Review

Re-evaluating the notion that resilience is commonplace: A review and distillation of directions for future research, practice, and policy

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HIGHLIGHTS

- We critically evaluate the adult resilience literature.
- Findings demonstrate that resilience is not as commonplace as discussed in the literature.
- Based on our conclusions, we discuss three important directions for future research.
- We outline a resilience framework for research, practice, and policy.

ABSTRACT

The majority of multi-wave studies examining resilience in adulthood have involved growth mixture modeling (GMM). We critically evaluate the central conclusion from this body of work that "resilience is commonplace". Our emphasis is on two questionable methodological assumptions underlying this conclusion: (1) the variances are the same across trajectories (i.e., homogeneity of variance) and (2) the amount of change does not differ across individuals (i.e., slope variances are zero). Seventy-seven empirical studies were included that used GMM to examine resilience to diverse adversities in adulthood. Of these 77 relevant studies, 66 (86%) assumed homogeneity of variances across trajectories and 52 (68%) set slope variances to zero; in the minority of studies where these assumptions were not applied (particularly the homogeneity of variance assumption), the resilient trajectory was among the smallest. Furthermore, 63 (82%) of the 77 studies conferred labels of resilience based on a single outcome, which is problematic as resilience is never an "across-the-board" phenomenon. Based on our conclusions, we discuss three important directions for future research: (1) replication across samples and measures, (2) illumination of processes leading to resilience, and (3) incorporation of a multidimensional approach. We conclude by outlining a resilience framework for research, practice, and policy.

There is much scientific and public interest in resilience, the human capacity to overcome significant life adversity (Luthar, Crossman, & Small, 2015; Masten & Narayan, 2012; Zautra et al., 2008). Over the past decade, accumulated empirical evidence in adulthood and old age has led to claims that when confronted with significant adversities (irrespective of the type), most individuals are remarkably resilient, defined as showing stable, healthy levels of psychological functioning (for recent review, see Bonanno & Diminich, 2013). For example, as many as 85% of members of the United States military coming back from deployment to Iraq and Afghanistan were reported to be resilient (Bonanno et al., 2012).

The previously cited commonness of resilience rests on applications of growth mixture modeling (GMM). GMM is a statistical method of analysis that, when applied to large data sets encompassing exposure to

adversities such as spousal loss or disability, enables illumination of discrete trajectories (i.e., resilient, recovery, growth, and chronic low well-being). Researchers have increasingly used GMM to ascertain not just the number and shape of different trajectories, but also, the proportion of people belonging to each. Much of the work applying GMM to studying resilience has shown two consistent findings: (a) 3–4 trajectories following the adversity and (b) the resilient trajectory was the most common (Bonanno & Diminich, 2013).

Recently, we challenged notions that resilience is the common response to adversity, showing that this is largely due to data analytic and measurement choices (see Infurna & Luthar, 2016a, 2017a). In our own analyses, we have consistently found that a recovery trajectory is the most common response, which is characterized by declines at the time of the adversity followed by gradual improvements back to near-

previous levels over time. Two additional conclusions emerged in our work. First, the a priori methodological assumptions applied in GMM analyses significantly influence the number of and proportion of individuals in identified trajectories. Second, from a conceptual perspective, definitive declarations of rates of resilience are inherently specious, because as was established in the child development research, resilience in one domain may often co-exist with deficits in other important domains (Farber & Egeland, 1987; Luthar, Doernberger, & Zigler, 1993).

Why is an in-depth review of the adult resilience literature required? Our previous papers specifically focused on testing the methodological assumptions underlying research utilizing GMM (see Infurna & Luthar, 2016a, 2017a, 2017b); we expand upon our previous papers by reviewing the state of the cumulative adult resilience literature that has used GMM to examine resilience to adversity, distilling future directions for research, and outlining a resilience framework for research, practice, and policy. Several key issues remain that we aim to address. First, the adult resilience literature that has used GMM to examine resilience to adversity has developed separately from the methodological literature that developed and continues to hone these methods. In our previous papers (Infurna & Grimm, 2018; Infurna & Luthar, 2016a), we observed that two key methodological assumptions led to resilience being the modal trajectory in response to adversity (explained in more detail below in the Section, Resilience to Major Life Stressors). Recent simulation studies have further established that these methodological assumptions lead to the over-extraction of trajectories in the data (Diallo, Morin, & Lu, 2016).

Second, conceptual developments in the child and adult resilience literatures have grown in parallel, without much intersection. For example, the child resilience literature has long acknowledged the multidimensional nature of resilience (Farber & Egeland, 1987; Luthar et al., 1993). Only in recent studies have researchers explicitly applied this principle in the adult resilience literature, showing that resilience manifests differently across the type and number of outcomes examined (see Infurna & Luthar, 2017a, 2017b).

Third, we seek to bring together conceptual notions from the child and adult resilience literatures and the methodological literature to outline a resilience framework that can be applied to research, practice, and policy. From its inception, research on childhood resilience has been recognized as being a field that is fundamentally applied in nature (Luthar et al., 2015; Luthar & Zelazo, 2003). Michael Rutter's (1987) highly influential paper on protective mechanisms was critical in illuminating how studies on resilience can effectively inform interventions, as Emmy Werner underscored that, "If we encourage and nurture these dispositions and competencies in our children as best we can, we have a basic survival kit for meeting adversities that tax the human spirit" (Werner & Smith, 1992, p. 204). Norman Garmezy underscored the significant "potential for informing prevention, practice, and policy if the pathways that led away from psychopathology could be understood" (Masten & Tellegen, 2012, p. 346). Consideration of policy and practice implications have been relatively rare in the accumulated literature on adults' resilience based on GMM approaches; we seek to address this gap in our review.

In summary, the importance of examining the human capacity to be resilient, coupled with recurrent claims of the commonness of resilience and discrepancies in findings based on the application of GMM, render important a review of the conceptual and methodological bases of extant studies, and distillation of critical directions for future research, practice, and policy. Our objectives in this paper are threefold. First, we critically appraise the body of existing studies that have used GMM to examine resilience across various adversities experienced in adulthood and old age, with attention to the a priori methodological assumptions applied in each study and the number of outcomes assessed. We document the number of studies that have applied the methodological assumptions that are of interest, the nature of the findings across studies, and the number of outcomes each study included to ascertain

resilience. Second, we identify future directions to pursue, specifically focusing on (1) replication studies across samples and measures, (2) illumination of processes leading to resilience, and (3) incorporation of a multidimensional approach. Lastly, based on our review of the literature and the future directions discussed, we conclude by outlining a resilience framework for research, practice, and policy.

1. Resilience: definitions and measurement

Resilience research has a long and scientifically rich history, dating back to the 1950s and 1960s when developmental researchers observed that some children growing up in adverse living conditions, such as poverty, maltreatment, and war exhibited unexpectedly good mental health and academic achievement (for reviews, see Garmezy, 1985; Luthar, Cicchetti, & Becker, 2000; Rutter, 1987; Werner & Smith, 1989). For example, Rutter (1987) observed that some women who were institutionalized at a young age were remarkably well adjusted as adults. These pioneering researchers set the stage for future research on resilience in the context of chronic adversity.

In the child development literature, resilience is broadly defined as a dynamic process representing positive adaptation in the context of significant adversity (Cicchetti, 2016; Luthar et al., 2000; Masten & Narayan, 2012). This definition of resilience is an aggregate from across researchers in this literature. Luthar et al. (2000) define resilience as "a dynamic process encompassing positive adaptation within the context of significant adversity (p. 543)". Masten (2014) defines resilience as "The capacity of a dynamic system to adapt successfully to disturbances that threaten the viability, the function, or the development of that system (p. 10)". Rutter (1987) has a broader consideration of resilience, stating that "Resilience is concerned with individual variations in response to risk. Some people succumb to stress and adversity whereas others overcome life hazards. (p. 317)". Inherent within these definitions are two critical conditions, namely, (1) exposure to a significant adversity and (2) manifestation of positive adaptation despite this adversity.

In the context of discrete, major life stressors, resilience may take many forms including stable, healthy levels of psychological, behavioral, and physical functioning before and after the adversity, or declines because of the adversity, followed by gradual improvement to near-previous levels over time, which is indicative of recovery. Different from the adult resilience literature (discussed in further detail below), the child resilience literature has asserted that both of the trajectories described above, which are commonly differentiated as resilient and recovery, constitute a form of resilience. As Rutter (2006, 2012) has emphasized, the critical defining feature of resilience is that individuals exhibit better levels of functioning than compared with others who experienced the same adversity; there is no requirement that they must attain superior levels of functioning, or sustain such good functioning with no dips whatsoever across the same time frame.

