Modeling Growth and Resilience among Military Personnel:
How Using Different Models Yields Different Answers

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Abstract

The prospect that people can be resilient to—or even grow from—a stressful experience is an alluring possibility—especially so for soldiers and veterans. Some have proposed that deploying and military experiences provide soldiers with enduring mental resources and toughness that are protective for the rest of their lives. However, definitive evidence for growth and resilience among military personnel has proved elusive. Part of the unknowns about growth and resilience can be attributable to how people think about and model questions related to growth and resilience. In this chapter, I provide two empirical examples—changes in depressive symptoms among veterans and changes in character strengths among deploying soldiers—to illustrate how different conceptualizations, methods, and analyses can dramatically change the inferences we make about growth and resilience. Altogether, the demonstrations provide an increased understanding about methodological flexibility in the study of growth and resilience and some expectations about how and why individuals might change in response to adversity.

Keywords: growth, resilience, longitudinal modeling, growth mixture modeling, soldiers, veterans

The prospect that people can be resilient to—or even grow from—a stressful experience is an alluring possibility. This is especially true of soldiers and veterans. Some have proposed that deploying and military experiences provide soldiers with enduring mental resources and toughness that are protective for the rest of their lives (Gallaway et al., 2011; Tedeschi & McNally, 2011). To date, however, consistent evidence for the possibility of growth and resilience among soldiers and veterans has proved elusive at least with respect to how it is currently operationalized (Habib et al., 2018; Jayawickreme & Blackie, 2014; Jayawickreme et al., 2020; Mark et al., 2018). There are many reasons for our uncertainty about how common resilience and growth are among military personnel and people facing adversity more generally, both conceptually and methodologically (Mark et al., 2018; Tedeschi & McNally, 2011). Most relevant to the current chapter are the reasons most closely aligned with study design and data analysis. Specifically, these considerations include the lack of prospective, longitudinal data on soldiers and veterans and the ways researchers have historically modeled, analyzed, and conceptualized growth and resilience (Infurna et al., 2016; Infurna & Jayawickreme, 2019; Infurna & Luthar, 2016c; Jayawickreme & Blackie, 2014; Jayawickreme et al., 2020; Tennen & Affleck, 2009). In this chapter, I will provide a conceptual and methodological overview of how growth and resilience have been traditionally studied among soldiers and veterans, including two empirical examples showcasing how methodological flexibility can yield different inferences in how military personnel adapt to stressful circumstances.

Post-traumatic Growth and Resilience

The idea that individuals can grow from adversity has a long history in psychology. However, a great deal of research has focused on *resilience* to adversity and found that individuals do not change considerably following adverse events. Some of the first evidence suggesting resilience in children appeared nearly sixty years ago (Luthar, 2006). The path to growth and resilience, particularly among military personnel, has been hypothesized to contain specific elements that involve distinct emotion regulatory achievements and reframing of the experience. For example, Tedeschi and McNally (2011) suggest that soldiers must, at least: acknowledge the potential of trauma as a precursor to growth, enhance emotion regulation (e.g., the reduction of anxiety and controlling intrusive thoughts), self-disclose to solicit social support, develop a trauma narrative that cultivates and encourages growth and resilience, and develop principles that will presumably serve them well when they encounter future challenges. Although this stage-based model has not been explicitly tested, this final point—that resources built during this process serve soldiers well in the future—is a critical element. In other words, through trauma, people become stronger people for life (Calhoun & Tedeschi, 1999, 2006). The tools that helped individuals weather an initial trauma serve them well with adversity later in life.

Before establishing the exact process through which growth and resilience occur, researchers have rightly devoted their attention to documenting if and how adults adapt to adverse circumstances (Bonanno, 2004). From these efforts, the field to date is left with the perception that resilience is a common consequence of adversity, with some estimates of resilience approaching 70-80% (Bonanno et al., 2012; Infurna & Luthar, 2016b). High levels of resilience have also been found across a wide variety of traumatic experiences (Bonanno, 2005; Bonanno & Diminich, 2013; Bonanno et al., 2006, 2007; Bonanno & Kaltman, 2001; Bonanno et al., 2002). Few studies have successfully documented *growth* following adversity in a prospective way. In the aforementioned studies, the percentages of individuals reporting improvements in well-being after adversity are low and not found in every study (e.g., often in the 4.8-8% range when it is found; Bonanno et al., 2012; Porter et al., 2017). Nevertheless, the

collective results from these studies paint an optimistic picture of how individuals adapt to adversity—they are largely resilient.

Although there is cause for optimism about the rates of resilience observed for individuals experiencing adversity, there is also cause for skepticism. Specifically, there are several methodological considerations and decisions that researchers make that might result in the overestimation of growth and resilience. These factors range from how the data are collected to how the data are analyzed and reported.

