates *N*: 1152 R^2: .23.

Table 4.8d

Direct Effects of Unit Belonging on Behavioral Health Service Use

	Behavioral Health Service Use			
Tested Separately	β	*SE*	β*	*p*
Unit Belonging	-.11	.02	-.19	< .001
Controlling for BH Symptoms				
Unit Belonging	-.02	.02	-.03	.29
Psychological Distress	.47	.03	.40	< .001
With Covariates				
Unit Belonging	-.01	.03	-.02	.53
Psychological Distress	.46	.04	.35	< .001
COVID Concerns	.22	.03	.19	< .001
Age	-.01	.01	-.06	.27
Gender	.35	.10	.10	< .001
White	.10	.07	.05	.12
Coupled	.11	.07	.05	.14
Number of Children	.02	.03	.02	.50
Rank	-.05	.02	-.12	.002
Military Tenure	.08	.01	.31	< .001

Note. Unconditional *N*: 2185, R^2: .03, Controlling for BH Symptoms *N*: 2185, R^2: .17, With Covariates *N*: 1857, R^2: .24.

Table 4.8e

Direct Effects of Unit Morale on Behavioral Health Service Use

	Behavioral Health Service Use			
Unconditional	β	*SE*	β*	*p*
Unit Morale	-.09	.02	-.16	< .001
Controlling for BH Symptoms				
Unit Morale	-.01	.02	-.01	.86
Psychological Distress	.48	.03	.41	< .001
With Covariates				
Unit Morale	.01	.02	.02	.59
Psychological Distress	.49	.04	.36	< .001
COVID Concerns	.22	.03	.19	< .001
Age	-.01	.10	-.06	.27
Gender	.35	.10	.10	< .001
White	.10	.07	.05	.12
Coupled	.11	.07	.05	.14
Number of Children	.02	.03	.02	.50
Rank	-.05	.02	-.12	.002
Military Tenure	.08	.01	.31	< .001

Note. Unconditional *N*: 2185, R^2: .02, Controlling for BH Symptoms *N*: 2185, R^2: .17, With Covariates *N*: 1857, R^2: .24.

Table 4.8f

Direct Effects of Supervisor Support on Behavioral Health Service Use

	Behavioral Health Service Use			
Unconditional	β	*SE*	β*	*p*
Supervisor Support	-.12	.03	-.11	< .001
Controlling for BH Symptoms				
Supervisor Support	-.01	.03	.01	.91
Psychological Distress	.48	.03	.41	< .001
With Covariates				
Supervisor Support	.02	.03	.02	.50
Psychological Distress	.49	.04	.36	< .001
COVID Concerns	.22	.03	.19	< .001
Age	-.01	.01	-.06	.27
Gender	.35	.10	.10	< .001
White	.10	.07	.05	.12
Coupled	.11	.07	.05	.14
Number of Children	.02	.03	.02	.50
Rank	-.05	.02	-.12	.002
Military Tenure	.08	.01	.31	< .001

Note. Unconditional *N*: 2185, R^2: .01, Controlling for BH Symptoms *N*: 2185, R^2: .17, With Covariates *N*: 1857, R^2: .24.

Table 4.9

Predictors of Behavioral Health Service Use Tested Simultaneously Among Coupled SMs

	Behavioral Health Service Use			
	β	*SE*	β*	*p*
Unconditional				
Behavioral Health Stigma	-.04	.06	-.04	.52
Barriers to Care	-.04	.09	-.03	.65
Perceived Partner Responsiveness	-.16	.03	-.23	< .001
Unit Belonging	-.08	.05	-.13	.10
Unit Morale	-.02	.05	-.03	.74
Supervisor Support	.03	.05	.03	.50
With Covariates				
Behavioral Health Stigma	-.10	.06	-.10	.10
Barriers to Care	-.21	.09	-.15	.02
Perceived Partner Responsiveness	-.12	.03	-.15	< .001
Unit Belonging	-.05	.05	-.07	.34
Unit Morale	.03	.05	.06	.48
Supervisor Support	.01	.05	.01	.91
Psychological Distress	.55	.06	.39	< .001
COVID Concerns	.20	.04	.18	< .001
Age	-.02	.01	-.08	.18
Gender	.30	.12	.09	.01
White	.03	.08	.02	.68
Number of Children	.03	.03	.03	.39
Rank	-.06	.02	-.15	.001
Military Tenure	.08	.01	.33	< .001

Note. Results are reported for coupled participants. Unconditional *N*: 1249, R^2: .08, With Covariates *N*: 1152, R^2: .26.

Table 4.10a

Stigma by Perceived Partner Responsiveness on Behavioral Health Service Use Among Coupled SMs

	Behavioral Health Service Use			
	β	*SE*	β*	*p*
Unconditional				
Perceived Partner Responsiveness	-.30	.04	-.24	< .001
BH Stigma	-.02	.06	-.01	.76
PPR*Stigma	.08	.04	.07	.02
With Covariates				
Perceived Partner Responsiveness	-.20	.05	-.14	< .001
BH Stigma	-.39	.09	-.21	< .001
PPR*Stigma	.07	.04	-.05	.07
Psychological Distress	.97	.11	.39	< .001
COVID Concerns	.13	.08	.06	.09
Age	-.03	.02	-.08	.12
Gender	.43	.22	.07	.06
White	.11	.15	.03	.48
Number of Children	.10	.07	.06	.12
Rank	-.04	.03	-.06	.17
Military Tenure	.12	.02	.26	< .001

Note. Results are reported for coupled participants. PPR = Perceived Partner Responsiveness, BH = Behavioral Health. Unconditional *N*: 1249, R^2: .06, With Covariates *N*: 1152, R^2: .21.

Table 4.10b

Stigma by Unit Belonging on Behavioral Health Service Use

	Behavioral Health Service Use			
Unit Belonging	β	*SE*	β*	*p*
Unit Belonging	-.19	.03	-.17	< .001
BH Stigma	-.04	.05	-.02	.52
Unit Belonging*Stigma	-.03	.03	-.03	.23
With Covariates				
Unit Belonging	-.03	.04	-.02	.52
BH Stigma	-.42	.07	-.22	< .001
Unit Belonging*Stigma	-.04	.03	-.03	.22
Psychological Distress	1.12	.09	.46	< .001
COVID Concerns	.18	.07	.08	.01
Age	-.02	.02	-.06	.21
Gender	.58	.18	.09	.001
White	.15	.12	.04	.21
Coupled	.23	.14	.05	.09
Number of Children	.10	.06	.05	.12
Rank	-.03	.03	-.04	.26
Military Tenure	.13	.02	.25	< .001

Note. BH = Behavioral Health. Unconditional *N*: 2185, R^2: .03, With Covariates *N*: 1857, R^2: .24.

Table 4.10c

Stigma by Unit Morale on Behavioral Health Service Use

	Behavioral Health Service Use			
Unit Morale	β	*SE*	β*	*p*
Unit Morale	-.15	.03	-.15	< .001
BH Stigma	.01	.05	.01	.88
Unit Morale*Stigma	.01	.03	.01	.66
With Covariates				
Unit Morale	.01	.04	.01	.83
BH Stigma	-.40	.07	-.21	< .001
Unit Morale*Stigma	-.01	.03	-.01	.81
Psychological Distress	1.15	.09	.46	< .001
COVID Concerns	.18	.07	.08	.01
Age	-.02	.02	-.05	.24
Gender	.59	.18	.09	.001
White	.16	.13	.04	.20
Coupled	.24	.14	.06	.09
Number of Children	.10	.06	.05	.11
Rank	-.03	.03	-.04	.22
Military Tenure	.13	.02	.25	< .001

Note. BH = Behavioral Health. Unconditional *N*: 2185, R^2: .02, With Covariates *N*: 1857, R^2: .24.

Table 4.10d

Stigma by Supervisor Support on Behavioral Health Service Use

	Behavioral Health Service Use			
Supervisor Support	β	*SE*	β*	*p*
Supervisor Support	-.07	.02	-.09	.002
BH Stigma	.01	.02	.02	.52
Supervisor Support*Stigma	.01	.02	.01	.84
With Covariates				
Supervisor Support	-.01	.02	-.01	.63
BH Stigma	-.14	.02	-.19	< .001
Supervisor Support*Stigma	-.01	.02	-.01	.78
Psychological Distress	.40	.03	.43	< .001
COVID Concerns	.06	.02	.07	.01
Age	-.01	.01	-.04	.27
Gender	.19	.06	.07	.01
White	.03	.04	.02	.28
Coupled	.03	.04	.02	.36
Number of Children	.03	.02	.04	.20
Rank	-.01	.01	-.04	.08
Military Tenure	.04	.01	.21	< .001

Note. BH = Behavioral Health. Unconditional *N*: 2185, R^2: .01, With Covariates *N*: 1857, R^2: .19.

Table 4.11a

Barriers to Care by Perceived Partner Responsiveness on Behavioral Health Service Use Among Coupled SMs

	Behavioral Health Service Use			
PPR	β	*SE*	β^*	*p*
Perceived Partner Responsiveness	-.31	.05	-.24	< .001
Barriers to Care	.08	.09	.03	.40
PPR* Barriers	.12	.05	.08	.02
With Covariates				
Perceived Partner Responsiveness	-.23	.05	-.16	< .001
Barriers to Care	-.53	.13	-.21	< .001
PPR* Barriers	.12	.06	.07	.03
Psychological Distress	.99	.12	.40	< .001
COVID Concerns	.14	.08	.06	.09
Age	-.03	.02	-.09	.11
Gender	.42	.23	.06	.06
White	.09	.15	.02	.54
Number of Children	.08	.07	.04	.26
Rank	-.06	.03	-.07	.08
Military Tenure	.13	.02	.28	< .001

Note. Results are reported for coupled participants. PPR = Perceived Partner Responsiveness. Unconditional *N*: 1249, R^2: .07, With Covariates *N*: 1152, R^2: .22.