Over the past decade, a resilience literature has emerged in the adulthood and old age literature in which the most common definition, championed by Bonanno and colleagues, is that resilience entails individuals exhibiting a trajectory of stable, healthy levels of psychological functioning (e.g., mental health or well-being) before and after an adversity (Bonanno & Diminich, 2013; Bonanno, Romero, & Klein, 2015). More specifically, resilience "pertains to the ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event, such as the death of a close relation or a violent or life-threatening situation, to maintain relatively stable, healthy levels of psychological and physical functioning (p. 20, Bonanno, 2004)". Other definitions of resilience that have been discussed in the adult resilience literature include Zautra et al. (2008) who argue that resilience is best defined as "an outcome of successful adaptation to adversity (p. 42)". The definition of resilience that Zautra et al. (2008) put forth includes two components: the first is recovery, or how well do people bounce back and recover fully from adversity and

second, sustainability, or the capacity to continue forward in the face of adversity. Carver (1998) discusses that resilience refers to a "homeostatic return to a prior condition (p. 247)"; individuals show declines in functioning because of an adversity, but bounce back over time by exhibiting gradual improvements to near-previous levels of functioning (recovery).

Bonanno and colleagues argue that individuals who exhibit a recovery trajectory are not considered resilient; as noted earlier, this perspective differs from the child resilience literature and other resilience researchers who study individuals in adulthood and old age. Accumulated empirical evidence from this prolific research team – and from the larger research community employing similar analytic methods – has shown that resilience, not recovery, is the common response to adversity, irrespective of the type of adversity (Bonanno & Diminich, 2013; Kalisch, Müller, & Tüscher, 2015). Based on the cumulative research findings in the resilience literature focusing on adulthood and old age, researchers have proclaimed the empirical evidence has confirmed resilience to be the modal response to adversity (see Kleim & Galatzer-Levy, 2015).

At the core of this perspective – while also at the crux of a controversy (Infurna & Luthar, 2016a) – have been methodological advancements in the analysis of longitudinal data, that is, the use of GMM. GMM allows for the possible existence of distinct trajectories over time, which are shown in Fig. 1. Other common trajectories beyond that of resilience that have been documented include recovery, characterized by decrements in psychological functioning because of the adversity (possibly for several years) followed by a return to near-previous levels. Chronic low is characterized by individuals showing stable, low levels of psychological functioning before and after the adversity, while growth encompasses improvements as a result of the adversity that are enduring. As part of modeling these distinct trajectories, individuals who are grouped within a specific trajectory can (or cannot) be allowed to vary across other members of their trajectory in their levels of functioning at the time of the adversity and rate of change over time following the adversity (see Ram & Grimm, 2009), with there being researcher degrees of freedom in how the within- and between-trajectory variances are modeled (Infurna & Grimm, 2018). Infurna and Grimm (2018) demonstrated how differences in the modeling of within- and between-trajectory variances greatly influences the findings that emerge with regard to the number of trajectories identified and proportion of individuals in each identified trajectory; they also exhibited how the manner in which modeling decisions translate to how the data are portrayed. We discuss the specifics of these modeling decisions

below and are graphically illustrated in Appendix A (see Figs. A.1 and A.2).

Our goal in this paper is to evaluate whether or not resilience – defined as stable, healthy psychological functioning – is the prototypical response to adversity. As discussed above, we acknowledge that different definitions of resilience have been used in past studies, but in this review, we focus on the definition stipulating stable, healthy levels of psychological functioning because (a) this is the definition most commonly used in the adult resilience literature, based on GMM and (b) is the basis of widespread claims, in science and in the media, that most people are resilient across different types of major life events.

To evaluate whether or not resilience is the prototypical response to adversity, we will review the large corpus of studies that have used GMM to examine resilience to adversity in adulthood. The importance of addressing the issues we raise is paramount for several reasons, including (1) the widespread use of the term resilience, (2) the implications of this stringent definition for determining/interpreting what constitutes resilience, (3) claims of confirmation that resilience is the modal response to adversity and (4) the significance of how research in this arena is portrayed to the lay public and policy makers. We believe that it is problematic to communicate that most people who experience an adversity remain unscathed across psychological, behavioral, and health domains, if in fact, these claims largely rest on the same questionable statistical assumptions applied across dozens of studies. Similar concerns have been voiced in research on post-traumatic growth, in the form of proclamations that some good should come out of adversity (Jayawickreme & Blackie, 2014). Such assertions can invoke tendencies to blame the victim in the form of suggesting a personal inadequacy if people take too long to adjust or recover following the adversity. Given that this idea has been widely cited and distributed in the public eye (Brody, 2016; Konnikova, 2016; Sandberg & Grant, 2017), addressing this issue, carefully and systematically, is of utmost importance.

2. Resilience to major life stressors

In discussions that follow, we will review the adult resilience perspective that has emerged in the past decade, with the claim – based on GMM – that resilient trajectories of stable, healthy levels of psychological functioning are the most common, regardless of the adversity. Points of focus are the methodological assumptions underlying studies that have used GMM to examine resilience. These include, first, assumptions of homogeneity or similarity of within-group variance across
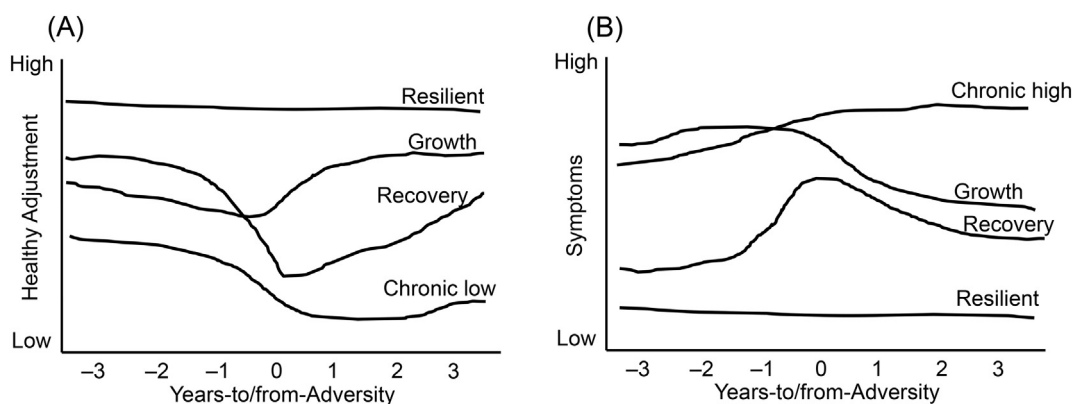

Fig. 1. Graphical illustration of possible trajectories or paths individuals may follow in the years leading up to and following significant life adversity. Fig. 1A shows the four trajectories that have commonly been observed for outcomes centered on psychological functioning where higher levels are indicative of better adjustment, including life satisfaction, positive affect, physical functioning, and perceptions of general health. Fig. 1B shows the four trajectories that have commonly been observed for outcomes centered on symptoms where higher levels reflect poorer adjustment, including depressive symptoms, anxiety, negative affect and post-traumatic stress symptoms. These trajectories are not exhaustive; other trajectories that have been observed in the literature include moderate levels of functioning before and after the adversity and delayed distress, which is characterized by stability prior to the adversity, but declines in healthy adjustment (or increases in symptoms) that occur during a time period following the adversity.

different trajectories, second, setting the slope variances to zero, and third, the measurement of diverse types of outcomes to operationalize resilience.

In an in-depth analysis of previously published findings, we demonstrated the importance of relaxing the two previously noted methodological assumptions (for conceptual illustration of these assumptions, see Fig. 1 in Infurna & Luthar, 2016a; for further discussions, see Infurna & Grimm, 2018). In past research, by estimating the variances to be the same between trajectories, researchers have tacitly assumed that the amount of within-group variability is the same between trajectories. To clarify, within-group variability refers to the differences across individuals who are within the same trajectory in the outcome of interest (level and rates of change), whereas between-group variability is differences between trajectories in their means and variances across levels and rates of change. This is graphically illustrated in comparing between Figs. A.1A and A.1B, as well as across Figs. A.2A, A.2B, and A.2C in Appendix A. The distribution of scores are the same across trajectories for each outcome and the amount that persons change within each identified trajectory is the same. This type of model is a constrained version of GMM and analogous to what is applied in a latent class growth analysis (LCGA, i.e., residual variances are the same across classes, but in LCGA, the level and slope variances are zero; see Nagin & Odgers, 2010). As shown by Diallo et al. (2016) and Infurna and Grimm (2018), estimating the intercept variance to zero also matters, but the issue of greatest concern is that of assuming the variances to be the same across trajectories. van der Schoot, Sijbrandij, Winter, Depaoli, and Vermunt (2017) provide a thorough discussion of how a series of models should be tested and reported in papers that utilize latent trajectory modeling procedures (i.e., LCGA and GMM) and that the best fitting of these models should be used. This allows for instances in which the best fitting and most parsimonious models may have one trajectory where the slope variance is set to zero, but estimated in the other trajectories. We refer readers to van de Schoot and colleagues (2017) for a more in-depth analysis of the various types of models that can be applied, how there are many decisions that go into implementing these models, and that there needs to be better reporting of the models tested; this is beyond the scope of our review.

