

The Longitudinal Impact of Gratitude and Hope on PTSD and Well-Being in U.S. Armed  
Forces Veterans

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## **DEDICATION**

Dedicated to Faith, for being the first one to truly introduce me to hope,  
und Angelika, ich werde dir immer dankbar sein.

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## ABSTRACT

United States (U.S.) Armed Forces veterans face stressors that are unique to their military experience. Combat and military sexual trauma are two common stressors that can lead to the development of posttraumatic stress disorder (PTSD). Although base rates of PTSD diagnoses in veterans are higher compared to other populations, most veterans who report experiencing military-related stressors do not develop PTSD. The absence of PTSD is indicative of underlying factors that protect veterans' overall state of mental health. Two factors shown to promote well-being and predict lower levels of PTSD are gratitude and hope. There has yet to be an exploration of both related, yet distinct sources of resilience in veterans. The present study is a longitudinal examination of the unique effects of hope and gratitude on well-being and PTSD in veterans. Data were collected from a longitudinal study targeting U.S. veterans ( $n=218$ ) across three waves using the crowdsourcing website Amazon Mechanical Turk (MTurk). The current study used six latent cross-lagged panel models to examine separate relationships between one source of resilience (hope or gratitude) and one mental health outcome (well-being or PTSD) as well as the unique effects of hope and gratitude and each mental health outcome. Results demonstrated a bidirectional relationship between gratitude and PTSD during the first two waves. Small cross-lagged associations between hope and PTSD were also found. Both hope and gratitude at wave 2 were positively predicted by well-being and in turn, promoted even greater levels of well-being at wave 3. When placed in the same model, hope at wave 1 predicted greater PTSD at wave 2 whereas initial gratitude predicted lower PTSD at wave 2, which appeared to promote reduction in gratitude at the last wave. Findings suggest that PTSD and gratitude influence each other over time and hope and gratitude appear to broaden and build upon well-being. This study provides support for the separate and unique roles that gratitude and hope may have in reducing PTSD symptoms and increasing overall well-being in a military-connected population.

## TABLE OF CONTENTS

<b>DEDICATION .....</b>	<b>III</b>
<b>ACKNOWLEDGEMENTS .....</b>	<b>IV</b>
<b>ABSTRACT.....</b>	<b>V</b>
<b>TABLE OF CONTENTS .....</b>	<b>VI</b>
<b>LIST OF TABLES.....</b>	<b>8</b>
<b>LIST OF FIGURES .....</b>	<b>9</b>
<b>INTRODUCTION .....</b>	<b>10</b>
Mental Health in Veterans .....	10
A More Comprehensive Perspective of Mental Health .....	12
Gratitude.....	13
Hope .....	16
Gratitude and Hope in Veterans.....	19
Gaps in the Literature.....	20
Present Study.....	21
<b>METHODS .....</b>	<b>22</b>
Procedures .....	22
Participants.....	23
Measures .....	24
Analyses .....	26
<b>RESULTS .....</b>	<b>29</b>
Longitudinal Measurement Invariance .....	29
Gratitude and Mental Health among U.S. Veterans.....	29
Hope and Mental Health among U.S. Veterans .....	31
Gratitude and Hope on PTSD .....	33
Gratitude and Hope on Well-Being .....	34

Gratitude and Mental Health Among U.S. Veterans.....	36
Hope and Mental Health in United States Veterans.....	37
Unique Impacts of Hope and Gratitude on Mental Health Outcomes .....	38
Strengths and Limitations .....	39
Future Directions.....	40
<b>REFERENCES .....</b>	<b>43</b>

## List of Tables

Table 1	Demographic Characteristics of Participants .....	56
Table 2	Descriptive Statistics and Bivariate Correlations of Predictors and Outcomes.....	58
Table 3	Internal Consistencies of Hope, PTSD, and Mental Health Measure Subscales .....	59
Table 4	Longitudinal Measurement Invariance of Hope, Gratitude, PTSD, and Well-Being.....	60
Table 5	Model Fit Indices .....	61
Table 6	Autoregressive, Cross-Lagged, and Cross-Sectional Estimates between Gratitude and PTSD .....	63
Table 7	Autoregressive, Cross-Lagged, and Cross-Sectional Estimates between Gratitude and Well-Being .....	65
Table 8	Autoregressive, Cross-Lagged, and Cross-Sectional Estimates between Hope and PTSD.....	67
Table 9	Autoregressive, Cross-Lagged, and Cross-Sectional Estimates between Hope and Well-Being.....	69
Table 10	Autoregressive, Cross-Lagged, and Cross-Sectional Estimates between Hope, Gratitude, and PTSD .....	71
Table 11	Autoregressive, Cross-Lagged, and Cross-Sectional Estimates between Hope, Gratitude, and Well-Being.....	73



## List of Figures

Figure 1	Longitudinal Relationship between Gratitude and PTSD.....	62
Figure 2	Longitudinal Relationship between Gratitude and Well-Being .....	64
Figure 3	Longitudinal Relationship between Hope and PTSD .....	66
Figure 4	Longitudinal Relationship between Hope and Well-Being .....	68
Figure 5	Unique Longitudinal Relationships between Gratitude, Hope, and PTSD .....	70
Figure 6	Unique Longitudinal Relationships between Gratitude, Hope, and Well-Being.....	72

## **Introduction**

Approximately 18 million U.S. adults currently report identifying as a veteran, or an individual who has served in the U.S. Armed Forces (Vespa, 2020). Veteran status is often accompanied by unique stressors, including but not limited to: deployment to war zones, injury, military sexual trauma, and exposure to combat and harmful environments (Spiro et al., 2018). These challenges are risk factors for long-term negative health outcomes, particularly PTSD (Wisco et al., 2014). While important to examine the impact of risk factors of negative outcomes in this population, it is just as important to identify and study protective factors that may buffer the full influence stressful and traumatic events may have on veterans' complete mental health. The present study aimed to examine how two specific protective factors, gratitude, and hope, predict both mental health and mental illness over time in a veteran population.

### ***Mental Health in Veterans***

U.S. veterans have higher rates of substance use disorders, homelessness, and chronic illnesses in the U.S. compared to their civilian counterparts (Aldwin et al., 2017). According to the U.S. Department of Veterans Affairs, the suicide rate in the veteran population is 1.5 times higher than that of their civilian counterparts (2019). While veteran status alone cannot explain these negative outcomes alone, higher rates of mental illness and suicide in veterans are often attributed to lower levels of socioeconomic status, lower levels of education, and trauma experienced during military service. After they leave the service, there is a multitude of mental health services provided to veterans; however, they may not be utilized by all veterans due to stigma, environmental barriers, or lack of

awareness of services (Helmick, 2010). Therefore, there is a large proportion of veterans who continue to struggle with the aftermath of their military stressors.

While many veterans experience service-related stressors, traumas, and experiences, not all of them develop negative health outcomes (Settersten Jr., Aldwin, & Spiro, 2018). Specifically, it is estimated that approximately 10-30% of those who encounter military service-related stressors go on to develop PTSD (Medicine, 2012). Veteran status is therefore not synonymous with poor mental and physical health. Some veterans experience similar life stressors and yet can return to their baseline level of functioning after experiencing trauma and stressors. This return to one's baseline level of functioning in the aftermath of trauma is often referred to as resilience (Bonanno et al., 2011).

Recent studies have begun to identify factors of resilience in both veterans and active-duty service members to reduce poor health outcomes after service (Aldwin et al., 2018; Angel, 2016; Crabtree & DeYoung, 2017). However, there is still not a definitive answer as to what triggers or protects against later mental illness in some veterans (Straus et al., 2019). Military service has been linked to both positive and negative long-term outcomes, further supporting the presence of vital protective factors at play that buffers against service-related stressors and trauma (Aldwin et al., 2018). While many of these are environmental factors, such as social support, research has shown that there are also trait characteristics that promote resilience towards mental illness (Bergmann et al., 2019). More literature has begun to link positive psychological resources such as mindfulness and posttraumatic growth (PTG) with the promotion of resilience and better help-seeking outcomes in veterans (Carrola & Corbin-Burdick, 2015; Porcari et al., 2017). While

identifying risk factors in veterans is imperative to understanding their higher rates of negative outcomes, it is equally as important to understand protective factors that can promote resilience and possibly buffer the effects of trauma. While a considerable amount of research has examined vulnerability factors and negative mental health outcomes in veterans, fewer studies have also investigated the impact of protective factors and resilience on their mental health.

### ***A More Comprehensive Perspective of Mental Health***

A common conceptualization of mental health is the lack of mental illness, whereas a mentally healthy person does not exhibit symptoms of psychopathology. However, there is a more comprehensive model of mental health, through which a mentally healthy individual has both the absence of psychopathology and the presence of mental health, or positive functioning (Keyes, 2005). This model illustrates a continuum of mental health in which on one end lies a state of languishing that is distinct from mental illness. A person who is in a state of languishing experiences a lack of positive emotional, social, or psychological functioning. On the other end of the spectrum, complete mental health is conceptualized as the absence of psychopathology in conjunction with the presence of flourishing, or the experience of mental health (Keyes, 2002). Consequently, an individual can have no current diagnosis of a psychological disorder, yet still experience dissatisfaction with their relationships, direction in life, or growth. Individuals who report a state of complete mental health (an absence of mental illness and presence of mental health) have been shown to have the highest rates of resilience, the least amount of health limitations on daily activities, fewer missed days of work, and higher levels of

positive psychosocial functioning compared to individuals who only have an absence of mental illness (Keyes, 2005).

Keyes identified three major components of mental health: emotional well-being, psychological well-being, and social well-being (2005). A state of emotional well-being, also described as hedonic or subjective well-being, consists of a greater frequency of positive affect compared to negative affect as well as subjective life satisfaction (Diener, 1984). Psychological well-being, or eudaimonic well-being, is the extent to which an individual is thriving in aspects of their life including personal growth, autonomy (Ryff, 1989). The last component, social well-being, is operationalized as the presence of perceived positive functioning in one's social environments (Keyes, 1998). The presence of these components along with the absence of psychopathology (e.g., depression, PTSD) is the definition of mental flourishing or complete mental health. Therefore, there are two major ways to improve one's health: reduction of mental illness symptoms and improvement of positive functioning. Two traits that are predictive of both PTSD and well-being, and thus more comprehensive factors of mental health, are gratitude and hope.

### ***Gratitude***

Gratitude is a universal trait, based on its appearance in cultures and religions around the world (Emmons & McCullough, 2004). At its core, gratitude is conceptualized as the perception of a favorable outcome that occurred due to an external entity. The outside force that facilitates one's feelings of gratitude does not have to be human; one can feel gratitude towards nonhuman sources such as their deity or nature (Teigen, 1997). This opens up the possibilities of how and in what situations gratitude can be promoted.

Contemporary research on gratitude in the 21<sup>st</sup> century has examined the conceptualization of gratitude as a disposition, an emotion, and a mood (Emmons et al., 2019). Trait-level gratitude, or the grateful disposition, is a conceptualization focused on including the appreciation component of gratitude as well as its distinctness from other emotions such as joy, fear, or sadness. It was theorized that gratitude is a broader trait, in which one is more oriented towards noticing and appreciating positive outcomes. McCullough and colleagues conceptualize gratitude as a disposition consisting of four dimensions: intensity (how much gratitude one feels), frequency (how often what experiences gratitude), span (the number of grateful experiences), and density (the proportion of people to whom one is grateful to a single outcome; 2002).

Gratitude may promote better mental health through the promotion of cognitive processes such as positive reappraisal, which has been demonstrated to predict higher levels of well-being (Folkman & Moskowitz, 2000). Furthermore, greater attendance to positive experiences in one's life may promote more resilience to mental illness, particularly PTSD. A core component of PTSD is a skewed view of esteem in others and themselves. As gratitude puts others' behaviors in a more positive light, this could help buffer the assimilation/accommodation of one's traumatic experience into their existing schemas (Resick et al., 2016).

Gratitude's association with better mental health outcomes, including lower levels of PTSD, is consistent with the Broaden-and-Build Theory (Fredrickson, 2013). The Broaden-and-Build Theory postulates that the experience of positive emotions is an adaptive one; positive emotions increase chances of one's survival through the broadening of one's perspective and creation of new relationships and behaviors, leading to the

cultivation (i.e. building) of environmental and psychological resources such as social support networks and resilience (Fredrickson, 2013). Gratitude is one of the ten positive emotions suggested by the model that enhances the individual's thoughts and behaviors.

Gratitude has been shown to benefit individuals both mentally and physically (Emmons & Stern, 2013). Individuals who participated in interventions that promoted gratitude also reported greater levels of positive affect, life satisfaction, prosocial behavior, fewer somatic complaints, and more exercise behaviors (Emmons & McCullough, 2003). In addition to specific positive outcomes, research has demonstrated a direct relationship between gratitude and extraversion, agreeableness, openness, conscientiousness, and an inverse association between gratitude and neuroticism (McCullough et al., 2004; Watson et al., 1994). Gratitude impacts the other side of the mental health continuum, specifically through predicting lower levels of mental illnesses such as anxiety and depression (McCullough et al., 2002; Van Dusen et al., 2015). Gratitude's inverse relationship with psychopathology is also evident in findings from a meta-analysis showing that gratitude has a negative relationship with PTSD (Richardson & Gallagher, 2020).

In addition to being associated with lower severity of psychological disorders, gratitude has been linked to higher levels of prosocial behavior and emotional well-being, and psychological well-being (Emmons & Shelton, 2002). This may be due to components of gratitude that foster resilience and positive emotions such as attribution of positive events on others' behaviors (Emmons and McCullough 2003; McCullough et al. 2002; Wood et al. 2010). Studies have also demonstrated relationships between gratitude and subjective well-being (Emmons and McCullough 2003; McCullough et al. 2004). In

addition to emotional functioning, dispositional gratitude has predicted psychological well-being (Kashdan et al. 2006; Wood et al. 2009). Furthermore, increased levels of gratitude are predictive of positive relationships and prosocial behavior (Algoe et al. 2008, 2010; Naito et al. 2005).

Gratitude is conceptually related to other positive psychology traits that predict positive outcomes such as hope (Wood et al., 2010). Extant research findings show an positive association between trait hope and gratitude (McCullough et al., 2002). Both hope and gratitude are associated with life satisfaction, social engagement, and emotional and psychological well-being (Disabato et al., 2016; Froh et al., 2010; Park et al., 2004). While there is empirical support that gratitude and hope are related, less is known about their unique contribution to clinical outcomes (Witvliet et al., 2019).

