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# Does perceived post-traumatic growth during the COVID-19 pandemic reflect actual positive changes?

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## ABSTRACT

**Background and Objectives:** People commonly report positive changes following stressful experiences (perceived posttraumatic growth; PPTG), yet whether PPTG validly reflects positive changes remains unestablished. **Design and Methods:** We tested the extent to which COVID-19 pandemic-related PPTG relates to positive changes in corresponding psychosocial resources in a national US sample participating in a five wave study (T1-T5), focusing here on T2-T5: $ns$ = 712–860. We examined correlations between resource change (both latent and observed difference scores) and PPTG at each occasion and conducted structural equation models to separate occasion-specific and stable (traitlike) PPTG variance. We related changes in resources to occasion-specific and stable PPTG components. **Results:** Associations between change scores and occasion-specific PPTG were sparse, providing limited evidence of PPTG validity. Associations between change scores and stable PPTG tended to be positive and stronger than associations for occasion-specific PPTG. **Discussion:** Perceptions of growth were largely unrelated to experienced positive changes and thus appear to be largely illusory. However, a personality-like tendency to believe one grows from stressful experiences relates more strongly to actual resource growth. These results suggest that people are not accurate reporters of positive changes they experience and that interventions aimed at promoting post-traumatic growth may be premature.

## Introduction

Perceived posttraumatic growth (PPTG) refers to positive life changes that people commonly report experiencing following highly stressful events (Park & Boals, 2021), such as developing closer relationships with significant others, appreciating life more, and deepening their spirituality. This phenomenon has been studied in the context of a wide variety of different types of traumatic events, including cancer and other health conditions, divorce, motor vehicle accidents, combat, ship-wrecks, bereavement, and sexual assault (Mangelsdorf et al., 2019).

Much of this work has been conducted with individuals experiencing personal traumas, but PPTG is also commonly reported in communal experiences such as earthquakes, hurricanes, floods, and terrorist attacks (Park & Blake, 2020). The COVID-19 pandemic has been conceptualized as a world-wide and generally highly-stressful experience (North et al., 2021), posing a "clear and tangible threat

to all humans" (p. 389; Kimhi et al., 2021), although exposure to COVID-19 stressors has been unevenly distributed (Do & Frank, 2021). Thus, PPTG might be expected to also be common in the context of the COVID-19 pandemic, and indeed early studies have documented fairly high levels of PPTG in samples around the world, including in China (Li et al., 2022), Greece (Koliouli & Canellopoulos, 2021), Germany (Büssing et al., 2020), Spain (Vazquez et al., 2021), Turkey (Ikizer et al., 2021), Taiwan (Chen et al., 2021), Canada, France and Israel (Uziel et al., 2021), and the US (Pietrzak et al., 2021).

PPTG is indeed common, yet what PPTG actually indicates remains unclear. In particular, the validity of PPTG has been challenged in terms of whether it reflects actual positive changes or some other phenomenon, such as coping efforts or an underlying aspect of personality (Jayawickreme et al., 2022). The universal and enduring impact of the COVID-19 pandemic provides a rare opportunity to examine this question in a population that has collectively experienced substantial disruption to their society and their personal lives. The present study examined whether reports of PPTG are associated with actual growth in relevant domains of psychosocial resources.

PPTG is often taken at face value as accurately assessing true positive change (e.g., Tedeschi et al., 2018; Vazquez et al., 2021), perhaps because the notion of growth through adversity is almost irresistibly appealing (Park & Boals, 2021). Although PPTG is sometimes associated with better psychological adjustment (see Tedeschi et al., 2018, for a review), empirical evidence that PPTG reflects actual positive change is sparse. In fact, the small body of available evidence largely suggests the opposite, that PPTG may be illusory, lacking association with positive change and likely representing coping efforts instead (Hall et al., 2009; Livneh et al., 2019; Tennen & Affleck, 2009).