By contrast, in our methodological re-analyses (Infurna & Luthar, 2016a), we allowed for the (conceptually reasonable) possibility that resilient individuals, as a group, might show less variability or more stability, whereas those in the other groups would show more variability around their respective group means. Furthermore, by estimating the slope variances to zero, prior analyses had assumed that all individuals in the particular group show the same rate of change in the outcome of interest. Again, we allowed for the possibility, for example, that relative peaks and valleys around the groups slope may have occurred at different points for different people within a given trajectory (see also Figs. 3–7 in Infurna & Luthar, 2017a). This is akin to what is shown in Figs. A.1C and A.1D and Figs. A.2D and A.2E, where participants across and within each identified trajectory show differences in their levels at the time of spousal loss and the amount that they change over time. When relaxing these stringent methodological assumptions, the proportion deemed resilient to spousal loss, divorce, and unemployment were substantively lower than previous studies (Infurna & Luthar, 2016a).

Why is it important to consider these methodological assumptions?[1] There are at least three major reasons. To begin with, they are

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[1] Reviewer 1 raised the issue that many assumptions need to be made when using GMM. We acknowledge that this is an important issue, and we point the reader to van der Schoot et al. (2017) for a more detailed analysis of this issue and also the GRoLTS checklist, which was developed to analyze the methodological nature of studies that have used GMM. Given our findings from several empirical studies (see Infurna & Grimm, 2018; Infurna & Luthar, 2016a, 2017a, 2017b), these two methodological assumptions seem to matter most for findings pertaining to resilience. Furthermore, our concerns based on our findings from empirical studies have been confirmed by a thorough simulation study by Diallo et al. (2016). We detail below the main findings from the simulation study by Diallo et al. (2016) and how it relates to our review.

questionable on conceptual grounds. As noted earlier, assuming homogeneity of variance is at odds with the fact that resilience, by definition, implies more stability over time around group means than do other trajectories, and the second assumption of within-group slopes being zero belies the fact that among some people, for example, an early decline could be followed by stable high well-being.

Second, quantitative analyses have shown that these methodological assumptions lead to "over-extraction of trajectories" underlying the data, that is, obtaining results that multiple trajectories exist in the data when in fact, only one trajectory truly exists (Bauer & Curran, 2003). For example, using simulated data, Diallo et al. (2016) demonstrated that when only one trajectory was known to encompass the data, the use of these restrictive assumptions led to four trajectories being found in over 95% of the simulations.

Third, relaxing these methodological assumptions improves the ability to recover the proper number of trajectories underlying the data. Diallo et al. (2016) showed that when three trajectories were known to encompass the data, the model with the relaxed methodological assumptions found three trajectories to best represent the data in over 90% of the simulations. Using empirical data, Infurna and Grimm (2018) further demonstrated that relaxing this assumption led to better identification of trajectories in the data (see also, Enders & Tofighi, 2008).

3. Past resilience research based on GMM

In Tables B.1–B.4 in Appendix B, we include the specific articles (total of 77) and organize them by category of adversity and detail the methodological assumptions applied, the number of outcomes examined, how resilience was defined, and the number of and proportion of individuals in each of the identified trajectories. For inclusion in the Tables, requirements for studies were that they (1) used a form of longitudinal mixture modeling (i.e., LCGA or GMM); (2) a major life event or stressor was examined (i.e., negative or positive); and (3) the sample consisted of participants in adulthood and old age. We only included studies that have been published and did not include unpublished studies. Furthermore, we only included studies that used the technique of LCGA or GMM for reasons outlined earlier, i.e., there exist dozens of published studies that have led to conclusions that "resilience is common", yet recent studies have raised several serious issues surrounding the use of LCGA and GMM underlying this claim (see Infurna & Grimm, 2018; Infurna & Luthar, 2016a, 2017a, 2017b). The major life events or stressors involved those that are negative, such as military deployment, onset of a disability or chronic illness, and spousal bereavement, as well as those that are positive, such as childbirth and retirement. We include both types because each category of event results in a qualitative shift in one's life circumstances and could result in both positive and negative adjustment (Gray, Litz, Hsu, & Lombardo, 2004; Turner & Wheaton, 1995; Zautra & Reich, 1983).

Our review of the literature included the use of PsychINFO, PubMed, Web of Science, and Google Scholar, using the combination of the following search terms: resilience, resilient, adulthood, old age, trajectories following adversity, latent class growth analysis, growth mixture modeling, latent growth mixture modeling, post-traumatic stress symptoms, mental health, depression, depressive symptoms, anxiety, life satisfaction, and subjective well-being. We also used the reference lists of identified articles that fit our criteria to identify additional articles for inclusion into our review. Fig. 2 provides more information on the search process for identifying relevant studies. Using established PRISMA guidelines (Moher et al., 2009), we first identified 239 studies and after removing duplicate studies and studies that did not meet our inclusion criteria, the number of studies that were included in our review was reduced to those 77 that are shown in Tables B.1-B.4. We acknowledge that the use of GMM is not confined to the resilience literature, but has wider applicability in studies on other constructs (e.g., substance use, Chassin, Sher, Hussong, & Curran, 2013;
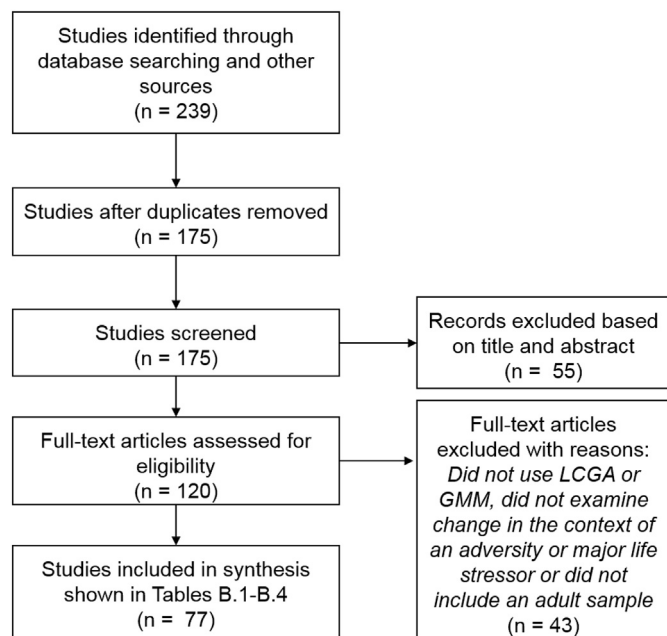
Fig. 2. PRISMA flow diagram of search strategy for identifying studies to include.

physical functioning, Liang, Xu, Bennett, Ye, & Quiñones, 2010; Martin, Zimmer, & Lee, 2017). Including these various literatures would have been beyond the scope of this review. We tried to be as exhaustive as possible in considering relevant studies in the resilience literature (our review includes studies published up to May 2018), and have briefly summarized findings for each Table rather than going into details for each study.

3.1. Marital/family transitions

Presented in Table B.1 are details of marital/family transitions that have been studied with an explicit focus on resilience: bereavement, divorce, marriage, and childbirth. Outcomes examined include life satisfaction, depressive symptoms, and health indices. The collective studies show that the proportion of individuals showing a resilient trajectory is mixed and based on the methodological assumptions applied and outcomes considered. About 69% of the studies estimated the variances to be the same across trajectories and 54% estimated the slope variances to zero. The studies that applied the stringent methodological assumptions each found a resilient trajectory to be modal. However, in the studies that did not apply these stringent assumptions, the recovery trajectory was most commonly observed (Infurna & Luthar, 2016a, 2017a, 2017b).

Additionally, it is important to note that all but two studies included a single outcome, inhibiting ascertainment of whether resilience differed across outcomes and concordance across outcomes. As we demonstrated in a prior study on spousal loss, when considering the multidimensional nature of resilience across five key outcomes, only 8% of bereaved individuals were deemed resilient across all outcomes and 20% did not show a resilient trajectory in all five outcomes examined (Infurna & Luthar, 2017a).

In summary, the proportion of individuals deemed to be resilient differs considerably across the assumptions applied in the GMM analyses. Findings summarized in Table B.1 attest to the fact that resilience to marital/family transitions was commonplace only in studies applying the strict methodological assumptions underlying the longitudinal model of change, and the consideration, generally, of a single adjustment outcome.