### ***Hope***

Hope is a future-oriented cognitive trait through which an individual has positive expectancies about achieving their goals (Snyder et al., 1991). There have been multiple conceptualizations of psychological hope; however, the most widely studied model was developed by C.R. Snyder and conceptualizes hope as a cognitive trait that encompasses two major components: pathways and agency. The pathways component of hope involves the individual identifying routes from their present state to their ideal goal state. A person with more hope is more likely to be flexible in creating their pathways, allowing for possible obstacles that may cause the individual to adapt their routes (Snyder, 2002). The agency component of hope is the motivational part of hope, where one has the belief that they can actively and efficiently utilize the routes they have created to meet their goals.



Ideally, the high-hope individual will have high levels of both agency and pathways-oriented thinking compared to their “lower-hope” counterparts (Snyder et al., 1991). Hope can be experienced as both a state and a broader orientation in life. Furthermore, there are validated measures of specific types of hope, such as academic, employment-related, and state hope (Rose & Sieben, 2017). Hope is a trait that is broadly beneficial across contexts (Gallagher & Lopez, 2017; Snyder, 2000). The goal and agentic nature of Snyder’s model of hope promote physical as well as mental health (Cheavens et al., 2006; Rasmussen et al., 2017; Schofield et al., 2016).

The relationship between hope and positive mental health outcomes may be explained through the goal-oriented aspect of hope. High-hope individuals tend to use problem-focused and active coping strategies, which have been related to lower levels of stress (Lazarus & Folkman, 1984; Snyder, 2002). Pathways-oriented thinking can assist in the identification of ways they can influence an outcome. Most importantly, the individual who has more flexible pathways may be able to be more adaptive to obstacles that come their way. Thus, a person with higher levels of dispositional hope may find themselves better equipped with strategies to cope with stressors (Gallagher, D’Souza, et al., 2020; Ong et al., 2018).

Hope has been linked to all three major components of mental health: emotional, psychological, and social well-being (Lee & Gallagher, 2017). Results of a meta-analysis found that hope is moderately associated with higher levels of positive affect and subjective happiness (Alarcon et al., 2013). Another study using structural equation modeling demonstrated that hope predicted emotional, social, and psychological well-

being even after controlling for optimism (Gallagher & Lopez, 2009). The data demonstrate that hope is a distinct and robust predictor of positive facets of mental health.

Many studies have demonstrated that hope has a moderate to strong association with depression ( $r = -0.52$ ) in addition to predicting multiple positive outcomes such as higher levels of markers of mental health (Alarcon et al., 2013). In addition to one study finding that hope predicts lower levels of anxiety ( $r = -0.25$ ), a recent meta-analysis demonstrated that hope is consistently related to lower levels of PTSD (Gallagher, Long, & Phillips, 2020; Gana et al., 2013)

The benefits of hope have been examined across contexts, demonstrating its relevance to and impact on many situations and obstacles that occur in one's life. Furthermore, while research indicates that hope is a trait that is typically stable over time, levels of hope can change based on current affective states or through interventions (Cheavens & Guter, 2017; Snyder et al., 1996). Hope-focused interventions have been successful in changing levels of hope across samples including undergraduate students, older adults, and cancer survivors (Feldman & Dreher, 2012; Klausner et al., 1998; Thornton et al., 2014). Changes in hope have also predicted changes in treatment outcomes of anxiety and PTSD (Gallagher, Long, Richardson, et al., 2020; Gilman et al., 2012; Ritschel et al., 2012). The current hope literature demonstrates that hope is not only an important predictor of well-being but can be used as a mechanism of positive change in mental health.

Hope, like gratitude, impacts one's perspective of the world. Hope is unique in that it focuses more on future outcomes as well as how one approaches those outcomes. In contrast, gratitude is more past-focused and focuses on the appreciation of positive

outcomes as well as the benefits received from positive events (Wood et al., 2010). While gratitude and hope are two distinct constructs, both focus on the appraisal of a positive outcome either in the past or the future, respectively.

### ***Gratitude and Hope in Veterans***

Research in veterans has demonstrated that gratitude is a possible source of resilience that can be useful in veteran's mental health (Kashdan et al., 2006). In particular, gratitude could improve posttraumatic cognition distortions about the world that are associated with higher levels of PTSD severity in veterans (Lyons et al., 2019). In the face of life stressors and traumas, gratitude may protect veterans from attending to fewer positive events as well as attributing these events to luck or coincidence. Studies examining gratitude as a source of resilience in veterans have demonstrated that gratitude is associated with lower levels of PTSD and higher levels of psychological well-being (Adkins, 2020; Kachadourian et al., 2019).

Current research demonstrates that the impact of hope on mental health is also present in veteran populations. Hope has predicted lower levels of PTSD, depression, and anxiety in both active duty military and veteran samples (Koenig et al., 2020; Umucu, 2017). A study examining the effectiveness of a treatment for PTSD in a sample of veterans found that pre-treatment and mid-levels of dispositional hope predicted lower levels of clinician-rated PTSD symptoms post-treatment. Furthermore, the relationship between hope and PTSD in veterans was not bidirectional, providing temporal evidence that hope does have an impact on PTSD (Gilman et al., 2012).

### *Gaps in the Literature*

While current evidence-based treatments have been shown to be effective in reducing PTSD and depression symptoms, reductions in PTSD and depression have been smaller in military-affiliated populations compared to civilians (Jacoby et al., 2022). Thus, novel ways of improving mental health outcomes in military-affiliated individuals appears to be needed. Extant research has identified hope and gratitude as predictors of higher levels of mental health and lower levels of mental illness. While past studies have examined these positive psychological constructs separately in veteran samples, unique contributions have yet to be explored. As hope and gratitude provide different life orientations, their functions for the promotion of positive outcomes may also differ. One study examined the relationship between items on the dispositional gratitude and hope scales and found that dispositional gratitude was a separate, yet related factor from pathways and agency subscales of hope in both student and community samples (McCullough et al., 2002). There is no research, however, examining the unique effects of hope and gratitude on mental health and mental illness in veterans. The lack of research in this area limits the ability to better understand resilience. Therefore, longitudinal studies are needed to better understand how hope and gratitude may foster resilience and promote complete mental health across time.

Keyes's continuum of mental health has been replicated across contexts and the lifespan (Westerhof & Keyes, 2010). One study examining well-being and psychopathology in a sample of more than 1,000 clinical patients demonstrated support a model with two highly correlating factors (psychopathology and well-being (van Erp Taalman Kip & Hutschemaekers, 2018). It is just as important to understand how one

improves their well-being as it is to understand how to reduce symptoms of psychopathology. The results of the examination of the clinical implications of the continuum of mental health would greatly benefit veterans, a population that face uniquely high levels of stressors. One such population is the veteran population. By examining how protective factors influence both positive and negative outcomes over time presents a more comprehensive picture of how to not only improve the mental illness problem in veterans but to improve their quality of life as well.

### ***Present Study***

The current study examined the longitudinal and prospective effects of gratitude and hope on well-being and symptoms of PTSD in a sample of United States veterans. Although extant research has demonstrated that gratitude and hope predict levels of well-being and PTSD, this relationship has not been examined longitudinally or in a sample of veterans. Furthermore, this was the first research of its kind to specify unique longitudinal effects of gratitude and hope on PTSD and well-being within the same sample. I examined how gratitude and hope uniquely impacted the longitudinal course of PTSD and well-being across 12 months in 218 individuals who identified as having served in the U.S. Armed Forces. The following aims and hypothesis are described below:

- Aim 1: To examine the longitudinal relationships between gratitude and PTSD and gratitude and well-being.
  - o Hypothesis 1a: Gratitude measured at Wave 1 and Wave 2 will predict lower levels of PTSD at Wave 2 and Wave 3, respectively with a small to moderate effect size.

- Hypothesis 1b: Gratitude measured at Wave 1 and Wave 2 will strongly predict higher levels of well-being at Waves 2 and 3, respectively.
- Aim 2: To examine the longitudinal relationships between hope and PTSD and hope and well-being.
  - Hypothesis 2a: Hope measured at Wave 1 and Wave 2 will moderately predict lower levels of PTSD at Wave 2 and Wave 3, respectively.
  - Hypothesis 2b: Hope measured at Wave 1 and Wave 2 will moderately predict higher levels of mental health at Waves 2 and 3, respectively.
- Aim 3: To examine the unique longitudinal impact of gratitude and hope on PTSD as well as the unique longitudinal impact of gratitude and hope on well-being.
  - Hypothesis 3a: Gratitude measured at Wave 1 and Wave 2 will have a small to moderate longitudinal association with PTSD at Wave 2 and Wave 3 and a moderate longitudinal relationship with well-being at Wave 1 and 2, respectively.
  - Hypothesis 3b: Hope measured at Wave 1 and Wave 2 will moderately predict lower levels of PTSD and higher levels of well-being at Wave 2 and Wave 3.

## **Methods**

### ***Procedures***

Data were collected using Amazon Mechanical Turk, through a survey targeted at individuals who identified themselves as U.S. Armed Forces veterans. The project was approved by the University of Houston Institutional Review Board. The primary aim of

the study was to examine resilience, vulnerability, coping, and their impact on the longitudinal course of mental health outcomes in U.S. veterans. Data collection occurred in three waves between April 4<sup>th</sup>, 2019, and April 29<sup>th</sup>, 2020. Five veteran status screening questions were included at the beginning of the survey based on recommendations from a previous multi-phased study that developed a recruitment protocol for veterans (Morgan & Lynn, 2016). Questions were based on common military experiences across Armed Forces branches (e.g., “What is the acronym for the generic term the military uses for various job fields”). In addition, the participant had the choice to respond by selecting “I am not a veteran” at the beginning of the survey to self-select out of the research. Participants who missed four or more questions were automatically shown the ineligibility statement and did not continue with the rest of the survey. Data from individuals who answered two or more questions correct were examined individually to ensure validity, including but not limited to dates of service in relation to age, rank, and separation of service. This was done to ensure that a veteran was not excluded due to misspelling or poor memory.

### ***Participants***

Data collected from 218 participants was used for the analyses. The sample had a mean age of 39.81 (SD=10.86), 26.1% of the sample identified as female and 0.9% of the sample identified as a gender other than male or female. 68.3% of the sample identified as European American/White, 17% identified as African American/Black, 4.1% identified as Asian American/Pacific Islander, and 6.9% identified as Latinx. The average length of military service was 8 years. Table 1 presents additional demographic information.

## *Measures*

**Gratitude** was measured with the Gratitude Questionnaire-6 (GQ-6), one of the most widely-used measures of gratitude (Card, 2019; McCullough et al., 2002). The scale consists of 6 items, two of which were reverse-coded. Participants indicated on a 7-point Likert scale how much they agreed or disagreed with each statement reflecting facets of gratitude such as intensity (e.g. “I have so much in life to be thankful for”), frequency (e.g. “Long amounts of time can go by before I feel grateful to something or someone”), span (e.g. “If I had to list everything that I feel grateful for, it would be a very long list”) and density (e.g. “I am grateful to a wide variety of people”). Item scores were totaled, and higher scores were indicative of higher levels of gratitude. The internal consistency of the GQ-6 for all three time points were  $\alpha=0.86$ ,  $\alpha=0.90$ ,  $\alpha=0.81$ , respectively (Table 2). The GQ-6 is a reliable measure for measuring dispositional gratitude across contexts (Emmons, Froh, & Rose, 2019).

**Hope** was measured using the Adult Hope Scale (Snyder et al., 1991). The Adult Hope Scale is a widely-used measure of dispositional hope and consists of 12 items: four items measuring agency (e.g. “I meet the goals I set for myself”), four items measuring pathways (e.g. “I can think of many ways to get the things in life that are important to me”), and four distractor items. Participants rate their agreement with each statement on an 8-point Likert scale. To calculate total scores, only the four agency and four pathways’ items are summed, where higher totals reflect higher levels of dispositional hope. Internal consistencies for the Adult Hope Scale at three waves were:  $\alpha=0.91$ ,  $0.91$ , and  $0.89$ , respectively. Pathways and agency subscales of the scale demonstrated good internal



reliability (Table 3). Previous studies have shown that the Adult Hope Scale is a highly reliable and valid measure of Snyder's construct of hope (Snyder, 2002).

The current study used the **PTSD Checklist for the DSM-5** (PCL-5) as a measure for PTSD symptoms (Weathers, 2013). The PCL-5 consists of 20 items that consist of four subscales, reflecting Re-experiencing Symptoms (5 items), Avoidance of Trauma-Related Stimuli (2 items), Negative Alterations in Cognitions or Mood (7 items), and Hyperarousal and Reactivity to Stimuli (6 items) of the DSM-5 diagnostic criteria for PTSD. Participants rate the severity of their symptoms in the past month using a 5-point Likert scale. Total scores are calculated by summing all 20 items, with a higher score indicating higher levels of PTSD symptoms. The DMS-5 four factor model has been shown to be good fit both in prior literature (Blevins et al., 2015) and in the current study using confirmatory factor analyses and longitudinal measurement invariance (Table 4). The PCL-5 has demonstrated construct validity as well as good reliability in previous research. The internal consistency for the PCL-5 scale was  $\alpha=0.98$  for all three waves (Table 2). Additional internal consistencies for the subscales of the PCL-5 for each wave are described in Table 3.

Mental health was measured using the **Mental Health Continuum-Short Form** (MHC-SF), a 14-item scale that measures three major components of mental health: emotional well-being (three items), social well-being (five items), and psychological well-being (six items; Keyes, 2005). Participants rate the frequency to which they experience all fourteen facets of mental health on a 6-point Likert scale. The MHC-SF has been shown to demonstrate validity and reliability across languages and cultures (Keyes, 2009). The internal consistency for the MHC-SF in the current sample for the entire scale was

$\alpha=0.95$  across all three waves. As depicted in table 3, the subscales of the MHC-SF demonstrated high internal reliability across the three waves.

### *Analyses*

IBM SPSS Statistics version 27 was used to calculate means, standard deviations, and inter-correlations for gratitude, hope, PTSD, and mental health. Descriptive statistics and correlations for all waves are presented in Table 2. At wave 1, approximately 34.1% of the sample ( $n=218$ ), reported a score of 33 or higher on the PCL-5, which is indicative that a diagnosis of PTSD is probably met (Bovin et al., 2016).