To date, only a handful of studies have directly examined whether PPTG relates to actual changes in PTG-related domains. In an early prospective study, college students completed a measure of current standing on PTG domains and direct measures of those domains (e.g., relating to others, spirituality, appreciation of life) and measures of general distress at baseline (Frazier et al., 2009). Participants who experienced a subsequent traumatic event completed the same measures of current standing in PTG domains, direct measures of PTG-related domains, PPTG, and measures of distress and coping. PPTG was mostly unrelated to changes in both measures of actual PTG (current standing in PTG domains and changes in direct measures of PTG-related domains); although there was a small but significant relationship between spiritual PPTG and positive changes in religiousness. Further, higher PPTG related to *increased* distress and greater efforts to cope with the trauma through positive reappraisal. This study failed to support the notion that PPTG indicates genuine PTG and instead suggested that PPTG reflects coping efforts. Subsequent prospective studies have replicated and extended these findings of minimal associations between PPTG and actual change (Boals et al., 2019; Owenz & Fowers, 2019; Ransom et al., 2008; Yanez et al., 2011).

Importantly, all of the prospective studies referenced above calculated difference scores between observed PTG-related variables across a time interval (e.g., T2 scores – T1 scores) and correlated the raw difference scores with PPTG. However, this strategy is limited because observed variables contain measurement error, and thus raw difference scores may reflect error rather than (or in addition to) true change. In contrast, latent change score models (LCSMs) are a class of structural equation models (SEMs) that calculate latent difference scores that do not include measurement error (McArdle, 2009). Several recent studies examining the validity of PPTG that relied on LCSMs found some weak evidence that PPTG related positively to changes in self-efficacy and purpose in life in spinal cord injury patients (Kunz et al., 2019) as well as qualified evidence that PPTG related to changes in social and personal resources across the transition to high school (only for the small subset for whom the transition was central to their identity; Iimura & Taku, 2018). These results raise the possibility that detecting associations between PPTG and actual change may depend to some extent on the analytic strategy employed.

The present study aimed to advance our understanding of PPTG by examining the extent to which PPTG relates to increases in corresponding psychosocial resources (changes in social support, meaning, peace, and faith) during the COVID-19 pandemic. We selected these resources

as representing both socially and personally relevant domains of PPTG most likely to correspond with actual change based on previous research (e.g., Frazier et al., 2009; Iimura & Taku, 2018; Kunz et al., 2019). We examined this question using two ways of calculating changes in resources: (a) raw differences between observed variables and (b) estimated differences from LCSMs.

Additionally, to our knowledge, previous studies testing the validity of PPTG measured changes in resources over just one time interval, whereas we measured three intervals. This design feature presents the opportunity to test for validity multiple times in the same study and, perhaps more importantly, also allows us to separate interval-specific variance in PPTG from stable variance in PPTG. That is, PPTG may comprise both a dynamic component sensitive to time and context (i.e., the typical conceptualization of PPTG) and a more stable, or trait-like, component reflecting the general tendency to perceive positive changes through adversity relatively independent of time and context. This potential for PPTG to demonstrate a traitlike quality has been raised before (e.g., Infurna & Jayawickreme, 2019) and demonstrated in short-term repeated-measures studies of PPTG (e.g., LoSavio et al., 2011). For example, every week for a year, a national sample reported weekly on recent negative events and PPTG; this sample demonstrated a strong individual-difference level propensity to report growth (Jayawickreme et al., 2022). We therefore tested the possibility that changes in PTG-related resources may have different associations with interval-specific variance and stable variance in PPTG.

## Method

### Participants

Participants were recruited from the Amazon MTurk online worker pool. Eligible participants were aged 18 or older, residing in the US, and able to read English. After following best practice guidelines for online data cleaning at each timepoint to screen out suspicious or poor-quality responses (e.g., removal of inattentive cases and responses originating outside valid locations in the US, ensuring unique human responders as opposed to computerized bot responses), 1544 high quality unique responses were available at baseline (T1), of whom 860 provided high quality data at T2, 816 at T3, 744 at T4, and 712 at T5. Cases were validated through the use of time to completion or "fast-responder" analysis that eliminated any response completed in less than 10 min, Captcha attention screening, and location verification through GPS coordinate confirmation; Table 1 shows the demographic characteristics of our sample at T1.

Studies using MTurk have found the data to be high quality, replicable, and valid across comparisons with frequently used academic platforms (Bartneck et al., 2015; Sheehan & Pittman, 2016) and reasonably representative of the US population as a whole on many health and behavior measures (e.g., Kim & Hodgins, 2017; Mortensen & Hughes, 2018).