Design Considerations in the Study of Growth and Resilience

In conceptualizing growth and resilience following adversity, there are a few characteristics that should ostensibly be present in every study. Ideally, there would be information on individuals both before and after the adversity occurs, measured prospectively. Many of the studies that purport to find high rates of post-traumatic growth and resilience rely on cross-sectional samples, small sample sizes, and retrospective measures. The problems of cross-sectional samples and small sample sizes have been extensively documented (Caruana et al., 2015; Simmons et al., 2011). In addition to the interpretational difficulties that accompany cross-sectional designs, cross-sectional data also limit researchers' abilities to model the mechanisms that give rise to character development across adverse experiences over time (Maxwell & Cole, 2007). Furthermore, a typical way of assessing post-traumatic growth is through retrospective measures in which participants are advised to reflect on how an experience might have changed them (Barakat et al., 2006; Tedeschi & Calhoun, 1996). The use of retrospective measures requires a great deal of mental effort to be exerted—effort that may not always result in accurate responses. When applying retrospective measures to the study of adversity—participants must discern their current standing on some dimension (e.g., well-being), previous standing on that same dimension before an event occurred, compare these standings and calculate the amount of change that occurred, and evaluate how much of this change can be attributed to an adverse event (Frazier et al., 2009; Jayawickreme & Blackie, 2014; Tennen & Affleck, 1998, 2009). Such an effort is a tall order for quantifying how people change in response to adverse life events. As a result, a rigorous standard is to have prospective assessments of a construct before and multiple times after an event occurs.

Regarding conceptual considerations, there is generally a hierarchy of personal characteristics that are expected to be malleable to adverse life events (McAdams & Pals, 2006). For example, well-being and broader measures of adjustment (e.g., post-traumatic stress, depressive symptoms) have reliably been shown to change in response to life events (Bonanno et al., 2012; Lucas, 2005, 2007a; Luhmann & Eid, 2009). The same is true for more intensely measured phenomena, like individuals' affect or even behavior measured repeatedly over shorter intervals (Almeida, 2005; Prentice et al., 2020). There are also more stable, enduring characteristics (e.g., personality, character) that might not change as dramatically in response to adverse life events. This may be one explanation for why the existing literature has yet to find consistent evidence for systematic personality changes before-to-after life events (Bleidorn et al., 2016). The same can also be said about narratives that people construct about who they are, which also change over time and in response to life events (e.g., McAdams, 1995; Newton et al., 2014). Specifying the expectations for how individuals change in response to adversity also necessarily requires a discussion about the specific ways in which they change. Do they become happier? Do they have more or fewer depressive symptoms? Do their personalities change? Do their reflections about an event change over time and are these changes related to well-being? Each of these individual characteristics might be accompanied by different expectations about

the magnitude and direction of changes. However, the magnitude of growth and occurrence of resilience are rarely contextualized in this layered framework (Jayawickreme et al., 2020).

Analytic Flexibility

In addition to the study of growth and resilience being dependent on how growth and resilience are measured and conceptualized, the particular analytic model can have large implications for the conclusions one can draw. These analytic models vary both in how the types of inferences they are meant to make (e.g., between v. within-subjects differences) and the types of assumptions they make (e.g., whether individuals vary in where they start and how they change over time). Of course, many different designs can prospectively test growth and resilience processes, including multiphasic growth curve models, more short-term longitudinal studies, and studies that incorporate measurement-burst designs in the context of macro-longitudinal studies (Infurna et al., 2016; Zachry et al., 2018). In the examples below, I focus more on traditional, longer-term change among individuals assessed multiple years. A thorough treatment of the differences between these approaches can be found elsewhere (Infurna et al., 2016); the following sections are just illustrations of a few of these models applied to a specific question to give you a sense of what is possible.

A story of three types of resilience studies. To illustrate how resilience and growth can be modeled with varying degrees of analytic flexibility, I draw on three different but related models that seek to answer approximately the same question: How does the onset of disability change veterans' depressive symptoms. Whether and how disability impacts well-being has been studied in the past, concerning normative impacts of disability as well as potential moderating factors of the impact of disability on well-being (Harder et al., 2019; Lucas, 2007a, 2007b; Lucas & Chopik, 2020). In short, the onset of a disability leads to immediate and often long-lasting negative changes in well-being. However, it could be the case that there are subgroups of veterans who might be resilient to the onset of a disability. For example, disabled veterans might have developed the mental resources and capacity to withstand such a significant life stressor, as some frameworks of growth and resilience might suggest (Calhoun & Tedeschi, 2006; Tedeschi & McNally, 2011). Likewise, experiencing an adverse life event might change veterans' perspectives, making them feel more grateful about other areas in their lives. Although these possibilities might seem preposterous if one is not steeped in the literature on growth and resilience, the idea that there might be individual differences in changes in depressive symptoms (i.e., some people increase, decrease, and stay the same) following a life event is a reasonable one that has been tested in other, adjacent questions (Luchetti et al., 2020).