3.2. Job/career transitions

Work transitions that have been examined using GMM include unemployment and retirement, with outcomes including life satisfaction and depressive symptoms. Findings from the studies in Table B.2 are mixed on trajectories before and after work transitions. Of the six studies, 50% assumed homogeneity of variance and 50% estimated the slope variances to zero. Initial research applying the stringent methodological assumptions to unemployment indicated that resilience was modal (Galatzer-Levy, Bonanno, & Mancini, 2010), whereas when these assumptions were relaxed, the recovery trajectory was most common (Infurna & Luthar, 2016a). Focusing on retirement and work training (Galatzer-Levy et al., 2013; Heybroeck, Haynes, & Baxter, 2015; Wang, 2007), resilience was found to be the modal trajectory. However, in the case of both these events, it is not clear that each constitutes an adversity to quite the same degree, as would unemployment. Retirement could connote desired and appreciated freed time to devote to family, friends, and leisure pursuits, as work training could represent sought-after improvements in marketable skills. Therefore, depending on the context through which retirement, work training, and to some extent unemployment transpire, this could lead to differences in what constitutes resilience. This signifies the importance of how perceptions of the event and its severity could potentially influence the trajectory of change. We discuss the identification of predictors of trajectory membership later on (Section, Resilience Framework for Research, Practice, and Policy). Finally, none of the studies in Table B.2 simultaneously examined multiple outcomes, leading to the inability to discern whether resilience was modal across pertinent outcomes.

3.3. Health adversities

Table B.3 shows the range of health adversities that have been examined in the context of resilience, including disability and chronic illness. Diverse outcomes have been examined, including depressive symptoms, anxiety, quality of life and post-traumatic stress symptoms. Of the 23 studies included in Table B.3, 87% estimated the intercept and slope variances to be the same across the trajectories identified and 61% estimated the slope variance to zero. Six studies simultaneously examined multiple outcomes and of those, all six found a similar proportion of participants in the resilient trajectory. For example, deRoon-Cassini, Mancini, Rusch, and Bonanno (2010) found that 58% of participants were classified as resilient in both depressive symptoms and post-traumatic stress symptoms. In sum, the collective studies focusing on health adversities found resilience to be the modal trajectory following the adversity and this was consistent across outcomes. However, given the same stringent methodological assumptions applied in each study, we cannot be certain that resilience is in fact the most common trajectory. Several studies did not apply these stringent methodological assumptions and in each study, the resilient trajectory did not contain an overwhelmingly larger number of participants (see Chambers et al., 2017; Dunn et al., 2011, 2012). Chambers et al. (2017) found that the proportion of individuals in the resilient trajectory differed based on the outcome (39% to 63%) and Dunn et al. (2011, 2012) observed that there was a relatively even distribution of individuals across the identified trajectories.

3.4. Traumatic events

Table B.4 documents traumatic events that have been studied in the context of resilience, including military deployment and natural disasters. Studied outcomes include depressive symptoms, anxiety, and post-traumatic stress symptoms. Of the 35 studies, 97% estimated the intercept and slope variances to be the same across the identified trajectories and 80% estimated the slope variance to zero. Only six studies examined more than one outcome and each found high concordance of resilience across the outcomes examined. Across the studies, all found

resilience to be the modal trajectory except in Armour, Shevlin, Elklit, and Mroczek (2012) and Steenkamp, Dickstein, Salters-Pedneault, Hofmann, and Litz (2012), where Steenkamp et al. (2012) did not find evidence for a resilient trajectory. These findings could have been due to the nature of the adversity examined (i.e., sexual assault) and the closely spaced assessments (monthly).

3.5. Summary of findings

What are the take away messages from studies in Tables B.1–B.4, all involving the use of GMM to illuminate adaptation patterns following a range of diverse life events? First, a large proportion applied similar approaches/assumptions: Of the 77 studies included, 66 (86%) assumed homogeneity of variance across trajectories, and 52 (68%) estimated the slope variances to be zero in each trajectory. The studies applying these assumptions typically found four trajectories, with resilient, recovery, and chronic low/high being the most commonly observed, and other trajectories found being growth/improvement, moderate, and delayed distress. As described by van der Schoot et al. (2017), methodological decisions are often made by researchers due to convergence issues in running GMM models. Given this, the application of the homogeneity assumption could be the result of convergence issues that researchers encounter when using GMM.[2] We believe that convergence issues are likely not driving the application of this assumption, but instead researchers are relying on the default setting of the statistical program (typically, Mplus or SAS PROC TRAJ). We urge researchers to explore alternative models of how the variance-covariance matrices are estimated within- and between-trajectories to avoid over-reliance on the default settings (for discussion, see van der Schoot et al., 2017). This is especially vital because of results from empirical studies (see Infurna & Grimm, 2018; Infurna & Luthar, 2016a), as well as from a simulation study by Diallo et al. (2016), showing how these assumptions influence the number of identified trajectories, the proportion of individuals classified into each trajectory, and the ability to find the "best" solution to the data. One way to promote better research practices in future applications of GMM is to use the GRoLTS checklist (van der Schoot et al., 2017), which can help illuminate the different assumptions that researchers are making when using GMM and whether there is an over-reliance on the default settings.

Second, most studies defined resilience as maintaining stable, healthy levels of psychological functioning before and after the adversity, and results showed that the resilient trajectory was modal across adversities. However, given that most studies used the same stringent methodological assumptions, this likely led to what Larzelere, Cox, and Swindle (2015) call exact replications, with the same biases, repeatedly applied, and essentially leading to the same findings. Of the 77 studies, 11 allowed the variances to differ across trajectories (five were those conducted by our team) and two found the resilient trajectory to be modal across the outcomes examined. We want to qualify this in that in three of these 11 studies, multiple outcomes were included (see Chambers et al., 2017; Infurna & Luthar, 2017a, 2017b) and in each of these three studies, the resilient trajectory was modal for at least one outcome. The lack of consistent findings across outcomes signifies the importance of simultaneously examining multiple pertinent outcomes.

Third, of the 77 studies, 63 (82%) assessed just a single adjustment outcome; yet, conclusions about prevalence of resilience in general were based on this single measure. For example, Galatzer-Levy and Bonanno (2014) examined trajectories of depressive symptoms following heart trouble and found that 68% of the sample was likely to belong to the resilient trajectory; they concluded that their study provided "population-based estimates of the proportion of individuals who follow distinct trajectories of response" (p. 2186).

Only 30 (39%) of the 77 studies documented in Tables B.1 – B.4 had pre-event data. One possibility for resilience being the modal trajectory may be that the first post-adversity assessment was not close enough to the event to detect any initial declines in psychological functioning (which might have indicated, in fact, a recovery trajectory). We highlight this in the next section on Future Directions by discussing methodological approaches for studying processes underlying resilience to adversity.

Another important implication that arises from the studies reviewed in Tables B.1 – B.4 is whether the commonly used definition of resilience in adulthood and old age, based on GMM, is too stringent and should be revised. An overwhelming number of studies used the criteria of stable, healthy levels of psychological functioning for defining resilience. However, how does this definition of resilience translate to the amount of absolute change that the resilient trajectory exhibits? Is there a certain amount of absolute change (or lack thereof) that needs to occur for a trajectory to be differentiated as resilient or recovery? Very few studies reported the fixed and random effects for the identified trajectories; this could lead to one study determining that small, but non-significant declines in well-being constitute resilience, whereas another study classifies the resilient trajectory as exhibiting significant declines, followed by improvements to near-previous levels. Small sample sizes may contribute to the amount of change that is deemed significant in the slopes, leading to differences in what constitutes resilience. It could also be argued that this definition of resilience is too stringent because it entails that individuals show no (or small) deviations in psychological functioning before and after the adversity. Conceptually, Seery, Holman, and Silver (2010) assert that low levels of adversity may itself promote development of subsequent resilience, or improved functioning over the long term (see also Aldwin, 2007). As a result, researchers have suggested that the cumulative nature of diverse adversities could lead to better adjustment when confronted with future adversities (Seery, 2011).