Table 4.11b

Barriers to Care by Unit Belonging on Behavioral Health Service Use

	Behavioral Health Service Use			
Unit Belonging	β	*SE*	β*	*p*
Unit Belonging	-.19	.03	-.17	< .001
Barriers to Care	.07	.07	.03	.37
Unit Belonging* Barriers	.03	.04	.02	.43
With Covariates				
Unit Belonging	-.05	.04	-.04	.25
Barriers to Care	-.49	.11	-.19	< .001
Unit Belonging* Barriers	.04	.04	.03	.28
Psychological Distress	1.11	.10	.45	< .001
COVID Concerns	.18	.07	.08	.01
Age	-.02	.02	-.05	.32
Gender	.60	.18	.09	.001
White	.13	.12	.03	.29
Coupled	.26	.14	.06	.06
Number of Children	.08	.06	.04	.22
Rank	-.04	.03	-.05	.16
Military Tenure	.13	.02	.25	< .001

Note. Unconditional *N*: 2185, R^2: .04, With Covariates *N*: 1857, R^2: .24.

Table 4.11c

Barriers to Care by Unit Morale on Behavioral Health Service Use

	Behavioral Health Service Use			
Unit Morale	β	*SE*	β*	*p*
Unit Morale	-.15	.03	-.14	< .001
Barriers to Care	.10	.07	.05	.17
Unit Morale*Barriers	.05	.04	.04	.14
With Covariates				
Unit Morale	-.01	.04	-.01	.83
Barriers to Care	-.47	.11	-.18	< .001
Unit Morale* Barriers	.05	.04	.04	.19
Psychological Distress	1.13	.10	.46	< .001
COVID Concerns	.18	.07	.08	.01
Age	-.02	.02	-.05	.34
Gender	.61	.18	.09	.001
White	.13	.12	.03	.28
Coupled	.25	.14	.06	.07
Number of Children	.08	.06	.04	.21
Rank	-.04	.03	-.05	.14
Military Tenure	.13	.02	.25	< .001

Note. Unconditional *N*: 2185, R^2: .03, With Covariates *N*: 1857, R^2: .24.

Table 4.11d

Barriers to Care by Supervisor Support on Behavioral Health Service Use

	Behavioral Health Service Use			
	β	*SE*	β*	*p*
Supervisor Support				
Supervisor Support	-.08	.03	-.09	.001
Barriers to Care	.03	.03	.03	.35
Supervisor Support* Barriers	.05	.03	.05	.07
With Covariates				
Supervisor Support	-.02	.02	-.02	.46
Barriers to Care	-.19	.03	-.19	< .001
Supervisor Support* Barriers	.04	.04	.04	.18
Psychological Distress	.40	.03	.43	< .001
COVID Concerns	.06	.02	.07	.01
Age	-.01	.01	-.03	.40
Gender	.20	.06	.08	.002
White	.03	.04	.02	.40
Coupled	.04	.04	.02	.32
Number of Children	.02	.02	.03	.35
Rank	-.02	.01	-.05	.04
Military Tenure	.04	.01	.21	< .001

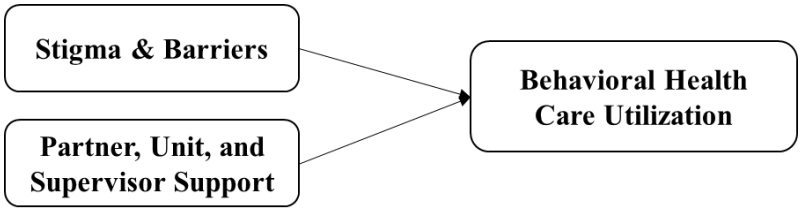
Note. Unconditional *N*: 2185, R^2: .01, With Covariates *N*: 1857, R^2: .19.

Study III Figures

Figure 4.1

Conceptual Models of Predictive and Moderated Analyses

a.



b.

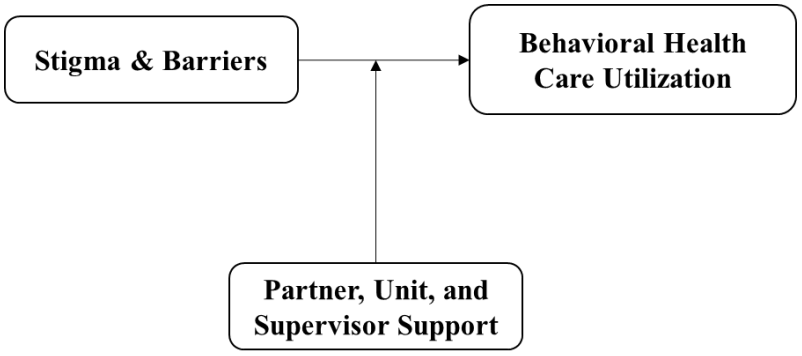
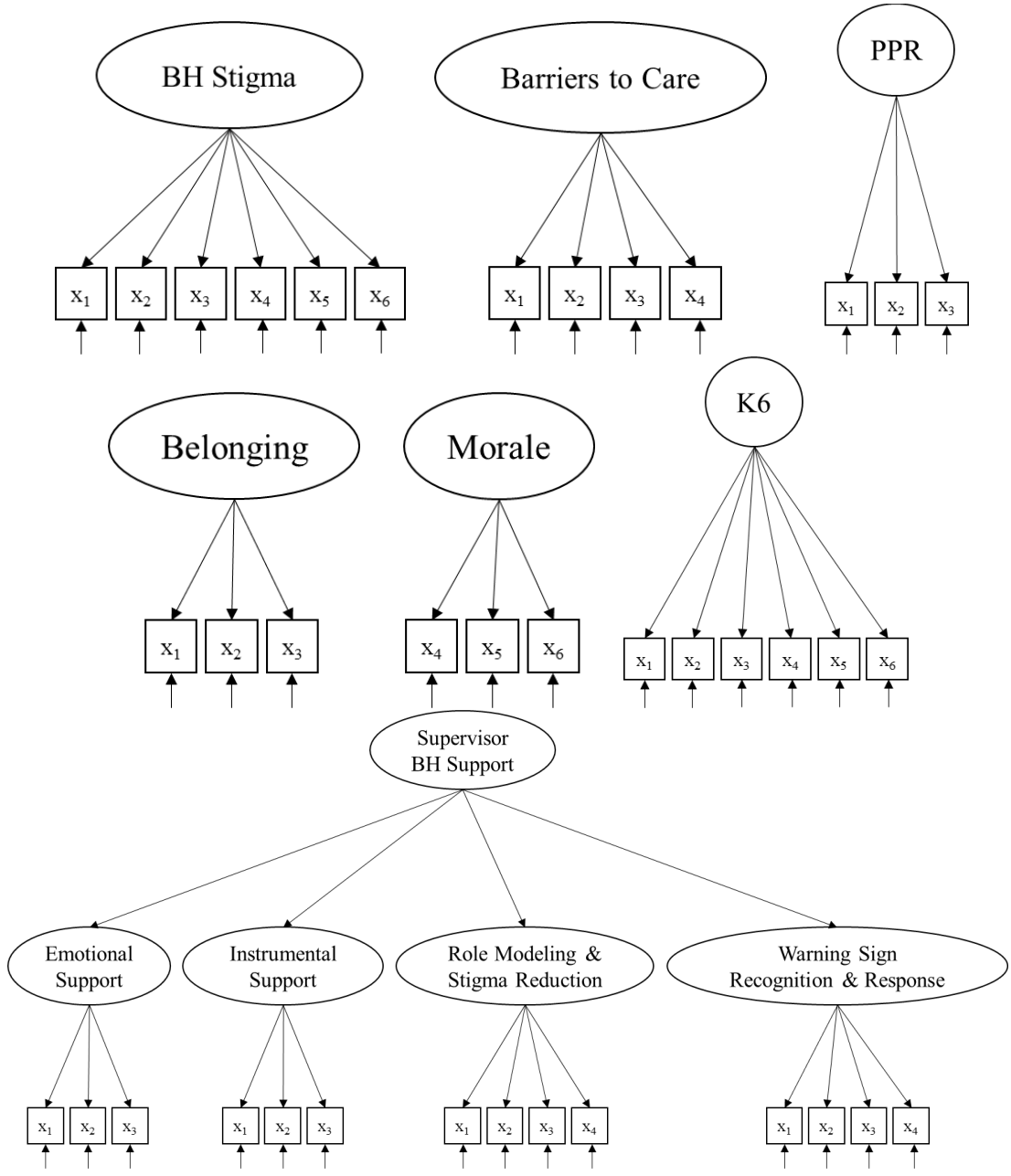


Figure 4.2

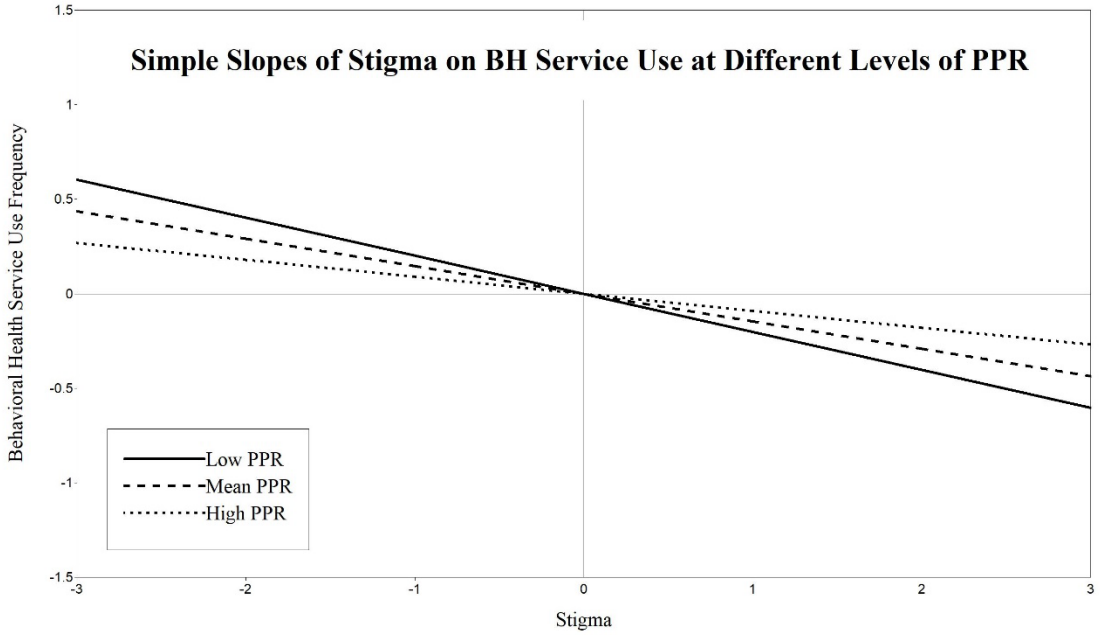
Single-Factor Measurement Models of Main Study Measures



Note. K6 = Psychological Distress, BH = Behavioral Health, PPR = Perceived Partner Responsiveness.