I revisit this question using data on the veteran sample from the Health and Retirement Study (HRS; Sonnega et al., 2014). Specifically, I examined a sample of 266 veterans without a disability at study entry who experienced some form of permanent disability over the 26-year history of HRS (M_{age} = 61.62 at baseline, SD = 8.28; $M_{YearsOfEducation}$ = 12.97; 16.2% female; 83.8% White/Caucasian). The measure of interest is depressive symptoms which is a count variable. The measure of disability was whether veterans experienced a new functional limitation from which they never recovered. Although this admittedly superficial distinction of disability has its limitations—it is agnostic to severity and official distinctions of what constitutes a disability—I viewed it as sufficient for at least some illustrative demonstrations of a life event that might spur psychological change. Other studies have used different definitions of disability and provide deeper considerations of how disability status can be measured (Infurna & Wiest, 2016; Lucas, 2007b; see Palmer & Harley, 2012, for an in-depth discussion about how disability is conceptualized and measured in survey research). Using a data set with so many assessment

waves allowed me to model changes from before-to-after the onset of the disability.

       Between-subjects changes and modeling. In one common approach to modeling changes in growth and resilience over time, researchers will employ a growth curve modeling approach (Little et al., 2006; Singer & Willett, 2003). Essentially, multiple assessments of individuals followed over time allow for the estimation of an intercept and slope in a given construct. If studying a specific population (e.g., veterans), these designs could also include matched controls (e.g., non-veterans) to further isolate the effects of disability on well-being (Austin, 2011; Schwaba & Bleidorn, 2019). From this basic framework, researchers have been flexible in how they have applied growth curve modeling to the study of resilience and growth. For instance, there are examples in which a researcher might conduct a sample-level growth curve model in which an overall intercept and slope for the entire sample are estimated. From there, they might predict variation in the intercepts and slopes based on a life event (i.e., does the slope vary depending on whether someone experienced a disability or not?), group membership (i.e., does the slope vary depending on being a veteran or not?), or both (i.e., do veterans who experience a disability change differently than other groups?)(see Chopik, Oh, et al., 2020; Jackson & Allemand, 2014). There are also more formalized models in which multi-group comparisons can be run, specifically comparing measurement properties and the structure and nature of changes between veterans and non-veterans (i.e., do depressive symptoms change in a curvilinear way among veterans but a linear way among everyone else? Is the underlying factor structure of the measure similar between veterans and everyone else, and over time?).

       Using this approach, researchers can model how people with and without disabilities change in depressive symptoms over the study window, which can yield useful insights. As seen in Figure 1a, veterans who would eventually develop a disability over the study window were initially higher in depressive symptoms and increased in depressive symptoms over time. Those who did not develop a permanent disability (a control group of 14,754 participants that includes veterans and non-veterans) were relatively stable in their depressive symptoms over time. Aligned with the aforementioned process, veteran status significantly predicted the intercept (i.e., veterans had higher depressive symptoms on average) and the quadratic slope of depressive symptoms (i.e., veterans increased in depressive symptoms over time. From this approach, on average, the onset of a disability is associated with an increase in depressive symptoms.

       Within-subjects changes and modeling. Another approach is to examine how one group of people (i.e., veterans who experience a disability) change from before-to-after an event, like the onset of a disability. This within-subject approach is a departure from the between-subjects approach mentioned earlier. Rather than comparing two disparate groups of people, the "within" approach as I am operationalizing and highlighting here instead focuses on pre-to-post disability changes in depressive symptoms among veterans who experience a disability *only* (see Lucas, 2005; Lucas, 2007a; 2007b for examples). One major benefit of this approach is to more clearly isolate the effect that an event has on changes in an outcome. With the traditional approach described earlier, the year-to-year changes in depressive symptoms were obscured without the additional modeling of something akin to piecewise or multi-phase changes (Infurna et al., 2016; Ning & Luo, 2017). Because many participants in a sample experience the onset of a disability at different waves, this approach centers the onset of the event for every participant who experiences it. This centering allows for an examination of changes that occur before and after an event to be examined rather than overall changes both among those who experience an event or don't (i.e., a between-subjects question). Worth noting, psychological characteristics occasionally change immediately before the onset of an event. For example, some declines in

well-being occur in the year *before* a divorce, which likely reflects the relationship dynamics of a couple or the contentious nature of a divorce rather than the actual divorce being finalized (Lucas, 2005). In this way—across all of these models—special adaptation characteristics (like whether adaptation occurs in the year immediately prior to or immediately after an event) can be estimated as well. Between-subject considerations can also be integrated into the model. For example, within-subject adaptions might vary according to some between-subjects characteristic, like gender, age, or another psychological characteristic.