There exist several studies, in fact, indicating the value of this broader definition of resilience. For example, the time leading up to divorce and spousal loss has been documented to involve a decline in mental health and well-being (Infurna et al., 2017; Lucas, 2005), which could be due to health declines in the dying spouse and marital discord, respectively. Following spousal loss and divorce, at the same time, individuals show gradual improvements, on average, in psychological functioning over several years, approaching previous levels. Focusing on health adversities, the years before the actual diagnosis of a chronic illness may be characterized by declines in mental health and well-being due to individuals experiencing various health symptoms, such as pain and difficulties in activities in everyday living (Verbrugge & Jette, 1994), just as individuals with cancer showed poorer psychological, physical, and social functioning prior to the diagnosis (compared to a control group who did not experience a cancer diagnosis, Costanzo, Ryff, & Singer, 2009). Knowing the actual diagnosis could provide a relief by the individual knowing the cause of symptoms and leading to a roadmap for ensuring receipt of proper treatment; this in turn could lead to improvements in mental health and well-being. Drawing more attention to whether and how different types of adversities may invoke different psychological responses (Holmes & Rahe, 1967; Turner & Wheaton, 1995) will importantly allow for comparing whether the resilient trajectory depends on the adversity.

Based on these factors, ultimately, we cannot be certain that resilience is the common response to significant adversity in adulthood and old age. Instead, we believe that a recovery trajectory is the modal response to adversity, a conclusion based on empirical analyses we have described (and indeed, one that is conceptually reasonable, as significant adversities are likely to have some effects, however fleeting, on most people). We believe that the findings showing a resilient trajectory as the modal response to adversity are an artifact of the methodological assumptions that underlie a majority of studies utilizing GMM in this literature (86% assumed homogeneity of variance across identified

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[2] Most studies that set the slope variances to 0 mentioned that this was due to convergence issues.

trajectories and 68% set the slope variances to zero). If the same systematic biases in analyses are applied, coupled with a stringent definition of resilience, and the use of one outcome (82% of studies included solely one outcome), this can result in the same misleading/erroneous findings. Based on the studies that did not assume homogeneity of variance and those that simultaneously examined multiple outcomes, the picture of resilience is much more complex than and not as straightforward as it has been communicated in the adult resilience literature. Resilience is a complex phenomenon (Luthar et al., 2000) and in discussions that follow, we introduce a resilience framework that can be harnessed to ensure that these complexities are carefully considered in future studies examining resilience to adversity in adulthood and old age.

4. Future directions

Based on our review of the literature, we believe that there are three important future directions that promise to illuminate the nature and processes of resilience to adversity. We discuss them in turn: (1) replicating trajectories across samples and outcomes; (2) illuminating the processes underlying resilience; and (3) incorporating a multidimensional approach.

4.1. Replication studies and methodological approaches

One potential reason for the previous application of stringent methodological assumptions could be due to small sample sizes and number of observations. GMM needs a sizeable number of participants to reliably extract distinct trajectories from the data. We have several points of emphasis that center on replication, including different research labs examining resilience, and harmonization of datasets.

The notion of "big data" is gaining momentum across literatures, typically discussed in the social media sense (e.g., gathering data from Twitter, Facebook, and Mechanical Turk, see Gosling, Vazire, Srivastava, & John, 2004). In the context of resilience, we view this as carrying high potential. Given the number of longitudinal panel surveys and their easy access, they can be harnessed through harmonization or combining datasets that have similar measures and adversities included, to examine the nature of and vulnerability and protective factors associated with resilience.

There are several reasons why researchers should move toward the harmonization of datasets in the study of resilience. To begin with, there are precedents; this is akin to the movement of Integrated Data Analyses that have shown to increase sample size and the power to detect between-person differences in examining longitudinal change in cognitive functioning (Hofer & Piccinin, 2009; McArdle, Grimm, Hamagami, Bowles, & Meredith, 2009). With the increase in sample size for given adversities and number of observations, there is enhanced ability to increase power to relax the methodological assumptions typically applied. Additionally, some adversities have a low frequency (e.g., spousal, child loss, chronic illness) and can lead to a decreased likelihood of participation after adversity onset (i.e., attrition). Combining datasets will increase power for detecting distinct trajectories and can allow for simultaneously examining multiple outcomes to ascertain the concordance of resilience.

More attention is needed to the implication of potential non-normality of the outcomes examined, such as depressive symptoms and post-traumatic stress symptoms. These measures typically do not have a normal distribution, which our models assume unless specified otherwise. Researchers may not fully consider whether a more appropriate outcome distribution may be necessary. As shown by Bauer and Curran (2003), GMM is one way to account for non-normality in the distribution of observed variables. More recently, Infurna and Grimm (2018) demonstrated the implications of ignoring non-normality. Using empirical data of changes in depressive symptoms (count measure of symptoms) following spousal loss, they found that not accounting for

non-normality led to over-extraction of trajectories and resilience being the modal response; when non-normality was taken into consideration, model fit improved and recovery, not resilience, was the modal trajectory found (Infurna & Grimm, 2018).

Finally, the application of GMM and findings from our review raises the additional important questions of (a) which is the most appropriate method of statistical analysis for examining the nature of resilience to adversity, and (b) what we ultimately seek to learn by studying resilience. With regard to the first issue, for example, what is the meaningfulness of dividing participants into distinct trajectories (e.g., resilient, recovery, growth, chronic low/high) based on their trajectories averaged over time? Given the nature of GMM, it is likely difficult to isolate those individuals who experienced very high or low levels of distress at a given time point. In future research, therefore, it would be useful to compare and contrast the value of using GMM on the one hand, versus the use of latent growth curve (multilevel) modeling on the other (see Grimm, Ram, & Estabrook, 2017). Latent growth curve modeling allows for studying the sample as a single population, with the ability to examine model-implied changes and assessing whether there are between-person differences in level and rates of change over time (Grimm & Ram, 2018). This latter approach enables prediction of between-person variations in the within-person associations over time, and across each measure of adjustment (e.g., Infurna et al., 2017; Lucas, 2007). As such, therefore, latent growth curve (multilevel) modeling is likely closer to Rutter's (2006, 2012) stipulation that resilience is best defined as manifestation of relatively better outcomes as compared to those individuals who also experienced the adversity.

With regard to the second issue, we reiterate what has been emphasized in the child resilience literature (see Luthar et al., 2015), that is, from its inception, the field of resilience has been fundamentally applied in nature, with the goal of learning from those who do well despite adversity about how best to help those who struggle. A central focus in most of the studies included in Tables B.1–B.4 was on ascertaining different trajectories and their relative sizes. We acknowledge that most studies also considered predictors of trajectory membership; a review of those findings is beyond the scope of the present review. In future research, we urge researchers studying adults to stay away, entirely, from specifying "rates of resilience" (see Infurna & Luthar, 2016b) and instead, be focused on the substantive question of interest, that is, what are the vulnerability and protective processes associated with better courses of change following adversity?

The use of latent growth curve (multilevel) modeling has clear advantages in the ability to identify factors that are associated with better or worse changes in response to the adversity. Latent growth curve (multilevel) modeling would allow for identifying factors that are associated with better levels of psychological functioning at the time of the reported adversity and what is associated with more positive change following the adversity. In GMM, predictors of trajectory membership are attempting to predict trajectory membership as a whole and does not permit for isolating their association with the outcome at the time of the adversity and changes thereafter. With GMM, it may be difficult to isolate individuals who experienced dramatic and sustained changes because of the adversity encountered or very high levels of distress that begin not until 1–2 years following the adversity. This shift in analytic strategy could be one way to better match the goal of moving away from emphasizing "rates of resilience" and toward predicting meaningful variation in psychological functioning in response to adversity, and thus better informing interventions for whom to target, as discussed later.

4.2. Research designs for studying processes that lead to resilience

We need more attention to processes and mechanisms in resilience. Rutter (1987) wrote that it is not enough to identify "vulnerability and protective factors" but to go beyond this to discern underlying mechanisms. For example, the benefits of high social support could arise

from an overall feeling of being supported when in need, of feeling safe in anticipating that such help would be offered if needed, and/or of feeling like a liked or loved human being. Disentangling the relative importance of such processes is critical in setting the most important priorities for interventions (Luthar & Eisenberg, 2017).

In this regard, longitudinal panel surveys – one of the types of designs used when using GMM in studying resilience – are limited; although they allow for the study of long-term change trajectories following major life stressors, they generally preclude disentangling the "causal" mechanisms that lead to resilience. To some degree, depth of inquiry is inevitably limited in ongoing large-scale surveys. In future waves of such surveys, it could be useful to incorporate occasional in-depth studies of critical psychological and behavioral processes with subsamples of nationally surveyed individuals. Such data on what happens between yearly (and biennial) assessments can provide important insights into the processes that lead to resilience, and to other forms of adaptation following adversity (for discussion, see Jayawickreme & Blackie, 2014).

More closely spaced assessments are needed in order to capture variability between assessments, ideally at the monthly or bimonthly intervals. This will permit evaluations of whether individuals classified as resilient show stable levels of psychological functioning in the immediate months following the adversity or whether their stable, high trajectory is due to the yearly assessments that fail to capture variability between assessments. Furthermore, there is no set time for the recovery period, with this differing between individuals with some taking several months and others taking one, two, three, or more years to fully recover; this is in addition to the recovery period being influenced by the adversity experienced and outcome(s) assessed. As we found, the timing of recovery, on average, was quicker for positive and negative affect as compared to life satisfaction (Infurna & Luthar, 2017a).

