

# The Effect of Perceived Social Support on Personal Resources Following Minor Adversity: An Experimental Investigation of Belonging Affirmation

Personality and Social Psychology Bulletin  
2021, Vol. 47(7) 1152–1168  
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DOI: 10.1177/0146167220961270  
journals.sagepub.com/home/pspb  


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## Abstract

People rely on their social relationships to help them cope with many stressors over the course of their lives. Across three experiments, we randomly assigned people to experience minor adversity or not and then to experience perceived social support (via belonging affirmation) or not. We found that those who underwent adversity without perceived social support had lower scores on personal resources (e.g., gratitude, connectedness) than the other conditions. In addition, we tested whether perceived social support helps people grow following adversity or simply buffers them from adversity-related declines in personal resources. Our findings comparing growth and buffering hypotheses were mixed; however, the evidence for buffering was slightly stronger than the evidence for growth. Thus, more research is needed to determine whether perceived social support buffers decrements in personal resources following adversity or actually promotes growth. Nevertheless, perceived social support is an important source of resilience when facing life's inevitable challenges.

## Keywords

stress-related growth, posttraumatic growth, social support, belonging affirmation

Received September 11, 2019; revision accepted August 23, 2020

People encounter a variety of stressors—both major and minor—over the course of their lives. Responses to stressors are varied, with some people reporting increases in personal resources like gratitude and connectedness following adversity and others reporting no change or even decrements in personal resources (Frazier et al., 2009). One factor that could contribute to growth is whether the person facing the stressor has adequate social support. Thus far, research on stress-related growth has focused heavily on growth following major events (e.g., posttraumatic growth), rather than minor stressors, and has often relied on correlational methods to assess growth and its potential correlates (e.g., social support). In the current studies, we draw on the literature considering growth following major adversity to consider growth following minor stressors. Specifically, we investigate minor adversity and growth in an experimental context to determine how and why people develop or maintain personal resources in the face of minor stressors.

## Personal Growth Following Adversity

People experience psychological distress following adverse events in their lives, but Tedeschi and Calhoun (2004) contend that a corresponding or alternative long-term outcome is

*posttraumatic growth* whereby people experience positive psychological change because of the struggle with these challenging circumstances. Specifically, following trauma, people have reported closer relationships with others, greater appreciation of life, greater sense of personal strength, recognition of new possibilities or paths for one's life, and spiritual development (Tedeschi & Calhoun, 1996). Importantly, growth is present when a person's development on certain resources (e.g., gratitude, personal strength) surpasses what was present before the adverse event occurred (Tedeschi & Calhoun, 2004).

*Posttraumatic growth* theory holds that adverse events need to be traumatic or life-altering to prompt personal growth (Tedeschi & Calhoun, 2004), but other researchers have focused on *stress-related growth* and have considered a broader range of both major and minor stressful experiences (e.g., problems in romantic relationships, problems in

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academic performance; Park et al., 1996). The accumulation of relatively minor stressors could promote growth incrementally rather than one major event (Aldwin & Levenson, 2004). Indeed, Aldwin and Levenson (2004) note that when people successfully navigate a minor stressor, they build coping resources that could translate into Tedeschi and Calhoun's (2004) more sweeping conception of "a greater sense of personal strength." Thus, meeting the demands of mild daily stressors could promote incremental and continuous personal growth that could equate or surpass growth from more jarring traumatic experiences. Because development can occur via minor or major stressors, and because the current studies experimentally manipulate a minor stressor, we prefer the broader *stress-related growth* terminology to the *posttraumatic growth* terminology and use it throughout this article.

### *Methodological Issues in Stress-Related Growth Literature*

Researchers have reported that growth following adversity is a common experience, with the majority of respondents reporting some type of growth (Linley & Joseph, 2004). Despite the apparent ubiquity of stress-related growth—or maybe because of it—researchers have raised concerns about the common methodology used to assess this phenomenon (e.g., retrospective reports, no control groups; Infurna & Jayawickreme, 2019; Jayawickreme & Blackie, 2014).

Most of the empirical evidence for stress-related growth relies on questionnaires that ask participants to self-report past challenging events and the degree to which they have changed on various positive domains due to the stressful event (e.g., "I have a greater appreciation for the value of my own life"; Park et al., 1996; Tedeschi & Calhoun, 1996). This approach requires that the participant engage in the cognitively demanding task of evaluating their current standing, recalling their prior standing before the event occurred, comparing the current and prior standings, and evaluating how much of the change was due to the stressful event (Jayawickreme & Blackie, 2014). Past research indicates that people's retrospective self-reports of personality change is minimally correlated with actual change (Robins et al., 2005), and research on stress-related growth also demonstrates that the ability to assess personal change on psychological resources following adversity is poor.

For example, one study assessed various dimensions (i.e., positive relationships, meaning in life, life satisfaction, and religious commitment) theorized to grow following stressful experiences at two time points, 2 months apart (Frazier et al., 2009). At the second time point, they also asked participants to report whether they had experienced a stressful event during the 2 months and how much they had grown from that experience (the typical method of assessing stress-related growth). Thus, researchers were able to assess

the relationship between perceived and actual growth. They found a small to moderate correlation between perceived and actual changes in religious commitment, but no correlation on any of the other measures. Interestingly, only 5% to 25% of participants showed actual change on the five dimensions of growth, percentages much lower than is often reported with the reflective, self-reported stress-related growth measures (Linley & Joseph, 2004).

In addition, most studies in the stress-related growth literature do not include a comparison group (but see Blackie et al., 2017; Cordova et al., 2001). Thus, researchers cannot determine whether reported growth is due to the adversity, self-enhancement, or simply maturational changes characteristic of people in general (McFarland & Alvaro, 2000; Roberts & Mroczek, 2008). In the current paper, we address past methodological flaws by randomly assigning adversity, which allows us to infer causality between the adverse event and the outcomes. In addition, we hold the type of stressful experience constant, as well as the time elapsed since the stressful experience. Experimental modeling of stress-related growth will complement studies with prospective designs and add to a more accurate picture of stress-related growth than is currently available via retrospective self-reports.

### *Stress-Related Growth and Social Support*

Despite methodological concerns about the stress-related growth literature, we contend that personal growth following adversity does happen for some people under certain conditions (Frazier et al., 2009). Our experimental approach will allow us to test one such condition—the presence of social support following adversity. Tedeschi and Calhoun (2004) propose that people struggle to accommodate the adverse experience into their previous schemas about how the world works and that this process of meaning making is what promotes growth. One way in which people make meaning of their stressful experience is by reaching out to others. Their confidants might offer them new perspectives that can help them accommodate the adverse event into their worldview and lead to growth. Thus, Tedeschi and Calhoun (2004) proposed that enacted social support—what others say and do to assist the person following the event (e.g., words of encouragement or insight, meal preparation)—can help people grow after adversity. In addition, Park et al. (1996) found that stress-related growth was related to one's perceived social support. As opposed to enacted social support when one's social network actually does something with them or for them, perceived social support is one's appraisal that social support would be available and adequate if needed (Barrera, 1986). In line with Park et al. (1996), in the current studies, we expected that people who underwent adversity would be more likely to grow from the experience if they were reminded of the close relationships in their lives (i.e., if they had perceived social support).

## An Alternative to Stress-Related Growth: Stress-Buffering

Although we predicted that stress-related growth would be more likely if a person perceives social support, an alternative possibility may be that perceived social support will restore people's personal resources to pre-adversity levels. Correlational evidence demonstrates that stress is inversely related to the stress-related growth domains purported by Tedeschi and Calhoun (2004). For example, stress is negatively related to relationship satisfaction (Randall & Bodenmann, 2009), appreciation of life (Wood et al., 2008), self-esteem (Dumont & Provost, 1999), and spirituality (Underwood & Teresi, 2002). Thus, with no intervening factors accounted for, stress is negatively related to important personal resources. Perhaps, instead of social support helping people overcome stressful experiences to the extent that they actually grow in personal resources, it might simply help them restore the levels of the personal resources they had prior to the stressful experience.

Indeed, perceived social support has been found to buffer the adverse effects of stress on well-being (S. Cohen & Wills, 1985), but we know of no research that has explored whether social support also suppresses the negative relationship between stress and other personal resources (e.g., appreciation of life, better interpersonal relationships). Thus, in the current set of studies, we explore whether social support promotes buffering following adversity as an alternative to prompting stress-related growth.

## Belonging Affirmation

Belonging affirmation is a specific type of self-affirmation activity in which people write about how their important personal values (e.g., Creativity, Religion) have made them feel closer and more connected to other people. Typical self-affirmation activities in which people write about important personal values without the explicit belonging framing reduce the negative effect of a stressful experience on various outcomes (e.g., academic performance, willingness to receive threatening health information; G. L. Cohen & Sherman, 2014). Research suggests that the key ingredient in the typical self-affirmation activity is its ability to bring to mind close personal relationships (Crocker et al., 2008; Shnabel et al., 2013). Thus, affirmation activities that focus explicitly on belonging themes (i.e., belonging affirmation) should be more effective in overcoming threat than typical affirmation activities because they include a more direct reference to the key ingredient of close relationships.