Mplus version 8 (Muthén & Muthén, 1998-2017) were used to test my main hypotheses using confirmatory factor analysis (CFA) and latent cross-lagged panel modeling. Item-level missing data were imputed using robust maximum likelihood estimation. All variables were specified as latent constructs indicated by item-level data. For measures consisting of more than six items, manifest variables were created through parceling, a technique through which individual items of a scale are placed into groups either randomly or based on validated subscales.

In the proposed analyses, the 6 items of gratitude were 6 individual manifest variables, however all structural models using this proposed model structure demonstrated mediocre fit. To improve the fit of models that included gratitude as a variable, the 6 items of the gratitude measure were divided into 3 parcels, each consisting of the sum of 2 items (Parcel 1: Item 1 and Reversed item 6; Parcel 2: Item 2 and Item 5; Parcel 3: Reversed item 3 and Item 4). When examining the structure of gratitude across time (Table 4), the model of gratitude that parceled items [ $\chi^2(15)=31.34, p<0.01, RMSEA=0.07, 95\% CI$

(0.04, 0.11), CFI=0.98, 0.95] was a better fit to the data compared to the initial model of gratitude where items were individual factors  $\chi^2(114)=276.54, p<0.01, RMSEA=0.08, 95\% CI (0.07, 0.09), CFI=0.88, 0.84]$  Thus, the results reported in the results section reflect the altered structure of gratitude in models 1, 2, 5, and 6.

The 8 items of hope were divided into four parcels, each consisting of one pathways item and one agency item. This parceling method and factor structure of hope has been used in numerous studies in which hope was a latent construct and has demonstrated good fit to the data (e.g. Gallagher et al., 2021; Gallagher, Long, Richardson, et al., 2020). The 20 items of the PCL-5 were divided into four manifest variables representing each factor of the DSM-5 conceptualization of PTSD: Re-experiencing the Traumatic Event (Criterion B), Avoidance of Trauma-Related Stimuli (Criterion C), Negative Alterations in Cognition or Mood (Criterion D), and Hyperarousal/Reactivity (Criterion E). The 14 items of the MHC-SF were separated into three manifest variables that loaded on to latent mental health, each representing the three major types of well-being: emotional well-being, psychological well-being, and social well-being.

Initial analyses examined correlations between the latent and manifest constructs as well as the model's goodness of fit to the data through a CFA. I analyzed correlations using the magnitude of effect sizes and confidence intervals to emphasize clinical significance and precision of estimates rather than only statistical significance. I tested the goodness of fit of both the CFA and latent cross-lagged panel models to the data using the following recommended criteria: a Root Mean Square Error (RMSEA) value less than 0.08 (Hu and Bentler, 1998), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI)

values greater than 0.90 (Marsh, Hau, & Wen, 2004), as well as the chi-squared value ( $\chi^2$ ). Longitudinal measurement invariance was conducted for all four constructs to ensure that the assessment of the constructs of hope, gratitude, PTSD, and well-being was consistent across timepoints.

To address the first aim, I specified two models. Model 1 (Figure 1) consisted of a latent autoregressive structural model that includes gratitude and PTSD at each time point as latent constructs predicting the subsequent time point. Cross-lagged relationships were specified, with gratitude measured at wave 1 and wave 2 predicting PTSD measured at wave 2 and wave 3, respectively. Furthermore, I estimated the impact of PTSD at waves 1 and 2 predicting gratitude at waves 2 and 3 (Figure 1). The second model had the same structure as the previous model, however, the longitudinal relationships between gratitude and well-being were examined (Figure 2).

The second set of analyses consisted of two latent cross-lagged panel models. Model 3 was specified to predict the impact of hope and PTSD at waves 1 and 2 on PTSD and hope measured at waves 2 and wave 3, respectively (Figure 3). Model 4, shown in Figure 4, estimated the bidirectional, longitudinal relationships between the constructs of hope and well-being across the three time points.

The final set of analyses examined the unique effects of gratitude and hope on PTSD and well-being across time. To estimate these effects, two models were specified, each with three constructs occurring at three different time points included in the model. One model contained gratitude, hope, and PTSD as three latent constructs (Figure 5), and the other specified the relationships between gratitude, hope, and well-being (Figure 6).

Standardized  $\beta$  estimates were used to estimate both autoregressive and cross-lagged regression pathways. Autoregressive paths represent the amount of variance in one construct that is explained by the same construct at a prior time point, controlling for variance explained by another construct at the first time point. Cross-lagged paths estimate the variance explained by the unique effect of one construct at one time point on another construct at a different time point while controlling for autoregressive effects. Standardized estimates were used to estimate the relationship between the latent construct and the indicators. Residual variances among each indicator across waves were allowed to covary.

## **Results**

### ***Longitudinal Measurement Invariance***

Results from longitudinal measurement invariance analyses are reported in Table 4. All variables were shown to demonstrate weak and strong invariance. Results demonstrate that measurement of all variables do not significantly differ across time points. Therefore, any increases or decreases in hope, PTSD, gratitude, or mental health across time are more likely to be due to actual changes in levels themselves rather than the factor structure of the measure over time.

### ***Gratitude and Mental Health among U.S. Veterans***

Model fit indices for all six models are reported in Table 5. The model examining the relationship between gratitude and PTSD (Model 1) demonstrated good fit to the data: ( $\chi^2(157)=248.09$ , RMSEA=0.05, 95% CI (0.04, 0.06);CFI=0.97;TLI=0.96).

Standardized  $\beta$  estimates for this model (Figure 1) are reported in Table 6. Initial levels of Gratitude and PTSD were negatively, moderately correlated one another at wave 1 ( $r = -0.51$ , 95% CI(-0.63, -0.39)). Results show that levels of both gratitude and PTSD remained stable over time. When controlling for cross-lagged associations between gratitude and PTSD, PTSD demonstrated strong autoregressive relationships between waves, particularly between waves 2 and 3 [PTSD<sub>wave1</sub>  $\rightarrow$  PTSD<sub>wave2</sub> ( $\beta=0.70$ , 95% CI (0.57, 0.83) PTSD<sub>wave2</sub>  $\rightarrow$  PTSD<sub>wave3</sub> ( $\beta=0.92$ , 95% CI (0.84, 1.01)]. The stability of gratitude between the first two waves ( $\beta=0.67$ , 95% CI (0.51, 0.82)) was comparable to the stability of gratitude between waves 2 and 3 ( $\beta=0.65$ , 95% CI (0.43, 0.88)). When controlling for autoregressive associations, gratitude at wave one predicted lower levels of PTSD at wave 2 ( $\beta = -0.17$  95 % CI (-0.31, -0.03)). However, gratitude at wave 2 predicted slightly greater levels of PTSD at wave 3 ( $\beta = 0.11$ , 95% CI (-0.05, 0.28)). PTSD at wave 1 predicted lower levels of gratitude at wave 2 ( $\beta = -0.19$  95 % CI (-0.37, -0.01)). Greater levels of PTSD at wave 2 predicted lower levels of gratitude at wave 3 ( $\beta = -0.22$ , 95% CI (-0.45, 0.01)). This model showed a bidirectional negative relationship between PTSD and Gratitude at Waves 1 and 2. Overall, PTSD was a more consistent predictor of gratitude than gratitude was a predictor of PTSD across waves.

When examining the separate relationship between gratitude and well-being across three waves (Model 2, Figure 2), the specified model demonstrated good fit to the data( $\chi^2(106)=212.62$ , RMSEA=0.07, 95% CI [0.06, 0.08] ;CFI=0.95;TLI=0.93)). Autoregressive effects, cross-lagged effects, and cross-sectional associations are reported in Table 7. Gratitude was strongly correlated with well-being at wave 1(  $r=0.74$ , 95% CI (0.65, 0.82)). Autoregressive  $\beta$  estimates demonstrated that both gratitude and well-being

were moderately to strongly stable over time. Levels of gratitude were more stable between waves 2 and 3 ( $\beta = 0.78$ , 95 % CI (0.59, 0.97)) than they were between the first two waves ( $\beta = 0.50$ , 95 % CI (0.27, 0.72)). In terms of the stability of well-being, greater stability was observed in the autoregressive associations between the first two waves ( $\beta = 0.82$ , 95 % CI (0.65, 0.98)) compared to wave 2 and wave 3 ( $\beta = 0.60$ , 95 % CI (0.37, 0.83)). When controlling for autoregressive associations, well-being at wave 1 predicted greater levels of gratitude at wave 2 ( $\beta = 0.36$ , 95 CI (0.13, 0.59)), which in turn predicted greater levels of well-being at wave 3 ( $\beta = 0.23$ , 95 CI (-0.01, 0.46)). Gratitude at waves 1 and 3 did not appear to predict ( $\beta = -0.05$ , 95 % CI (-0.25, 0.15)) or be predicted ( $\beta = 0.02$ , 95 % CI (-0.21, 0.24)) by well-being at wave 2, respectively. Results of this model revealed that gratitude is not only predicted by well-being, however it also appears to promote more well-being.

### ***Hope and Mental Health among U.S. Veterans***

The longitudinal relationship between hope and PTSD demonstrated good fit to the data ( $\chi^2(217)=351.19$ ; RMSEA=0.07, 95% CI (0.04, 0.06); CFI=0.96; TLI=0.95; Figure 2). Effect sizes for Model 3 are reported in Table 8. Latent hope and PTSD were strongly and negatively associated with one another at wave 1 ( $r = -0.48$ , 95% CI (-0.61, -0.35)). Autoregressive paths demonstrated stability in hope across time, the stability between the last two waves being highly stable [ $Hope_{wave1} \rightarrow Hope_{wave2}$  ( $\beta = 0.69$ , 95% CI (0.49, 0.90)),  $Hope_{wave2} \rightarrow Hope_{wave3}$  ( $\beta = 0.85$ , 95% CI (0.76, 0.93))]. PTSD was also highly stably in this model, as demonstrated by autoregressive coefficients which were comparable for both pathways [ $PTSD_{wave1} \rightarrow PTSD_{wave2}$  ( $\beta = 0.83$ , 95% CI (0.71, 0.94)),

PTSD<sub>wave2</sub> → PTSD<sub>wave3</sub> ( $\beta=0.87$ , 95% CI (0.78, 0.96)). There was a small, positive cross-lagged association between hope at wave 1 and PTSD at wave 2 ( $\beta=0.09$ , 95% CI(-0.04, 0.21)). PTSD at wave 2 marginally predicted lower levels of hope at wave 3 ( $\beta= -0.07$ , 95% CI (-0.20, 0.07)). Initial levels of hope and PTSD strongly related with one another, however longitudinal relationships between hope and PTSD were small after controlling for autoregressive effects.

Next, the latent longitudinal relationships between hope and well-being were examined. Confirmatory factor analysis for this model demonstrated acceptable fit to the data ( $\chi^2(157)= 267.75$ ; RMSEA=0.06, 95% CI (0.05, 0.07);CFI=0.95;TLI=0.94). The association between hope and well-being at wave 1 ( $r= 0.67$ , 95% CI (0.55, 0.79)) was moderate to strong in magnitude. Autoregressive stability of hope appeared to increase with each wave, whereas greater levels of hope at one timepoint predicted greater levels of hope at the next. [Hope<sub>wave1</sub> → Hope<sub>wave2</sub> ( $\beta=0.53$ , 95% CI (0.25, 0.82)), Hope<sub>wave2</sub> → Hope<sub>wave3</sub>( $\beta= 0.81$ , 95% CI (0.63, 0.98))]. The stability in well-being was strong between the first two waves and moderate between waves 2 and 3 [Well-Being<sub>wave1</sub> → Well-Being<sub>wave2</sub>( $\beta= 0.71$ , 95% CI (0.54, 0.87)), Well-Being<sub>wave2</sub> → Well-Being<sub>wave3</sub>( $\beta= 0.58$ , 95% CI (0.31, 0.85))]. Latent well-being at wave 1 positively and moderately predicted latent hope at wave 2 ( $\beta= 0.27$ , 95% CI (-0.01, 0.55)), which then moderately predicted higher levels of well-being at wave 3 ( $\beta=0.26$ , 95% CI (0.05, 0.48)). There were smaller cross-lagged effects of well-being being predicted by hope at wave 1 ( $\beta=0.11$ , 95% CI (-0.08, 0.30)) and predicting hope at wave 3 ( $\beta=0.10$ , 95% CI (-0.12, 0.32)), however these effects were not statistically significant. These results revealed that hope and well-being were consistent predictors of each other. In particular, the strongest effects



were between well-being at wave 1 predicting hope at wave 2 and hope at wave 2 predicting well-being at wave 3.

### ***Gratitude and Hope on PTSD***

The third and final aim was to examine how hope and gratitude uniquely influenced PTSD and well-being (Figures 5 & 6). The model specified for the relationship between hope, gratitude, and PTSD was estimated to have acceptable fit to the data ( $\chi^2(435) = 744.29$ ; RMSEA=0.06, 95% CI (0.05, 0.06); CFI=0.93; TLI=0.92). Correlations, residual covariances, and standardized  $\beta$  estimates for autoregressive and cross-lagged associations are in Table 10. Results demonstrated a positive, strong relationship between hope and gratitude wave 1 ( $r = 0.63$ , 95% CI (0.52, 0.74)). Greater initial levels of PTSD were strongly correlated with lower initial levels of hope ( $r = -0.48$ , 95% CI (-0.61, -0.35)) and gratitude ( $r = -0.51$ , 95% CI (-0.63, -0.40)). Based on autoregressive effects, all three latent variables demonstrated strong stability across three waves when controlling for cross-lagged associations (Table 10). Out of the three variables, PTSD was most stable over time [ $PTSD_{wave1} \rightarrow PTSD_{wave2}$  ( $\beta = 0.75$ , 95% CI (0.62, 0.88)),  $PTSD_{wave2} \rightarrow PTSD_{wave3}$  ( $\beta = 0.92$ , 95% CI (0.82, 1.02))]. When controlling for autoregressive effects, greater levels of PTSD at wave 1 predicted less gratitude at wave 2 with a small effect ( $\beta = -0.13$ , 95% CI (-0.31, 0.04)), but did not significantly predict hope at wave 2. The effects of initial levels of hope on gratitude ( $\beta = 0.18$ , 95% CI (-0.03, 0.39)) and PTSD ( $\beta = 0.24$ , 95% CI (0.10, 0.39)) at wave 2 were small to moderate and positive. Gratitude at wave 1 moderately predicted lower levels of PTSD at wave 2 ( $\beta = -0.30$ , 95% CI (-0.47, -0.12)), which in turn predicted greater levels of gratitude at

wave 3 ( $\beta = -0.22$ , 95% CI (-0.45, 0.01)). When controlling for hope, gratitude at waves 2 and 3 were consistently predicted by PTSD at the previous waves, however, was less consistent in predicting PTSD at subsequent waves. Longitudinal relationships between PTSD and hope were less consistent in direction and magnitude when controlling for gratitude.