  Using this approach and honing in on just the individuals that experience a life event (i.e., veterans who experience a disability), researchers can model anticipatory, event-based, and adaptation processes among those who experienced a life event. As seen in Figure 1b, veterans experienced a dramatic increase in depressive symptoms upon experiencing a disability. Further, there was no evidence of adaptation—depressive symptoms continued to increase over time after the onset of a disability. There was also some evidence for anticipatory increases in depressive symptoms in the year immediately before the onset of a disability. From this approach, on average, the onset of a disability is associated with an average increase in depressive symptoms. However, the within-subjects approach allowed me to better track whether the changes in depressive symptoms could be attributable to the event in question. Worth noting, there were significant differences in veterans' starting levels of depression (i.e., intercepts) and how they changed following the disability (i.e., slopes) but not in the average increase as a result of the disability onset. These individual differences in intercepts and slopes can be further explored in expanded models that examine predictors of intercepts and moderators of change over time.

  Growth mixture modeling. Yet another approach the merges many of the considerations made so far is growth mixture modeling (Grimm & Ram, 2009; Ram & Grimm, 2009). Growth mixture modeling is an amalgamation of latent growth curve and mixture modeling that enables researchers to (a) examine trajectories of growth and resilience and (b) identify different latent classes that show specific trajectories. In other words, it allows for the possibility that one group of individuals may begin high on depressive symptoms, decline across a life event, and then rebound to a moderate level. Likewise, another group may start low and increase across the onset of an event (as seen with the previous approaches). Permitting multiple growth trajectories is an advantage over other models that have been traditionally used to model longitudinal data (e.g., growth curve modeling) that assume the population under study develops in one way over time, and individuals vary with where they start (an intercept) and change over time (slope).

  In this field, the use of growth mixture modeling has been historically used to characterize growth, resilience, and adaptation following adverse life events, often yielding high rates of resilience or growth. However, recent considerations have been made concerning the appropriate use and specification of mixture modeling for these purposes. One of the decision points at which analytic flexibility can affect the results is whether researchers allow subgroups and individuals within a particular subgroup to vary in where they start and how they change over time. Traditionally, most of these parameters are constrained to zero or to be equal across groups (Bonanno et al., 2012; Bonanno et al., 2002; Galatzer-Levy et al., 2018). Estimating parameters in such a way assumes no variability in intercepts and slopes and can potentially alter a researcher's conceptual model (e.g., people vary just as much from the typical slope in one group than they do in a different group). Importantly, allowing these parameters to be freely estimated dramatically changes (a) the number of distinct trajectories the analysis yields and (b) the distribution of individuals within each trajectory. Following an initial demonstration by Infurna and Luthar, there have now been several examples of how selectively varying a few

assumptions in growth mixture modeling can lead to wildly different interpretations for how individuals adapt to challenging circumstances compared to traditional forms of the analysis (Chambers et al., 2017; Infurna & Grimm, 2017; Infurna & Luthar, 2016a, 2016c, 2017b; Infurna et al., 2017). Again, like the other approaches, the model is flexible and be customized to answer specific questions and model discontinuous growth.

Using this approach, researchers can identify subgroups in the sample that might vary in their adaptation to an adverse event. This is particularly important for studying growth and resilience processes—growth mixture modeling can identify if there is a detectable group of individuals who are showing growth or resilience as a departure from the sample-wide pattern seen in other approaches. As seen in Figure 1c, after allowing the aforementioned parameters to be freely estimated, two separate patterns of change were identified. This suggests that a growth mixture modeling approach was worthwhile for demonstrating that there might be subgroups of veterans experiencing the onset of disability differently. Specifically, the changes in depressive symptoms for Class 1 (62% of the sample) resembled what we saw earlier—an increase in depressive symptoms upon disability onset followed by increases in depressive symptoms. A second class (38% of the sample) also emerged which was initially lower on depressive symptoms, experienced an increase in depressive symptoms upon obtaining a disability, and experiencing some adaptation albeit not until a few years later. From this approach, the onset of disability is again shown to increase depressive symptoms. However, some of the sample (the 38% in Class 2) were lower on depressive symptoms initially and experienced some adaptation, albeit they never fully returned to their pre-disability levels of depressive symptoms.

An Example of Soldiers' Character Development Across the Deployment Transition

Analytic flexibility and model selection can dramatically alter the conclusions that one can make regarding growth and resilience. In the three examples presented above, veterans with disabilities were shown to have increased in depressive symptoms over time (Figure 1a), increase immediately before and pre-to-post disability (Figure 1b), and demonstrate some adaptation after the onset of disability (Figure 1c). Next, I present an example that extends the previous models to include more stable, trait-like characteristics (e.g., character strengths) and predictors of change.