Figure 4.3

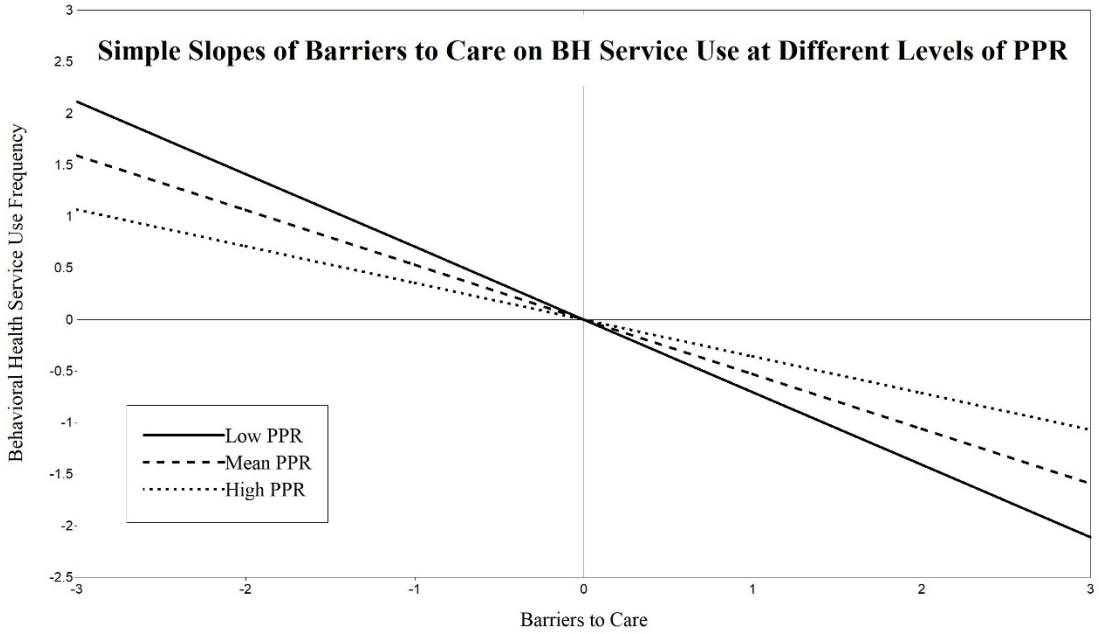
Simple Slopes of Stigma on Behavioral Health Service Use Frequency at Different Levels of Perceived Partner Responsiveness Among Coupled SMs with Covariates



Note. LOW(-1 SD) B = -.49, SE = 09, p < .001, MEAN B = -.39, SE = .09, p < .001, HIGH (+1 SD) B = -.28, SE = .11, p = .01. Interaction term was marginally significant (*p* = .07), R^2: .18. Y-axis includes negative values because the model is an ordinal logistic regression with log-odds values rather than the original metric on the y-axis.

Figure 4.4

Simple Slopes of Barriers to Care to Service Use Frequency at Different Levels of Perceived Partner Responsiveness Among Coupled SMs With Covariates



Note. LOW (-1 SD) B = -.70, SE = .15, p < .001. MEAN B =-.53, SE = .13, p < .001. HIGH (+1 SD) B = -.36, SE = .15, p = .02. Interaction term was significant, R^2: .22. Y-axis includes negative values because the model is an ordinal logistic regression with log-odds values rather than the original metric on the y-axis.

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CHAPTER V. DISCUSSION

The global burden of mental illness is increasing (Liu et al., 2020) with high prevalence of depression and anxiety (World Health Organization [WHO], 2017), which substantially worsened during the COVID-19 pandemic (WHO, 2022), consistent with previous research indicating mental health is exacerbated in times of increased stress (Ingram & Luxton, 2005). The downstream consequences of adverse mental health outcomes are far-reaching as they impact social, work, and physical health domains (Kessler, 2012). Mental health and well-being are also affected by social connectedness (Holt-Lunstad et al., 2010; Holt-Lunstad, 2018; Prati & Pietrantoni, 2010). Increases in loneliness and social isolation among Americans, due in part to the COVID-19 pandemic, have brought increased attention to the interplay between social relationships and mental health (US Surgeon General, 2023). When social connection and sense of belongingness are thwarted, adverse mental (Rankin et al., 2018) and physical health consequences are likely (Holt-Lunstad, 2018).

Mental illness is exacerbated during times of stress and adversity (Ingram & Luxton, 2005). Stressful events interact with existing predispositions to mental illness, including previous experiences of depression, contributing to the downward spiral of negative emotions, depleting an individual's resources (Garland et al., 2010) which ultimately increases the likelihood of developing mental illness in response to subsequent stressful events. These affective processes have been implicated in mental health and well-being. The broaden-and-build theory of positive emotions (Fredrickson, 2001), proposed that positive emotions broaden mindsets, build resources, and contribute to a positive upward spiral which leads to thriving. Negative emotions have an analogous

effect such that a downward spiral is seen among depressed individuals, whereby depressed mood narrows thinking, contributes to persistence of depressive episodes, and increases severity of symptoms (Fredrickson, 2001). Downward spirals of negative affect begin with affective, cognitive, and behavioral responses to negative emotions, which increase negative affect, which ultimately contributes to even greater maladaptive affective, cognitive, and behavioral responses. The downward spiral of negative affect can be interrupted by the upward spiral of positive emotions, with previous interventions demonstrating the effectiveness of increasing positive affect to promote mental health by increasing personal resources (Fredrickson et al., 2008).

Social relationships are impactful on mental health due, at least in part, to their impact on positive and negative emotions, contributing to an upward or downward spiral of emotions. Work related to the interpersonal aspects of depression suggest mental health symptoms aggravate and increase maladaptive social behaviors (e.g., Joiner, 2000; Hames et al., 2013), which in turn, degrades the quality of one's social exchanges, leading to decreases in global evaluations of perceived social support. These reductions in perceived social support then exacerbate poor mental health, perpetuating the spiral and extending duration of symptoms, consistent with the downward spiral of negative affect (Fredrickson, 2001; Garland et al., 2010). Relational Regulation Theory (RRT; Lakey & Orehek, 2011) also provides an explanation for the consistent main effects found between social support and mental health. Specifically, ordinary yet affectively consequential interactions provide opportunities for social regulation of emotions, promoting mental health over time. When an individual lacks effective social regulation

partners, this contributes to poorer mental health outcomes over time. This work (e.g., RRT; Lakey & Orehek, 2011) provides a perspective which links social connections and social support with the downward spiral of negative affect described in the broaden and build theory (Fredrickson, 2001; Garland et al., 2010), as social support providers act as important sources of affect regulation which can either promote thriving or act as drivers of negative affect depending upon the nature of the relationship. Much work has examined effects between social relationships and mental health (Hames et al., 2013; Lakey & Orehek, 2011). Less research on these associations has specifically compared distinct sources of support.

The present dissertation addresses this important issue: the ways in which different sources of social support interact with aspects of the downward spiral of negative affect. The effects of support from different social ties on mental health over time likely depends upon related factors such as the closeness of relationship (e.g., central and peripheral ties, Fingerman, 2009), how well-matched needs and provided support are (Cutrona & Russell, 1990), and the degree to which support providers have direct experience with relevant situational stressors (Thoits, 2011). Similar others who have experienced relevant stressful experiences can role model adaptive responses to stress (Thoits, 2011) and influence social norms regarding treatment seeking (Britt et al., 2020). These processes likely differ according to degree of closeness with one's ties which impact the function of the relationship and differs in stability and quality (Fingerman, 2009). For example, spouses are well-poised to have a high degree of closeness and function as central ties in individual's networks (e.g., Fingerman, 2009), but may have

varying degrees of direct experience with specific stressors an individual is facing (Thoits, 2011). While a spouse may share vast experience parenting and be able to provide effective support for stressors in this domain, they may not have direct experience with specific occupational stressors that emerge. This may be especially relevant for military-connected individuals with civilian spouses as it is likely spouses lack direct experience with military-specific occupational stressors, potentially inhibiting support quality for those stressors. Supervisors, on the other hand, are peripheral ties which can vary in their degree of emotional closeness but have direct knowledge and experience with specific occupational stressors their employees face and resources available to them (Dimoff & Kelloway, 2016). Degree of closeness and relevant experience for specific stressful situations are also expected to vary across other sources of support, including friends, family, children, and coworkers, explaining potential differences in quality of support and effectiveness as facilitators of behavioral health treatment.

Summary of Present Dissertation. To examine differing effects of sources of support on mental health, the present dissertation investigated the interactive effects of social support from multiple sources with different indicators of mental health and well-being across three different high-risk samples. Figure 5.1a presents the conceptual model which frames the present dissertation, outlining which studies address which aspects of the interactive model between social support and mental health (Figures 5.1b-5.1d). Additionally, the associations of mental health and social support with treatment use are explicated in this conceptual model. While not presented in the figure, it is assumed there

are many mechanisms linking mental health and social support, including maladaptive social behavior (Joiner, 2000; Hames et al., 2013) and reductions in social regulation quality (e.g., RRT; Lakey & Orehek, 2011). Additionally, while not explicitly presented in the figure, it is also assumed that receiving behavioral health treatment has cyclical effects upon subsequent mental health symptoms and perceptions of social support (Greene-Shortridge et al., 2007). The main aim, then, of the present dissertation is to examine different components of the presented conceptual model across different sources of support. Each source of social support differs in several important ways, therefore illuminating distinctions or similarities across sources is important to inform interventions aimed at social support and mental health.