### Data collection

All study materials were approved by the University of Connecticut Institutional Review Board. Participants volunteered for the study on the MTurk homepage and provided informed consent prior to screening and completing T1 questionnaires. The project was advertised as an anonymous, longitudinal study of the impact of COVID-19 on daily life, providing participants with $2 for completing the T1 survey and $3 for subsequent surveys. The T1 survey (essentially not used in the present analyses because key measures were only added at T2) was administered from 8–25 April 2020 (approximately 3 weeks after widespread US shelter-in-place recommendations were first issued). Follow-up assessment points include the T2 survey, administered from 15–29 May, at which point many areas of the US had begun to implement reopenings; the T3 survey, 30 June – 14 July, a period of additional reopenings but also sporadic viral surges, reclosures, and increased uncertainty; the T4 survey (24 August to 10 September 2020); and the Time 5 survey (12–29 November 2020),

**Table 1.** Demographic information.

| Demographic characteristic | M (SD) range or percentage |
|---|---|
| Age | $M = 35.62$, $SD = 13.30$, Range = 18–88 |
| Gender | Male: $n = 668$ (43%) |
| | Female: $n = 850$ (54%) |
| | Non-binary/third gender: $n = 11$ (.7%) |
| | Transgender: $n = 7$ (<1%) |
| | Prefer to self-describe: $n = 21$ (1%) |
| | Prefer not to say: $n = 4$ (<1%) |
| Race (participants could endorse > 1) | Black/African American: $n = 209$ (13%) |
| | Asian/Asian American: $n = 208$ (13%) |
| | Native Hawaiian/Other Pacific Islander: $n = 89$ (6%) |
| | American Indian/Alaska Native: $n = 119$ (8%) |
| | White: $n = 1249$ (80%) |
| | Other: $n = 116$ (7%) |
| Partner status | Married: $n = 554$ (35%) |
| | Single: $n = 621$ (40%) |
| | Divorced: $n = 85$ (5%) |
| | Separated: $n = 15$ (1%) |
| | Widowed: $n = 19$ (1%) |
| | Living with (not married to) significant other: $n = 252$ (16%) |
| Caregiver status | Yes: $n = 332$ (21%) |
| | No: $n = 1214$ (78%) |
| Sexual orientation | Straight/Heterosexual: $n = 1310$ (84%) |
| | Gay or lesbian: $n = 65$ (4%) |
| | Bisexual: $n = 137$ (9%) |
| | Prefer to self-describe: $n = 21$ (1%) |
| | Prefer not to say: $n = 13$ (1%) |
| Employment | Not employed: $n = 482$ (31%) |
| | Part-time: $n = 308$ (20%) |
| | Full-time: $n = 756$ (48%) |

immediately following a contentious national general election that was not yet resolved at the time of data collection.

## Measures

### COVID-19 stressors

Based on previous work during SARS and the early months of the COVID-19 pandemic, a novel measure of COVID-19 stressors was used to assess participants' exposure ("Yes" vs "No") to 23 stressors in the past week (Hynes et al., 2022; Tambling et al., 2021; see Figure 3 for items). A total score of stressor exposure was tallied by summing the total number of "Yes" responses (possible range 0–23). For each stressor experienced, participants rated the degree of appraised stressfulness from 1 ("not at all") to 5 ("extremely").

### Social support

At each time point, participants completed the 4-item appraisal subscale of the Interpersonal Support Evaluation List-12 (ISEL-12; Cohen et al., 1985) as a measure of the perceived availability of supportive others. The ISEL-12 has demonstrated strong psychometric properties in a wide range of samples. The appraisal subscale was selected as the most appropriate type of social support to assess given social distancing and barriers to interaction and travel during COVID-19. Given the repeated-measures design of the study, instructions were modified to refer to the past two weeks. Items are rated from 0 ("definitely false") to 3 ("definitely true") and summed to create a total score (possible range for appraisal subscale = 0–12). A sample item is, "When I need suggestions on how to deal with a personal problem, I know someone I can turn to." Cronbach's alphas for each time point used in the analyses were: T2 (.88), T3 (.88), T4 (.88), and T5 (.89).