Is a potentially stressful transition like a military deployment cycle sufficient to spur character change? Are any character changes permanent or do individuals return to their pre-existing character levels before the deployment (Lucas, 2007a)? What we do know about *growth* of positive characteristics in soldiers often comes from research in which soldiers are asked about their responses and experiences *after the fact* (e.g., Feder et al., 2008) or from studies that have focused more on well-being and post-traumatic stress symptoms (Bonanno et al., 2012; Porter et al., 2017). Although the literature on growth and resilience explicitly discusses positive characteristics, these characteristics are rarely the focus of longitudinal studies involving stressful events. Rather, researchers have traditionally focused on evaluations of well-being (as we did earlier), rather than more trait-like, individual difference constructs. In Jayawickreme and Blackie (2014)'s conceptualization of post-traumatic growth as positive personality change, they leveraged the post-traumatic growth literature in the context of personality change processes. Specifically, growth and resilience are often framed in terms of how individuals' traits change in response to non-normative life events (Tennen & Affleck, 1998, 2009).

One important taxonomy of positive characteristics is Peterson and Seligman (2004)'s conceptualization of strengths and virtues within the Values in Action Inventory of Strengths. The inventory of strengths includes 24 positive characteristics on which individuals can vary (e.g., creativity, kindness, hope, gratitude, leadership). These character strengths are considered

to be enduring individual differences characteristics with a moderate degree of stability over time and across the lifespan (Disabato et al., 2017). Although longitudinal data on character strengths are relatively rare, there is an implicit assumption in the field that character strengths are at least somewhat malleable and changeable. Studies of cross-sectional age differences suggest that normative changes may be possible, although it is unclear from where these changes might originate (Chopik et al., 2018; Martínez-Martí & Ruch, 2014). There is also some evidence that character strengths vary considerably across different cultures, subpopulations, and settings, suggesting that there may be at least some contextual influences on the development of character strengths (McGrath, 2015). Worth noting, despite the initial introduction of the character strengths taxonomy being primarily conceptual (Peterson & Seligman, 2004), more recent efforts have focused on developing a more empirical taxonomy of character strengths (Vanhove et al., 2016; Vie et al., 2016). These efforts have resulted in more succinct organizations of character strengths into four broader character strengths—intellect, warmth, civic strengths, and temperance. We used this particular taxonomy in the study I describe next because it was specifically developed on a sample of military personnel.

My colleagues and I took this charge seriously by examining changes in character strengths among 212,386 American Army soldiers deploying for the first time (Chopik et al., 2021). Adopting the approach of Infurna and Luther (2016c) to allow the variability of the intercepts and slopes to vary within and between classes, we found evidence for two classes of character change (see Figure 1d). The first class (which represented anywhere between 52-63% of the sample, depending on which character strength being examined) were resilient—the soldiers in this group were higher on character strengths to being with and stayed high across the deployment cycle. The second class (representing 37-48% of the sample) experienced pre-to-post deployment declines in character strengths from which they never rebounded. In this example, soldiers were largely resilient—they had relatively stable levels of character strengths. However, there was still the common maladjustment that we saw in the previous examples—a portion of the soldiers experienced declines in their character strengths, which did not increase again in the years immediately after the deployment. When examining more trait-like constructs like character strengths, most of the sample showed stable levels of each strength domain, which is a departure from other studies examining adjustment-related outcomes like depressive symptoms, post-traumatic stress, and well-being (Bonanno et al., 2012; Porter et al., 2017). As previously discussed, these differences demonstrate the hierarchy of personal characteristics that are susceptible to changes in response to life events—traits may be less malleable compared to global evaluations of well-being or adjustment. Nevertheless, as in our previous example, we did not observe a group of soldiers who fared *better* following adversity.

Predictors of change. After identifying patterns of change, a natural next step involved examining the antecedents of those changes. In other words, were there personal or experiential characteristics that made someone more likely to be resilient? As an illustration, I will detail how a researcher might go about predicting resilience and growth in the framework of growth mixture modeling. In a follow-up study, we looked at a wide variety of predictors of resilience: demographic characteristics (e.g., age, race/ethnicity), military characteristics (e.g., rank, time in service), health characteristics (e.g., both mental and physical health), and deployment characteristics (e.g., combat stress, combat injury). Using a logistic regression, we predicted group membership into the resilience trajectory group mentioned above (Chopik, Kelley, et al., 2020).