### ***Gratitude and Hope on Well-Being***

The second half of the third aim examined the longitudinal relationship between gratitude, hope, and well-being. The associated model was estimated to have acceptable fit to the data ( $\chi^2(348) = 666.65$ ; RMSEA = 0.07, 95% CI (0.06, 0.07); CFI = 0.92; TLI = 0.90). Initial hope, gratitude, and well-being were all positively and moderately associated, with correlations ranging from 0.63-0.74 (Table 11). All latent variables demonstrated stability across time. Out of the three variables in the model, gratitude was the least stable [Gratitude<sub>wave1</sub> → Gratitude<sub>wave2</sub> ( $\beta = 0.45$ , 95% CI (0.21, 0.69)), Gratitude<sub>wave2</sub> → Gratitude<sub>wave3</sub> ( $\beta = 0.74$ , 95% CI (0.56, 0.97))]. While the stability of hope increased over time [Hope<sub>wave1</sub> → Hope<sub>wave2</sub> ( $\beta = 0.55$ , 95% CI (0.27, 0.84)), Hope<sub>wave2</sub> → Hope<sub>wave3</sub> ( $\beta = 0.74$ , 95% CI (0.49, 0.99))], autoregressive effects of well-being slightly decreased between waves [Well-Being<sub>wave1</sub> → Well-Being<sub>wave2</sub> ( $\beta = 0.76$ , 95% CI (0.56, 0.97)), Well-Being<sub>wave2</sub> → Well-Being<sub>wave3</sub> ( $\beta = 0.54$ , 95% CI (0.28, 0.80))]. Well-being at wave 1 had a positive, moderate effect on gratitude at wave 2 ( $\beta = 0.30$ , 95% CI (0.04, 0.57)) and a moderate, positive effect on hope at wave 2 ( $\beta = 0.30$ , 95% CI (-0.05, 0.64)). Initial levels of hope predicted gratitude at wave 2 ( $\beta = 0.15$ , 95% CI (-0.08, 0.37)) and well-being at wave 2 ( $\beta = 0.12$ , 95% CI (-0.08, 0.32)), with small,

positive effects. Well-being at wave 3 was positively predicted by hope at wave 2 ( $\beta=0.19$ , 95% CI (-0.06, 0.44)). Results revealed that longitudinal relationships between gratitude and well-being were smaller and less statistically significant when controlling for hope compared to the those between hope and well-being when controlling for gratitude. Hope at waves 1 and 2 consistently predicted well-being at waves 2 and 3, respectively. Furthermore, initial levels of well-being appeared to be moderately predictive of both sources of resilience.

### **Discussion**

The current study is an examination of separate and unique impacts of factors of resilience, specifically gratitude and hope, on two facets of mental health, PTSD, and well-being, across three waves in a sample of self-identified United States veterans. Three major aims guided my hypotheses regarding the longitudinal associations between gratitude, hope, well-being, and PTSD. To test hypotheses associated with the relationship between gratitude and other variables, the proposed factor structure (six items of the GQ-6 as six individual indicators) of gratitude was altered. Furthermore, additional longitudinal measurement invariance analyses were conducted on each variable, with results demonstrating that changes in levels of each predictor and outcome would most likely reflect the changes in levels across time rather than changes in measurement or factor structure. While controlling for cross-lagged effects, all four latent variables of interest demonstrated good stability between waves, with gratitude generally being less stable compared to other variables.

## ***Gratitude and Mental Health Among U.S. Veterans***

***Gratitude and PTSD across Time.*** As hypothesized, initial levels of gratitude predicted lower levels of PTSD at time 2. However, PTSD at wave 1 also predicted gratitude at wave 2, revealing a bidirectional relationship between gratitude and PTSD. Previous literature has demonstrated a moderate, indirect relationship between gratitude and PTSD (Richardson & Gallagher, 2020), however less was known about the directionality of this association. The bidirectional relationship between levels of gratitude and PTSD in this study suggest that they can influence each other in various ways. Gratitude could promote resilience towards the development or worsening of PTSD symptoms after experiencing a trauma. If the individual is more predisposed to noting benefits or positive outcomes that are caused by another's actions, they may be more likely to attend to positive events after their trauma, thereby increasing positive emotions. A recent study has shown that gratitude has the strongest relationship with the negative alterations in cognitions and mood symptom cluster of PTSD (Brier et al., 2023). Therefore, gratitude may push back against the rigidity in thinking that often accompanies PTSD, particularly in how individuals view their world. An individual with greater symptoms of PTSD could be less likely to be able to cultivate feelings of gratitude towards others if they view the world as unsafe and are already more prone to attend to possible threats in their environment (Armstrong et al., 2013; Ashley et al., 2013; Buckley, 2000).

***Gratitude and Well-Being across Time.*** Initial levels of well-being predicted greater levels of gratitude at the next timepoint, which then promoted even greater levels of well-being at wave 3. These findings support the initial hypothesis that gratitude would

predict higher levels of well-being over time. Results also suggest that well-being and gratitude could build from each other in a sort of spiral effect. This effect is consistent with Fredrickson's (2013) broaden-and-build theory, which suggests that the function of positive emotions is to allow one to extend their perceptions of their world. This extension, or *broadening*, allows the individual to identify possible ways to *build* personal resources such as coping skills, which then reinforces the desire to form more positive experiences in the future. Based on this theory, the individual with greater emotional, psychological, and social well-being may already possess personal resources that promote more positive experiences and emotions, such as gratitude, which in turn build even more resources that facilitate growth in well-being (Fredrickson, 2013; Wood et al., 2010).

### ***Hope and Mental Health in United States Veterans***

***Hope and PTSD across Time.*** The baseline correlation between hope and PTSD was negative and strong ( $r = -0.48$ ), which is consistent with the literature. However, hope and PTSD were not found to have statistically significant cross-lagged effects on one another over time, which is inconsistent with my hypothesis and prior research. A number of studies have found that hope has predicted lower levels of PTSD as both a factor of resilience and a mechanism of change (Gallagher, 2017; Long, 2022). Furthermore, One possible explanation for these results is that the autoregressive effects of PTSD demonstrate high levels of stability over the three waves, which would make it difficult for substantial changes in PTSD to be observed without intervention. In several studies where greater levels of hope was shown to promote reduction in levels of PTSD, some type of intervention was taking place that increased levels of hope (Cheavens & Guter,

2017; Feldman & Dreher, 2012; Snyder, 2002). Therefore, as both PTSD and hope remained relatively stable over time, intervention may have been needed to target change in levels of PTSD.

***Hope and Well-Being across Time.*** The building effect between gratitude and well-being was also visible in the relationship between hope and well-being. Greater levels of well-being at wave 1 promoted greater levels of hope at wave 2, and hope at the second timepoint predicted greater levels of well-being at wave 3. Based on these results, hope appears to be a stronger predictor of well-being compared to PTSD when controlling for gratitude. Furthermore, well-being also appears to be predictive of hope at later timepoints. One way in which hope may promote well-being is through an increased sense of agency, which could promote several facets of both psychological and social well-being (Keyes, 2002). In particular, agency components of hope could increase one's sense of mastery and positive expectancies, increasing the likelihood they could develop their own coping skills and goals, and better expectancies for their social environment (Lee & Gallagher, 2017; Murphy, 2023).

### ***Unique Impacts of Hope and Gratitude on Mental Health Outcomes***

***Hope and Gratitude and PTSD.*** When placed within the same model as hope, gratitude at wave 1 predicted lower levels of PTSD at wave 2, which predicted lower levels of gratitude at wave 3. The bidirectional relationship between PTSD and gratitude observed in the separate gratitude and PTSD model was also observed between the first two waves when hope was added to the model. Interestingly, when gratitude was included in the model, initial levels of hope predicted greater levels of PTSD at wave 2.

The positive cross-lagged associations between hope and PTSD are converse to cross-sectional, negative associations between hope and PTSD at all three waves in the same model. Hope at wave 1 did predict greater levels of gratitude the second wave, however this effect was small and warrants future study. When placed in a model together, the findings of this study revealed gratitude to be more uniquely, longitudinally associated with PTSD. Gratitude was also less stable across time compared to PTSD and hope, suggesting that gratitude may change more across time without intervention, while hope and PTSD may require more intervention or other events to initiate change.

***Hope and Gratitude and Well-Being.*** In this model, well-being was shown to be a substantial predictor of later hope and gratitude, whereas hope predicted other variables with small effects. Initial levels of well-being moderately predicted greater levels of gratitude and hope at the next wave, further supporting prior findings that greater levels of mental health can build resilience over time (Adkins, 2020; Murphy, 2023). Hope at waves 1 and 2 did predict greater levels of well-being at subsequent waves, even when the autoregressive stability of both variables was moderate to strong. These results provide support for utilizing hope as not only a source of resilience but a way to promote greater levels of overall well-being in veterans. As significant effects were found even without intervention, there is a possibility that targeting hope in formal therapies or other programming could provide a strengths-based way to promote greater well-being.

### ***Strengths and Limitations***

This current research is the first of its kind to use cross-lagged paneled modeling to examine longitudinal relationships between two factors of resilience and two factors of

mental health (PTSD and well-being) in a sample of U.S. Veterans. In addition to addressing the continuum of mental health in a population vulnerable to mental illness, the sample was diverse in gender (25% female). In fact, the percentage of females within this sample is larger than the estimated percentage of female U.S. veterans number is significantly larger what has most recently been reported in the population (9%; U.S. Census Bureau, 2017). Finally, the use of cross-lagged structural equation models allowed for the examination of change between latent variables with reduced measurement error.

The main limitations of the current study are the attrition rates between waves, lack of clinician-rated measures as well as its observational nature. The high levels of autoregressive stability of all four variables made it difficult to detect cross-lagged effects between variables. Perhaps using a sort of intervention to initiate change in variables or collecting data at certain time points during a time when change in mental health is to be expected would make it easier to identify cross-lagged effects. Furthermore, while validation strategies were used, there was not a way to fully verify veteran status among participants. Replicating this study in a sample of verified veterans would improve generalizability and validity of the results.

### ***Future Directions***

As results demonstrated a bidirectional relationship between gratitude and PTSD, implications of this study include further examination into how brief gratitude interventions before or during PTSD treatment promote recovery. There are already brief exercise such as in Cognitive Behavioral Couple Therapy for PTSD (CBCT for PTSD ; Monson et al., 2012), where couples are asked to express gratitude to their partner at the



beginning of session. Future research could use measures of gratitude within such treatments to analyze gratitude as a possible mechanism of change in PTSD treatment.

The results of this study suggest that the variables may have been too stable across time to detect change, especially in PTSD. Prior research has provided evidence for hope being a factor of resilience to PTSD in treatment (Long, 2022). In the future, studies replicating these methods could do so in a time frame where levels of PTSD are expected to change more (e.g. before/after life changes (e.g. separation from military, during treatment, etc.)). It is worth noting, however, that hope was still associated with PTSD at the baseline level, demonstrating that hope and PTSD do have a relationship that warrants further study in a veteran sample.

Well-being demonstrated a spiraling relationship with hope and gratitude, demonstrating that using one to promote the other could be beneficial to resilience in this sample. However, less is still known about directionality of well-being and hope and gratitude. While all three were associated with one another, it appeared that well-being's impact on resilience was higher in magnitude compared hope and gratitude's impact on well-being, particularly in the last model discussed. Future examination into directionality of the relationship between well-being and hope and gratitude could provide information as to effective ways to which variable would be a good initial target: facets of resilience, or psychological, social, and emotional well-being. This is especially important for veterans, whose experiences in the military may call for more resources to promote their well-being (Carrola & Corbin-Burdick, 2015; Oster et al., 2017).

In conclusion, this study has provided further understanding into the relationships between aspects of mental health and illness within a population that continues to

experience stressors even after their separation from service. There was substantial stability of hope, gratitude, PTSD, and well-being across all three waves, which is consistent with there being no intervention or event that may have promoted substantial change. Findings revealed a more consistent relationship between gratitude and PTSD. While there was a bidirectional relationship between gratitude and PTSD at for the first two waves, PTSD appeared to be more of a consistent predictor of PTSD for this sample. As both an individual predictor and when controlling for gratitude, hope seemed to be more of a relevant predictor of well-being compared to gratitude. Furthermore, greater levels of well-being could promote the two factors of resilience in veterans, thus suggesting that identifying gaps in well-being of veterans, whether it is psychological, social, or emotional well-being is important in building hope and gratitude. However, findings also suggest that gratitude and hope can promote even more levels of well-being, demonstrating a broaden-and-build effect. These findings particularly have implications within military-connected populations, a group that values strength and resilience (Litz, 2014). Targeting factors of resilience such as gratitude and hope could provide an innovative and attractive way of improving the complete mental health spectrum in veterans.