For example, researchers tested whether belonging affirmation could improve results for vulnerable people above the typical affirmation instructions (Shnabel et al., 2013). They randomly assigned men and women to complete affirmation activities with varying levels of social focus or a control condition (no affirmation) before taking a difficult math

test. Because of well-known negative stereotypes regarding women in math, women were believed to be under stress (i.e., stereotype threat), whereas men were not. As expected, when assigned to the no affirmation group, men performed better than women. In the standard affirmation condition, men and women performed about equally well (demonstrating buffering), but in the belonging affirmation condition women actually performed better than men (demonstrating growth), earning the highest average score for men or women in any of the conditions. Thus, although the standard affirmation had seemingly reduced stereotype threat among women, the belonging affirmation was even more effective in helping a vulnerable group overcome a challenge, pointing to the key role of social relationships in the affirmation process.

Although not tested directly by Crocker et al. (2008) or Shnabel et al. (2013), we expect that the belonging affirmation condition boosted perceptions of social support to a greater degree than the standard affirmation condition, and that was what helped people overcome their adversity. As one piece of evidence, Crocker et al. (2008) found that positive other-directed feelings mediated the relationship between the affirmation manipulation and differences in defensive responding to negative health information. We posit that a similar process would occur when participants are threatened by a variety of adverse events (e.g., social exclusion, poor academic or work performance). Although these adverse experiences may prompt initial decrements in personal resources like gratitude, bringing to mind one's close relationships may make the adverse event feel smaller and less threatening, thus bringing gratitude back to the levels prior to the event (buffering hypothesis) or prompting greater gratitude than the person had prior to the event (growth hypothesis).

## The Current Studies

Park et al. (1996) reported that problems in romantic relationships, problems with academic performance, moving away/starting college, and the death of a loved one were the top four stressful events self-generated by their participants. Accordingly, in Studies 1 and 2, we manipulated loneliness to simulate how people might feel after moving away/starting college or after having problems in a romantic relationship, and, in Study 3, we manipulated intelligence to simulate how students might feel after performing poorly in their classes. Following the adversity manipulation, in all three studies, we manipulated perceptions of social support by randomly assigning participants to engage in the aforementioned belonging-affirmation writing activity (Shnabel et al., 2013) or a control activity. Thus, all three studies included the same experimental design:  $2 \times 2$  (Adversity [adverse experience, control])  $\times$  (Social Support [belonging affirmation, control]).

After our manipulations, all participants completed measures meant to represent the stress-related growth domains

proposed by Tedeschi and Calhoun (2004). To avoid overburdening participants, we did not exhaustively represent these domains, but chose to include assessments of interpersonal relationships, appreciation of life, and personal strength. We chose these three domains because we thought they might be the most subject to depletion from our loneliness and intelligence manipulations and also more responsive to the social support manipulation (as opposed to the domains of spiritual development or recognizing new possibilities or paths for one's life). For interpersonal relationships, we assessed feelings of connectedness to others and prosocial behavior; for appreciation of life, we assessed gratitude in two ways (one modified trait measure and one state measure more subject to change); and for personal strength, we assessed self-integrity and humility. To our knowledge, none of the stress-related growth literature specifically mentions humility as a potential area of growth, but we include it here as an important character strength that may be enhanced after an adverse experience. Humility has been defined as having a secure identity that is free from distortion and open to new information, as well as an appreciation of the equality and positive worth of others (Chancellor & Lyubomirsky, 2013). We predicted that, if adversity coupled with social support could enhance the other listed attributes (e.g., gratitude, self-integrity), humility may also be bolstered and may be an important personal attribute in promoting growth.

We explored two competing hypotheses: growth or buffering. In both hypotheses, we predicted that those who experience adversity, but do not receive social support would report the lowest personal resources of all the groups (i.e., adversity without social support is detrimental). For the growth hypothesis, we tested whether experiencing adversity followed by social support led to the highest levels of personal resources among the four groups. For the buffering hypothesis, we tested whether experiencing adversity followed by social support led to similar level of personal resources as those who experienced no adversity. Because elements of the growth and buffering hypotheses are overlapping, we also tested the degree to which the growth hypothesis was a better fit to the data than the buffering hypothesis (or vice versa). Finally, we include a meta-analysis of our findings across the three studies to summarize our results.

## Study 1

Humans have a fundamental need to belong and are extremely sensitive to cues of rejection that might signal their lack of worth and impending exclusion from a social group (Baumeister & Leary, 1995). Indeed, the inverse of belonging, loneliness, is one of the most deleterious states for mental and physical health (Cacioppo & Patrick, 2008). Given people's sensitivity to loneliness and its negative effects, loneliness constitutes an adverse experience that could be manipulated to answer our research questions.

## Method

### Participants

Undergraduate students from the participant pool at California State University, East Bay, received course credit in exchange for their participation ( $N = 236$ ; 62.8% female, 35.9% male, 1.3% preferred not to state). Ages ranged from 18 to 84 years ( $M = 20.92$ ,  $SD = 6.22$ ), and the sample was ethnically diverse (34.5% Hispanic/Latino, 28.3% Asian, 12.6% Black/African American, 11.2% White, 5.8% More than one, 4.0% Other, 3.1% Hawaiian/Pacific Islander, and 0.4% Prefer not to state).

To detect medium effect sizes, we would need 171 participants to achieve 90% power (Faul et al., 2009; the analysis of variance [ANOVA]: fixed effects, special, main effects, and interactions option, effect size  $f = .25$ , numerator  $df = 1$ , number of groups = 4). We anticipated eliminating some participants due to not following instructions or not believing our adversity manipulation, so we collected more participants than necessary based on this power analysis. In addition, this power analysis is estimating the ability to detect effects in a  $2 \times 2$  ANOVA, so is conservative given that we used focused contrast analyses as our primary analyses.

### Procedure

Participants signed up for the "Cognition and Personality" study on the research participation website and then came to a computer lab in groups of up to 24 students. Participants were given a link to the Qualtrics study website, consented to participate, and then all study instructions and random assignment to conditions took place via this website. First, participants were randomly assigned to the *lonely* or *not lonely* condition and completed their respective activity. Second, participants reported how they were feeling in the moment (state affect, including state gratitude). Third, participants were randomly assigned to the *belonging-affirmation* or *control* condition and completed their respective activity. Fourth, participants again reported how they were feeling in the moment (state affect). Fifth, participants completed outcome and manipulation check measures in the following order: connectedness, perceived social support, GQ-6 gratitude, humility, prosocial behavior, and self-integrity. Finally, participants reported their demographics and read a debriefing statement revealing the true purpose of the study. Average completion time of the study was 18 min, 36 s ( $SD = 5$  min, 51 s). Complete instructions for manipulations and measures are available in Supplemental Material.

**Adversity (loneliness) manipulation.** Following past research, we manipulated loneliness by administering a 10-item loneliness survey (varied by condition) and then providing fake feedback regarding participants' loneliness score (Wildschut et al., 2006). Participants randomly assigned to the *lonely*

condition completed a survey with items that would be easy to endorse (e.g., “I sometimes feel unhappy doing things alone”); 7-point Likert-type scale from *strongly disagree* to *strongly agree*), whereas participants assigned to the *not lonely* condition completed a survey with items that would be relatively difficult to endorse (e.g., “I always feel unhappy doing things alone”).

Next, participants in the *lonely* condition saw the following message “You were in the 62nd percentile of loneliness. This means that, compared with other college students, you were above average on loneliness.” Participants in the *not lonely* condition saw the following message “You were in the 12th percentile of loneliness. This means that, compared with other college students, you were well below average in loneliness.” We then asked participants in the *lonely* and *not lonely* conditions to provide a written response explaining why they scored so high (*lonely*) or low (*not lonely*) in loneliness. As a manipulation check of the loneliness manipulation, two independent coders rated whether participant responses indicated an understanding of their score and a belief in their results (1 = *yes to both*, 0 = *no to at least one*; sample responses are presented in Supplemental Material, Table 4). Raters achieved substantial agreement (Cohen’s  $\kappa = .67$ , 83.7% agreement; J. Cohen, 1960; Landis & Koch, 1977) and we randomly selected one of the coders’ ratings to serve as our filter variable, moving forward with only those participants who understood and believed their loneliness score ( $N = 133$ ; *lonely*:  $n = 51$ ; *not lonely*:  $n = 82$ ). In a post hoc power analysis, we found that our final sample size left us with 81% power to detect medium effect sizes (Faul et al., 2009). Unfortunately, significantly more people were eliminated from the *lonely* condition ( $n = 63$ ) than from the *not lonely* condition ( $n = 30$ ),  $\chi^2(1) = 18.92$ ,  $p < .001$ . This uneven dropout rate is likely due to the “not lonely” feedback seeming more plausible to people than the “lonely” feedback. Indeed, in an oft-cited loneliness scale paper, 84% of people rated themselves below the midpoint on loneliness (Russell, 1996), thus making it more difficult to get people to believe they are lonely versus not. Final sample sizes per cell were as follows: *lonely/belonging-affirmation* ( $n = 25$ ), *lonely/control* ( $n = 26$ ), *not lonely/belonging-affirmation* ( $n = 42$ ), and *not lonely/control* ( $n = 40$ ).