Higher age predicted resilience, with each additional decade corresponding to a 32%

increased odds of being in the overall character resilient group (OR = 1.32, 95% CI = 1.27-1.37). Being male (OR = 1.20, CI = 1.15-1.25), having more than a high school education (OR = 1.16, 95% CI = 1.11-1.22), and identifying as non-Hispanic White were each associated with being classified in the high resilience trajectory. Regarding military characteristics, officers had a greater odds of being in the resilient class in the overall character analysis (OR = 1.26, CI = 1.17-1.35). Reserve and National Guard soldiers were each more likely to be in the overall character resilient group than active duty soldiers (OR = 1.45, CI = 1.37-1.54 and OR = 1.34, CI = 1.28-1.40, respectively). However, time in service was largely unrelated to character strength development. Finally, both mental and physical health measured before the deployment was associated with character development after the deployment. Each unit increase in self-rated health was associated with a 64% greater odds of being in the resilient group in the overall character analysis (OR = 1.64, CI = 1.61-1.67). Psychiatric treatment in the year prior to deployment, on the other hand, was again associated with a lower odds of being in the resilient class in the overall character analysis (OR = 0.67, CI = 0.62-0.72).

Importantly, experiences during deployment affected soldiers' odds of being resilient. Injury during deployment, combat stress, and longer deployments were each associated with lower odds of being in the resilient class. Soldiers injured while deployed had a 14% lower odds of being in the resilient group (OR = 0.86, CI = 0.83-0.90). Combat stress was also negatively related to resilience in all analyses, with 4% to 8% decreased odds of belonging to the resilient class with each successive combat stressor. Longer deployment lengths also showed a negative association with resilience, such that every additional month of deployment was associated with 3% lower odds of being in the overall character resilient class (OR = 0.97, CI = 0.97-0.98).

Altogether, many characteristics that are associated with the development of psychological traits outside of adverse experiences (e.g., health) also predicted resilience and change in character across the deployment cycle. Physical and mental health were the largest predictors of trajectory group membership. But individual and deployment characteristics played a role as well—age, branch of the military, and the severity of the combat experience (e.g., stress, injury, length)—also predicted how soldiers changed over time.

Future Directions

One of the main purposes of this chapter was to provide some illustrations for how to model resilience and growth using veterans and soldiers as exemplars. In both examples, there was little evidence of growth—that individuals thrive following adversity. This can be attributable to a common if uncontroversial conclusion about adversity: it introduces stress and difficulty into people's lives and people likely rarely benefit from it. Adversity likely changes health and well-being (as we saw in the veteran examples) but it might not be sufficient to fundamentally change character in a dramatic way (as we saw from the stability and small changes among deploying soldiers). The two forms of adversity are fundamentally different, introduce different challenges, and are not comparable in most ways. However, they do highlight some of the many ways to go about answering questions related to growth and resilience.

Methodological and analytic discussions about how to appropriately model growth and resilience have brought to light a dire and uncomfortable realization for researchers—that growth and resilience (particularly in well-being) might not be as common as cultural narratives and previous research might have us believe. Further, it is also unclear what the functions of growth would be for individuals, including military personnel. It is likely that people might feel better or be more well-adjusted if they improved in most character strengths and that could be a goal in and of itself. However, does growth in character make for better people, better interpersonal

relationships, more effective military personnel, or help people live longer? Such *consequences* of growth are rarely examined. Of course, there are many unanswered questions about the study of growth and resilience. Below, I highlight just a few future directions that can increase our understanding of growth and resilience. They range from conceptual to methodological directions that researchers can consider.

For one, the lack of prospective data and detailed information about that adversity is one of the main limitations that has affected our inferences about growth and resilience. Even the typical approaches I outlined with respect to veterans experiencing a disability run afoul of this limitation. This is also a broader point about how life events affect psychosocial characteristics more broadly. When researchers examine pre-to-post changes in a construct, they often strip that event of its context and merely look at whether an event occurred or not (Bleidorn et al., 2016). I've done this myself and even the predictors of resilience highlighted here are also measured in short, relatively crude ways (Chopik, 2018; Chopik, Oh, et al., 2020). Life events vary on several dimensions and few taxonomies exist that characterize which life events are most likely to lead to changes in psychological characteristics (Chopik et al., 2019). In one of the few exceptions, Luhmann and colleagues (2020) have provided an initial framework for describing how and why some events, like deployment, might lead to lasting changes in psychological characteristics. This framework includes a description of the many different dimensions on which life events can vary, including the appraisal and controllability of the events. Such features of a deployment experience might explain why character strengths change for some soldiers and not others (and how some life events spur change and others do not, in general). The same can be said about the context in which resilience and growth are hypothesized to happen—the long period after a life event occurs. These post-event contexts might alter one's interpretation of the event and ultimately the downstream consequences of not only that event but also any psychological changes that result from it (Tedeschi & McNally, 2011). Moving forward, it is crucial that studies are designed so that accurate portrayals of what life is like before and well-after an event occurs. Guidelines for considerations about new, primary forms of data collection, how to best utilize existing data sources, and analyses can be found elsewhere (Jayawickreme et al., 2020). But in summary, greater attention to measurement and specificity and long-term longitudinal data are needed in the study of growth and resilience.