## References

- Adkins, C. (2020). *Improving Veterans' Psychological Well-Being with a Positive Psychology Gratitude Exercise* [Ph.D., Old Dominion University].  
<http://www.proquest.com/docview/2479077557/abstract/210EBC4C94DF4611PQ/>  
1
- Alarcon, G. M., Bowling, N. A., & Khazon, S. (2013). Great expectations: A meta-analytic examination of optimism and hope. *Personality and Individual Differences, 54*(7), 821–827.
- Aldwin, C. M., Park, C. L., Choun, S., & Lee, H. (2018). The impact of military service on stress, health, and well-being in later life. In A. I. Spiro, R. A. Jr. Settersten, & C. M. Aldwin (Eds.), *Long-term outcomes of military service: The health and well-being of aging veterans*. (2017-47095-010; pp. 167–186). American Psychological Association. <https://doi.org/10.1037/0000061-010>
- Angel, C. M. (2016). Resilience, post-traumatic stress, and posttraumatic growth: Veterans' and active duty military members' coping trajectories following traumatic event exposure. *Nurse Education Today, 47*, 57–60.  
<https://doi.org/10.1016/j.nedt.2016.04.001>
- Armstrong, T., Bilsky, S. A., Zhao, M., & Olatunji, B. O. (2013). Dwelling on Potential Threat Cues: An Eye Movement Marker for Combat-Related Ptsd. *Depression and Anxiety, 30*(5), 497–502. <https://doi.org/10.1002/da.22115>

- Ashley, V., Honzel, N., Larsen, J., Justus, T., & Swick, D. (2013). Attentional bias for trauma-related words: Exaggerated emotional Stroop effect in Afghanistan and Iraq war veterans with PTSD. *BMC Psychiatry, 13*(1), 86.  
<https://doi.org/10.1186/1471-244X-13-86>
- Bergmann, J. S., Renshaw, K. D., & Paige, L. (2019). Psychological well-being in Iraq and Afghanistan veterans: Risk and protective factors. *Psychological Trauma: Theory, Research, Practice, and Policy, 11*(4), 434–441.  
<https://doi.org/10.1037/tra0000416>
- Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *Journal of Traumatic Stress, 28*(6), 489–498.  
<https://doi.org/10.1002/jts.22059>
- Bonanno, G. A., Westphal, M., & Mancini, A. D. (2011). Resilience to loss and potential trauma. *Annual Review of Clinical Psychology, 7*, 511–535.  
<https://doi.org/10.1146/annurev-clinpsy-032210-104526>
- Bovin, M. J., Marx, B. P., Weathers, F. W., Gallagher, M. W., Rodriguez, P., Schnurr, P. P., & Keane, T. M. (2016). Psychometric properties of the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders–Fifth Edition (PCL-5) in veterans. *Psychological Assessment, 28*(11), 1379–1391.  
<https://doi.org/10.1037/pas0000254>
- Brier, Z. M. F., Burt, K. B., Legrand, A. C., & Price, M. (2023). An examination of the heterogeneity of the relationships between posttraumatic stress disorder, self-

- compassion and gratitude. *Clinical Psychology & Psychotherapy*, 30(3), 566–574.  
<https://doi.org/10.1002/cpp.2815>
- Buckley, T. (2000). Information processing and ptsd A review of the empirical literature. *Clinical Psychology Review*, 20(8), 1041–1065. [https://doi.org/10.1016/S0272-7358\(99\)00030-6](https://doi.org/10.1016/S0272-7358(99)00030-6)
- Card, N. A. (2019). Meta-analyses of the reliabilities of four measures of gratitude. *The Journal of Positive Psychology*, 14(5), 576–586.  
<https://doi.org/10.1080/17439760.2018.1497690>
- Carrola, P., & Corbin-Burdick, M. F. (2015). Counseling military veterans: Advocating for culturally competent and holistic interventions. *Journal of Mental Health Counseling*, 37(1), 1–14. <https://doi.org/10.17744/mehc.37.1.v74514163rv73274>
- Cheavens, J. S., Feldman, D. B., Gum, A., Michael, S. T., & Snyder, C. R. (2006). Hope Therapy in a Community Sample: A Pilot Investigation. *Social Indicators Research*, 77(1), 61–78. <https://doi.org/10.1007/s11205-005-5553-0>
- Cheavens, J. S., & Guter, M. M. (2017). Hope Therapy. In *The Oxford Handbook of Hope*. Oxford University Press.
- Crabtree, -Nelson Sonya, & DeYoung, L. P. (2017). Enhancing Resilience in Active Duty Military Personnel. *Journal of Psychosocial Nursing and Mental Health Services*, 55(2), 44–48. <https://doi.org/10.3928/02793695-20170210-06>
- Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, 95(3), 542–575.  
<https://doi.org/10.1037/0033-2909.95.3.542>
- Disabato, D. J., Goodman, F. R., Kashdan, T. B., Short, J. L., & Jarden, A. (2016). Different types of well-being? A cross-cultural examination of hedonic and

eudaimonic well-being. *Psychological Assessment*, 28(5), 471–482.

<https://doi.org/10.1037/pas0000209>

Emmons, R. A., Froh, J., & Rose, R. (2019). Gratitude. In *Positive psychological assessment: A handbook of models and measures., 2nd ed.* (2019-20160-020; pp. 317–332). American Psychological Association. <https://doi.org/10.1037/0000138-020>

Emmons, R. A., & McCullough, M. E. (2003). Counting Blessings Versus Burdens: An Experimental Investigation of Gratitude and Subjective Well-Being in Daily Life. *Journal of Personality & Social Psychology*, 84(2), 377–389.  
<https://doi.org/10.1037/0022-3514.84.2.377>

Emmons, R. A., & McCullough, M. E. (Eds.). (2004). *The Psychology of Gratitude*. Oxford University Press.

Emmons, R. A., & Shelton, C. M. (2002). Gratitude and the Science of Positive Psychology. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 459–471). Oxford University Press.

Emmons, R. A., & Stern, R. (2013). Gratitude as a Psychotherapeutic Intervention. *Journal of Clinical Psychology*, 69(8), 846–855.  
<https://doi.org/10.1002/jclp.22020>

Feldman, D. B., & Dreher, D. E. (2012). Can hope be changed in 90 minutes? Testing the efficacy of a single-session goal-pursuit intervention for college students. *Journal of Happiness Studies: An Interdisciplinary Forum on Subjective Well-Being*, 13(4), 745–759. <https://doi.org/10.1007/s10902-011-9292-4>

- Folkman, S., & Moskowitz, J. T. (2000). Stress, Positive Emotion, and Coping. *Current Directions in Psychological Science*, 9(4), 115–118. <https://doi.org/10.1111/1467-8721.00073>
- Fredrickson, B. L. (2013). Positive Emotions Broaden and Build. In *Advances in Experimental Social Psychology* (Vol. 47, pp. 1–53). Elsevier. <https://doi.org/10.1016/B978-0-12-407236-7.00001-2>
- Froh, J. J., Kashdan, T. B., Yurkewicz, C., Fan, J., Allen, J., & Glowacki, J. (2010). The benefits of passion and absorption in activities: Engaged living in adolescents and its role in psychological well-being. *The Journal of Positive Psychology*, 5(4), 311–332. <https://doi.org/10.1080/17439760.2010.498624>
- Gallagher, M. W. (2017). Transdiagnostic mechanisms of change and cognitive-behavioral treatments for PTSD. *Current Opinion in Psychology*, 14, 90–95. <https://doi.org/10.1016/j.copsyc.2016.12.002>
- Gallagher, M. W., D’Souza, J. M., & Richardson, A. L. (2020). Hope in contemporary psychology. In C. Blöser & T. Stahl (Eds.), *The moral psychology of hope*. (2019-64274-012; pp. 189–207). Rowman & Littlefield International. <http://ezproxy.lib.uh.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2019-64274-012&site=ehost-live>
- Gallagher, M. W., Long, L. J., & Phillips, C. A. (2020). Hope, optimism, self-efficacy, and posttraumatic stress disorder: A meta-analytic review of the protective effects of positive expectancies. *Journal of Clinical Psychology*, 76(3), 329–355. <https://doi.org/10.1002/jclp.22882>

- Gallagher, M. W., Long, L. J., Richardson, A., D'Souza, J., Boswell, J. F., Farchione, T. J., & Barlow, D. H. (2020). Examining Hope as a Transdiagnostic Mechanism of Change Across Anxiety Disorders and CBT Treatment Protocols. *Behavior Therapy, 51*(1), 190–202. <https://doi.org/10.1016/j.beth.2019.06.001>
- Gallagher, M. W., & Lopez, S. J. (2009). Positive expectancies and mental health: Identifying the unique contributions of hope and optimism. *The Journal of Positive Psychology, 4*(6), 548–556. <https://doi.org/10.1080/17439760903157166>
- Gallagher, M. W., & Lopez, S. J. (Eds.). (2017). *The Oxford Handbook of Hope*. Oxford University Press.
- Gallagher, M. W., Smith, L. J., Richardson, A. L., D'Souza, J. M., & Long, L. J. (2021). Examining the longitudinal effects and potential mechanisms of hope on COVID-19 stress, anxiety, and well-being. *Cognitive Behaviour Therapy, 50*(3), 234–245. <https://doi.org/10.1080/16506073.2021.1877341>
- Gana, K., Daigre, S., & Ledrich, J. (2013). Psychometric Properties of the French Version of the Adult Dispositional Hope Scale. *Assessment, 20*(1), 114–118. <https://doi.org/10.1177/1073191112468315>
- Gilman, R., Schumm, J., & Chard, K. (2012). Hope as a Change Mechanism in the Treatment of Posttraumatic Stress Disorder. *Psychological Trauma: Theory, Research, Practice, and Policy, 4*, 270–277. <https://doi.org/10.1037/a0024252>
- Jacoby, V. M., Straud, C. L., Bagley, J. M., Tyler, H., Baker, S. N., Denejkina, A., Sippel, L. M., Kaya, R., Rozek, D. C., Fina, B. A., Dondanville, K. A., & STRONG STAR Training Initiative. (2022). Evidence-based posttraumatic stress disorder treatment in a community sample: Military-affiliated versus civilian patient



outcomes. *Journal of Traumatic Stress*, 35(4), 1072–1086.

<https://doi.org/10.1002/jts.22812>

Kachadourian, L. K., Tsai, J., Harpaz-Rotem, I., Southwick, S. M., & Pietrzak, R. H. (2019). Protective correlates of suicidality among veterans with histories of posttraumatic stress disorder and major depressive disorder: Results from the National Health and Resilience in Veterans Study. *Journal of Affective Disorders*, 246, 731–737. <https://doi.org/10.1016/j.jad.2018.12.058>

Kashdan, T. B., Uswatte, G., & Julian, T. (2006). Gratitude and hedonic and eudaimonic well-being in Vietnam war veterans. *Behaviour Research and Therapy*, 44(2), 177–199. <https://doi.org/10.1016/j.brat.2005.01.005>

Keyes, C. L. M. (1998). Social Well-Being. *Social Psychology Quarterly*, 61(2), 121–140. <https://doi.org/10.2307/2787065>

Keyes, C. L. M. (2002). The Mental Health Continuum: From Languishing to Flourishing in Life. *Journal of Health and Social Behavior*, 43(2), 207–222. <https://doi.org/10.2307/3090197>

Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, 73(3), 539–548. <https://doi.org/10.1037/0022-006X.73.3.539>

Klausner, E. J., Clarkin, J. F., Spielman, L., Pupo, C., Abrams, R., & Alexopoulos, G. S. (1998). Late-life depression and functional disability: The role of goal-focused group psychotherapy. *International Journal of Geriatric Psychiatry*, 13(10), 707–716. [https://doi.org/10.1002/\(SICI\)1099-1166\(199810\)13:10<707::AID-GPS856>3.0.CO;2-Q](https://doi.org/10.1002/(SICI)1099-1166(199810)13:10<707::AID-GPS856>3.0.CO;2-Q)

- Koenig, H. G., Youssef, N. A., Smothers, Z., Oliver, J. P., Boucher, N. A., Ames, D., Volk, F., Teng, E. J., & Haynes, K. (2020). Hope, Religiosity, and Mental Health in U.S. Veterans and Active Duty Military with PTSD Symptoms. *Military Medicine*, 185(1–2), 97–104. <https://doi.org/10.1093/milmed/usz146>
- Lee, J. Y., & Gallagher, M. W. (2017). Hope and Well-being. In M. W. Gallagher & S. J. Lopez (Eds.), *The Oxford Handbook of Hope*. Oxford University Press.
- Litz, B. T. (2014). Clinical heuristics and strategies for service members and veterans with war-related PTSD. *Psychoanalytic Psychology*, 31(2), 192–205. <https://doi.org/10.1037/a0036372>
- Long, L. J. (2022). Hope and PTSD. *Current Opinion in Psychology*, 48, 101472. <https://doi.org/10.1016/j.copsyc.2022.101472>
- Lyons, R., Haller, M., Curry, I., & Norman, S. B. (2019). The relationship between negative trauma-related cognitions and psychosocial functioning in veterans with posttraumatic stress disorder and alcohol use disorder. *Substance Abuse*. <https://doi.org/10.1080/08897077.2019.1635957>
- McCullough, M. E., Emmons, R. A., & Tsang, J.-A. (2002). The grateful disposition: A conceptual and empirical topography. *Journal of Personality and Social Psychology*, 82(1), 112–127. <https://doi.org/10.1037/0022-3514.82.1.112>
- Medicine, I. of. (2012). *The Mental Health and Substance Use Workforce for Older Adults: In Whose Hands?* (J. Eden, K. Maslow, M. Le, & D. Blazer, Eds.). The National Academies Press. <https://doi.org/10.17226/13400>
- Monson, C. M., Fredman, S. J., Macdonald, A., Pukay-Martin, N. D., Resick, P. A., & Schnurr, P. P. (2012). Effect of Cognitive-Behavioral Couple Therapy for PTSD:

- A Randomized Controlled Trial. *JAMA*, 308(7), 700–709.  
<https://doi.org/10.1001/jama.2012.9307>
- Morgan, J., & Lynn, B. M.-D. (2016). *Using Amazon's Mechanical Turk (MTurk) to recruit military Veterans: Issues and suggestions*. 31(3), 10–14.
- Murphy, E. R. (2023). Hope and well-being. *Current Opinion in Psychology*, 50, 101558.  
<https://doi.org/10.1016/j.copsyc.2023.101558>
- Ong, A. D., Standiford, T., & Deshpande, S. (2018). Hope and stress resilience. In *The Oxford handbook of hope* (pp. 255–284). Oxford University Press.
- Oster, C., Morello, A., Venning, A., Redpath, P., & Lawn, S. (2017). The health and wellbeing needs of veterans: A rapid review. *BMC Psychiatry*, 17(1), Article 1.  
<https://doi.org/10.1186/s12888-017-1547-0>
- Park, N., Peterson, C., & Seligman, M. E. P. (2004). Strengths of Character and Well-Being. *Journal of Social and Clinical Psychology*, 23(5), 603–619.  
<https://doi.org/10.1521/jscp.23.5.603.50748>
- Porcari, C., Koch, E. I., Rauch, S. A. M., Hoodin, F., Ellison, G., & McSweeney, L. (2017). Predictors of help-seeking intentions in Operation Enduring Freedom and Operation Iraqi Freedom veterans and service members. *Military Medicine*, 182(5), e1640–e1647. <https://doi.org/10.7205/MILMED-D-16-00105>
- Rasmussen, H. N., O'Byrne, K. K., Vandament, M., & Cole, B. P. (2017). Hope and physical health. In M. W. Gallagher & S. J. Lopez (Eds.), *The Oxford Handbook of Hope*. Oxford University Press.
- Resick, P. A., Monson, C. M., & Chard, K. M. (2016). *Cognitive Processing Therapy for PTSD: A Comprehensive Manual*. Guilford Publications.