**Social support manipulation.** Following the loneliness manipulation, all participants were prompted with a list of 10 personal values (e.g., Creativity, Relationship with friends or family, Sports ability) and asked to rank them in order from most to least important (adapted from past research on self-affirmation; e.g., G. L. Cohen et al., 2000). On the following page, participants randomly assigned to the *belonging-affirmation* condition ( $n = 67$ ) wrote about how their most important value helped bring them closer to others whereas those randomly assigned to the *control* condition ( $n = 66$ ) wrote about how their least important value might have helped someone else feel closer and more connected with other people (adapted from Shnabel et al., 2013). We asked

participants to spend at least a few minutes writing before moving on to the next page, but they were not required to stay on the page for a certain amount of time ( $M = 2$  min, 46 s,  $SD = 1$  min, 34 s). The manipulation ended with a few more questions about the listed value to further emphasize what people wrote about (see Supplemental Material for exact instructions).

## Measures

For all measures, we averaged items to form a composite. Data from all three studies are available on Open Science Framework (<https://osf.io/jdtu8/>).

### Manipulation checks

**Perceived social support.** As a manipulation check of the belonging affirmation activity, we administered the Multidimensional Scale of Perceived Social Support (Zimet et al., 1988). The 12-item measure assesses the degree to which participants agree with a series of statements regarding support in their lives from a significant other, family, and friends (e.g., “There is a special person who is around when I am in need”) on a 7-point scale (*strongly disagree* to *strongly agree*;  $\alpha = .91$ ).

**State affect.** Before and after the social support manipulation, participants rated the degree to which they were feeling a variety of different states RIGHT NOW (7-point scale: *not at all* to *extremely*). We used the items Lonely, Sad, and Worried/Anxious to assess the degree of stress participants experienced following the adversity manipulation. A few items are included in our State Gratitude composite below and analyses on the following items are included in Supplemental Material: A desire to help others, A desire to become a better person, Optimistic about humanity, Connected to my close friends, and A sense of meaning in life.

### Interpersonal relationships

**Connectedness.** Participants completed a subscale of the Balanced Measure of Psychological Needs (adapted from Sheldon & Hilpert, 2012). Participants rated the degree to which six items were true of them (e.g., “Right now I feel a sense of contact with people who care for me, and whom I care for”) on a 5-point scale (*not at all true* to *extremely true*;  $\alpha = .73$ ).

**Prosocial behavior.** We administered the Prosocialness Scale for Adults (Caprara et al., 2005). Participants rated the frequency to which a series of 16 items (e.g., “I am pleased to help my friends/colleagues in their activities”) were true of them on a 5-point scale (*almost never true* to *almost always true*;  $\alpha = .92$ ).

### Appreciation of life

**State gratitude.** Before and after the social support manipulation, participants rated the degree to which they

were feeling thankful, grateful, and appreciative RIGHT NOW (7-point scale: *not at all* to *extremely*; Emmons & McCullough, 2003; Cronbach's  $\alpha$ s > .93).

**GQ-6 gratitude.** In addition to our three-item state gratitude measure, we also wanted to test whether a revised version of a trait measure would detect differences between groups. Thus, we adapted the Gratitude Questionnaire (GQ-6; McCullough et al., 2002) to be more sensitive to current feelings. For example, instead of the original item "I have so much in life to be thankful for" we used "Lately, I notice that I have so much in life to be thankful for." Participants rated their level of agreement with six statements on a 7-point scale (*strongly disagree* to *strongly agree*;  $\alpha = .81$ ).

#### Personal strengths

**Humility.** We assessed humility with the systemic perspective subscale of the Humility Inventory (Brown et al., 2013). Participants rated their level of agreement with six statements (e.g., "I recognize I need help from other people") on a 7-point scale (*strongly disagree* to *strongly agree*;  $\alpha = .75$ ).

**Self-integrity.** We administered the Self-Integrity Scale (Sherman et al., 2009). Participants rated their level of agreement with eight statements (e.g., "On the whole I am a capable person") on a 7-point scale (*strongly disagree* to *strongly agree*;  $\alpha = .85$ ).

**Demographics.** Participants reported their age, gender, and ethnicity.

## Results

### Overview of Analyses

We tested our predictions with three focused contrast analyses. First, to test the hypothesis that perceived social support helps people grow in the face of adversity, the growth contrast tested the degree to which the *lonely/belonging-affirmation* group reported the highest levels of our outcome variables (+3), the *lonely/control* group reported the lowest levels (-3), and the *not lonely/belonging-affirmation* (+1) and *not lonely/control* (-1) groups fell in between the two, with belonging-affirmation performing better than control. This contrast assumes that belonging-affirmation will be most beneficial in the context of adversity, but that even belonging-affirmation without adversity will be somewhat beneficial (Crocker et al., 2008). Second, the buffering contrast tested the degree to which the *lonely/belonging-affirmation* group (+1) reported similar levels of our outcome variables as the *not lonely* groups (both *not lonely/belonging-affirmation* and *not lonely/control*: +1), whereas the *lonely/control* group reported the lowest levels compared with the other three groups (-3). This contrast assumes that

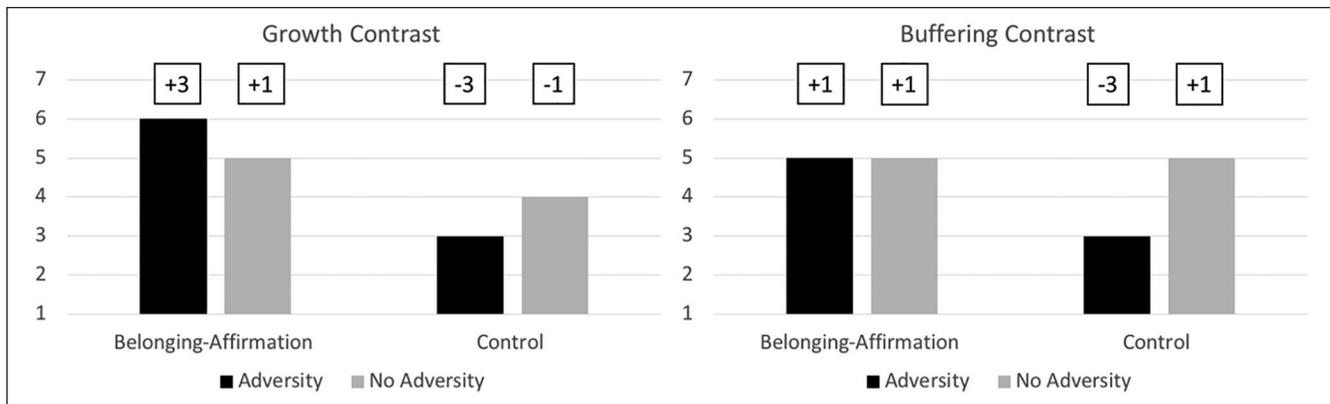
belonging-affirmation is beneficial in the midst of adversity, but only to the extent that it helps people recover to levels of personal resources as though they never experienced any adversity (i.e., recovery, but not growth). See Figure 1 for expected pattern of means for the growth and buffering hypotheses.

The third contrast tested the degree to which the growth and buffering contrast analyses were significantly different from one another. Specifically, we calculated the contrast weights so that positive values would indicate that the growth hypothesis was significantly better than the buffering hypothesis (Rosenthal et al., 2000). We first divided each contrast weight from the growth contrast analysis by the standard deviation across the growth contrast weights. We also divided each contrast weight from the buffering contrast analysis by the standard deviation across the buffering contrast weights. Using these new contrast weights, for each group, we subtracted the buffering contrast weight from the growth contrast weight to get the contrast weight that would compare the two. This calculation resulted in the following weights: *lonely/belonging-affirmation* (+0.66), *lonely/control* (+0.34), *not lonely/belonging-affirmation* (-0.11), and *not lonely/control* (-0.89).

### Manipulation Check

Following the loneliness manipulation, the *lonely* condition reported feeling lonelier ( $M = 3.31$ ,  $SE = 0.20$ ) than the *not lonely* condition ( $M = 2.24$ ,  $SE = 0.15$ ),  $t(131) = 4.40$ ,  $p < .001$ ,  $r = .36$ . Further reflecting that this manipulation was an adverse experience, participants in the *lonely* condition also reported feeling sadder,  $t(131) = 2.24$ ,  $p = .03$ ,  $r = .19$ , and more worried,  $t(131) = 2.46$ ,  $p = .02$ ,  $r = .21$ , than those in the *not lonely* condition (Sad: *lonely* condition:  $M = 2.84$ ,  $SE = 0.22$ ; *not lonely* condition:  $M = 2.24$ ,  $SE = 0.16$ ; Worried/Anxious: *lonely* condition:  $M = 4.00$ ,  $SE = 0.26$ ; *not lonely* condition:  $M = 3.23$ ,  $SE = 0.19$ ).