Ultimately, more closely spaced assessments offer the promise of examining the timing of recovery and the factors that contribute to a quicker recovery. Individuals who recover may show improvements to near-previous levels on the outcome of interest, but this recovery could be indicative of adjustment to a "new normal". For example, closely spaced assessments could capture changes in cognitive schemas, coping strategies, or meaning-making (Park, 2010) that increase or decrease one's ability to show a resilient or recovery trajectory following the adversity. Being mindful of how individuals may turn their attention or focus to different areas of living can help provide greater meaning as to what constitutes adjustment across the various trajectories following adversity. We view that this is a promising approach in order to examine in detail what leads to different trajectories following adversity.

4.3. Multidimensional approach

In future research on resilience in adulthood and old age, it is critical to consider multiple indicators of "doing well". Early child development research involving inner-city teens showed that 74% of stress-exposed adolescents were deemed resilient when the outcome measure was academic achievement; however, when additional indicators, such as positive peer ratings were taken into consideration, a far less proportion, 15% were deemed resilient (Luthar et al., 1993). Among adults, we recently examined resilience to spousal bereavement across five key indicators, also considering concordance across the outcomes (Infurna & Luthar, 2017a). The proportion of individuals that were resilient drastically differed across outcomes, with 66%, 26%, 19%, 37%, and 28% for the outcomes life satisfaction, negative affect, positive affect, general health, and physical functioning, respectively. When considered collectively across all five outcomes, only 8% of the 421 participants were resilient in each measure, whereas 20% were not resilient across all five outcomes.

These findings clearly establish that "prevalence rates" of resilience depend on the outcome and the number of domains considered, and this is true of adaptation in general, which is multidimensional in

nature (Baltes, 1987). Thus, depending on the indicator considered, the likelihood of resilience will vary. Therein lies the rub for anyone seeking to quantify rates of resilience: How can we be certain, as researchers, that low levels of depressive symptoms before and after spousal loss (or low post-traumatic stress symptoms following military deployment) do not coexist with unmeasured disturbances in various germane areas of maladjustment, such as abuse of drugs or alcohol, or any of myriad problems with physical health or interpersonal relationships? If empirical studies that use GMM to examine resilience only report on a single outcome, it is impossible to ascertain the proportion of individuals who are "truly" resilient, because there is no information on potentially high disturbances across other pertinent adjustment outcomes that are not included in that particular study.

With this dilemma acknowledged, we echo child developmentalists' recommendations that in studying resilience in adulthood, researchers include multiple outcomes that are most conceptually relevant to the adversity under study (Luthar et al., 2000, 2015). For example, when focusing on bereavement, measures of grief, depressive symptoms, and loneliness, as well as social functioning may be most pertinent, as opposed to overall life satisfaction. Focusing on health adversities, outcomes centered on physical health are likely to be most relevant, including physical functioning, perceptions of health, and physiology, as well as social functioning as they represent one's ability to remain engaged in everyday activities of daily living (Infurna & Wiest, 2018). For caregiving, there are strains across multiple domains beyond that of mental health, such as physical exhaustion, psychological depletion, and role overload. For unemployment, beyond the examination of well-being, feelings of self-worth, mastery, and personal identity may be among the most pertinent for studying resilience. Ultimately, this multidimensional approach permits for studying cross-domain variability and will allow for determining whether and how resilience co-exists with declines or stability in other pertinent domains.

There are different strategies that can be used in implementing this multidimensional strategy in operationalizing resilience (Luthar & Zelazo, 2003), including selecting the relevant domains and analyzing them separately as done in studies reported here (Infurna & Luthar, 2017a, 2017b). Alternatively, a single, composite resilience summary score can be created that represents overall resilient adaptation, by combining multiple outcomes either through z-scores or factor analysis. Whichever strategy is used, it is critical that researchers clearly specify, in their conclusions, both the nature and limitations of their measurement choices.

Another direction is the consideration of outcomes other than those based in self-reports (of well-being or symptoms), that is, to consider others' views of a person's "doing well" (Clement & Bollinger, 2016; Luthar et al., 2015; Luthar & Zelazo, 2003). In research on resilience in children and adolescents, a common strategy has been to define competence in terms of ratings by teachers, peers, parents, or observers. The rationale has been that getting along adequately with peers and adults in one's life are important stage salient developmental tasks, and others' ratings of what a child brings to these relationships are likely more reliable and valid than is the child's self-report. Arguably, for adults who have experienced an adversity, it is as compelling a sign of doing well as any, if their partner, child(ren), or colleagues at work rated them as being generally responsive and responsible in any of those life roles (Luthar et al., 2015).

In a similar vein, it would be useful to draw upon positive psychology, which studies character strengths and virtues that help individuals facilitate a broader connection with all of humanity, and empathetic concern for others (Luthar, Lyman, & Crossman, 2014; Peterson & Seligman, 2004). In our review, the majority of studies focused on well-being and mental health outcomes. Considering character strengths and virtues would help researchers consider constructs involving humans' prosocial behaviors and feelings of gratitude toward one another, not just in their personal lives but more broadly, to communities and society (Clement & Bollinger, 2016; Helzer &

Jayawickreme, 2015; Luthar et al., 2014; Luthar & Eisenberg, 2017). It would be useful to illuminate, for example, salient, mutable factors that foster stress-exposed individuals' proclivities for compassion, empathy, or humility. Although such constructs are not as mainstream and typically not included in longitudinal research studies, inhibiting their study in resilience research, they can and should be incorporated in future designs, as is feasible/practical. This further reiterates the notion that changes in well-being or character strengths and virtues following adversity is a dynamic process, which, as we discussed above, requires empirical approaches to do just that, study resilience to adversity as a dynamic process.

Taking this one-step further, the specific character strengths of relational virtues (i.e., compassion for and closeness with others), humility, prosocial behavior, and empathy should be the focus of research studies examining adaptation to adversity. The importance of focusing on these indicators is due to their ability to facilitate a broader perspective and connection with all of humanity and their role for competence in everyday life (Emmons, 1999). Relational virtues broadly consist of one's general closeness with others and feeling, noticing, and responding to another's condition (Kanov et al., 2004) and promote well-being, mental health and the process of recovery (Cosley, McCoy, Saslow, & Epel, 2010; Strauss et al., 2016). Humility broadly encompasses having a sense of modesty that involves action tendencies oriented toward celebrating others, as well as self-evaluations that involve hiding from others' evaluations; research has documented its relevance to a wide-range of outcomes, including well-being and spirituality (Weidman, Cheng, & Tracy, 2018). Prosocial behaviors consist of voluntary actions that individuals may take on to help, take care of, assist or comfort others; research has documented its relevance for self-regulatory capacities, well-being, and adjustment to life stages (Caprara, Steca, Zelli, & Capanna, 2005; Eisenberg et al., 2002). Empathy consists of multiple facets, such as perspective taking, affective response, and emotional regulation that are associated with positive outcomes across the lifespan (Eisenberg, 2000; Gerdes & Segal, 2011).

Guiding our rationale for focusing on these character strengths are theoretical perspectives (Tangney, 2000; Vollhardt, 2009) and limited empirical studies showing that adversity has the potential to shape the course of changes in these character strengths. In past research, character strengths have typically been assessed at one time point and the antecedents are not fully studied (Clement & Bollinger, 2016). Peterson and Seligman (2003) observed that following the terrorist attacks of September 11, 2001, the virtues of gratitude, hope, kindness, leadership, spirituality, love, and teamwork showed elevations up to 10 months following the attacks. There is limited longitudinal research that has examined changes in character strengths following adversity. Frazier et al. (2009, 2013) observed that individuals who experienced a recent trauma showed increases in the strength of their relations with others and likelihood of engaging in prosocial behaviors (daily helping behaviors) over a two-month period. Adversity may cause individuals to take greater notice and importance in one's relationships, leading to greater compassion for others. Engaging in prosocial behavior following adversity could alleviate one's own distress, as well as a way to help themselves and others (Steffen & Fothergill, 2009).

5. Resilience framework for research, practice, and policy

The findings from our review of the articles in Tables B.1 – B.4 and considerations for future research make clear the importance of developing a resilience framework that is accessible to researchers, clinicians, and policy makers. A resilience framework can help guide researchers, clinicians, and policy makers of various backgrounds in their respective approaches to furthering our understanding of individuals' ability to overcome various types of life adversities (Luthar et al., 2000). Most importantly, this can provide an actionable plan for informing intervention efforts and how resources should be best utilized to foster positive outcomes in the face of adversity (Luthar & Eisenberg,

Table 1
Summary of family of tenets characteristic of resilience framework for research, practice, and policy.