- Richardson, A. L., & Gallagher, M. W. (2020). Giving Thanks is Associated with Lower PTSD Severity: A Meta-Analytic Review. *Journal of Happiness Studies*.  
<https://doi.org/10.1007/s10902-020-00322-9>
- Ritschel, L. A., Cheavens, J. S., & Nelson, J. (2012). Dialectical Behavior Therapy in an Intensive Outpatient Program With a Mixed-Diagnostic Sample: DBT in an Intensive Outpatient Program. *Journal of Clinical Psychology*, 68(3), 221–235.  
<https://doi.org/10.1002/jclp.20863>
- Rose, S., & Sieben, N. (2017). Hope Measurement. In M. W. Gallagher & S. J. Lopez (Eds.), *The Oxford Handbook of Hope*. Oxford University Press.
- Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, 57(6), 1069–1081. <https://doi.org/10.1037/0022-3514.57.6.1069>
- Schofield, P. E., Stockler, M. R., Zannino, D., Tebbutt, N. C., Price, T. J., Simes, R. J., Wong, N., Pavlakis, N., Ransom, D., Moylan, E., Underhill, C., Wyld, D., Burns, I., Ward, R., Wilcken, N., & Jefford, M. (2016). Hope, optimism and survival in a randomised trial of chemotherapy for metastatic colorectal cancer. *Supportive Care in Cancer*, 24(1), 401–408. <https://doi.org/10.1007/s00520-015-2792-8>
- Snyder, C. R. (2000). *Handbook of Hope: Theory, Measures, and Applications*. Academic Press.
- Snyder, C. R. (2002). TARGET ARTICLE: Hope Theory: Rainbows in the Mind. *Psychological Inquiry*, 13(4), 249–275.  
[https://doi.org/10.1207/S15327965PLI1304\\_01](https://doi.org/10.1207/S15327965PLI1304_01)

- Snyder, C. R., Harris, C., Anderson, J. R., Holleran, S. A., Irving, L. M., Sigmon, S. T., Yoshinobu, L., Gibb, J., Langelle, C., & Harney, P. (1991). The will and the ways: Development and validation of an individual-differences measure of hope. *Journal of Personality and Social Psychology*, *60*(4), 570–585.
- Snyder, C. R., Sympson, S. C., Ybasco, F. C., Borders, T. F., Babyak, M. A., & Higgins, R. L. (1996). Development and validation of the State Hope Scale. *Journal of Personality and Social Psychology*, *70*(2), 321–335.
- Spiro, A. I., Settersten, R. A. Jr., & Aldwin, C. M. (2018). Introduction: Understanding the long-term outcomes of military service. In *Long-term outcomes of military service: The health and well-being of aging veterans*. (2017-47095-001; pp. 3–16). American Psychological Association. <https://doi.org/10.1037/0000061-001>
- Straus, E., Norman, S. B., Haller, M., Southwick, S. M., Hamblen, J. L., & Pietrzak, R. H. (2019). Differences in protective factors among U.S. Veterans with posttraumatic stress disorder, alcohol use disorder, and their comorbidity: Results from the National Health and Resilience in Veterans Study. *Drug and Alcohol Dependence*, *194*, 6–12. <https://doi.org/10.1016/j.drugalcdep.2018.09.011>
- Teigen, K. H. (1997). Luck, envy and gratitude: It could have been different. *Scandinavian Journal of Psychology*, *38*(4), 313–323. <https://doi.org/10.1111/1467-9450.00041>
- Thornton, L. M., Cheavens, J. S., Heitzmann, C. A., Dorfman, C. S., Wu, S. M., & Andersen, B. L. (2014). Test of mindfulness and hope components in a psychological intervention for women with cancer recurrence. *Journal of*

*Consulting and Clinical Psychology*, 82(6), 1087–1100.

<https://doi.org/10.1037/a0036959>

Umucu, E. (2017). *Evaluating Optimism, Hope, Resilience, Coping Flexibility, Secure Attachment, and PERMA as a Well-Being Model for College Life Adjustment of Student Veterans: A Hierarchical Regression Analysis* [Ph.D., The University of Wisconsin - Madison].

<http://www.proquest.com/docview/1948877891/abstract/2FD51ECE87FB47B2PQ/1>

U.S. Census Bureau. (2017). *SEX BY AGE BY VETERAN STATUS FOR THE CIVILIAN POPULATION 18 YEARS AND OVER Universe: Civilian population 18 years and over 2017 American Community Survey 1-Year Estimates*. American Fact Finder.

[https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS\\_17\\_1YR\\_B21001&prodType=table](https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_1YR_B21001&prodType=table)

Van Dusen, J. P., Tihamiyu, M. F., Kashdan, T. B., & Elhai, J. D. (2015). Gratitude, depression and PTSD: Assessment of structural relationships. *Psychiatry Research*, 230(3), 867–870. <https://doi.org/10.1016/j.psychres.2015.11.036>

van Erp Taalman Kip, R. M., & Hutschemaekers, G. J. M. (2018). Health, well-being, and psychopathology in a clinical population: Structure and discriminant validity of Mental Health Continuum Short Form (MHC-SF). *Journal of Clinical Psychology*, 74(10), 1719–1729. <https://doi.org/10.1002/jclp.22621>

Vespa, J. E. (2020). *Those Who Served: America's Veterans From World War II to the War on Terror* (p. 18). United States Census Bureau.

- Westerhof, G. J., & Keyes, C. L. M. (2010). Mental Illness and Mental Health: The Two Continua Model Across the Lifespan. *Journal of Adult Development, 17*(2), 110–119. <https://doi.org/10.1007/s10804-009-9082-y>
- Wisco, B. E., Marx, B. P., Wolf, E. J., Miller, M. W., Southwick, S. M., & Pietrzak, R. H. (2014). Posttraumatic Stress Disorder in the US Veteran Population: Results From the National Health and Resilience in Veterans Study. *The Journal of Clinical Psychiatry, 75*(12), 0–0. <https://doi.org/10.4088/JCP.14m09328>
- Witvliet, C. vanOyen, Richie, F. J., Root Luna, L. M., & Van Tongeren, D. R. (2019). Gratitude predicts hope and happiness: A two-study assessment of traits and states. *The Journal of Positive Psychology, 14*(3), 271–282. <https://doi.org/10.1080/17439760.2018.1424924>
- Wood, A. M., Froh, J. J., & Geraghty, A. W. A. (2010). Gratitude and well-being: A review and theoretical integration. *A. M.*, 16.

**Table 1***Demographic Characteristics of Participants*

Demographic Characteristics	<i>N</i>	%
Gender		
Male	159	72.9
Female	57	26.1
Other	2	0.9
Race/Ethnicity		
White	149	68.3
Black/African American	37	17
Asian American/Pacific Islander	9	4.1
Latinx	15	6.9
Native American	3	1.4
Biracial/Multiracial	2	0.9
Other	3	1.4
Sexual Orientation		
Heterosexual/Straight	192	88.1
Bisexual	17	7.8
Gay/Lesbian	6	2.8
Other/Prefer Not to Say	3	1.4
Relationship Status		
Married	121	55.5
Single	40	18.3
In a Relationship	29	13.3
Divorced/Annulled	23	10.6
Widowed	2	0.9
Education Level		
High School Graduate/GED	11	5.0
Some College	54	24.8
Associate degree	44	20.2
Bachelor's Degree	70	32.1
Master's Degree	35	16.1
Professional School Degree	3	1.4
Doctoral Degree	1	0.5
Military Branch		
Army	113	51.8
Air Force	48	22.0
Navy	40	18.3
Marine Corps	12	5.5
Coast Guard	5	2.3
Military Service Era		
September 2001 or later	157	72
August 1990-August 2001 (Gulf War)	73	33.5
May 1975 – July 1990 (Post-Vietnam)	42	19.3



August 1964 – April 1975 (Vietnam)	6	2.8
Deployed During OIF/OEF	77	35.8
<hr/>		
Note: OIF = Operation Iraqi Freedom (2003-2011), OEF = Operation Enduring Freedom (Oct. 2001 – 2014)		

**Table 2***Descriptive Statistics and Bivariate Correlations of Predictors and Outcomes*

	Grat W1	Grat W2	Grat W3	Hope W1	Hope W2	Hope W3	PTSD W1	PTSD W2	PTSD W3	MH W1	MH W2	MH W3
<b>Descriptive Statistics</b>												
N	218	169	134	218	170	132	217	168	130	217	166	131
Mean (SD)	30.33 (7.82)	30.81 (8.46)	30.80 (7.25)	44.33 (11.32)	45.20 (11.64)	44.17 (10.73)	26.01 (22.30)	14.09 (18.24)	13.85 (18.01)	40.14 (16.25)	38.9 (16.28)	38.85 (16.79)
$\alpha$	0.86	0.90	0.81	0.91	0.91	0.89	0.98	0.98	0.98	0.95	0.95	0.95
<b>Correlations</b>												
Grat W1	1	0.68	0.67	0.58	0.46	0.46	-0.48	-0.49	-0.43	0.62	0.48	0.46
Grat W2	--	1	0.67	0.58	0.67	0.61	-0.5	-0.47	-0.36	0.65	0.62	0.57
Grat W3	--	--	1	0.49	0.49	0.55	-0.48	-0.4	-0.43	0.49	0.41	0.62
Hope W1	--	--	--	1	0.66	0.65	-0.44	-0.28	-0.32	0.58	0.51	0.46
Hope W2	--	--	--	--	1	0.78	-0.37	-0.28	-0.23	0.55	0.6	0.6
Hope W3	--	--	--	--	--	1	-0.33	-0.27	-0.32	0.5	0.56	0.65
PTSD W1	--	--	--	--	--	--	1	0.75	0.74	-0.48	-0.4	-0.42
PTSD W2	--	--	--	--	--	--	--	1	0.83	-0.38	-0.41	-0.4
PTSD W3	--	--	--	--	--	--	--	--	1	-0.36	-0.35	-0.41
MH W1	--	--	--	--	--	--	--	--	--	1	0.73	0.67
MH W2	--	--	--	--	--	--	--	--	--	--	1	0.72
MH W3	--	--	--	--	--	--	--	--	--	--	--	1

Note.  $\alpha$  =internal reliability coefficient, Grat= Gratitude, PTSD = Posttraumatic Stress Disorder, MH = Mental Health.

**Table 3*****Internal Consistencies of Hope, PTSD, and Mental Health Measure Subscales***

Measure Subscales	Wave 1 $\alpha$	Wave 2 $\alpha$	Wave 3 $\alpha$
Adult Hope Scale			
Agency	0.86	0.86	0.82
Pathways	0.82	0.86	0.81
PCL-5			
Re-Experiencing	0.95	0.95	0.95
Avoidance	0.90	0.91	0.92
NACM	0.95	0.95	0.95
Hyperarousal	0.92	0.93	0.93
MHC-SF			
Emotional Well-Being	0.91	0.89	0.88
Social Well-Being	0.90	0.89	0.92
Psychological Well-Being	0.90	0.90	0.91

Note.  $\alpha$  =Internal reliability coefficient, PCL-5 = PTSD Checklist for DSM-5, MHC-SF = Mental Health Continuum-Short Form

**Table 4***Longitudinal Measurement Invariance of Hope, Gratitude, PTSD, and Well-Being*

<b>Model Tested</b>	$\chi^2$	<b>df</b>	<b>p</b>	<b>RMSEA</b>	<b>RMSEA (95% CI)</b>	<b>CFI</b>	<b>TLI</b>
<b>Gratitude</b>							
Null Model	749.05	36	<0.001	--	--	--	--
Configural	31.34	15	<0.01	0.071	(0.04, 0.11)	0.98	0.95
Weak	33.47	19	0.02	0.059	(0.02, 0.09)	0.98	0.96
Strong	36.56	23	0.04	0.052	(0.01, 0.08)	0.98	0.97
<b>Hope</b>							
Null Model	1028.43	66	<0.001	--	--	--	--
Configural	61.88	39	0.01	0.05	(0.03, 0.08)	0.98	0.96
Weak	66.33	45	0.02	0.05	(0.02, 0.07)	0.98	0.97
Strong	81.18	51	<0.01	0.05	(0.03, 0.07)	0.97	0.96
<b>PTSD</b>							
Null Model	1685.37	66	<0.01	--	--	--	--
Configural	76.47	42	<0.001	0.06	(0.04, 0.08)	0.98	0.97
Weak	77.75	45	<0.01	0.06	(0.04, 0.08)	0.98	0.97
Strong	84.62	51	<0.01	0.06	(0.03, 0.08)	0.98	0.97
<b>Well Being</b>							
Null Model	1020.53	36	<.001	--	--	--	--
Configural	37.45	15	<.01	0.08	(0.05, 0.12)	0.98	0.95
Weak	44.64	19	<.01	0.08	(0.05, 0.11)	0.97	0.95
Strong	48.11	23	<0.01	0.07	(0.04, 0.10)	0.97	0.96