Following the social support manipulation, the *belonging-affirmation* condition did not report more perceived social support than the *control* condition overall,  $F(1, 129) = 0.40$ ,  $p = .53$ ,  $r = .04$ , but we did find an interaction between loneliness and belonging,  $F(1, 129) = 5.02$ ,  $p = .03$ ,  $r = .40$ . Specifically, the *belonging-affirmation* condition reported marginally more perceived social support than the *control* condition among participants in the *lonely* condition,  $F(1, 129) = 3.35$ ,  $p = .07$ ,  $r = .28$ , and the trend was opposite but nonsignificant among the *not lonely* condition,  $F(1, 129) = 1.68$ ,  $p = .20$ ,  $r = -.15$ . Thus, the *belonging-affirmation* condition bolstered perceived social support among those under the threat of loneliness, but did not affect social support for those under no threat (*lonely/belonging-affirmation*:  $M = 5.77$ ,  $SE = 0.22$ ; *lonely/control*:  $M = 5.22$ ,  $SE = 0.21$ ; *not lonely/belonging-affirmation*:  $M = 5.59$ ,  $SE = 0.17$ ; *not lonely/control*:  $M = 5.90$ ,  $SE = 0.17$ ).



**Figure 1.** Expected patterns of means for growth (left) and buffering (right) contrasts.

### Primary Analyses

In Table 1, we reported means and standard errors by group, as well as the specific results from our three contrast analyses (growth, buffering, and growth minus buffering). We found support for the growth hypothesis on appreciation of life (significant for state gratitude and marginal support for GQ-6 gratitude), and marginal support for interpersonal relationships (connectedness only). We found significant support for the buffering hypothesis on interpersonal relationships (connectedness) and one personal strength (humility-systemic perspective). Our third contrast indicated that the buffering hypothesis had significantly better support than the growth hypothesis on connectedness. Alternatively, the growth hypothesis had marginally better support than the buffering hypothesis on state gratitude. We found no marginal or significant effects on prosocial behavior or self-integrity.<sup>1</sup>

### Discussion

We found at least marginal evidence for all outcomes except prosocial behavior and self-integrity that either the growth or buffering hypotheses reflected the pattern of means. Thus, the participants in the lonely group who did not receive social support were the lowest in personal resources, but there was not a consistent pattern of whether the growth or buffering hypotheses were a better fit across outcomes. We powered the study to detect medium effect sizes, but the difference between the growth and buffering hypotheses may be smaller. In addition, many participants did not believe or understand the loneliness manipulation which reduced our sample size and made our groups unequal, undermining statistical power. Thus, in the next study, we re-ran this exact experimental design with a larger group of online participants.

### Study 2

In Study 2, we followed mostly the same procedure as Study 1 with a few improvements. We included a larger, nonstudent

sample to increase our statistical power and generalizability, and we attempted to make the loneliness manipulation clearer to avoid losing participants due to misunderstanding their feedback.

### Participants

Participants from Amazon's Mechanical Turk completed this study in exchange for \$4.00 ( $N = 415$ ; 50.9% Male, 48.9% Female, and 0.3% Prefer not to state). The majority of participants were White (79.4%), followed by Black/African American (7.3%), Asian (5.8%), Hispanic/Latino (4.5%), More than one (1.3%), American Indian/Alaskan Native (1.0%), Prefer not to state (0.5%), and Other (0.3%). Ages ranged from 20 to 73 years ( $M = 37.59$ ,  $SD = 10.19$ ).

Because many of our effect sizes in Study 1 were below medium, we decided to power Study 2 to detect effect sizes between small and medium. We would have needed 364 participants to achieve 90% power, but, given cost concerns, we decided to power Study 2 at 80%, which required 259 participants (Faul et al., 2009; the ANOVA: fixed effects, special, main effects, and interactions option, effect size  $f = .175$ , numerator  $df = 1$ , number of groups = 4). By collecting over 400 participants, we again allowed room to eliminate some participants for not following instructions or not believing our adversity manipulation.

### Materials and Procedure

The study was advertised as the "Cognition and Personality Study" and interested parties completed the study online via Qualtrics. The manipulations and measures were the same as in Study 1 with a few exceptions (noted here). Following the loneliness manipulation, in addition to reading their percentile score and being told they were above or below average, we also provided a parenthetical statement that read "you are relatively lonely" for the *lonely* condition ( $n = 107$ ) or "you are not lonely" for the *not lonely* condition ( $n = 169$ ) to clarify participants' results. As in Study 1, participants were asked to explain their loneliness score after the loneliness

**Table 1.** Descriptive Statistics, Contrast Tests, and Effect Sizes for Study 1.

Dependent variables	Experimental conditions								Growth contrast <i>t</i> -contrast <i>r</i> [95% CI]	Buffering contrast <i>t</i> -contrast <i>r</i> [95% CI]	Growth minus buffering contrast <i>t</i> -contrast <i>r</i> [95% CI]
	Belonging-affirmation				Control						
	Lonely		Not lonely		Lonely		Not lonely				
	<i>M</i> ( <i>SE</i> )	<i>n</i>	<i>M</i> ( <i>SE</i> )	<i>n</i>	<i>M</i> ( <i>SE</i> )	<i>n</i>	<i>M</i> ( <i>SE</i> )	<i>n</i>			
<b>Interpersonal relationships</b>											
Connectedness	3.95 (0.14)	24	4.08 (0.10)	42	3.56 (0.16)	26	4.14 (0.08)	40	1.96 <sup>†</sup> .17 [-0.01, .33]	3.46*** .29 [.13, .44]	-2.32* -.20 [-.36, -.03]
Prosocial behavior	3.88 (0.13)	25	3.76 (0.11)	42	3.82 (0.11)	26	3.76 (0.11)	40	0.33 .03 [-.14, .20]	-0.12 -.01 [-.18, .16]	0.73 .06 [-.11, .23]
<b>Appreciation of life</b>											
State gratitude	6.19 (0.19)	25	5.68 (0.19)	42	5.38 (0.18)	26	5.40 (0.18)	40	2.51* .22 [.05, .37]	1.37 .12 [-.05, .28]	1.92 <sup>†</sup> .17 [-.004, .33]
Gratitude (GQ-6)	5.79 (0.170)	25	5.26 (0.17)	42	5.18 (0.22)	26	5.49 (0.13)	40	1.87 <sup>†</sup> .16 [-.01, .32]	1.54 .13 [-.04, .30]	0.59 .05 [-.12, .22]
<b>Personal strengths</b>											
Humility—systemic perspective	5.38 (0.17)	24	4.97 (0.14)	42	4.81 (0.18)	26	5.44 (0.13)	40	1.59 .14 [-.03, .30]	2.33* .20 [.03, .36]	-1.12 -.10 [-.27, .07]
Self-integrity	5.78 (0.18)	24	5.66 (0.12)	42	5.58 (0.17)	26	5.76 (0.10)	40	0.74 .07 [-.11, .23]	0.89 .08 [-.11, .23]	-0.22 .02 [-.15, .19]

Note. The growth contrast includes the following contrast weights: *lonely/belonging-affirmation* (+3), *not lonely/belonging-affirmation* (+1), *lonely/control* (-3), *not lonely/control* (-1). The buffering contrast includes the following contrast weights: *lonely/belonging-affirmation* (+1), *not lonely/belonging-affirmation* (+1), *lonely/control* (-3), *not lonely/control* (+1). The growth minus buffering contrast tests the degree to which the growth contrast is a better fit to the data than the buffering contrast (*lonely/belonging-affirmation*: +0.66; *lonely/control*: +0.34; *not lonely/belonging-affirmation*: -0.11; *not lonely/control*: -0.89; see text for explanation of contrast calculation). Positive and significant *t*-contrasts indicate that the data support the prediction.

<sup>†</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001 (two-tailed).

manipulation and two independent coders rated whether participant responses indicated an understanding of their score and a belief in their results (1 = *yes to both*, 0 = *no to at least one*; sample responses are presented in Supplemental Material, Table 5). Raters again achieved substantial agreement (Cohen’s κ = .73; 89.5% agreement; J. Cohen, 1960; Landis & Koch, 1977) and we randomly selected one of the coders’ ratings to serve as our filter variable, moving forward with only those participants who understood and believed their loneliness score (*N* = 276). This left us with our desired statistical power. Unfortunately, like in Study 1, significantly more people were eliminated from the lonely condition (*n* = 100) than from the not lonely condition (*n* = 38),  $\chi^2(1) = 41.78, p < .001$ .

In addition, to better measure loneliness, we added two items directly after the loneliness manipulation: “I am feeling lonely right now” and “At this moment, I feel quite lonely” (answered on a 7-point scale from *strongly disagree* to *strongly agree*; following Zhou et al., 2008). These items were averaged into a state loneliness composite ( $\alpha = .98$ ).

Participants were then randomly assigned to the *belonging-affirmation* (*n* = 139) or *control* (*n* = 137) conditions and the instructions were exactly the same as in Study 1. Average writing time was 3 min, 15 s (*SD* = 2 min, 27 s).