Study 1: Three-Wave Cross-Lagged Panel Models of Agitation and Perceived Social Support in a Sample of Employed Veterans. In Study 1, associations between social support and mental health were examined (see Figure 5.1b). Specifically, the reciprocal association between agitation and social support from multiple sources over time was investigated in a sample of post-9/11 US Veterans. Study 1 results revealed preliminary support for a reciprocal association between agitation and some sources of support, with directionality of cross-lagged effects varying across sources. Baseline perceived partner responsiveness predicted 3-month agitation when controlling for covariates. In an unconditional cross-lagged model, baseline agitation negatively predicted 3-month family support. When measured at a longer lag, 3-month family support was negatively associated with 9-month agitation. When adjusted for covariates, the association between baseline agitation and 3-month family support was no longer

significant, whereas family support predicted subsequent agitation 6 months later. For employed veterans, these kinship sources of support emerge as important drivers of agitation.

Findings did not necessarily provide evidence for the reciprocal nature of agitation and social support; however it is likely that these effects are mediated by social behavior and experiences during social exchanges and results would differ if these factors were also measured. Specifically, it is possible that the more agitated an individual is, the more negatively social support providers will respond in immediate social situations, increasing occurrence of negative social exchanges such as rejection, which is detrimental for mental health and well-being (Newsom et al., 2005). Reciprocal effects may then emerge between agitation and social support when directly measuring negative social exchanges and maladaptive social behaviors (e.g., Joiner, 2000; Hames et al., 2013), and if measured over a shorter period of time than multiple months (e.g., daily diary). As is described in the broaden and build theory of positive emotions (Fredrickson, 2001; Garland, 2010), emotional responses to specific interactions and experiences amass to shape one's overall evaluation of their emotional state. Results demonstrated that different sources of social support showed distinct patterns of results, providing support for the importance of separating out sources of support when examining the impact of social relationships on mental health outcomes.

Study 2: Social Support and Social Strain as Predictors of Depressive Symptom Trajectories Following a Marital Transition. Study 2 (see Figure 5.1c) continued this work by including the examination of how different sources of social support predict not

only levels of mental health but of trajectories over numerous years. Study 2 modeled changes in depressive symptoms before and after widowhood or divorce to investigate the effects of social relationships on depressive symptom recovery trajectories over a period of up to a decade. Both social support and social strain were measured prior to marital transition in relation to specific sources including spouse, family, friends, and children. Using latent growth curve models, the trajectories of depressive symptoms were modeled before and after marital transition. Social support and strain measures were then tested as predictors of depressive symptom slope and intercept factors. Social strain did not emerge as a significant predictor of depressive symptom trajectories post-marital transition, suggesting the effects of social strain may be overshadowed by the benefits of social support during a recovery from widowhood or divorce.

Results revealed that older adults with greater spousal support prior to transition had more difficult depressive symptom recoveries (e.g., positive association between spousal support and post-transition slope). Loss of a positive source of support is especially impactful for mental health following marital transitions. Additionally, those with greater friend support had faster depressive symptom recoveries after marital transition (e.g., negative association between support and post-transition slope). Friends serve a crucial role in mental health of older adults following marital transitions. Support from family and children was not associated with depressive symptom changes after marital transition. Ultimately, findings provide support for the conceptual model presented in Figure 5.1a for spouse and friend support, in this specific context, as we see the effects of social support on mental health symptoms as they change over a period of

multiple years. Study 2 also highlights the importance of examining multiple sources of support when research the effects of social support on metal health, especially in longitudinal research.

Study 3: An Examination of Interactive Risk and Protective Factors Related to Behavioral Health Service-Seeking in an Active-Duty Sample. Study 1 and Study 2 demonstrated differential effects of sources of support on mental health outcomes; therefore, Study 3 expanded upon this work to examine the effects of multiple sources of support on behavioral health treatment utilization (see Figure 5.1d), an important applied outcome to examine as behavioral health services can address mental health disorders common to service members (Hofmann et al., 2012; Kitchiner et al., 2019). Using a sample of active-duty Service Members (SMs) from the Resilience-Supportive Leadership Training (RESULT) study, Study 3 tested associations between social support from multiple sources and stigma and barriers to care on behavioral health service use. Perceived partner responsiveness, Military unit cohesion, and supervisor behavioral health-supportive behaviors were tested as moderators of behavioral health stigma and organizational barriers to care as they predict frequency of behavioral health service use. Main effects models demonstrated that perceived partner responsiveness, stigma, and barriers to care were all associated with less frequent behavioral health treatment use. Interactive models revealed that perceived partner responsiveness significantly moderated barriers to care and was marginally significant interacting with stigma. When investigated further, simple slopes indicated that the negative effects of barriers to care are attenuated as perceived partner responsiveness increases.

Results of models with perceived partner responsiveness, both main effects and interactive models, revealed a complex relationship between responsiveness, barriers to care, and behavioral health service use. Having a poorly responsive partner appears to be especially motivating for SMs to use treatment more frequently, however, interactive effects also indicated that supportive partners help SMs overcome organizational barriers. These findings highlight the importance of examining not only the presence or absence of spouses as sources of social support, but also why it is crucial to measure quality of support when evaluating treatment need of SMs. Findings also highlight additional challenges that an unresponsive partner may have on SM behavioral health treatment needs and navigating organizational barriers. Supervisor behaviors and unit support were not related to behavioral health treatment use and did not interact with stigma or barriers to care. Taken together, the results of this series of studies illuminate the differential roles of sources of support as they influence and are influenced by mental health over time. Findings from this series of studies have important theoretical and practical implications regarding different sources of support and their interplay with mental health symptoms and service use, highlighting the importance of the interplay between sample context and sources of support.

Theoretical Implications

Elaborating upon associations presented in Figure 5.1a, several mechanisms have been theorized to explain the robust association found between mental health and close relationships (Lakey & Orehek, 2011; Pietromonaco & Collins, 2017; Thoits, 2011). Pietromonaco and Collins (2017) proposed multiple intrapersonal mediators as

explanatory factors linking social connection and disconnection to health outcomes. Psychosocial mechanisms include processes which facilitate self-regulation of emotion, cognition, and behavior (consistent with RRT; Lakey & Orehek, 2011), alongside biological and lifestyle mechanisms. It is possible that an additional pathway by which mental health is affected by social support over time is by facilitating behavioral health treatment seeking, which ultimately serves to address behavioral health symptoms (Hofmann et al., 2012; Kitchiner et al., 2019).

Multiple theoretical perspectives address associations between social support and behavioral health treatment seeking. Social control is one possible explanation for this relationship (Thoits, 2011), as social support providers can help identify treatment need and communicate that to support recipients (Rafferty et al., 2019). This is consistent with findings from Study 3, wherein perceived partner responsiveness (PPR) acted as a buffer against barriers to care and stigma on treatment seeking. PPR may also bolster one's sense of perceived control over potential barriers, whether they be stigma or more tangible obstacles (e.g., time off work, access to transportation, childcare, etc.), which is a necessary factor in predicting engagement in a health behavior. However, social control also has the potential to backfire if it undermines autonomy or is done clumsily (Rook & Pietromonaco, 1987), which is consistent with the complex pattern of results in Study 3, such that negative social exchanges with one's spouse motivate treatment utilization, but greater PPR helps SMs overcome barriers to care and stigma. Social control in this context parallels the Theory of Planned Behavior (TPB; Azjen & Fishbein, 2005), which proposed that behavioral intentions are predicted by perceived control, along with

attitudes and norms. Study 3 findings are also consistent with other work examining the TPB and mental health treatment seeking among military personnel (Britt et al., 2011). Results of Study 3 demonstrated that PPR buffered the effects of barriers to care on behavioral health treatment use, suggesting that social control may explain how one way romantic partners encourage treatment utilization, ultimately facilitating mental health.

A key contribution of this dissertation is the demonstration of distinct effects of multiple sources of social support on mental health. This approach was informed by research examining how the benefits of social support depend on how compatible provided support is with the needs of the support recipient (Cutrona & Russell, 1990; Lakey & Cohen, 2000) and features of the specific source of support (Thoits, 2011; Fingerman, 2009). Recent work found that military unit climate regarding behavioral health predicted subsequent perceived stigma and barriers to care, but stigma and barriers to care did not predict subsequent unit climate (Britt et al., 2020b). Results of Study 3 did not find significant main effects or moderated effects between unit support and supervisor support measures on behavioral health service use; however this association may present differently if examined over time as it is possible taking temporal effects of the interaction between unit support with stigma and barriers to care reveals effects not seen in Study 3 of this dissertation. Ultimately, social support is valuable for mental health, but not in every circumstance.

Further, results of this series of studies advances social support theory by examining the effects of source of support in high-stress contexts, including active-duty military service and marital transitions, to allow for the examination of the potential for

distinct effects of these associations across sources and contexts. Differences in patterns of results across different sources of support may be related to differences in samples. While Study 1 and Study 3 include military-connected individuals, Study 2 focuses on civilians. These different groups are likely to face unique stressors and access to different social resources, however research has found associations between mental health and social relationships in civilian samples (Du et al., 2021; Nichter et al., 2021) and military samples (Smith et al., 2013a, 2013b). As the effects of social support from significant and similar others are likely to vary depending on the magnitude of stressor an individual is facing (e.g., everyday stressors versus major life events; Thoits, 2011), including these distinct samples may provide evidence for the robustness of these effects beyond sample-specific eccentricities. Future research should continue to examine these interactive effects between social support and mental health and extend this work by utilizing other high-risk samples, like LGBTQ+ military personnel.

The present dissertation illuminated effective targets for intervention aimed at improving behavioral health and behavioral health treatment utilization. Specifically, across all three studies perceived partner responsiveness emerged as significantly associated with mental health measures for coupled individuals, which ultimately highlights the key role of romantic partners as a driver of mental health and potentially damaging effects a lack of quality support may have (Rook, 2015). Results of Study 1 and Study 2 demonstrated that while experiencing and adjusting to different stressful experiences, whether separation from the military (Study 1) or marital transitions (Study 2), different sources of social support have differential effects on multiple indicators of

mental health over time. Study 3 furthered work in Study 1 and Study 2 by examining the ways in which distinct sources of support buffer the effects of stigma and barriers to care on behavioral health treatment utilization in the context of active-duty military service.