### Personal resources

From T2 onward, the FACIT-Sp (Peterman et al., 2002) was administered. The FACIT-Sp comprises three subscales, each of which measures a distinct aspect of spirituality with four items: faith (e.g., "I find comfort in my faith or spiritual beliefs"), meaning in life (e.g., "I feel a sense of purpose in my life"), and peace (e.g., "I feel peaceful"; Canada et al., 2008). Instructions were modified to refer to the past two weeks. Items are rated from 0 ("not at all") to 4 ("very much"). Subscale scores range from 0–16; in the present study, alphas were, for meaning: T2 (.88), T3 (.90), T4 (.90), and T5 (.90); peace: T2 (.86), T3 (.88), T4 (.88), and T5 (.88); and faith: T2 (.89), T3 (.90), T4 (.90), and T5 (.90).

### COVID-related perceived posttraumatic growth

From Time 2 onward, we administered the CAIR (Complementary and Integrative Research Lab)-Pandemic Impact Questionnaire (C-PIQ) Positive Impact scale (Lang, 2020) as recommended by NIH in the early days of the pandemic (NIH, 2020). This scale is a version of the PTGI (Tedeschi & Calhoun, 1996) modified for the COVID-19 Pandemic. It asks participants "Has the COVID-19 pandemic led to any of the following positive changes in your life IN THE PAST TWO WEEKS?" and presents five items (e.g., "created spiritual change" and "strengthened your relationships with others or your community") rated from "not at all" (1) to "extremely" (5). Cronbach's alphas for each time point used in the analyses were: T2 (.85), T3 (.86), T4 (.88), and T5 (.89).

### Analysis plan

We examined changes in psychosocial resources across three intervals: from T2 to T3; T3 to T4; and T4 to T5. We computed change scores in two ways. First, we derived change scores from LCSMs (McArdle, 2009). These models assess change through latent difference variables, which index true change over time corrected for measurement error (Steyer et al., 1997). Figure 1 shows the basic model. Given that $\Delta$ scores refer to change across time, the $\Delta$ Resource scores represent the latent change scores. The paths between (a) latent change scores and corresponding observed scores and (b) observed variables at T and T+1 are fixed to one so that change is modeled perfectly by the latent difference factor (McArdle & Nesselroade, 1994). We estimated LCSMs using maximum likelihood (ML), which allowed us to use full information maximum likelihood (FIML) to handle missing data, as recommended (Kievit et al., 2018). We conducted an LCSM for each resource variable, for a total of four LCSMs. Second, to allow comparison with previous research (e.g., Frazier et al., 2009), we used observed difference scores, which we computed simply by subtracting a person's score at T from their score at T+1 (e.g., subtracting the T2 score from the T3 score). We focus primarily on results from LCSMs in the tables and main text. We present detailed results
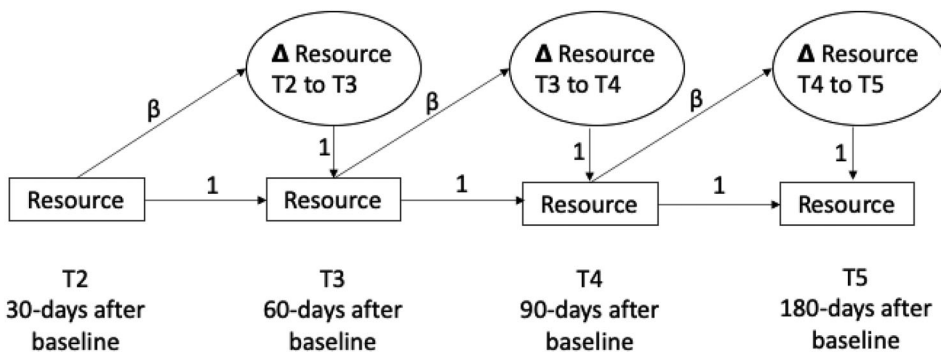


**Figure 1.** Conceptual representation of latent change score models.

Note: Resource variables at T3, T4, and T5 are defined perfectly by a latent change score variable ($\Delta$ Resource T to T+1). The path between observed variables at T and T+1 is fixed to one so that change is modeled perfectly by the latent change score factor.

from observed difference scores models in the Supplemental Tables and briefly discuss them in the main text.