Following the belonging manipulation, participants again reported their loneliness with the two-item measure ( $\alpha = .98$ ) and reported their state affect and state gratitude

( $\alpha = .97$ ). We included all of the same outcome and manipulation check measures as in Study 1, in the same order: connectedness ( $\alpha = .86$ ), perceived social support ( $\alpha = .96$ ), gratitude (GQ-6;  $\alpha = .93$ ), humility (systemic perspective;  $\alpha = .78$ ), prosocial behavior ( $\alpha = .95$ ), and self-integrity ( $\alpha = .91$ ). After the self-integrity measure, we added another subscale to measure humility-other-esteem (Brown et al., 2013). This 5-item subscale included items like “One of my greatest joys is helping others excel” and participants responded on a 7-point scale (*strongly disagree* to *strongly agree*;  $\alpha = .92$ ). Finally, participants reported their demographics and read a debriefing statement. Average completion time of the study was 18 min, 36 s (*SD* = 9 min, 17 s) and final sample size per cell were as follows: *lonely/belonging-affirmation* (*n* = 56), *lonely/control* (*n* = 51), *not lonely/belonging-affirmation* (*n* = 83), and *not lonely/control* (*n* = 86).

## Results

### Manipulation Check

After the loneliness manipulation, the *lonely* condition reported feeling lonelier (*M* = 3.86, *SE* = 0.18) than the *not lonely* condition (*M* = 1.70, *SE* = 0.08) on the two-item composite,  $t(142.77) = 10.98, p < .001, r = .68$ , and on the single-item used in Study 1,  $t(152.12) = 9.28, p < .001$ ,

$r = .60$  (*lonely* condition:  $M = 3.29$ ,  $SE = 0.18$ ; *not lonely* condition:  $M = 1.47$ ,  $SE = 0.08$ ). Like in Study 1, participants in the *lonely* condition also reported feeling sadder,  $t(159.46) = 6.10$ ,  $p < .001$ ,  $r = .44$ , and more worried,  $t(197.01) = 5.49$ ,  $p < .001$ ,  $r = .36$ , than those in the *not lonely* condition (Sad: *lonely* condition:  $M = 2.74$ ,  $SE = 0.17$ ; *not lonely* condition:  $M = 1.60$ ,  $SE = 0.08$ ; Worried/Anxious: *lonely* condition:  $M = 3.07$ ,  $SE = 0.16$ ; *not lonely* condition:  $M = 2.01$ ,  $SE = 0.11$ ).

After the social support manipulation, the *belonging-affirmation* condition reported marginally more perceived social support than the *control* condition,  $F(1, 269) = 3.04$ ,  $p = .08$ ,  $r = .18$ . We also found a significant interaction between loneliness and social support,  $F(1, 269) = 4.36$ ,  $p = .04$ ,  $r = .26$ , such that the *belonging-affirmation* condition reported higher perceived social support than the *control* condition among participants in the *lonely* condition,  $F(1, 269) = 6.03$ ,  $p = .02$ ,  $r = .34$ , but not among participants in the *not lonely* condition,  $F(1, 269) = 0.08$ ,  $p = .78$ ,  $r = -.005$  (*lonely/belonging-affirmation*:  $M = 5.23$ ,  $SE = 0.18$ ; *lonely/control*:  $M = 4.60$ ,  $SE = 0.18$ ; *not lonely/belonging-affirmation*:  $M = 5.54$ ,  $SE = 0.15$ ; *not lonely/control*:  $M = 5.60$ ,  $SE = 0.14$ ).

### Primary Analyses

In Table 2, we reported means and standard errors by group, as well as the specific results from our three contrast analyses (growth, buffering, and growth minus buffering). All contrast weights are the same as in Study 1. We found significant support for the growth hypothesis on appreciation of life (state gratitude), and interpersonal relationships (connectedness), as well as marginal support on two personal strengths (humility-systemic perspective and self-integrity). We found significant support for the buffering hypothesis on appreciation of life (state gratitude and GQ-6 gratitude), interpersonal relationships (connectedness and prosocial behavior), and all three personal strengths (significant on self-integrity and humility-other-esteem and marginal on humility-systemic perspective). Our third contrast indicated that the buffering hypothesis had significantly better support than the growth hypothesis on appreciation of life (state gratitude and GQ-6 gratitude), interpersonal relationships (connectedness), and one personal strength (self-integrity). The growth hypothesis did not have better support than the buffering hypothesis on any of our outcome variables.

### Discussion

A clearer picture of the data emerged in Study 2, with the buffering hypothesis being a stronger fit to the data than the growth hypothesis across four out of our seven outcomes. Similar to Study 1, all of our outcome variables in Study 2 followed either a buffering or a growth pattern, indicating that participants in the lonely group who did not receive

social support reported the lowest personal resources. Also, in both studies, the buffering hypothesis was a better fit to the data than the growth hypothesis on connectedness.

### Study 3

One potential limitation of Study 1 and Study 2 is that both have the same adversity manipulation (loneliness) and therefore the protective effects of social support may be unique to this type of adversity, which could possibly be considered a psychological outcome rather than a specific stressor. Social support may not be as effective in buffering against the negative effects of a different type of adversity—for example, feeling unintelligent. In Study 3, we manipulated an intelligence test and provided bogus feedback to explore whether our social support results are generalizable to other forms of adversity or simply an artifact of the type of adversity we manipulated in Studies 1 and 2.

### Participants

Undergraduate students from California State University, East Bay completed the study in exchange for course credit ( $N = 315$ ; 69.2% female, 30.8% male). The sample was diverse, including 41.3% Hispanic/Latino, 16.8% Asian, 12.4% Black/African American, 10.5% White, 10.2% More than one, 5.4% Other, 2.2% Hawaiian/Pacific Islander, and 0.3% American Indian/Alaskan Native participants, and 1.0% Prefer not to state. Ages ranged from 18 to 35 years ( $M = 19.58$ ,  $SD = 2.32$ ). Two participants were randomized to condition but did not report any outcome or demographic information and are not included in any analyses or our total sample size.

Study 3 had the same basic design as Studies 1 and 2, and therefore also required 364 or 259 participants to detect small to medium effect sizes at 90% and 80%, respectively (Faul et al., 2009; the ANOVA: fixed effects, special, main effects, and interactions option, effect size  $f = .175$ , numerator  $df = 1$ , number of groups = 4). We collected as many participants as we could over two semesters and ended up with 315 participants.

### Materials and Procedure

Just like in Study 1, participants signed up for the “Cognition and Personality” study on the research participation website and then came to a computer lab in groups of up to 24 students at their allotted time slot. The general procedure and materials were the same as in Studies 1 and 2, with a few exceptions noted here. The most notable change is that we manipulated adversity by randomly assigning participants to be made to feel *intelligent* ( $n = 157$ ) or *unintelligent* ( $n = 158$ ). We told all participants that we would be measuring intelligence with a problem-solving task in which they had to complete patterns with one missing picture (Raven et al., 1996). The

**Table 2.** Descriptive Statistics, Contrast Tests, and Effect Sizes for Study 2.

Dependent variables	Experimental conditions								Growth contrast t-contrast r [95% CI]	Buffering contrast t-contrast r [95% CI]	Growth minus buffering contrast t-contrast r [95% CI]
	Belonging-affirmation				Control						
	Lonely		Not lonely		Lonely		Not lonely				
	M (SE)	n	M (SE)	n	M (SE)	n	M (SE)	n			
<b>Interpersonal relationships</b>											
Connectedness	3.67 (0.12)	56	4.12 (0.08)	82	3.21 (0.13)	51	4.14 (0.08)	84	2.52*	5.44***	-5.49***
Prosocial behavior	3.45 (0.11)	56	3.52 (0.10)	82	3.22 (0.12)	51	3.56 (0.09)	84	.23 [.05, .40]	.55 [.37, .70]	-.39 [-.51, -.26]
<b>Appreciation of life</b>											
State gratitude	4.46 (0.22)	56	4.74 (0.18)	82	3.03 (0.23)	51	4.46 (0.20)	84	1.33	2.28*	-1.59
Gratitude (GQ-6)	4.46 (0.14)	56	4.79 (0.11)	82	4.15 (0.14)	51	4.84 (0.10)	84	.08 [-.04, .20]	.14 [.02, .25]	-.10 [-.21, .02]
<b>Personal strengths</b>											
Humility—systemic perspective	5.32 (0.10)	56	5.23 (0.11)	82	5.00 (0.13)	51	5.23 (0.11)	84	4.47***	5.74***	-2.17*
Self-integrity	5.68 (0.12)	56	5.77 (0.12)	81	5.31 (0.15)	51	5.87 (0.09)	84	.26 [.15, .37]	.33 [.22, .43]	-.13 [-.25, -.01]
Humility—other esteem	5.04 (0.17)	56	5.06 (0.15)	81	4.64 (0.17)	51	5.10 (0.14)	84	1.44	3.51***	-3.46***
									.09 [-.03, .20]	.21 [.09, .32]	-.21 [-.32, -.09]
									1.79†	1.66†	0.20
									.11 [-.01, .22]	.10 [-.02, .22]	.01 [-.11, .13]
									1.74†	3.05**	-2.21*
									.11 [-.01, .22]	.18 [.07, .30]	-.13 [-.25, -.02]
									1.48	2.11*	-1.06
									.09 [-.03, .21]	.13 [.01, .24]	-.06 [-.18, .05]

Note. The growth contrast includes the following contrast weights: *lonely/belonging-affirmation* (+3), *not lonely/belonging-affirmation* (+1), *lonely/control* (-3), *not lonely/control* (-1). The buffering contrast includes the following contrast weights: *lonely/belonging-affirmation* (+1), *not lonely/belonging-affirmation* (+1), *lonely/control* (-3), *not lonely/control* (+1). The growth minus buffering contrast tests the degree to which the growth contrast is a better fit to the data than the buffering contrast (*lonely/belonging-affirmation*: +0.66; *lonely/control*: +0.34; *not lonely/belonging-affirmation*: -0.11; *not lonely/control*: -0.89; see text for explanation of contrast calculation). Positive and significant t-contrastrs indicate that the data support the prediction. We found heterogeneity of variance across groups on the connectedness variable and therefore used the t-contrast estimates that did not assume equal variances.  
 †p < .10. \*p < .05. \*\*p < .01. \*\*\*p < .001 (two-tailed).