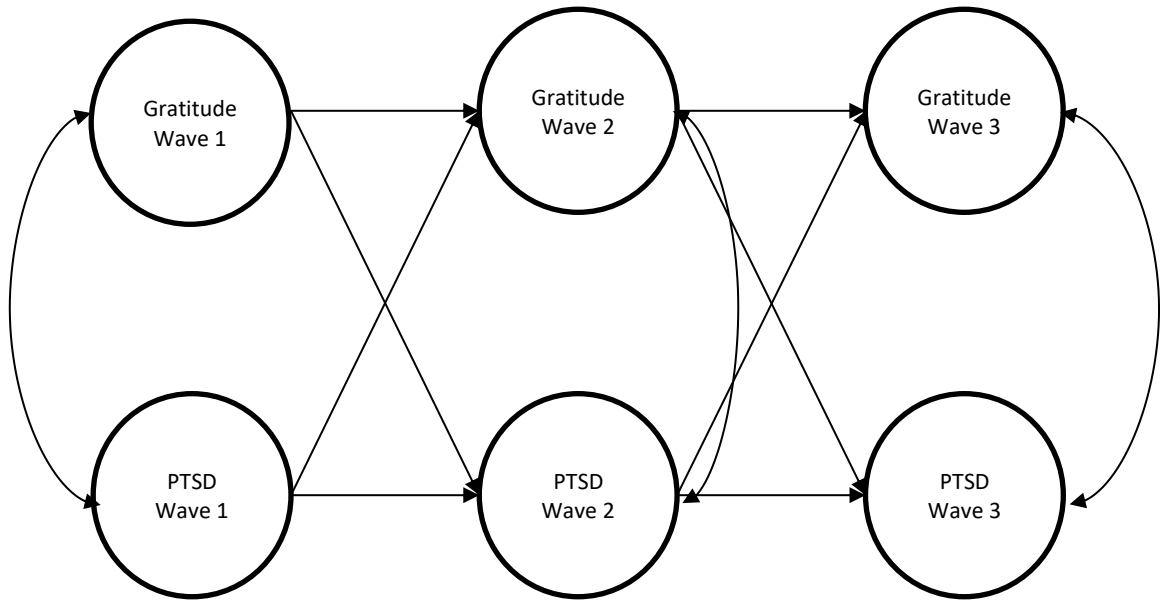
**Table 5*****Model Fit Indices***

Model	$\chi^2$	df	<i>p</i>	RMSEA	RMSEA (90% CI)	CFI	TLI
1. Gratitude and PTSD	248.09	157	<.001	0.05	(0.04, 0.06)	0.97	0.96
2. Gratitude and Well-Being	212.62	106	<.001	0.07	(0.06, 0.08)	0.95	0.93
3. Hope and PTSD	351.19	217	<0.001	0.05	(0.04, 0.06)	0.96	0.95
4. Hope and Well-Being	267.75	157	<0.001	0.06	(0.05, 0.07)	0.95	0.94
5. Gratitude, Hope, and PTSD	744.29	435	<.001	0.06	(0.05, 0.06)	0.93	0.92
6. Gratitude, Hope, and Well-Being	666.65	348	<.001	0.07	(0.06, 0.07)	0.92	0.90

Note.  $\chi^2$  = chi square statistic, df = degrees of freedom, *p* = p value, RMSEA = Root Mean Square Error of Estimation, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index

**Figure 1**

Model 1. Longitudinal Relationship between Gratitude and PTSD



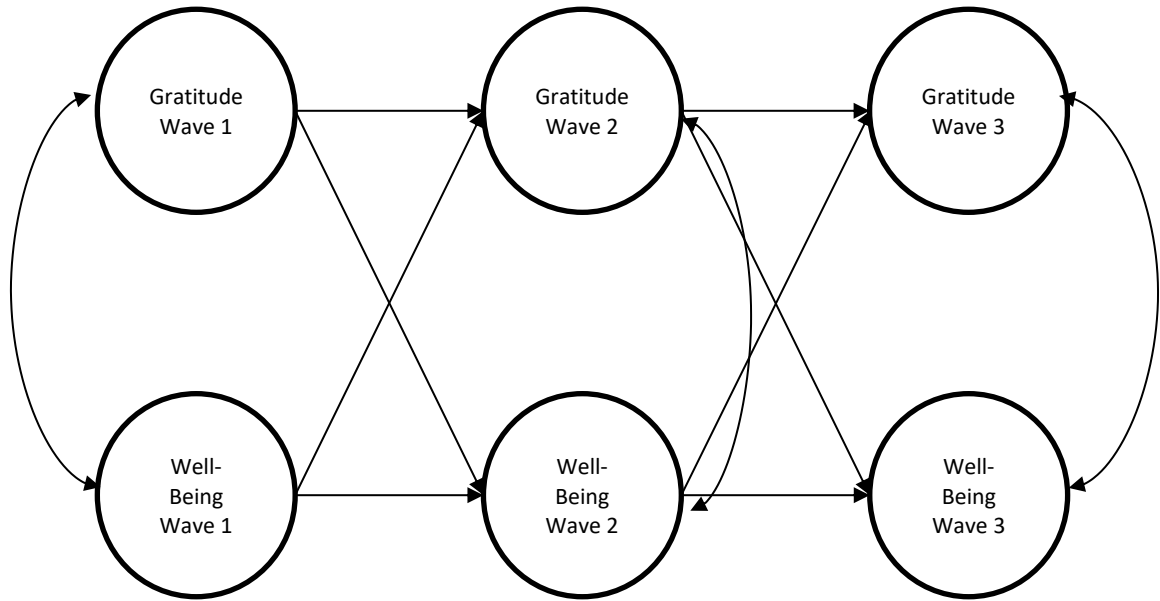
**Table 6*****Model 1. Longitudinal Autoregressive, Cross-Lagged, and Cross-Sectional Associations between Gratitude and PTSD***

Autoregressive Effects			
	$\beta$	Lower 95% CI	Upper 95% CI
W1 Gratitude → W2 Gratitude	0.67	0.51	0.82
W2 Gratitude → W3 Gratitude	0.65	0.43	0.88
W1 PTSD → W2 PTSD	0.7	0.57	0.83
W2 PTSD → W3 PTSD	0.92	0.84	1.01
Cross-Lagged Effects			
	$\beta$	Lower 95% CI	Upper 95% CI
W1 Gratitude → W2 PTSD	-0.17	-0.31	-0.03
W2 Gratitude → W3 PTSD	0.11	-0.05	0.28
W1 PTSD → W2 Gratitude	-0.19	-0.37	-0.01
W2 PTSD → W3 Gratitude	-0.22	-0.45	0.01
Cross-Sectional Associations			
	Estimate	Lower 95% CI	Upper 95% CI
W1 Gratitude ↔ W1 PTSD	-0.51 <sup>a</sup>	-0.63	-0.39
W2 Gratitude ↔ W2 PTSD	-0.04 <sup>b</sup>	-0.26	0.19
W3 Gratitude ↔ W3 PTSD	-0.35 <sup>b</sup>	-0.63	-0.08

Note: <sup>a</sup> Estimate reflects correlation; <sup>b</sup> Estimate reflects residual covariances

**Figure 2**

Model 2. Longitudinal Relationship between Gratitude and Well-Being





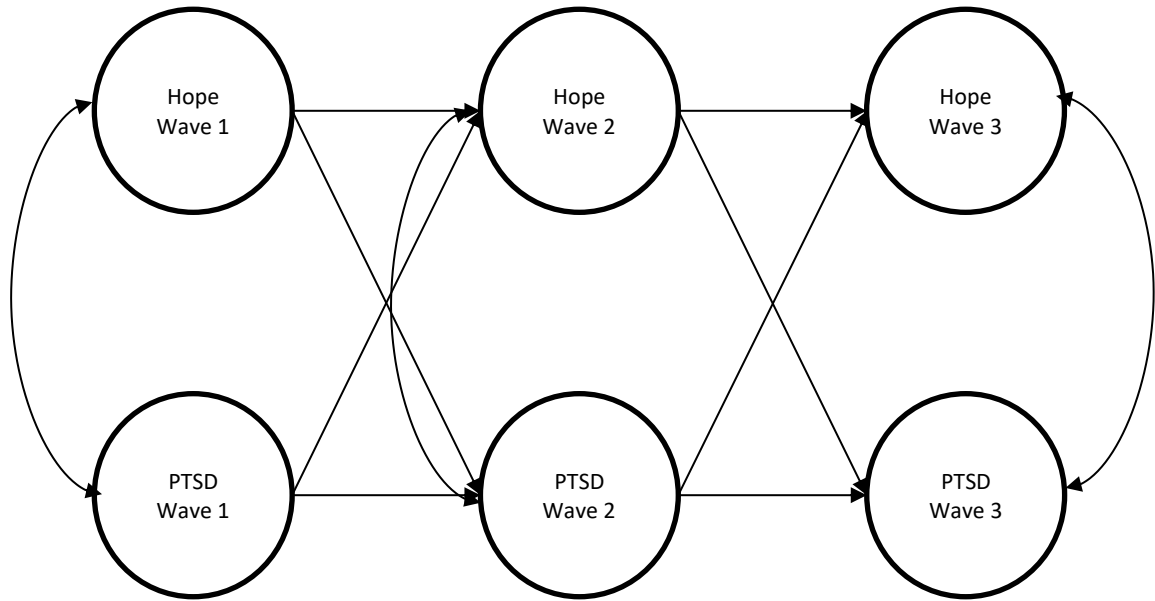
**Table 7*****Model 2. Longitudinal Autoregressive, Cross-Lagged, and Cross-Sectional Associations between Gratitude and Well-Being***

Autoregressive Effects				
	$\beta$	Lower 95% CI	Upper 95% CI	
W1 Gratitude → W2 Gratitude	0.50	0.27	0.72	
W2 Gratitude → W3 Gratitude	0.78	0.59	0.97	
W1 Well Being → W2 Well Being	0.82	0.65	0.98	
W2 Well Being → W3 Well Being	0.60	0.37	0.83	
Cross-Lagged Effects				
	$\beta$	Lower 95% CI	Upper 95% CI	
W1 Gratitude → W2 Well Being	-0.05	-0.25	0.15	
W2 Gratitude → W3 Well Being	0.23	-0.01	0.46	
W1 Well Being → W2 Gratitude	0.36	0.13	0.59	
W2 Well Being → W3 Gratitude	0.02	-0.21	0.24	
Cross-Sectional Associations				
	Estimate	Lower 95% CI	Upper 95% CI	
W1 Gratitude ⇔ W1 Well Being	0.74 <sup>a</sup>	0.65	0.82	
W2 Gratitude ⇔ W2 Well Being	0.36 <sup>b</sup>	0.14	0.58	
W3 Gratitude ⇔ W3 Well Being	0.69 <sup>b</sup>	0.46	0.91	

Note: <sup>a</sup>Estimate reflects correlation; <sup>b</sup>Estimate reflects residual covariances

**Figure 3**

Model 3. Longitudinal Relationship between Hope and PTSD



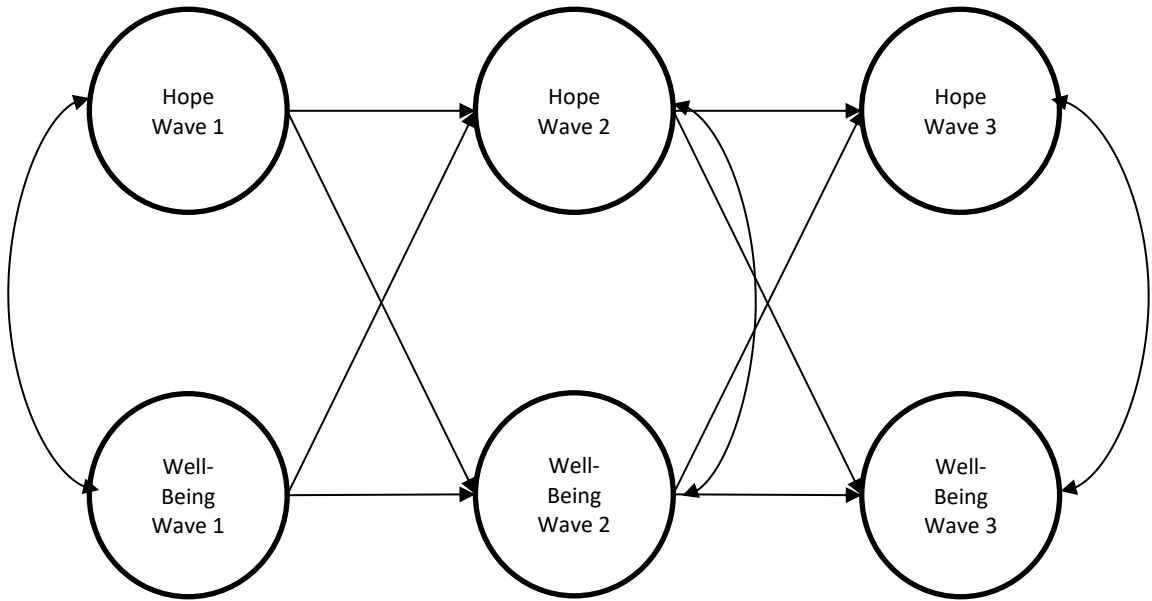
**Table 8*****Model 3. Longitudinal Autoregressive, Cross-Lagged, and Cross-Sectional Associations between Hope and PTSD***

Autoregressive Effects			
Path	$\beta$	Lower 95% CI	Upper 95% CI
W1 Hope → W2 Hope	0.69	0.49	0.9
W2 Hope → W3 Hope	0.85	0.76	0.93
W1 PTSD → W2 PTSD	0.83	0.71	0.94
W2 PTSD → W3 PTSD	0.87	0.78	0.96
Cross-Lagged Effects			
Path	$\beta$	Lower 95% CI	Upper 95% CI
W1 Hope → W2 PTSD	0.09	-0.04	0.21
W2 Hope → W3 PTSD	0.00	-0.12	0.11
W1 PTSD → W2 Hope	-0.04	-0.23	0.15
W2 PTSD → W3 Hope	-0.07	-0.2	0.07
Cross-Sectional Associations			
Path	Estimate	Lower 95% CI	Upper 95% CI
W1 Hope ↔ W1 PTSD	-0.48 <sup>a</sup>	-0.61	-0.35
W2 Hope ↔ W2 PTSD	-0.09 <sup>b</sup>	-0.33	0.15
W3 Hope ↔ W3 PTSD	-0.28 <sup>b</sup>	-0.58	0.03

Note: <sup>a</sup>Estimate reflects correlation; <sup>b</sup>Estimate reflects residual covariances