We related resource change scores (latent difference scores and observed difference scores) to both dynamic PPTG (changing over time) and general (traitlike) PPTG. To examine dynamic PPTG, we used two different strategies. First, we correlated resource changes over each T to T+1 interval to PPTG at T+1. For instance, we correlated resource change scores (both as observed and as latent variables) over the interval T2 to T3 with PPTG at T3. Second, we employed a structural equation modeling (SEM) approach to test the conceptual model depicted by Figure 2 for each resource variable. In each model (one for each resource variable), we defined a general factor of PPTG from the three observed indicators of PPTG: T3, T4, T5. This factor reflects the overall tendency to perceive posttraumatic growth over time (i.e., a "traitlike" variable). By residualizing the general factor of PPTG from observed PPTG at each time point, we were able to isolate the dynamic aspects of PPTG. These residualized PPTG variables reflect occasion-specific PPTG, independent of the general factor of PPTG. We then related change scores in each resource variable over T to T+1 intervals to PPTG at T+1 residualized for the general PPTG factor. We used ML estimation and FIML to handle missing data. We then tested the associations of the observed and latent changes in resources with the general PPTG factor. These tests look at the relations between changes in resources and the stable aspect of PPTG. Finally, we examined whether associations between change scores and occasion-specific variance of PPTG differed in magnitude from the associations between change scores and the general variance of PPTG.

## Results

To examine systematic attrition, we compared participants with complete PPTG data at all time-points from T2-T5 ($n = 448$) to participants who provided PPTG data at one to three time points ($n = 389$). We compared participants on PPTG and all resources variables across time points. Independent groups t-tests showed that complete responders did not differ from incomplete responders on PPTG or social support at any time point ($ps > .05$). Complete responders also showed equivalent levels of meaning, peace, and faith at T2 but higher levels of these resources at T3, T4, and T5. Thus, complete responders tended to have higher levels of FACIT-Sp variables following T2.
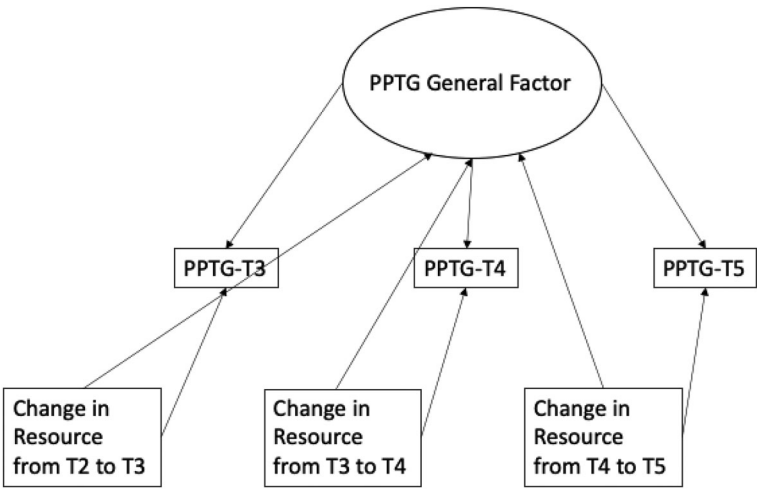


**Figure 2.** Conceptual representation of structural equation models relating changes in resources to PPTG.

Note: We conducted two SEMs for each Resource variable: one for observed difference scores and one for latent difference scores. The PPTG General Factor is defined by PPTG at T3, T4, and T5. PPTG observed variables (T3, T4, and T5) are residualized for the PPTG General Factor. Regressions predicted the PPTG General Factor and PPTG variables residualized for the general factor from Changes in Resource variables.

### COVID-19 stressors and appraised stressfulness

Because PPTG was assessed with regard to the pandemic, we characterized the levels of stressors encountered and stressfulness engendered by COVID-19 at baseline. Of the 23 COVID-19-related stressors inquired about, the reported mean exposure at baseline was 11.31 ($SD = 3.96$). Cumulative appraised stress, which could range from 1 to 104, was 35.71 ($SD = 17.72$) (see Figure 3). We also computed exploratory correlations between stressors at baseline (presence of stressor, level of appraised stress) and resources at each time point (see Supplemental Table 1). Generally, presence of stress and level of appraised stress had weak, negative correlations with resources (i.e., people who had more stress reported fewer resources). Exceptions were "changes to care for dependents" (weak, positive correlations with faith), "cancellations of celebrations, entertainment, or trips" (weak, positive correlations with faith and social support), and "cancellation of meaningful rituals" (strong, positive correlations with faith).