Practical Implications

Results of the present dissertation have important practical implications for interventions and treatment providers. Stigma and barriers to care are salient obstacles to treatment seeking for military personnel (Britt et al., 2020a), thus identifying differing effects of specific sources of support which mitigate these barriers illuminates sources to target to increase intervention effectiveness. Findings illuminate the unique interactive nature of social support from different sources and indicators of behavioral health among military personnel. Specifically, perceived partner responsiveness helped reduce the impact of barriers to care and stigma on behavioral health treatment use frequency. This suggests that interventions targeting ways in which partners can help reduce barriers to care to facilitate treatment seeking would likely be effective among coupled active-duty service members.

Previous interventions in similar contexts have addressed behavioral health-supportive behaviors from specific sources of social support such as supervisors (Greden et al., 2010; Mohr et al., 2023). The supervisor intervention tested as a part of RESULT, the same dataset used for Study 3, demonstrated that employee loneliness was decreased by a resilience-supportive leader training (Mohr et al., 2023). Military-specific research has also found success with peer interventions targeting behavioral health outcomes (Greden et al., 2010). Resource Utilization Theory (RUT; Dimoff & Kelloway, 2016)

suggests that supervisors should function as conduits that support employees and connect them to available resources they may be unaware of, or have barriers to access that supervisors can directly address. Results of the present dissertation do not provide support for RUT in this context as results did not reveal associations between supervisor behavioral health support and treatment use frequency or buffering effects on barriers to care or stigma in Study 3 of the present dissertation. Previous research found that military leader support was associated with behavioral health symptoms (Bessey et al., 2023), therefore future research can examine whether behavioral health symptoms may be a mediator of the association between supervisor support and behavioral health treatment use.

Spouses and romantic partners play important roles in their ability to facilitate social regulation and treatment seeking and are key providers of emotional support for adults (Dykstra & de Jong-Gierveld, 2004). The most consistent finding across this series of studies was the significant associations between perceived partner responsiveness and mental health symptoms, as well as behavioral health treatment use, among coupled veterans, widowed and divorced older adults, and active-duty service members. Results of these studies provide support for RRT (Lakey & Orehek, 2011), specifically with spouses, as having a more responsive partner is associated with better mental health outcomes, and a lack of PPR was associated with greater treatment utilization, indicating that having an ineffective regulation partner in one's spouse may be motivating for SMs to seek formal sources of support. This comports with evidence that partners do in fact

serve as important regulation partners that can facilitate regulation of thoughts, behaviors, and affect, ultimately having a strong impact on mental health.

Generation of positive emotions through social means may be especially effective at interrupting the downward spiral of negative affect and initiate the upward spiral of positive affect, fostering resilience (Garland et al., 2010). Certain social connections like spouses and friends may be well-poised to generate positive emotions. Social connections may encourage individuals to slow down and appreciate positive aspects of their lived experience, as positive psychology research notes "bringing increased awareness to the richly woven and unfolding tapestry of life experiences allows one to draw out innumerable gilded threads. The smiling face of a passerby, the song of a bird perched in a nearby tree, the trill of insects on a warm summer evening, a tiny flower blossoming from a crack in a sidewalk, the laughter of children, or even the ever-constant companion of one's own breath can become sources of wonder and delight to savor" (Garland et al., 2010; p. 14). Given the bias toward negativity seen in depressed individuals (e.g., Baumeister et al., 2001), having external sources of positive emotions may make be especially important to disrupt the downward spiral.

Conclusion

The present dissertation aimed to address a timely issue (e.g., US Surgeon General, 2023): mental health and social connection in high-risk populations. The effectiveness of social support on mental health is thought to depend on how well-matched perceived support is to support needs (Cutrona & Russell, 1990; Lakey & Cohen, 2000) and source of support (Thoits, 2011); therefore, the present dissertation

included multiple sources of support across all three studies, including: spouse/partner, friends, family, children, peers, and supervisors. Results revealed distinct effects of different sources, depending on the sources examined and contexts of the included samples. Study 3 examined mental health treatment seeking and found that perceived partner responsiveness attenuated the negative effects of barriers to care and stigma on behavioral health treatment in an active-duty US Army sample. Findings inform future intervention and prevention efforts by revealing effective sources of support to target that reduce the impacts of barriers to behavioral health treatment, increasing treatment utilization and ultimately improving mental health among this and other high-risk populations.

Figure 5.1a

Integrated Conceptual Model of Focal Constructs in the Present Dissertation

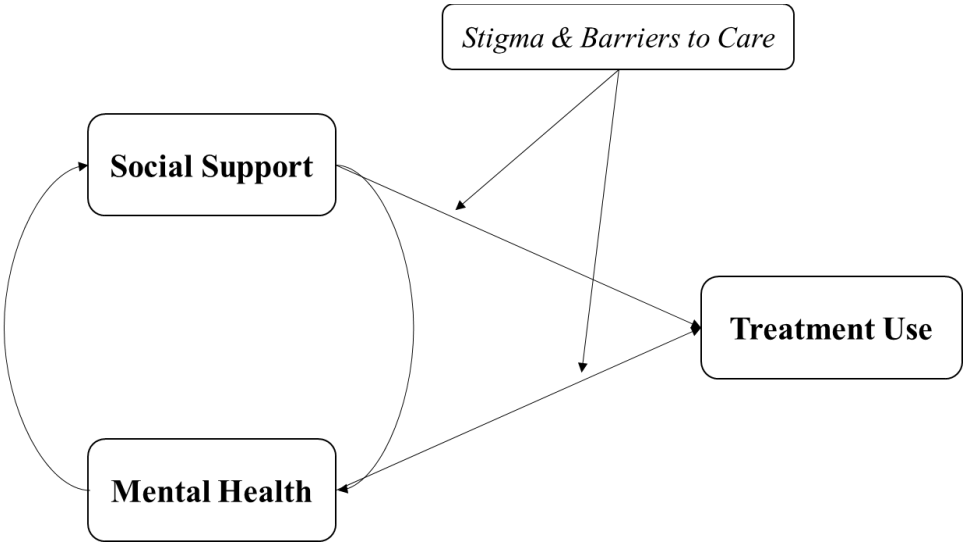


Figure 5.1b

Study 1 Highlighted in Integrated Conceptual Model of Focal Constructs in the Present Dissertation

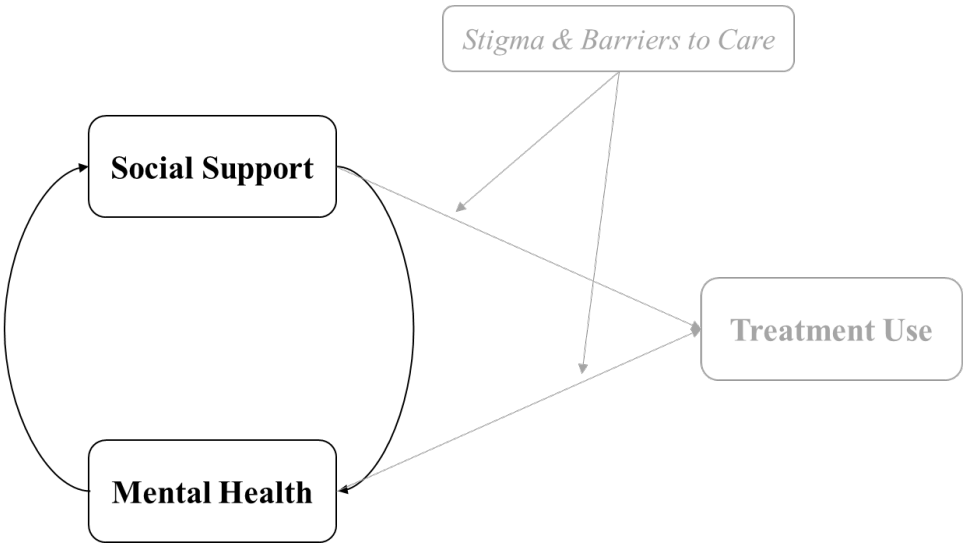


Figure 5.1c

Study 2 Highlighted in Integrated Conceptual Model of Focal Constructs in the Present Dissertation

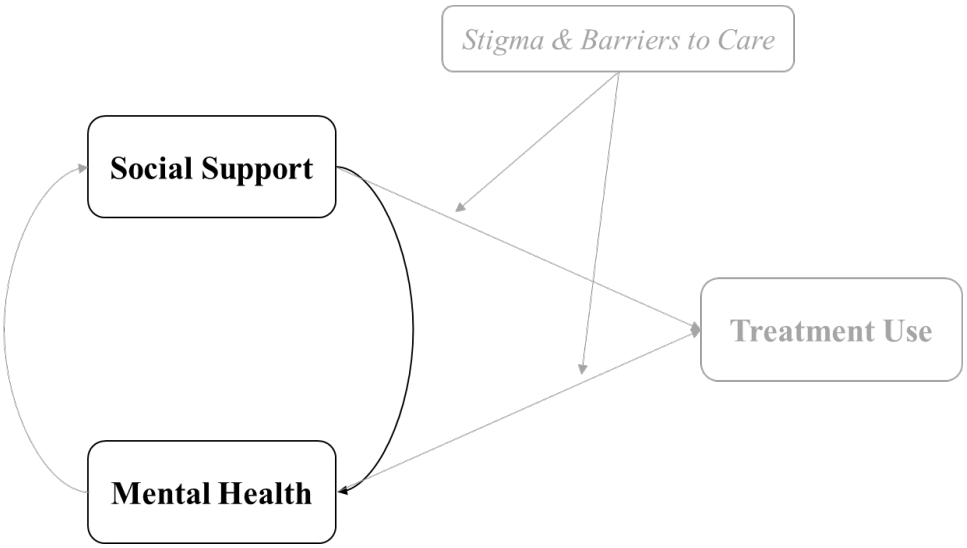
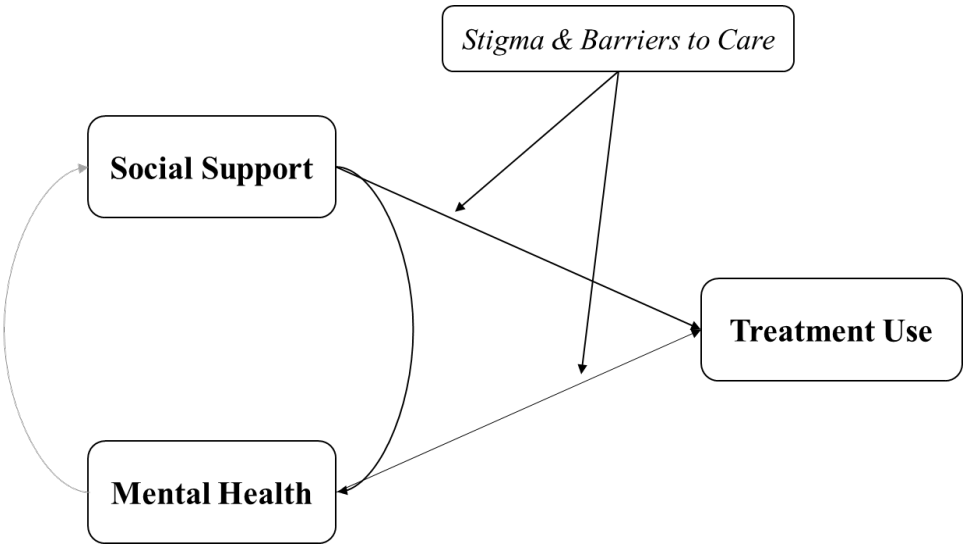


Figure 5.1d

Study 3 Highlighted in Integrated Conceptual Model of Focal Constructs in the Present Dissertation



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Appendix A: Study I Measures

Brief Agitation Measure (BAM; Ribeiro et al., 2011)

Please rate the extent to which each of the following statements have been true for you in the past week.