*intelligent* condition completed easier problems than the *unintelligent* condition.

After completing the 10 problems, people in the *intelligent* condition saw “You were in the 88th percentile of intelligence. This means that, compared with other people, you are far above average on intelligence (you are relatively intelligent).” Participants in the *unintelligent* condition saw “You were in the 38th percentile of intelligence. This means that, compared to other people, you are below average on intelligence (you are less smart than most others who have taken this test).” Then, all participants were asked to explain their score and why they thought they were so high or low in intelligence. We once again had two independent coders rate the degree to which participants understood and believed in their scores (1 = *yes to both*; 0 = *no to at least one*; sample responses are presented in Supplemental Material, Table 6). These raters only achieved fair agreement by Landis and Koch (1977) standards (Cohen’s κ = .36; 71.3% agreement), so we had one more coder rate responses to see if he could achieve better agreement with either of the first two. The third coder had fair agreement with the first coder (Cohen’s κ = .33; 86.4% agreement) and only slight agreement with the second (Cohen’s κ = .12; 62.1% agreement). Given the lack of agreement between the coders, we decided to use the full sample rather than eliminate any participants.

After the intelligence manipulation, participants rated their agreement with two statements that indicated how capable they were feeling: “I am feeling capable right now” and “At this moment, I feel quite capable” on a 7-point scale (*strongly disagree* to *strongly agree*; α = .94). Participants also completed the same list of state affect items as in Studies 1 and 2.

Next, participants were randomly assigned to the *belonging-affirmation* (n = 159) or *control* (n = 157) conditions from Studies 1 and 2. Average writing time was 2 min, 45 s (SD = 1 min, 39 s).

Following the belonging manipulation, participants again reported how they felt at the moment and we formed a two-item composite of their feelings of capability (α = .94) and a three-item composite of their feelings of gratefulness (α = .96). Right after this, we added one more humility subscale—acceptance of fallibility (four items), which included statements like “I readily admit when I am wrong” (Brown et al., 2013). Participants rated their agreement on a 7-point scale (*strongly disagree* to *strongly agree*; α = .60). Because the subscale did not have good reliability, and removing any items led to lower reliability, we will not report the acceptance of fallibility results here. After this, all other measures were the same as in Studies 1 and 2: connectedness (α = .73), perceived social support (α = .90),

gratitude (GQ-6;  $\alpha = .81$ ), humility-systemic perspective ( $\alpha = .70$ ), prosocial behavior ( $\alpha = .92$ ), self-integrity ( $\alpha = .86$ ), and humility-other esteem ( $\alpha = .83$ ). Finally, participants reported their demographics and read a debriefing statement. Average completion time of the study was 28 min, 39 s ( $SD = 6$  min, 1 s) and final sample size per cell were as follows: *intelligent/belonging-affirmation* ( $n = 79$ ), *intelligent/control* ( $n = 78$ ), *unintelligent/belonging-affirmation* ( $n = 80$ ), and *unintelligent/control* ( $n = 78$ ).

## Results

### Manipulation Check

As expected, those in the *intelligent* condition provided more correct responses on the intelligence test ( $M = 8.52$ ,  $SE = 0.12$ ) than those in the *unintelligent* condition ( $M = 2.10$ ,  $SE = 0.15$ ),  $t(298.44) = 34.29$ ,  $p < .001$ ,  $r = .89$ . In addition, after the intelligence manipulation, the *intelligent* condition reported feeling more capable ( $M = 5.75$ ,  $SE = 0.07$ ) than the *unintelligent* condition ( $M = 4.49$ ,  $SE = 0.11$ ),  $t(266.46) = 9.23$ ,  $p < .001$ ,  $r = .49$ . Participants in the *unintelligent* condition also reported feeling sadder,  $t(313) = -2.17$ ,  $p = .03$ ,  $r = -.12$ , but no more worried,  $t(313) = 0.65$ ,  $p = .52$ ,  $r = .04$ , than participants in the *intelligent* condition (Sad: *unintelligent* condition:  $M = 2.87$ ,  $SE = 0.13$ ; *intelligent* condition:  $M = 2.48$ ,  $SE = 0.13$ ; Worried/Anxious: *unintelligent* condition:  $M = 3.66$ ,  $SE = 0.14$ ; *intelligent* condition:  $M = 3.80$ ,  $SE = 0.14$ ).

After the social support manipulation, the *belonging-affirmation* condition reported higher perceived social support than the *control* condition overall,  $F(1, 311) = 4.38$ ,  $p = .04$ ,  $r = .24$ . Contrary to the findings in Study 1 and Study 2, we did not find an interaction between intelligence and social support,  $F(1, 311) = 0.03$ ,  $p = .86$ ,  $r = .002$ , indicating that the effect of the social support manipulation was similar for those in the *intelligent* and *unintelligent* conditions (*intelligent/belonging-affirmation*:  $M = 5.67$ ,  $SE = 0.12$ ; *intelligent/control*:  $M = 5.40$ ,  $SE = 0.12$ ; *unintelligent/belonging-affirmation*:  $M = 5.63$ ,  $SE = 0.12$ ; *unintelligent/control*:  $M = 5.40$ ,  $SE = 0.12$ ).

### Primary Analyses

In Table 3, we reported means and standard errors by group, as well as the specific results from our three contrast analyses (growth, buffering, and growth minus buffering). All contrast weights are the same as in Studies 1 and 2 (with the *unintelligent* condition equivalent to the *lonely* condition and the *intelligent* condition equivalent to the *not lonely* condition). We found significant support for the growth hypothesis on interpersonal relationships (significant for prosocial behavior, marginal for connectedness), appreciation of life (state gratitude), and one personal strength (self-integrity). We found significant support for the buffering hypothesis on

interpersonal relationship (prosocial behavior), appreciation of life (significant for state gratitude, marginal support for GQ-6 gratitude), and marginal support on one personal strength (self-integrity). Our third contrast indicated that the buffering hypothesis had significantly better support than the growth hypothesis on state gratitude. The growth hypothesis did not have better support than the buffering hypothesis on any of our outcome variables. We found no marginal or significant effects on the personal strengths humility-systemic perspective or humility-other-esteem.

## Discussion

In Study 3, we again found that our outcomes—with the exception of humility-systemic perspective and humility-other esteem—followed either a growth or buffering pattern. Thus, the participants in the *unintelligent* (adversity) group who did not receive social support were often the lowest on personal resources. Unfortunately, like Study 1, the findings from Study 3 do not paint as clear a picture as the findings from Study 2 in regard to whether the growth or buffering hypotheses better fit the data. Like in Study 2, the buffering hypothesis explained the means by group for state gratitude better than the growth hypothesis, but that was the only outcome on which we found a difference between the two hypotheses.

## Meta-Analysis of Findings Across Three Studies

To summarize the findings across our three studies, as well as to address potential statistical power concerns in Study 1, we meta-analytically combined the effect sizes from our contrast analyses (see Table 4 and Figure 2; Goh et al., 2016; Rosenthal, 1991; Rosenthal & Rosnow, 2008). Using a fixed effects approach, we calculated a weighted  $r$  effect size for each contrast (growth, buffering, and growth minus buffering) on each outcome, averaging across the results from the three studies. For the growth contrast, we found significant effect sizes on appreciation of life (medium effect for state gratitude, small effect for GQ-6 gratitude), and significant small effect sizes on interpersonal relationships (connectedness, prosocial behavior) and two personal strengths (humility-systemic perspective, and self-integrity), but a nonsignificant effect on the personal strength humility-other esteem. For the buffering contrast, we found significant effect sizes for appreciation of life (medium effect size for state gratitude, small effect size for GQ-6 gratitude), and significant small effect sizes on interpersonal relationships (connectedness, prosocial behavior) and two personal strengths (humility-systemic perspective, self-integrity), but a nonsignificant effect on the personal strength humility-other esteem.