Tenet 1: Resilience is a phenomenon reflecting doing well in the face of adversity
Resilience is defined based on the nature of change following adversity
Resilience is a dynamic process in which the timing is not "static": The timing of resilience varies across individuals
Resilience is doing better than expected, given the adversity

Tenet 2: Resilience is a multidimensional construct
There is cross-domain variability in adjustment to adversity: People can excel in some domains and struggle in others
The relevant domains to focus on for examining resilience will depend on the adversity: Salience of the domain to the adversity
Given substantial variations across major domains, it is wrong to "diagnose" resilience based on a single measure

Tenet 3: The salience of the methodological approach for examining resilience
Longitudinal data and research designs can be valuable, but is not "the only way" for learning about resilience
Methodological assumptions influence findings pertaining to resilience when using growth mixture modeling
It is important to utilize research designs and apply statistical analyses that allow for examining resilience as a dynamic process, and will help identify factors that promote resilience

Tenet 4: Identification of vulnerability and protective factors that promote resilience
It is important to identify which factors are most salient in their prediction of resilience to adversity
It is important to identify personal and social resources that are potentially malleable to intervention
It is important to shift individuals' attention to areas of strength given their specific context (i.e., age, gender, culture) that are available to them and can be readily harnessed to overcome adversity

Tenet 5: Intervention and Policy Implications
Mantra that "resilience is common" can be harmful to persons who struggle in the time (months, years) following adversity
Proclamation of rates of resilience is misleading and could lead to the lack of intervention efforts to help those in need
There is a need to consider top 3 factors shown to promote resilience: Dependable support system, absence of hostility, and self-regulation
Implementation of interventions to help persons overcome adversity need to be based on factors shown to predict resilience and are malleable to intervention

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Note. The above conceptual tenets have been influenced through the readings of Baltes (1987), Cicchetti (2016), Luthar and Zelazo (2003), Luthar et al. (2000), Luthar and Eisenberg (2017), Masten and Powell (2003), Rutter (1987, 2006, 2012), Ungar (2006), and Zautra et al. (2008).

2017). We next briefly elucidate the five key tenets that comprise our resilience framework.

Table 1 outlines these five tenets: Resilience is (1) a phenomenon reflecting doing well in the face of adversity and (2) is a multidimensional construct. Furthermore, it is critically important to attend to (3) methodological approaches used in examining resilience, (4) vulnerability and risk factors that promote resilience (what personal and social resources are individuals drawing on?), and (5) intervention and policy implications of resilience research. We believe that having such a framework can make for translation of key empirical findings to helping individuals who experience adversities (for discussion, see Luthar & Eisenberg, 2017; Luthar & Zelazo, 2003; Masten & Powell, 2003).

5.1. Resilience is a phenomenon reflecting doing well in the face of adversity

Along the lines that have been discussed by others (Luthar et al., 2000; Masten, 2001), resilience is not a personality trait. Rutter (1987) stated that "…resilience cannot be seen as a fixed attribute of the individual. Those people who cope successfully with difficulties at one point in their life may react adversely to other stressors when their situation is different. If circumstances change, resilience alters (p. 317)". Resilience is a dynamic process exemplified by when an individual (or community) is doing better than expected, given the adversity. The child resilience literature long acknowledged the notion that resilience does not require sustained superior functioning in

relation to the population as a whole, but instead that resilience following adversity can involve multiple pathways with some variations over different periods of time (Luthar et al., 2000; Masten & Narayan, 2012; Rutter, 2012; Ungar, 2006). This is exemplified across the definitions of resilience provided by Luthar et al. (2000), Masten (2014), and Rutter (1987), among others (see Carver, 1998; Zautra et al., 2008), in that resilience is a dynamic process that involves the capacity of an individual/community/system to show adaptation following significant adversity. Because resilience is a dynamic process, this signifies that resilience can take many forms – presence of competence or absence of serious psychopathology, a resilient or recovery trajectory as shown in Fig. 1 – what is important is evidence of relatively better outcomes than others who experienced the same adversity (Rutter, 2006, 2012). Also as discussed earlier, what constitutes resilience may differ based on the type of adversity.

We wish to emphasize, as well, that the timing of resilience differs across individuals. Two individuals may both exhibit a trajectory that is characteristic of recovery, but the time that it takes each individual to recover will differ. For some individuals, their mental health may rebound six months following the adversity, whereas for others, it may take several years for their mental health to fully recover. Translating this to the use of GMM, researchers should not be deterministic when discussing identified trajectories. For example, if the recovery trajectory, as a whole, rebounds after 1-year, this is the average across participants in this trajectory, with some likely taking less time to recover, whereas other individuals will take longer to recover. This can be accounted for in future studies through more frequent assessments that are coupled with statistical analyses that explicitly model non-linearity and estimate between-person differences. We must be cognizant of the fact that the trajectories that are fit using longitudinal data are not set in stone across individuals who belong to each trajectory, but in fact, there is a tremendous amount of heterogeneity in the nature and timing of change following adversity.

5.2. Resilience is a multidimensional construct

The adult resilience literature thus far has largely considered resilience to be a unidimensional reaction to adversity in that as reviewed above, 82% of studies have included one outcome to ascertain resilience to adversity and from this, broad statements regarding overall resilience have been made (see Kleim & Galatzer-Levy, 2015). Conversely, the child development literature has long acknowledged that the nature of resilience will differ based on the outcomes examined, with studies typically including multiple pertinent outcomes to examine resilience (see Luthar et al., 1993, 2000, 2015). We importantly emphasize that it is difficult to assume that resilience in one measured outcome among adults implies that resilience will manifest in other pertinent outcomes, especially if other outcomes are not included in a given empirical study (see Infurna & Luthar, 2017a, 2017b).

From a conceptual or theoretical standpoint, recognition of these cross-domain variations implies the need for specificity, in future work on adults' resilience, of the particular domains used to operationalize "doing well". Again, as child development researchers have emphasized (Luthar et al., 2000, 2015), investigators must specify the particular adjustment spheres to which their findings apply, using relatively precise, circumscribed terms such as "educational resilience", "emotional resilience", or "behavioral resilience". At the same time, it will be important to specifically note that measured domains of well-being, which are by no means generic, do not fully represent across-the-board risk-evasion; difficulties may in fact remain in unmeasured areas. Over time, the hope is that findings recurring across different research designs and measurement strategies will help to refine central theories on processes most strongly implicated in humans' resilience across diverse ways of operationalizing "doing well" (Seery, 2011). (Please see our discussions earlier in the Future Directions section, under 'multidimensional approach' for further arguments on the importance of applying a multidimensional approach to studying resilience in the face of adversity.)

5.3. The salience of the methodological approach for examining resilience

A core component of our review has focused on specific methodological considerations that need to be taken into account when studying resilience. As detailed in the review of the studies and shown in Table 1, the statistical analyses used for studying resilience is paramount. Focusing on GMM, the methodological assumptions applied strongly influence findings pertaining to resilience. We have discussed this throughout the manuscript; building upon this point, our third tenet additionally emphasizes that cross-sectional studies or those containing short-term longitudinal data with only post-adversity data available can, in fact, provide valuable insights into the nature of resilience. This is in contrast to recent papers arguing that pre- and post-adversity data must be available in order to properly study resilience (Bonanno et al., 2015; Kalisch et al., 2017). We agree to some extent that having pre- and post-adversity data provides meaningful insights. However, it is useful to note that the core, foundational studies that formed the basis of the resilience literature were often based on cross-sectional data; despite the availability of only post-adversity data, the core components of resilience were studied and important findings were effectively conveyed. Consider, for example, the initial studies by Garmezy (1985) who studied children of parents who had a mental health disorder or Rutter (1987) who studied women who were institutionalized as children and neglected children who grew up in orphanages. Each set of studies did not have pre-adversity data, but were able to show that despite adversity, individuals have the potential to live meaningful lives, and led to the illumination of important protective and vulnerability processes. In the adult resilience literature, similarly, there have been important findings on resilience even in the absence of pre-adversity data, as in individuals suffering from chronic pain and arthritis (Zautra, Johnson, & Davis, 2005; Zautra & Smith, 2001) and individuals following the September 11 attacks exhibiting few or no symptoms of PTSD (see Bonanno, Galea, Bucciarelli, & Vlahov, 2006).