1. I want to crawl out of my skin.
2. I feel so stirred up inside I want to scream.
3. I feel a lot of emotional turmoil in my gut.

1 = Not at all true
2 =
3 =
4 =
5 =
6 =
7 = Certainly true

Perceived Partner Responsiveness (PPR; Laurenceau et al., 1998)

Please read the following questions carefully and fill in the bubble which best represents your answer based on the scale below.

1. To what degree do you feel accepted by your spouse/partner?
2. To what degree do you feel understood by your spouse/partner?
3. To what degree do you feel cared for by your spouse/partner?

1 =Not at all
2 =
3 =
4 = Neutral
5 =
6 =
7 =Very much

Perceived Social Support from Family and Friends (PSS; Rice & Longabaugh, 1996)

The following statements refer to feelings and experiences which occur to most people at one time or another in their relationships with FRIENDS/FAMILY. Please read each statement carefully, and fill in the bubble which best represents your answer.

Friends Subscale

1. My friends give me the moral support I need.
2. My friends enjoy hearing about what I think.
3. I rely on my friends for emotional support.
4. There is a friend I could go to if I were just feeling down, without feeling funny about it later.
5. My friends are sensitive to my personal needs.
6. My friends are good at helping me solve problems.
7. I've recently gotten a good idea about how to do something from a friend.

Family Subscale

1. My family gives me the moral support I need.
2. My family enjoys hearing about what I think.
3. I rely on my family for emotional support.
4. There is a member of my family I could go to if I were just feeling down, without feeling funny about it later.
5. My family is sensitive to my personal needs.
6. Members of my family are good at helping me solve problems.
7. I don't have a relationship with a member of my family that is as close as other people's relationships with family members. (Reverse)

   1 = Strongly disagree
   2 = Disagree
   3 = Neither agree nor disagree
   4 = Agree
   5 = Strongly agree

Covariates

1. *What is your gender?*

   0 = Male
   1 = Female

2. *What is your age?*

3. *What is the highest degree or level of school you have completed?*

1 = Less than high school
2 = High school diploma/GED
3 = Some college or technical school, no degree
4 = Completed college or technical school, with a degree/certificate
5 = Graduate study in progress or completed (e.g., master's, doctorate, MD)

4. *What is your race/ethnicity?* (select all that apply)
1 = American Indian or Alaska Native
2 = Asian
3 = Black or African American
4 = Native Hawaiian or Pacific Islander
5 = Non-Hispanic White
6 = Other

5. *Are you of Hispanic, Latino or Spanish Origin?*

0 = No
1 = Yes

6. *What is your present or most recent Service Branch/Military Component?*

1 = Army National Guard
2 = Air National Guard
3 = Army Reserves
4 = Marine Reserves
5 = Navy Reserves
6 = Air Force Reserves
7 = Coast Guard Reserves
8 = Army
9 = Navy
10 = Air Force
11 = Marine
12 = Coast Guard

7. *What best describes your current military status?*

0 = Active
1 = Separated

Appendix B: Study II Measures

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff et al., 1977; Santor & Coyne, 1997; Steffick et al., 2000)

Now think about the past week and the feelings you have experienced. Please tell me if each of the following was true for you much of the time this past week.

1. I felt depressed.
2. I felt that everything I did was an effort.
3. I enjoyed life. (Reverse)
4. I could not get going.
5. I was happy. (Reverse)
6. I felt sad.
7. My sleep was restless.

0 = No
1 = Yes

Perceived Social Support and Social Strain (Clarke et al., 2008; Smith et al., 2017)

Participants responded to four separate sets of 7 items in reference to their spouses, children, family, and friends.

Please check the answer which best shows how you feel about each statement.

Social Support

1. How much do they really understand the way you feel about things?
2. How much can you rely on them if you have a serious problem?
3. How much can you open up to them if you need to talk about your worries?

Social Strain

1. How often do they make too many demands on you?
2. How much do they criticize you?
3. How much do they let you down when you are counting on them?
4. How much do they get on your nerves?

1 = Not at all
2 = A little
3 = Some
4 = A lot

Covariates

1. *Did you divorce or become widowed since [previous wave interview month, previous wave interview year]?*

   0 = No
   1 = Divorced/Annulled
   2 = Widowed

2. *What is your sex?*

   0 = Male
   1 = Female

3. *What year were you born? What month were you born?*

4. *What is the highest grade of school or year of college you completed?*

   0 = For no formal education
   1-11 = Grade school
   12 = High school
   13-15 = Some college
   16 = College grad
   17+ = Post college

5. *What race do you consider yourself to be: White, Black or African American, American Indian, Alaska Native, Asian, Native Hawaiian, Pacific Islander, or something else?*

   1 = White/Caucasian
   2 = Black/African American
   3 = Other

6. *Do you consider yourself Hispanic or Latino?*

   1 = Yes
   0 = No

7. *Has a doctor ever told you that you have high blood pressure or hypertension?*

0 = No
1 = Yes

8. *Has a doctor ever told you that you have diabetes or high blood sugar?*

0 = No
1 = Yes

9. *Has a doctor ever told you that you have cancer or a malignant tumor, excluding minor skin cancer?*

0 = No
1 = Yes

10. *Has a doctor ever told you that you have chronic lung disease such as chronic bronchitis or emphysema?*

0 = No
1 = Yes

11. *Has a doctor ever told you that you had a heart attack, coronary heart disease, angina, congestive heart failure, or other heart problems?*

0 = No
1 = Yes

12. *Has a doctor ever told you that you had a stroke?*

0 = No
1 = Yes

13. *Have you ever had, or has a doctor ever told you that you have arthritis or rheumatism?*

0 = No
1 = Yes

Appendix C: Study III Measures

Behavioral Health Service Use Frequency (modified from Hoge et al., 2004)

1. How often have you used professional behavioral health services?

    0 = Not at all
    1 = More than once a month
    2 = Monthly
    3 = Less than monthly

Perceived Partner Responsiveness (PPR; Laurenceau et al., 1998)

With the following, please consider your CURRENT or MOST RECENT relationship:

1. To what degree do you feel accepted by your spouse/partner?
2. To what degree do you feel understood by your spouse/partner?
3. To what degree do you feel cared for by your spouse/partner?

    1 =Not at all
    2 =
    3 =
    4 = Neutral
    5 =
    6 =
    7 =Very much

Perceived Team Cohesion (Chin et al., 1999)

For this part, think of your Platoon/Unit in general.

Belonging Subscale

1. I feel that I belong to this group.
2. I see myself as part of this group.
3. I feel that I am a member of this group.

Morale Subscale

1. I am happy to be part of this group.
2. This group is one of the best anywhere.
3. I am content to be part of this group.

1 = Strongly disagree
2 = Moderately disagree
3 = Slightly disagree
4 = Neither agree nor disagree
5 = Slightly agree
6 = Moderately agree
7 = Strongly agree

Supervisor Behavioral Health Supportive Behaviors

The following statements ask your opinions about your platoon leader's effectiveness as a leader.

Emotional Support

1. My platoon leader shows genuine concern for my behavioral health.
2. My platoon leader provides me with emotional support.
3. My platoon leader asks me how I am doing on a regular basis.

Instrumental Support

1. My platoon leader adjusts my duties, when possible, to help me avoid conflicts with family responsibilities.
2. My platoon leader makes practical arrangements to help me meet service demands while managing family and personal responsibilities.
3. My platoon leader talks about BH resources and/or MilitaryOne Source during huddles.

Role Modeling and Stigma Reduction

1. My platoon leader shares their healthy coping strategies.
2. My platoon leader normalizes help-seeking.
3. In formation, my platoon leader emphasizes that Soldiers in need should seek support from behavioral health resources or MilitaryOne Source.

Warning Sign Recognition and Response

1. My platoon leader recognizes when I am not myself.
2. My platoon leader uses open-ended questions when asking me about my behavioral health.
3. My platoon leader touches base with me to make sure I’m doing okay.
4. My platoon leader checks in with me to remind me that they at here to help.

1 = Strongly disagree
2 = Disagree
3 = Neither agree nor disagree
4 = Agree
5 = Strongly agree

Mental Health Stigma and Barriers to Care (Britt et al., 2008)

The following are common concerns that people face when they believe they may need to seek help from a counselor or psychologist. Which of these concerns might prevent you from seeking help if you thought you needed it?

Perceived Stigma
1. It would be too embarrassing.
2. It would harm my reputation.
3. My peers might treat me differently.
4. My peers would blame me for the problem.
5. I would be seen as weak.
6. People important to me would think less of me.

Barriers to Care
1. I don't know where to get help.
2. I don’t have adequate transportation.
3. It is difficult to schedule an appointment.
4. I would have difficulty getting time off work or school for treatment.