Thus, when combining results across the studies, both the growth and buffering hypotheses yield significant results across almost all of the outcomes. Because the growth and

**Table 3.** Descriptive Statistics, Contrast Tests, and Effect Sizes for Study 3.

Dependent variables	Experimental conditions								Growth contrast t-contrast r [95% CI]	Buffering contrast t-contrast r [95% CI]	Growth minus buffering contrast t-contrast r [95% CI]
	Belonging-affirmation				Control						
	Unintelligent		Intelligent		Unintelligent		Intelligent				
	M (SE)	n	M (SE)	n	M (SE)	n	M (SE)	n			
<b>Interpersonal relationships</b>											
Connectedness	3.83 (0.08)	80	3.87 (0.08)	79	3.68 (0.08)	78	3.68 (0.09)	78	1.72†	1.16	0.83
									.10 [-.01, .21]	.07 [-.05, .18]	.05 [-.06, .16]
Prosocial behavior	3.93 (0.08)	80	3.92 (0.07)	79	3.69 (0.08)	78	3.94 (0.07)	78	2.02*	2.65**	-0.97
									.11 [.003, .22]	.15 [.04, .26]	-.004 [-.11, .11]
<b>Appreciation of life</b>											
State gratitude	5.52 (0.15)	80	5.55 (0.16)	79	4.64 (0.21)	78	5.64 (0.14)	78	3.21**	4.16***	-2.39*
									.24 [.10, .38]	.38 [.10, .45]	-.17 [-.30, -.03]
Gratitude (GQ-6)	5.40 (0.11)	80	5.40 (0.11)	79	5.17 (0.12)	78	5.42 (0.12)	78	1.31	1.81†	-0.76
									.07 [-.04, .18]	.10 [-.01, .21]	-.04 [-.15, .07]
<b>Personal strengths</b>											
Humility—systemic perspective	5.22 (0.11)	80	5.29 (0.09)	79	5.20 (0.10)	78	5.35 (0.09)	78	-0.02	0.78	-1.21
									-.001 [-.11, .11]	.04 [-.07, .15]	-.07 [-.18, .04]
Self-integrity	5.73 (0.09)	80	5.74 (0.08)	79	5.49 (0.10)	78	5.62 (0.09)	78	2.06*	1.96†	0.14
									.12 [.01, .22]	.11 [.00, .22]	.01 [-.10, .12]
Humility—other esteem	5.84 (0.09)	80	5.74 (0.10)	79	5.73 (0.09)	78	5.81 (0.09)	78	0.60	0.61	-0.03
									.03 [-.08, .14]	.03 [-.08, .15]	-.002 [-.11, .11]

Note. The growth contrast includes the following contrast weights: *unintelligent/belonging-affirmation* (+3), *intelligent/belonging-affirmation* (+1), *unintelligent/control* (-3), *intelligent/control* (-1). The buffering contrast includes the following contrast weights: *unintelligent/belonging-affirmation* (+1), *intelligent/belonging-affirmation* (+1), *unintelligent/control* (-3), *intelligent/control* (+1). The growth minus buffering contrast tests the degree to which the growth contrast is a better fit to the data than the buffering contrast (*unintelligent/belonging-affirmation*: +0.66; *unintelligent/control*: +0.34; *intelligent/belonging-affirmation*: -0.11; *intelligent/control*: -0.89; see text for explanation of contrast calculation). Positive and significant t-contrasts indicate that the data support the prediction. We found heterogeneity of variance across groups on the state gratitude variable and therefore used the t-contrast estimates that did not assume equal variances.  
 †p < .10. \*p < .05. \*\*p < .01. \*\*\*p < .001 (two-tailed).

buffering contrasts both score the *adversity/control* group as the lowest and the no adversity groups above that, these findings reflect that, across almost all outcomes in all three studies, the group who experienced adversity, but no social support, scored the lowest. Where these two contrast analyses differ is in their treatment of the *adversity/belonging-affirmation* group, with the growth contrast placing the *adversity/belonging-affirmation* group above the no adversity group and the buffering contrast placing the *adversity/belonging-affirmation* group even with the no adversity groups. To compare the growth and buffering contrasts, we meta-analytically combined the effects from our growth minus buffering contrast analysis. A positive effect size would suggest that the growth contrast was a better fit to the data, whereas a negative effect size would suggest that the buffering contrast was a better fit to the data. We found non-significant differences between the growth and buffering contrast analyses on most of our outcomes (state gratitude, humility—systemic perspective, prosocial behavior, self-integrity, and humility—other esteem). However, on connectedness and gratitude (GQ-6), the buffering hypothesis was a significantly better fit to the data.

### General Discussion

Across all three studies and our meta-analysis, we found strong evidence that experiencing adversity without

perceiving social support negatively affects interpersonal relationships, appreciation of life, and personal strengths. Despite prior research suggesting that stress-related growth is quite common (Linley & Joseph, 2004), our research contributes to a growing body of literature (e.g., Infurna & Luthar, 2017) demonstrating that resources such as social support are needed for people to recover from adversity—let alone grow from it.

Our experimental approach allows for causal inference about the negative effect of adverse experiences and the positive effect of social support on personal resources that is not possible with the commonly employed prospective or correlational designs. However, what remains unclear is whether perceiving social support in the context of adversity helps people return to their pre-adversity levels (i.e., buffering) or contributes to personal growth. In our meta-analysis, we found evidence that the buffering hypothesis was a stronger fit to the data than the growth hypothesis on connectedness and gratitude (GQ-6), but on the rest of the outcomes, we found no difference between the two approaches. These findings suggest that social support is an important asset when facing challenging circumstances that at least buffers the negative effects of adversity on personal resources and may potentially contribute to growth.

Notably, most research on stress-related growth asks people to reflect upon their adverse experience and its effects long after it occurs. In contrast, we captured people’s

**Table 4.** Summary of Meta-Analytic Findings Using Fixed Effects Approach.

Outcome	Sample size		Growth contrast		Buffering contrast		Growth minus buffering contrast	
	Number of studies (k)	Total N	Weighted r effect size	Significance test	Weighted r effect size	Significance test	Weighted r effect size	Significance test
			M [95% CI]		M [95% CI]		M [95% CI]	
<b>Interpersonal relationships</b>								
Connectedness	3	720	.14 [.06, .22]	Z = 3.54, p < .001	.20 [.11, .28]	Z = 5.46, p < .001	-.13 [-.20, -.06]	Z = -3.84, p < .001
Prosocial behavior	3	721	.09 [.01, .16]	Z = 2.11, p = .03	.12 [.04, .19]	Z = 2.76, p = .006	-.03 [-.10, .05]	Z = -1.05, p = .29
<b>Appreciation of life</b>								
State gratitude	3	721	.25 [.17, .32]	Z = 5.78, p < .001	.27 [.19, .34]	Z = 6.09, p < .001	-.08 [-.16, .001]	Z = -1.52, p = .12
Gratitude (GQ-6)	3	721	.10 [.02, .17]	Z = 2.66, p = .008	.15 [.08, .22]	Z = 3.93, p < .001	-.09 [-.16, -.02]	Z = -2.08, p = .04
<b>Personal strengths</b>								
Humility—systemic perspective	3	720	.07 [-.01, .14]	Z = 1.93, p = .05	.10 [.02, .17]	Z = 2.73, p = .006	-.04 [-.12, .03]	Z = -1.22, p = .22
Self-integrity	3	719	.10 [.03, .18]	Z = 2.61, p = .009	.13 [.06, .20]	Z = 3.38, p = .007	-.04 [-.12, .03]	Z = -1.06, p = .29
Humility—other esteem	2	587	.06 [-.02, .14]	Z = 1.20, p = .23	.08 [-.003, .16]	Z = 1.56, p = .12	-.03 [-.11, .05]	Z = -0.63, p = .53

Note. Total N per study is the N that was included in the statistical analyses. Due to heterogeneous variances on Connectedness in Study 2 and State Gratitude in Study 3, we used the robust contrast

$$\bar{Z}r = \frac{\sum Zr(n-3)}{\sum (n-3)}$$

analyses, thus reducing our degrees of freedom on those variables. We calculated the weighted rs by converting all rs to Zrs and using the formula