In sum, although longitudinal data have the ability to provide insights into the nature of resilience to adversity, other important considerations warrant careful attention, such as the methodological assumptions underlying approaches to analyzing the data. We hope researchers do not discount studies that include solely post-adversity assessments, as these can in fact provide valuable insights into the vulnerability and protective processes that foster positive outcomes following adversity. This is especially relevant given the spate of natural disasters that continue to devastate parts of the United States and other countries across the world, as well as mass shootings and terrorist attacks that transpire across the world.

5.4. Identification of vulnerability and risk factors that promote resilience

Vulnerability and protective factors make a difference in adjustment to adversity. A majority of the studies that we reviewed additionally examined predictors of resilience. Although a review of these factors was beyond the scope of this article, it certainly warrants attention in future reviews; we reiterate the critical importance of identifying vulnerability and protective factors that strongly predict adults' resilience, especially those that are modifiable in interventions. Pertinent in this regard is a recent Special Section in the journal *Child Development* in which authors delineated how best to maximize resilience among children at risk for maladjustment, with accompanying evidence on processes that have relatively strong effects, and are feasibly modifiable by behavioral interventions (along with real-world examples of these; see Luthar & Eisenberg, 2017).

Two core take home messages emerged from the aforementioned Special Section, and these both have potential applications to the adult resilience literature. The first major take home message derived from all

the articles concerned adults, not children – and this was that all adults, especially those in major caregiving roles, must regularly receive tending themselves. Indeed, child development researchers have focused not only on factors that promote better outcomes in children and adolescents, but also in parents and other adults in significant caregiving roles (see Luthar & Ciciolla, 2015; Luthar, Curlee, Tye, Engelman, & Stonnington, C.M., 2017). Second, three key sets of factors were consistently associated with resilient outcomes: having a dependable social support system, absence of hostility/anger and maltreatment, and self-regulation factors and coping skills (Luthar & Eisenberg, 2017). These two core messages recurred across the eleven articles spanning diverse types of adversities, with documented robustness of findings. This is in contrast to the adult resilience literature, in which some have suggested that predictors of resilience are mostly weak, explaining only small proportions of variance (Kalisch et al., 2017). It is worth examining, in the future, whether the two core messages outlined above might in fact "replicate" in studies of resilience among adults, and potentially have non-trivial effect sizes.

More broadly, we respectfully suggest that researchers be mindful of the intersection between the child and adult resilience literatures. Major advances – in conceptualization, theory, and research on resilience – have accrued via the scholarship and research by developmental psychologists starting from almost seven decades ago. By acknowledging and treating the two literatures as complementary rather than being mutually exclusive, there is great potential to make meaningful advancements in our understanding of what contributes to individuals' ability to overcome adversity, and beyond that, to applying these insights in substantially improving their odds of doing well.

5.5. Intervention and policy implications of resilience research

Resilience research has the potential to inform how societal resources should be utilized to promote positive outcomes following adversity. This tenet has two elements. First, we believe that the dialogue on "prevalence rates of resilience" and mantra that "resilience is common" should no longer be a highlight or part of the take-home message for studies on resilience. As discussed in length above, resilience is a multidimensional construct, with a great deal of cross-domain variability in that resilience in one outcome will coincide with difficulties in other outcomes. We fear that policy makers can misinterpret the message of "resilience is common", leading to withholding of resources when they are much needed (Luthar et al., 2000). Should resources not be mobilized when Hurricanes strike and cause great damage (e.g., Hurricane Andrew and Katrina and most recently, Hurricanes Harvey, Irma, and Maria) or if there is a mass shooting (e.g., Las Vegas) or in the case when someone loses their job or their spouse passes away? As we have argued, these conclusions of resilience being the norm can be inaccurate due to faulty methodological assumptions. Individuals can and may struggle for a period of time (ranging from several months to several years or longer) following adversity and the key for researchers is to acknowledge this, and then seek to uncover what most helps them in order to inform practice and policy.

The second element to this tenet is that the protective and vulnerability factors that researchers should focus on are those that are both likely to have strong effects and are malleable to intervention. There is precedent in the child resilience literature of translating empirical research on resilience to interventions. This is typically done by first documenting how a particular protective factor is consistently shown to be predictive of resilient outcomes in empirical studies, with the second step involving developing an intervention that is centered on changing or enhancing this protective factor. Several examples are found in the aforementioned special issue in Child Development. For primary caregivers to have a dependable support system is a critical protective factor, consistently associated with resilient outcomes among mothers as well as their children. For example, Taylor and Conger (2017), as well as Valentino (2017) described that enhancing support for mothers

is critical for improving maternal sensitivity and positive parenting, and thereby promoting resilience among at-risk children. Luthar et al. (2017) developed and tested a workplace program with the central goal of facilitating authentic, supportive relationships among professional mothers under high stress. Results showed that mothers in the intervention group showed sustained declines in depressive symptoms, global symptoms, emotional exhaustion in work, and levels of cortisol, as well as improvements in self-compassion. In the adult resilience literature, we would benefit from similar compendium of review articles identifying replicated findings of "what matters most" in the face of different adversities, and "how best these can be changed" in the real world.

6. Limitations

With regard to potential limitations of this study, there are at least two issues that should be considered. The first concerns the selection of studies in this review, including reasons for inclusion or exclusion. On this front, we reiterate (as we did at the outset) that we included all published studies that were found using the terms outlined above. It is possible that non-published findings or any published ones that we inadvertently overlooked, might qualify some of our conclusions. If that is the case, we would certainly welcome notification of what we have missed, and with that, the opportunity to correct any conclusions that we may have mis- or over-stated.

Relatedly, we acknowledge that the use of GMM and latent trajectory methodologies are not confined to the adult resilience literature. GMM is also used in examining substance use from adolescence and into young adulthood (Chassin et al., 2013), perceptions of self and peers across time (Ladd, Ettekal, & Kochenderfer-Ladd, 2017), mental health in children following adversity (La Greca et al., 2013), and age-related trajectories of physical functioning in old age (Liang et al., 2010; Martin et al., 2017). The inclusion of these literatures was beyond the scope of this review due to our specific interest and focus on recent developments and findings in the resilience literature in adulthood. We hope that our review could provide insights on whether the issues surrounding these methodological assumptions apply to other literatures and venues where GMM is used.

A second question that might be raised concerns the procedures via which the included studies were coded. All studies in Tables B.1–B.4 were coded based on five specific criteria discussed by both authors. The first two concerned pivotal statistical assumptions that we have previously examined empirically (Infurna & Grimm, 2018; Infurna & Luthar, 2016a), that is, (1) whether or not the variances were estimated to be the same or different across trajectories, and (2) whether or not the slope variance was set to 0, estimated to be the same, or estimated to be different across trajectories. Given the implications for overall conclusions about "resilience is common", we also stipulated, a priori, consideration of (3) the number of outcomes and whether more than one was included, (4) the operational definition of resilience, and (5) the number of trajectories identified and proportions of individuals likely to belong to each trajectory. We acknowledge that depending on other researcher's particular interest, the criteria used to code the articles will likely differ. Again, we are open to other interpretations of the studies reviewed and engaging in a dialogue regarding their merit and criteria for evaluation. We hope that the issues raised begins a larger dialogue of how the methodological assumptions underlying our statistical methods of analysis has the potential to influence the findings and conclusions from longitudinal studies on resilience.

7. Conclusion

Resilience is a construct that is of great interest to the lay public and policy makers, and scientists' data-based conclusions can deeply affect societal views about whether it is normative, as opposed to largely atypical, for people to experience some set-backs (even relatively

briefly) in the aftermath of a major life stressor. These views, in turn, have implications for policy and clinical decisions potentially directed at helping those in need when confronted with an aversive life event. Our goal in this paper was to provide an overview of the resilience literature in adulthood and old age that has used GMM to derive distinct trajectories surrounding exposure to major life stressors. Based on our review of 77 studies on adults experiencing different adversities, we conclude that there is reason to doubt the commonness of resilience to major life stressors; instead, most individuals likely show a recovery trajectory. In future research, it will be important for researchers to learn from adults who do relatively well despite adversities about services that might be most beneficial for those who need it most. Toward this end, we have emphasized greater replication across future multi-wave studies and outcomes, illumination of process leading to resilience, and incorporation of a multidimensional approach in future research. In general, we advocate for greater interface and exchange of methods, theories, and findings from the child and adult resilience literatures. Furthermore, we set forth a resilience framework that we hope will be useful in guiding future research, practice, and policy. The tenets that comprise our resilience framework center around resilience being a phenomenon reflecting doing well in the face of adversity, and that exhibiting resilience is dependent on how it is studied, the outcomes examined, the adversity encountered and the resources that must be enhanced, to improve chances of doing well. We hope that this review will stimulate increased interest in research on resilience to major life stressors, ultimately, fostering the degree to which people can function well despite encountering significant adversities in life.

Author notes

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cpr.2018.07.003.

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