Second, the two projects here also highlight the need to broaden our definition of what is considered successful growth and resilience. For example, in the veterans' analysis, there was little evidence for resilience in depressive symptoms following the onset of a disability. In the soldiers' analysis, there was a high degree of resilience in character strengths. The differences between the two are attributable to many things—that deployments and disabilities are different things, the heterogeneous experiences of both, the composition of the samples, and the outcome variables under investigation. However, because of the few data sets that contain a suite of possible growth and resilience indicators (e.g., studies that have measures of depressive symptoms and traits), there is a current ignorance about how much change to expect and in which characteristics. It is very uncommon to see comprehensive studies of growth and resilience that can draw firm and specific conclusions about how adversity can change some indicators (e.g., well-being) and not others (e.g., personality). It is more often the case that a study focuses on just a single indicator of adjustment. The few exceptions have been very useful—even in studies that examine relatively similar constructs (e.g., life satisfaction, positive/negative affect), there is evidence that growth and resilience are heterogeneous experiences (Infurna & Luthar, 2017a). For example, people might still report that their lives are

relatively happy overall (i.e., life satisfaction) or be just as agreeable but nevertheless report worse mood or health following an adverse event. Would such a person be considered resilient? Or does only happiness and health matter and personality is less relevant? The exact criteria for what is considered a growing or resilient person is controversial (Infurna & Jayawickreme, 2019). To maximize the utility of the approaches outlined in this chapter, we first need an understanding of what domains are most important to look at and, just as important, actual data that measures a diversity of outcomes so that we can achieve this goal.

Conclusion

This chapter began with the observation that, although it might be natural for people to want to believe in growth and resilience, finding definitive evidence for whether and why it exists is a much harder task. I reviewed a few different examples that provide illustrations of how one might go about asking these types of questions. Do people who experience adversity differ from those who don't, on average? How do people change before-to-after adversity? Are there subgroups of people that respond differently to adversity? Are there be reliable predictors of these individual differences in change? Each of these questions involves a different analytic approach that can have large implications for the inferences that can be made. Even if growth and widespread resilience do not exist or are not common, evaluating the time course of adjustment and predictors of individual differences in adjustment among military personnel is a worthwhile endeavor. But doing so involves careful consideration of methodological and analytic flexibility—historically, a lack of consideration has led to the impression that growth and resilience are commonplace. The hope is that new studies and methods will be able to accurately capture processes of adaptation moving forward.