1 = Strongly disagree
2 = Disagree
3 = Neither agree nor disagree
4 = Agree
5 = Strongly agree

Psychological Distress (K-6; Kessler et al., 2002)

DURING THE LAST 30 DAYS…

1. About how often did you feel so depressed that nothing could cheer you up?
2. About how often did you feel hopeless?
3. About how often did you feel restless or fidgety?
4. About how often did you feel that everything was an effort?

5. About how often did you feel worthless?
6. About how often did you feel nervous?
   1 = None of the time
   2 = A little of the time
   3 = Some of the time
   4 = Most of the time

Covariates

1. What is your age?

2. What is your sex?

0 = Male
1 = Female

3. *What is your race/ethnicity?* (Check all that apply)

1 = Asian
2 = Black or African American
3 = Native Hawaiian or Pacific Islander
4 = White
5 = Other

4. Are you of Hispanic or Latino origin?

1 = Hispanic or Latino
0 = Not Hispanic or Latino

5. What best describes your current marital status?

1 = Single, never married
2 = In a committed relationship
3 = Cohabitating
4 = Married
5 = Divorced
6 = Separated
7 = Widowed
8 = Other

6. *How many dependent children do you have living in your home more than 3 days a week?*

7. *The Coronavirus (COVID-19) outbreak has impacted my psychological health negatively.*

   1 = Definitely false
   2 = Probably false
   3 = Neither true nor false
   4 = Probably true
   5 = Definitely true

8. *I am stressed around other people because I worry I'll catch the Coronavirus (COVID-19).*

   1 = Not at all true for me
   2 = Somewhat not true
   3 = Somewhat true
   4 = Very true for me

9. *What is your current military rank/pay grade?*

   0 = "N/A"
   1 = "E1-E4"
   2 = "E5-E6"
   3 = "E7-E9"
   4 = "O1-O3"
   5 = "O4-O6"
   6 = "O7+"
   7 = "WO1-WO5"

10. *How many years have you been in the military?*

11. *How many months have you been in your current unit?*

12. *Have you ever been deployed to a combat zone?*

    1 = Yes
    2 = No

Appendix D: Study I Supplemental Materials

Table D.1

ICCs of Main Measures

Variable	ICC
BAM BL	.02
BAM 3m	.03
BAM 9m	.03
PPR	0
PPR 3m	.01
PPR 9m	.03
PSSfr	.01
PSSfr 3m	.01
PSSfr 9m	0
PSSfm	.002
PSSfm 3m	0
PSSfm 9m	0

Note. BAM = Brief Agitation Measure, PPR = Perceived Partner Responsiveness, PSSfr = Perceived Social Support from Friends, PSSfm = Perceived Social Support from Family.

Table D.2

Factor Loadings and Model Fit of Scale Items Across Waves for the Brief Agitation Measure

	Baseline		**3m**		**9m**	
	β*	*SE*	β*	*SE*	β*	*SE*
X1	.78***	.02	.86***	.02	.73***	.03
X2	.94***	.01	.94***	.01	.91***	.02
X3	.86***	.02	.85***	.02	.91***	.02

Note. Used maximum likelihood estimation, estimated models for each wave separately, baseline $N = 494$, 3-month $N = 414$, 9-month $N = 358$. *** $p < .001$.

Table D.3

Factor Loadings and Model Fit of Scale Items Across Waves for Perceived Partner Responsiveness

	Baseline		**3m**		**9m**	
	β*	*SE*	β*	*SE*	β*	*SE*
X1	.95***	.01	.94***	.01	.94***	.01
X2	.86***	.02	.87***	.02	.84***	.02
X3	.90***	.01	.90***	.02	.88***	.02

Note. Used maximum likelihood estimation, estimated models for each wave separately, baseline $N = 412$, 3-month $N = 339$, 9-month $N = 292$. * *** $p < .001$.

Table D.4

Factor Loadings and Model Fit of Scale Items Across Waves for Social Support from Family

	Baseline		**3m**		**9m**	
	β*	*SE*	β*	*SE*	β*	*SE*
X1	.91***	.01	.91***	.01	.88***	.01
X2	.86***	.01	.87***	.01	.83***	.02
X3	.85***	.01	.90***	.01	.86***	.02
X4	.83***	.02	.82***	.02	.80***	.02
X5	.93***	.01	.94***	.01	.92***	.01
X6	.91***	.01	.91***	.01	.89***	.01
X7	.48***	.04	.29***	.05	.36***	.05
Model Fit						
$\chi^2(14)$	57.40***		44.70***		67.44***	
RMSEA	.079		.073		.103	
CFI	.987		.989		.974	
SRMR	.015		.019		.025	

Note. Used maximum likelihood estimation, estimated models for each wave separately, baseline $N = 494$, 3-month $N = 414$, 9-month $N = 358$. *** $p < .001$.

Table D.5

Factor Loadings and Model Fit of Scale Items Across Waves for Social Support from Friends

	Baseline		**3m**		**9m**	
	β*	*SE*	β*	*SE*	β*	*SE*
X1	.87***	.01	.85***	.02	.88***	.01
X2	.80***	.02	.76***	.02	.81***	.02
X3	.75***	.02	.72***	.03	.74***	.03
X4	.72***	.02	.77***	.02	.79***	.02
X5	.87***	.01	.90***	.01	.85***	.02
X6	.89***	.01	.89***	.01	.88***	.01
X7	.68***	.03	.73***	.03	.74***	.03
Model Fit						
χ^2(14)	85.45***		46.04***		79.72***	
RMSEA	.102		.074		.115	
CFI	.971		.985		.965	
SRMR	.026		.019		.027	

Note. Used maximum likelihood estimation, estimated models for each wave separately, baseline $N = 494$, 3-month $N = 414$, 9-month $N = 358$. *** $p < .001$.

Table D.6

Results of Perceived Partner Responsiveness CLPMs with Baseline Measures Directly Predicting 9-month Outcomes

	3-Month Agitation			3-Month PPR			9-Month Agitation			9-Month PPR		
	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*
Model 2b												
Baseline Agitation	.83***	.09	.74	-.10	.07	-.07	.52***	.12	.54	.19	.10	.14
Baseline PPR	-.06	.05	-.07	.82***	.08	.78	-.01	.09	-.01	.42**	.14	.38
3-Month Agitation	--	--	--	--	--	--	.14	.09	.16	-.13	.10	-.11
3-Month PPR	--	--	--	--	--	--	-.11	.10	-.15	.55***	.13	.52
Model 3b												
Baseline Agitation	.86***	.09	.75	-.12	.08	-.09	.43**	.14	.46	.22	.12	.15
Baseline PPR	-.11*	.05	-.12	.87***	.07	.79	.05	.09	.07	.53***	.12	.46
3-Month Agitation	--	--	--	--	--	--	.16	.13	.19	-.14	.12	-.12
3-Month PPR	--	--	--	--	--	--	-.14	.11	-.21	.45	.12	.43
Gender	.01	.10	.01	-.02	.11	-.01	.03	.09	.02	.20*	.10	.07
Age	-.002	.004	-.02	.001	.01	.01	-.01	.01	-.09	.002	.01	.02
Education	.03	.03	.03	-.02	.05	-.02	.05	.05	.06	.002	.05	-.001
Relationship Length	0.0	.004	0.0	-.01	.01	-.07	0.0	.004	-.01	.002	.01	.02
White	.04	.10	.02	-.05	.11	-.02	.03	.08	.01	.08	.10	.03
SAD_SNG	-.03	.07	-.02	-.05	.09	-.02	.07	.08	.05	-.06	.10	-.03
SAD_ANG	-.01	.07	-.003	.14	.10	.06	.07	.09	.04	-.09	.09	-.03

Note. SAD = separated active duty, SNG = Separated National Guard, ANG = active National Guard, PPR = perceived partner responsiveness, Model 2 $N = 494$, Model 3 $N = 399$. * $p < .05$, ** $p < .01$, *** $p < .001$.

	$\chi^2(df)$	RMSEA	CFI	SRMR
Model 2b	170.14(102)***	.037	.982	.044
Model 3b	270.22(186)***	.034	.980	.035

Table D.7

Results of Social Support from Friends CLPMs with Baseline Measures Directly Predicting 9-month Outcomes

	3-Month Agitation			3-Month SSfr			9-Month Agitation			9-Month SSfr		
	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*
Model 2b												
Baseline Agitation	.85***	.09	.76	-.04	.06	-.03	.48***	.13	.51	-.08	.09	-.07
Baseline SSfr	-.05	.05	-.05	.66***	.06	.67	-.03	.07	-.03	.17*	.07	.17
3-Month Agitation	--	--	--	--	--	--	.22*	.09	.26	.04	.077	.04
3-Month SSfr	--	--	--	--	--	--	.02	.06	.02	.69***	.08	.67
Model 3b												
Baseline Agitation	.91***	.09	.80	-.08	.07	-.07	.35*	.14	.39	-.06	.11	-.06
Baseline SSfr	-.01	.05	-.01	.62***	.07	.63	-.04	.06	-.05	.21**	.077	.22
3-Month Agitation	--	--	--	--	--	--	.26*	.13	.33	.02	.10	.02
3-Month SSfr	--	--	--	--	--	--	.01	.06	.02	.64***	.09	.65
Gender	.01	.10	.002	.38**	.11	.15	.03	.10	.01	-.05	.10	-.02
Age	-.001	.004	-.01	-.003	.01	-.03	-.004	.01	-.06	.003	.00	.04
Education	.04	.03	.03	-.05	.05	-.04	.06	.04	.07	-.07	.04	-.06
Relationship Length	0.0	.004	-.002	.003	.01	.03	-.001	.004	-.01	-.004	.01	-.04
White	.04	.11	.02	.08	.11	.03	.06	.08	.03	.04	.12	.02
SAD_SNG	-.01	.07	-.01	.05	.08	.03	.08	.08	.06	-.08	.08	-.05
SAD_ANG	-.01	.08	-.01	.07	.11	.03	.05	.09	.03	-.13	.10	-.06

Note. SAD = separated active duty, SNG = separated National Guard, ANG = active National Guard, SSfr = social support from friends, Model 2b $N = 494$, Model 3b $N = 399$. * $p < .05$, ** $p < .01$, *** $p < .001$.