**Figure 4**

Model 4. Longitudinal Relationship between Hope and Well-Being



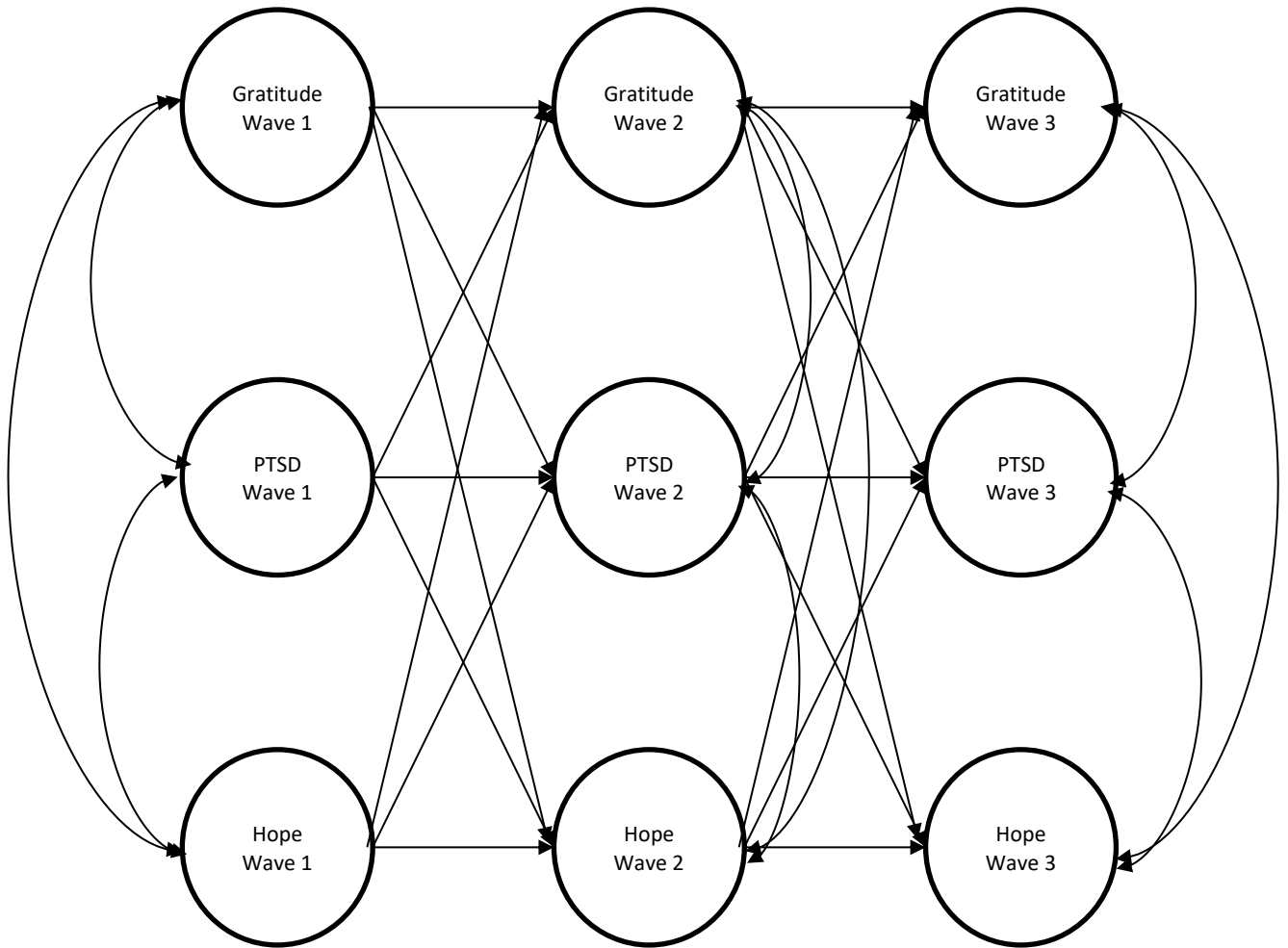
**Table 9*****Model 4. Longitudinal Autoregressive, Cross-Lagged, and Cross-Sectional Associations between Hope and Well-Being***

Autoregressive Effects			
Path	$\beta$	Lower 95% CI	Upper 95% CI
W1 Hope → W2 Hope	0.53	0.25	0.82
W2 Hope → W3 Hope	0.81	0.63	0.98
W1 Well Being → W2 Well Being	0.71	0.54	0.87
W2 Well Being → W3 Well Being	0.58	0.31	0.85
Cross-Lagged Effects			
Path	$\beta$	Lower 95% CI	Upper 95% CI
W1 Hope → W2 Well Being	0.11	-0.08	0.3
W2 Hope → W3 Well Being	0.26	0.05	0.48
W1 Well Being → W2 Hope	0.27	-0.01	0.55
W2 Well Being → W3 Hope	0.10	-0.12	0.32
Cross-Sectional Associations			
Path	Estimate	Lower 95% CI	Upper 95% CI
W1 Hope ⇔ W1 Well Being	0.67 <sup>a</sup>	0.55	0.79
W2 Hope ⇔ W2 Well Being	0.38 <sup>b</sup>	0.16	0.59
W3 Hope ⇔ W3 Well Being	0.45 <sup>b</sup>	0.19	0.7

Note: <sup>a</sup>Estimate reflects correlation; <sup>b</sup>Estimate reflects residual covariances

**Figure 5**

Model 5. Unique Longitudinal Relationships between Gratitude, Hope, and PTSD



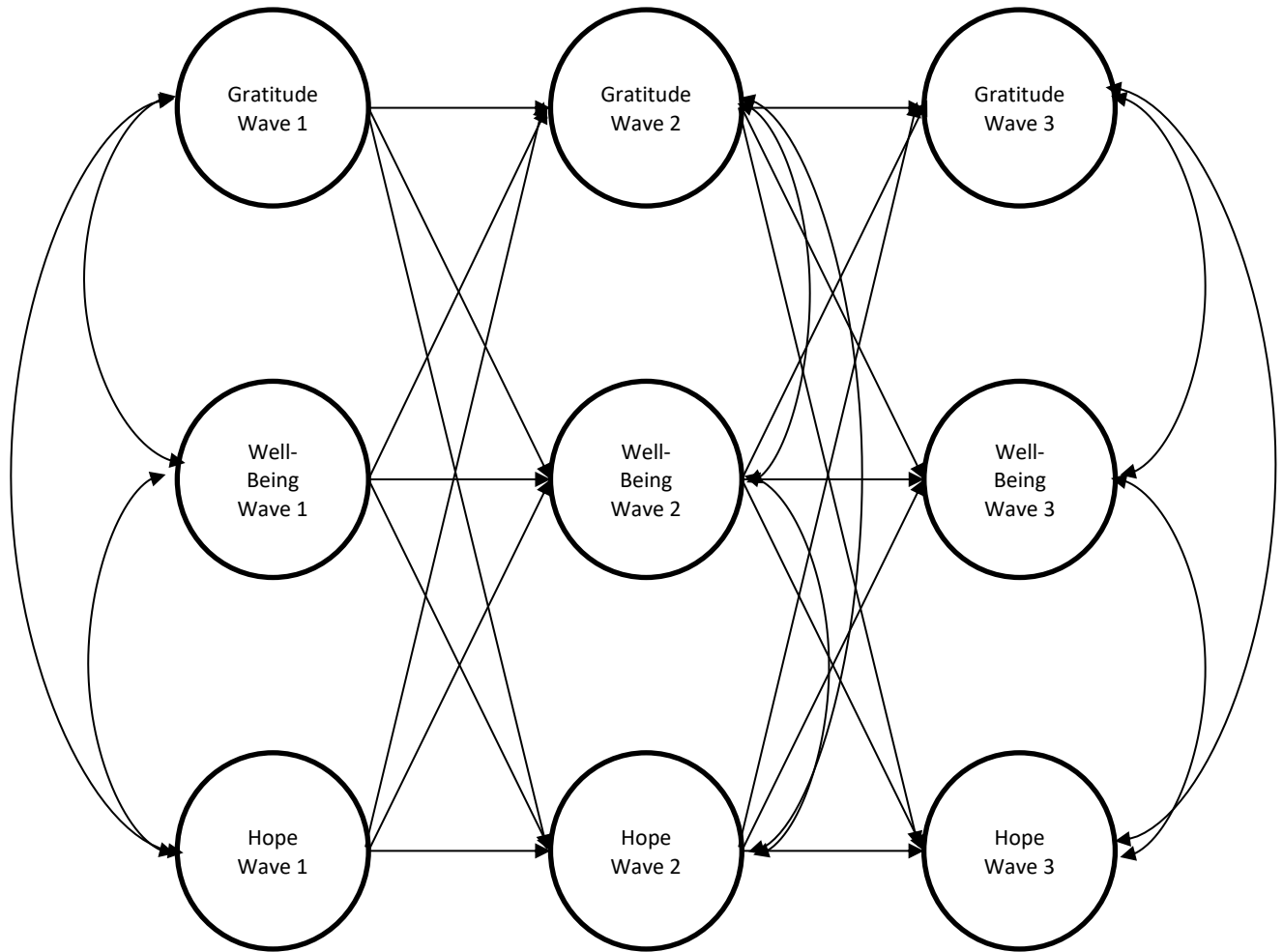
**Table 10*****Model 5. Longitudinal Autoregressive, Cross-Lagged, and Cross-Sectional Associations between Hope, Gratitude, and PTSD***

Autoregressive Effects			
Path	$\beta$	Lower 95% CI	Upper 95% CI
W1 Hope → W2 Hope	0.65	0.39	0.92
W2 Hope → W3 Hope	0.78	0.51	1.05
W1 Gratitude → W2 Gratitude	0.58	0.36	0.79
W2 Gratitude → W3 Gratitude	0.59	0.21	0.97
W1 PTSD → W2 PTSD	0.75	0.62	0.88
W2 PTSD → W3 PTSD	0.92	0.82	1.02
Cross-Lagged Effects			
Path	$\beta$	Lower 95% CI	Upper 95% CI
W1 PTSD → W2 Gratitude	-0.13	-0.31	0.04
W1 Hope → W2 Gratitude	0.18	-0.03	0.39
W2 PTSD → W3 Gratitude	-0.22	-0.45	0.01
W2 Hope → W3 Gratitude	0.10	-0.19	0.40
W1 Gratitude → W2 PTSD	-0.30	-0.47	-0.12
W1 Hope → W2 PTSD	0.24	0.10	0.39
W2 Gratitude → W3 PTSD	0.17	-0.10	0.44
W2 Hope → W3 PTSD	-0.11	-0.31	0.10
W1 PTSD → W2 Hope	-0.03	-0.21	0.15
W1 Gratitude → W2 Hope	0.09	-0.15	0.32
W2 PTSD → W3 Hope	-0.03	-0.22	0.16
W2 Gratitude → W3 Hope	0.10	-0.27	0.47
Cross-Sectional Associations			
Path	Estimate	Lower 95% CI	Upper 95% CI
W1 Hope ⇔ W1 Gratitude	0.63 <sup>a</sup>	0.52	0.74
W1 Hope ⇔ W1 PTSD	-0.48 <sup>a</sup>	-0.61	-0.35
W1 Gratitude ⇔ W1 PTSD	-0.51 <sup>a</sup>	-0.63	-0.40
W2 Hope ⇔ W2 Gratitude	0.61 <sup>b</sup>	0.43	0.79
W2 Hope ⇔ W2 PTSD	-0.07 <sup>b</sup>	-0.29	0.16
W2 Gratitude ⇔ W2 PTSD	-0.10 <sup>b</sup>	-0.34	0.13
W3 Hope ⇔ W3 Gratitude	0.32 <sup>b</sup>	-0.01	0.64
W3 Hope ⇔ W3 PTSD	-0.31 <sup>b</sup>	-0.61	-0.02
W3 Gratitude ⇔ W3 PTSD	-0.35 <sup>b</sup>	-0.62	-0.08

Note: <sup>a</sup> Estimate reflects correlation; <sup>b</sup> Estimate reflects residual covariances

**Figure 6**

Model 6. Unique Longitudinal Relationships between Gratitude, Hope, and Well-Being





**Table 11*****Model 6. Longitudinal Autoregressive, Cross-Lagged, and Cross-Sectional Associations between Hope, Gratitude, and Well-Being***

Autoregressive Effects			
	$\beta$	Lower 95% CI	Upper 95% CI
W1 Hope → W2 Hope	0.55	0.27	0.84
W2 Hope → W3 Hope	0.74	0.49	0.99
W1 Gratitude → W2 Gratitude	0.45	0.21	0.69
W2 Gratitude → W3 Gratitude	0.74	0.45	1.03
W1 Well Being → W2 Well Being	0.76	0.56	0.97
W2 Well Being → W3 Well Being	0.54	0.28	0.8
Cross-Lagged Effects			
	$\beta$	Lower 95% CI	Upper 95% CI
W1 Well Being → W2 Gratitude	0.30	0.04	0.57
W1 Hope → W2 Gratitude	0.15	-0.08	0.37
W2 Well Being → W3 Gratitude	0.01	-0.25	0.27
W2 Hope → W3 Gratitude	0.07	-0.26	0.40
W1 Gratitude → W2 Well Being	-0.08	-0.29	0.12
W1 Hope → W2 Well Being	0.12	-0.08	0.32
W2 Gratitude → W3 Well Being	0.13	-0.14	0.40
W2 Hope → W3 Well Being	0.19	-0.06	0.44
W1 Well Being → W2 Hope	0.30	-0.05	0.64
W1 Gratitude → W2 Hope	-0.05	-0.32	0.22
W2 Well Being → W3 Hope	0.07	-0.15	0.30
W2 Gratitude → W3 Hope	0.11	-0.17	0.40
Cross-Sectional Associations			
	Estimate	Lower 95% CI	Upper 95% CI
W1 Hope ⇔ W1 Gratitude	0.63 <sup>a</sup>	0.52	0.74
W1 Hope ⇔ W1 Well Being	0.67 <sup>a</sup>	0.55	0.79
W1 Gratitude ⇔ W1 Well Being	0.74 <sup>a</sup>	0.65	0.82
W2 Hope ⇔ W2 Gratitude	0.57 <sup>b</sup>	0.40	0.75
W2 Hope ⇔ W2 Well Being	0.39 <sup>b</sup>	0.17	0.61
W2 Gratitude ⇔ W2 Well Being	0.35 <sup>b</sup>	0.13	0.58
W3 Hope ⇔ W3 Gratitude	0.30 <sup>b</sup>	-0.05	0.65
W3 Hope ⇔ W3 Well Being	0.46 <sup>b</sup>	0.19	0.72
W3 Gratitude ⇔ W3 Well Being	0.67 <sup>b</sup>	0.43	0.91

Note: <sup>a</sup>Estimate reflects correlation; <sup>b</sup>Estimate reflects residual covariances

UHGS V1:1 062019