Figures 1a (between-subject changes), 1b (within-subject changes), 1c (growth mixture modeling), and 1d (growth mixture modeling of character strengths)
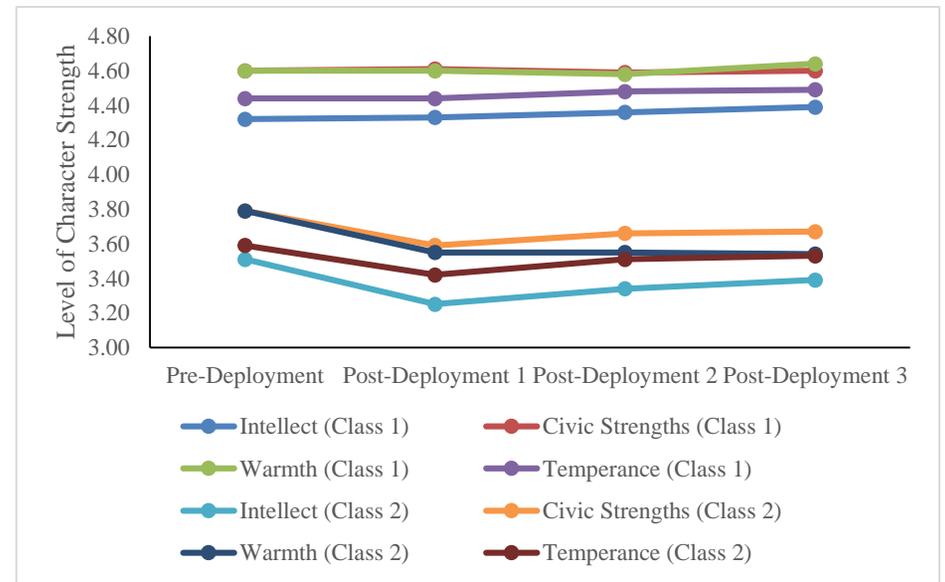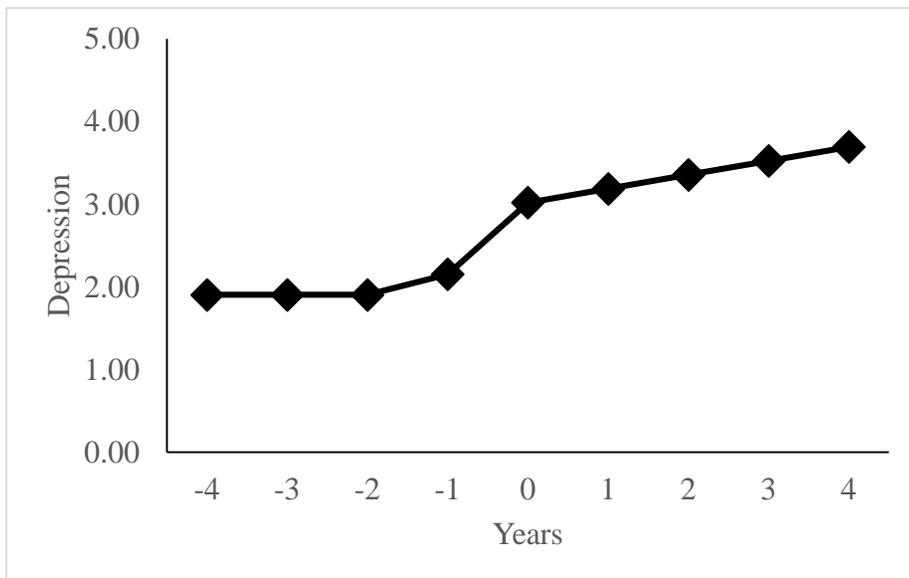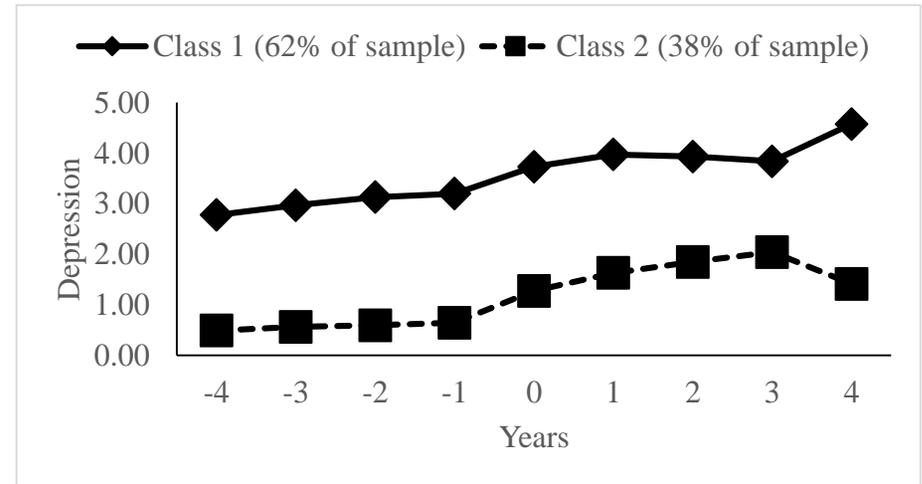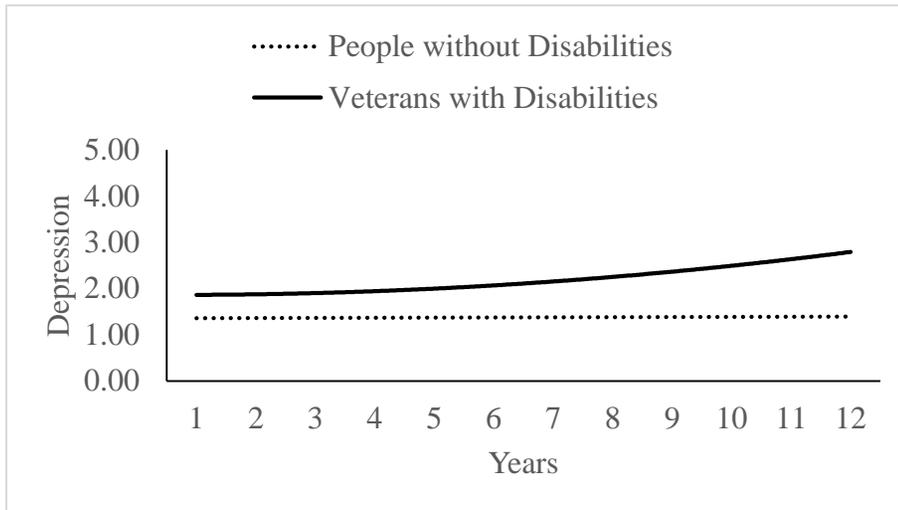
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