	$\chi^2(df)$	RMSEA	CFI	SRMR
Model 2b	732.73(370)***	.045	.954	.042
Model 3b	891.13(538)***	.041	.951	.039

Table D.8

Results of Social Support from Family CLPMs with Baseline Measures Directly Predicting 9-month Outcomes

	3-Month Agitation			3-Month SSfm			9-Month Agitation			9-Month SSfm		
	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*	β	*SE*	β*
Model 2b												
Baseline Agitation	.83***	.08	.74	-.12	.06	-.10	.51***	.12	.55	-.16*	.08	-.14
Baseline SSfm	-.09	.05	-.09	.70***	.06	.69	.03	.06	.03	.42***	.07	.44
3-Month Agitation	--	--	--	--	--	--	.15	.09	.17	.06	.08	.06
3-Month SSfm	--	--	--	--	--	--	-.13	.07	-.16	.41***	.07	.42
Model 3b												
Baseline Agitation	.90***	.09	.79	-.10	.07	-.08	.40**	.13	.44	-.05	.10	-.04
Baseline SSfm	-.03	.06	-.03	.66***	.08	.64	-.02	.06	-.02	.41***	.08	.44
3-Month Agitation	--	--	--	--	--	--	.17	.11	.21	-.04	.09	-.05
3-Month SSfm	--	--	--	--	--	--	-.17*	.07	-.21	.35***	.08	.39
Gender	.01	.10	.003	.01	.12	.003	.04	.09	.02	-.08	.09	-.03
Age	-.001	.004	-.01	-.01	.01	-.06	-.01	.01	-.10	0.0	.004	.003
Education	.04	.04	.03	.03	.04	.03	.06	.04	.07	-.03	.04	-.04
Relationship Length	0.0	.004	-.001	.002	.01	.02	.001	.004	.01	.01	.004	.06
White	.05	.10	.02	.03	.10	.01	.04	.08	.02	-.02	.11	-.01
SAD_SNG	-.02	.07	-.01	.12	.08	.07	.10	.08	.07	-.15*	.07	-.09
SAD_ANG	-.01	.08	-.01	.20*	.09	.09	.08	.09	.04	-.18*	.09	-.09

Note. SAD = separated active duty, SNG = separated National Guard, ANG = active National Guard, SSfm = social support from family, Model 2b $N = 494$, Model 3b $N = 399$. * $p < .05$, ** $p < .01$, *** $p < .001$.

	$\chi^2(df)$	RMSEA	CFI	SRMR
Model 2b	485.49(360)***	.027	.986	.035
Model 3b	701.38(528)***	.029	.977	.039

Appendix E: Study II Supplemental Materials

Attrition

Attrition was investigated by examining correlations between missingness patterns (dropout, intermittent missingness, all present) and covariates. Missingness patterns were also examined in Mplus to examine missingness patterns among depression scores over time. There were 16 distinct patterns of missing data, with each of these patterns containing 17.3% of total cases or less. Missing data patterns were grouped according to whether they represented dropout (monotonic probability of missingness), including if they were missing the last time point, or intermittent missingness. Most cases with missing data exhibited a dropout pattern (80.3%), where the other patterns involved intermittent missingness (19.7%). Correlations between dropout patterns and variables included in the models were examined to investigate the associations between them. Dropout patterns of missingness were correlated with age at MT, education, and chronic conditions at MT such that people who were older, less educated, and had more chronic conditions were more likely to exhibit a dropout pattern. Intermittent missingness was significantly correlated with sex such that men were more likely to exhibit intermittent missingness than women (p's < .001).

CFA of social support and strain measures

Prior to inclusion in the full structural model, a confirmatory factor analysis of social support and strain measures was tested. Social support was modeled with four separate factors for each source, with correlated errors between items worded the same across sources. Social strain was modeled similarly, with a factor for each source and correlated errors across items worded the same across factors. Indicators of model fit

suggest moderate fit, $\chi^2(288) = 631.98$, $p < .001$, CFI =.86, SRMR = .453, RMSEA = .07 (Hu & Bentler, 1999). Standardized loadings also provide information about the internal reliability of these measures, with standardized loadings above .4 often considered acceptable magnitude (e.g., Comrey & Lee, 1992). Individual item loadings were all significant and their magnitude exceeded recommended criteria and ranged from .75 (spouse demands) to .94 (family nerves).

Simple Slopes of Post-MT Depressive Symptom Slopes

Because a significant effect of social support and strain or post-MT depressive symptom slopes implies a cross-level interaction (Curran et al., 2006), simple slopes follow-up tests were conducted to further probe significant associations with results presented in supplemental materials. Simple slopes were computed at low (-1 *SD*), mean, and high (+1 *SD*) values of the significant predictors to examine the rate of change of depressive symptoms following a MT at different levels of social support/strain. Slopes are displayed in Figures 3.2 and 3.3.

At high levels of social support from spouse, measured prior to MT, the association with post-MT slope was not significant ($\beta = .21$, $SE = .13$, $p = .10$), indicating stable depressive symptoms after experiencing a MT. At low levels ($\beta = -.49$, $SE = .12$, $p < .001$), and mean levels ($\beta = -.14$, $SE = .04$, $p < .001$) of spousal support, however, a decline in depressive symptoms is present following a MT, indicating a reduction in depressive symptoms following a MT for those with low and mean support from spouses.

At low levels of social support from friends, no association was present with post-MT slope ($\beta = .10$, $SE = .12$, $p = .38$), suggesting depressive symptoms were stable after a

MT when individuals receive low social support from friends. At mean (β = -.14, *SE* = .04, $p < .001$) and high (β = -.38, *SE* = .11, $p < .001$) levels of social support from friends, a negative association was present, indicating that friend support is associated with a decline in depressive symptoms over time at average and high levels of friend support.

References

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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. https://doi.org/ 10.1080/10705519909540118

Table E.1

Individually-Varying Time Codes for Piecewise Growth Curve Slopes According to Wave of Transition

	Pre-MT Slope					
	Pre0	Pre1	Pre2	Pre3	Pre4	Pre5
2006	0	0	0	0	0	0
2008	-1	0	0	0	0	0
2010	-2	-1	0	0	0	0
2012	-3	-2	-1	0	0	0
2014	-4	-3	-2	-1	0	0
2016	-5	-4	-3	-2	-1	0
	Post-MT Slope					
	Post0	Post1	Post2	Post3	Post4	Post5
2006	0	1	2	3	4	5
2008	0	0	1	2	3	4
2010	0	0	0	1	2	3
2012	0	0	0	0	1	2
2014	0	0	0	0	0	1
2016	0	0	0	0	0	0

Note. Each participant had a single set of codes that were then utilized as their slope factor loadings, centered around wave of MT as can be seen by wave that is 0 for both codes.

Table E.2

Race/Ethnicity Recode, Non-Hispanic Black and Reference Group

	Dependent Variables		
	Intercept	Pre-MT Slope	Post-MT Slope
Model 2			
Average	1.29***	0.01	-0.10
NH White v. NH Black	-0.46	-0.02	-0.03
Hispanic v. NH Black	0.01	-0.14	0.07
Widowed v. Divorced	-0.36	-.19**	0.18*
Female	0.23	-0.05	0.11
Age at MT	-0.04*	0.001	.004
Education	-0.07	0.003	0.01
Net Worth at MT	0.00	0.00	0.00
Chronic Conditions at MT	0.34**	-0.01	-0.002
Model 3			
Average	1.61***	0.06	-0.06
NH White v. NH Black	0.61*	-0.08	-0.08
Hispanic v. NH Black	0.19	-0.19	-0.01
Social Support from Spouse	-0.09	0.07	0.35**
Social Strain from Spouse	0.56	0.20	0.15
Social Support from Children	-0.32	-0.09	0.01
Social Strain from Children	0.40	-0.08	0.06
Social Support from Friends	0.17	0.03	-0.24*
Social Strain from Friends	-0.41	-0.26	-0.09
Social Support from Family	0.06	-0.03	0.07
Social Strain from Family	-0.04	-0.01	0.02
Widowed v. Divorced	-0.50	-0.19**	0.20*
Female	0.07	-0.08	0.13*
Age at MT	-0.03	0.00	0.002
Education	-0.09	0.003	0.01
Net Worth at MT	0.00	0.00	0.00
Chronic Conditions at MT	0.31**	-0.01	0.01

Note. All coefficients are unstandardized values. MT = marital transition or wave of marital transition, NH = Non-Hispanic. * $p < .05$, ** $p < .01$, *** $p < .001$. Model 1 $N = 377$, Model 2 $N = 361$, Model 3 $N = 361$.

Table E.3

Race/Ethnicity Recodes, Hispanic as Reference Group

	Dependent Variables		
	Intercept	Pre-MT Slope	Post-MT Slope
Model 2			
Average	1.93***	-0.14	-0.03
NH White v. Hispanic	0.45	0.12	-0.10
NH Black v. Hispanic	-0.01	0.14	-0.07
Widowed v. Divorced	-0.36	-.19**	0.18*
Female	0.23	-0.05	0.11
Age at MT	-0.04*	0.001	.004
Education	-0.07	0.003	0.01
Net Worth at MT	0.00	0.00	0.00
Chronic Conditions at MT	0.34**	-0.01	-0.002
Model 3			
Average	1.35***	-0.13	-0.07
NH White v. Hispanic	0.42	0.11	-0.07
NH Black v. Hispanic	-0.19	0.19	0.01
Social Support from Spouse	-0.09	0.07	0.35**
Social Strain from Spouse	0.60	0.20	0.15
Social Support from Children	-0.32	-0.09	0.01
Social Strain from Children	0.40	-0.08	0.06
Social Support from Friends	0.17	0.03	-0.24*
Social Strain from Friends	-0.40	-0.26	-0.09
Social Support from Family	0.06	-0.03	0.07
Social Strain from Family	-0.04	-0.01	0.02
Widowed v. Divorced	-0.50	-0.19**	0.20*
Female	0.07	-0.08	0.13*
Age at MT	-0.03	0.00	0.002
Education	-0.09	0.003	0.01
Net Worth at MT	0.00	0.00	0.00
Chronic Conditions at MT	0.31**	-0.01	0.01

Note. All coefficients are unstandardized values. MT = marital transition or wave of marital transition, NH = Non-Hispanic. * $p < .05$, ** $p < .01$, *** $p < .001$. Model 1 $N = 377$, Model 2 $N = 361$, Model 3 $N = 361$.