$$\bar{Z}r \pm \frac{1.96}{\sqrt{\sum (n-3)}}$$

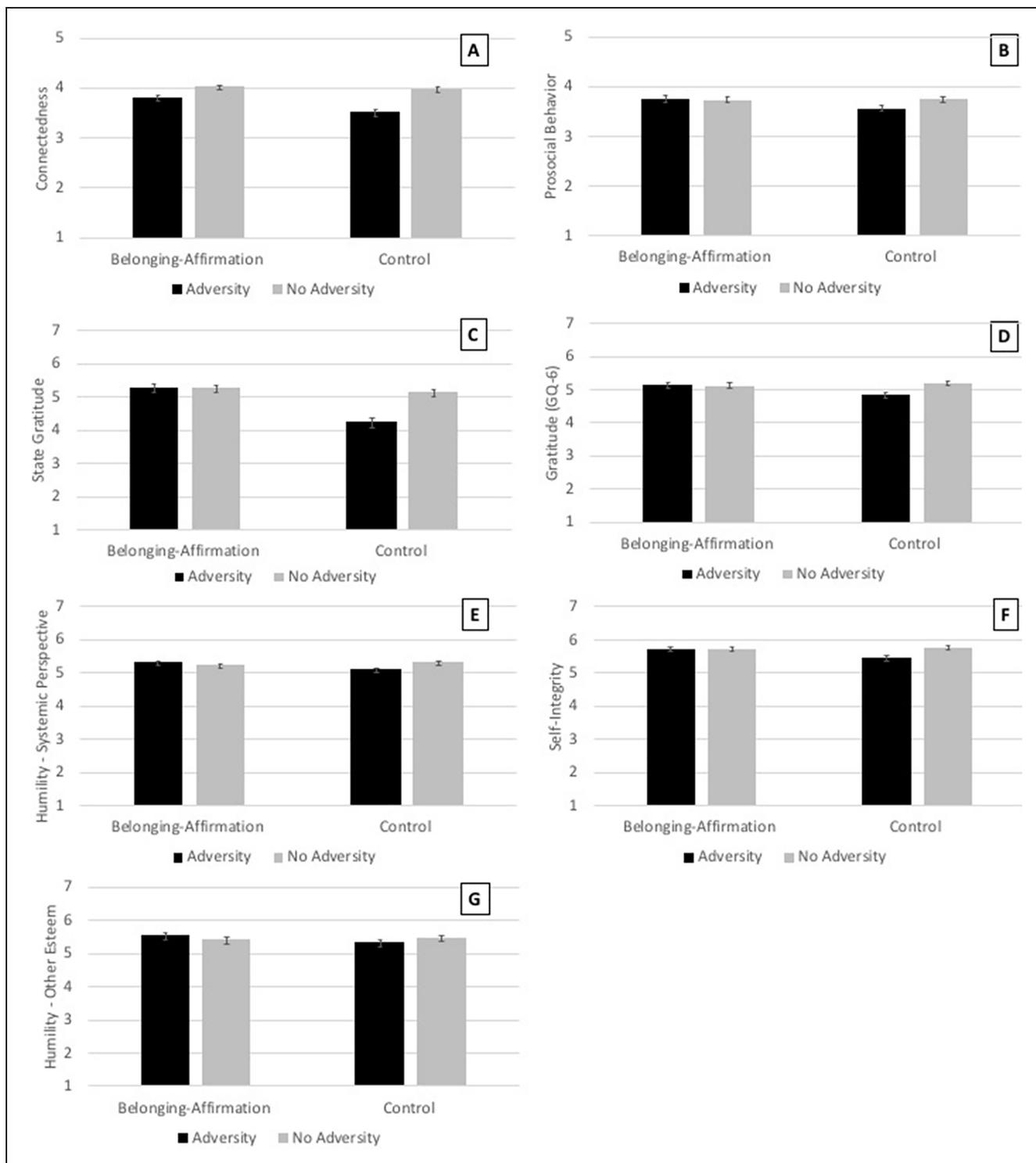
participants in each study. We calculated confidence intervals around the  $\bar{Z}r$  with the formula

$$\bar{Z}r \pm \frac{1.96}{\sqrt{\sum (n-3)}}$$

We then converted all Zrs to rs. The weighted  $\bar{Z}r$  corresponds to a fixed effects

approach. To calculate the fixed effects p value, we found the Z that corresponded to the one-tailed p value of each variable in each study and combined them with the following equation: (The Stouffer Method). For the growth and buffering contrast analyses, if the t-contrast from each study was in line with our prediction, the Z was given a positive sign, and if the t-contrast was opposite our prediction, the Z was given a negative sign. For the growth minus buffering contrast, a positive Z meant that the data supported the growth contrast more than the buffering contrast, and a negative Z means that the data supported the buffering contrast more than the growth contrast. All reported p values are two-tailed. Our Z estimates for some studies are a bit conservative due to online p

value to Z calculators and normal distribution tables only covering values of Z < 4.5, p ≤ .0000001. The unweighted  $\bar{Z}r$  and random effects statistical analyses are available from the first author upon request. All analyses were performed according to guidelines specified in Rosenthal (1991) and Rosenthal and Rosnow (2008).



**Figure 2.** Weighted means and standard errors by condition across studies for primary outcomes.

immediate reaction to a minor adversity and can therefore shed light on what helps people cope in the moment. Although capturing people’s proximal experience is telling, we also wonder how their personal resources developed over

time. Perhaps the buffering we found was a precursor to later growth. For example, if social support helps people cope with a poor performance at work or school, they might be better able to take action to improve future performance,

leading to personal growth (Walton & Wilson, 2018). Thus, a short-term consequence of social support may be buffering, but a longer-term consequence may be growth.

### *Belonging Affirmation as a Tool to Overcome Life's Challenges*

Because major and minor challenges are an inevitable part of life, having a social network that can offset the negative effects of adversity is an important personal asset. Unfortunately, certain types of social support (e.g., a conversation with a friend or a home cooked meal from family) are not always readily available. In contrast, belonging affirmation boosts perceptions of social support with no actual action required by people's social networks. This eliminates the possibility that people may reach out for help and not receive it, may receive help but feel uncomfortable about it, or may receive help from a begrudging friend and incur social costs. Indeed, past research has shown that perceived social support is more closely related to well-being than received social support (Wethington & Kessler, 1986), perhaps because the actual receipt of support entails an emotional cost for recipients (e.g., lower self-esteem; Bolger et al., 2000; Fisher et al., 1982). Conversely, the belonging affirmation safely brings to mind important close relationships, likely bolstering feelings of self-worth, as well as one's perception that they can meet the challenge at hand. Quasi-experimental research has shown that the belonging affirmation buffers against poor performance among negatively stereotyped groups in school (e.g., Shnabel et al., 2013), but to our knowledge, our studies are the first to explore the belonging affirmation's protective effects on a randomly assigned adverse experience, as well as the first to explore the belonging affirmation's effects on personal resources such as gratitude and self-integrity.

### *Different Patterns for Different Growth Domains*

Our meta-analysis provides a concise summary of the main findings from our studies, but we had some inconsistencies across the three studies. For example, in Study 1, we found that social support contributed to growth in state gratitude following adversity, but in Studies 2 and 3 we found that social support buffered the potential negative effects of adversity on state gratitude. Similarly, within Study 1, although we found evidence of growth in state gratitude, we found evidence of buffering for other outcomes (e.g., connectedness). These discrepancies may be due to limited power in our first study, individual differences in trajectories of change following adversity, or differences among outcomes in how resistant they are to growth.

For example, in a prospective study following spousal loss, only 8% of the sample showed resilient trajectories—and 20% showed nonresilient trajectories—on every measured outcome (Infurna & Luthar, 2017). In addition, for

each individual outcome, 19% to 66% of participants showed resilient trajectories, indicating the huge amount of variance across people and outcomes in responses to the loss. Because our studies were short-term (approximately 30 min), we did not want to administer all of our outcomes twice and risk participant fatigue or knowledge about the true purpose of the study. Therefore, we cannot analyze within person change over time to explore whether individuals showed different trajectories on personal resources—some growing, some being buffered, and others decreasing—or whether certain personal resources seemed more likely to include certain trajectories. We also did not have a large enough sample size to explore individual differences that may have promoted a growth or buffering response (e.g., personality or behavioral characteristics). For example, Infurna and Luthar (2017) found that people who continued to engage in everyday life activities were more likely to be resilient. Critically, they also found that people who continued to engage in social relationships were also more resilient, thus supporting our current findings.

### *Limitations and Future Directions*

Although our short-term experimental approach provided many benefits (e.g., isolation of the proximal experience of adversity and social support, control across adverse experience and social support), its generalizability to more chronic (e.g., marital discord) or traumatic (e.g., loss of a spouse) stressors may be limited. Future research would do well to explore the effect of a randomized controlled longitudinal belonging affirmation intervention among people undergoing a naturalistic life stressor to extend our findings beyond the laboratory and explore processes over time. This intervention could also include experience sampling or day reconstruction methods to capture people's real-time experiences and what states precede their eventual decline or resilience.

Importantly, we inferred growth if our *adversity/belonging-affirmation* group reported higher levels of personal resources than our *no adversity* groups (and of course more than our *adversity/control*) group following our manipulations. We did not measure personal resources before and after our manipulations to know if actual within-person growth occurred. Future experiments could assess personal resources before these experimental manipulations and then assess them again a week or so later to see if actual growth occurred. In the current study, we did not want to assess personal resources twice within a 30-min window, so we opted for the post-manipulation assessment alone.

In addition, we focused on the effect of minor adversity on personal resources, but recent research suggests that positive life events (e.g., getting married, having a child) promote personal growth to the same degree as negative life events (Mangelsdorf et al., 2019). Future research could explore whether social support is also necessary to help

people grow after positive life events. Finally, we focused on only one tool to help people overcome adversity—perceived social support. Future research could investigate whether other tools like actual social support or personal reflection may promote buffering or growth to a similar or greater degree than the belonging affirmation.

## Conclusion

We found strong evidence that experiencing adversity without social support leads to decrements in various personal resources (e.g., connectedness, gratitude). We also sought to discover whether adversity coupled with social support was more likely to promote personal growth or simply buffer people from the negative effects of adversity. Across our three studies, we found some evidence for growth and some for buffering, and, in some instances, the evidence for buffering was stronger than the evidence for growth. In sum, social support following adversity at least restores personal resources (buffering) and future research would do well to explore whether it also promotes growth, perhaps in the long-term if not in the short. Thus, the perception of social support is an important personal asset when facing life's inevitable challenges.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Support for this project was provided by a 2018-19 Faculty Support Grant from the California State University, East Bay Division of Academic Affairs.

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## Supplemental Material

Supplemental material is available online with this article.

## Note

1. In addition, for all three studies, we report main effects, interactions, and simple effects analyses from factorial ANOVAs for our primary outcomes in Supplemental Material. We also present figures with means and standard errors for each outcome in each study. Finally, we present contrast analyses for state affect items across studies.

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