### Descriptive statistics

We conducted descriptive statistics and results of paired *t-tests* to examine changes in PPTG and resources between adjacent time points. Compared to the scale midpoint, participants showed modest levels of PPTG at each time point, and PPTG tended to decrease across time. Compared to scale midpoints, participants showed moderate levels of meaning and peace, modest levels of faith, and rather high levels of social support. Resources tended to be stable across time. See Supplemental Table 2.

### Associations between changes in resources and dynamic PPTG

Table 2 shows results of analyses examining PPTG as a dynamic variable that changes across time points. We report unadjusted *p-values*, and we also report Holm-adjusted (Holm, 1979) values for
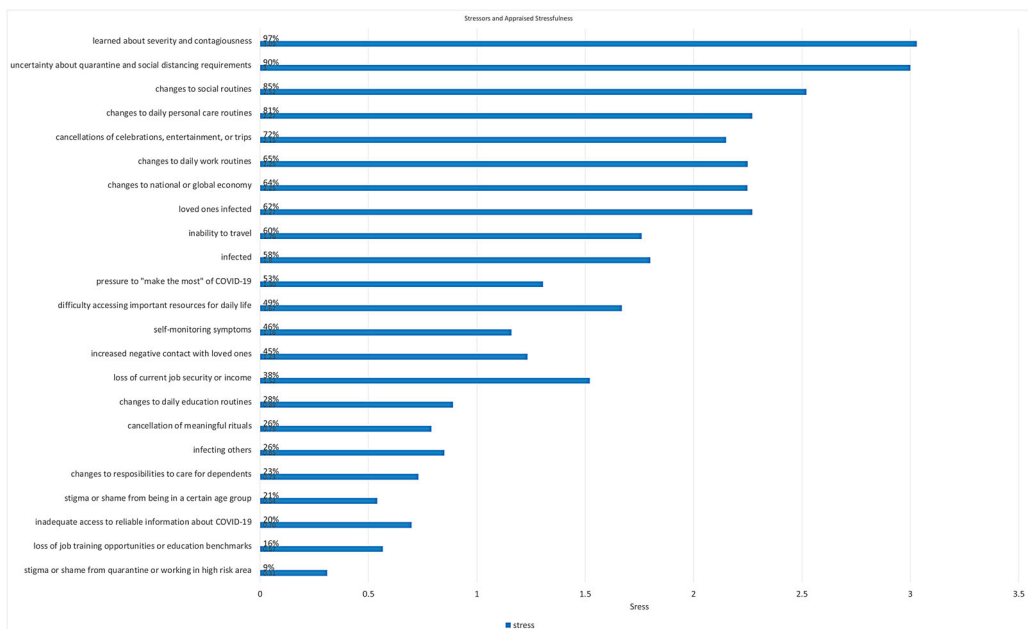


**Figure 3.** COVID-19 stressors and appraised stressfulness.

Notes: Percentages listed next to the shaded bars represent proportion of the total sample who endorsed experiencing each item. Stressors are ordered in decreasing order of prevalence. Stress appraisal items [rated 1 ("not at all stressful") to 5 ("extremely stressful")] were only completed for items endorsed.

**Table 2.** Associations between changes in resources over T to T+1 intervals and dynamic PPTG at T+1.

| | Measured PPTG | | | | | |
|---|---|---|---|---|---|---|
| | PPTG T3 | | PPTG T4 | | PPTG T5 | |
| Latent change scores | r | p | r | p | r | p |
| Meaning | .17 | <.001/<.001 | .03 | .47/1.00 | .06 | .02/.16 |
| Peace | .16 | <.001/<.001 | .02 | .68/1.00 | .08 | .03/.21 |
| Faith | .21 | <.001/<.001 | .04 | .30/.84 | .14 | <.001/<.001 |
| Social Support | .03 | .41/1.00 | .04 | .26/1.00 | .04 | .26/1.00 |
| | PPTG Residualized for a General Factor | | | | | |
| | PPTG T3 | | PPTG T4 | | PPTG T5 | |
| Latent change scores | b | p | b | p | b | p |
| Meaning | −.03 | .29/1.00 | .01 | .63/1.00 | .09 | .002/.02 |
| Peace | −.03 | .30/1.00 | .04 | .15/.90 | .10 | <.001/<.001 |
| Faith | −.10 | .001/.01 | .08 | .008/.06 | .15 | <.001/<.001 |
| Social Support | −.03 | .29/1.00 | .00 | .95/1.00 | .05 | .08/.56 |

Note: r = correlation; b = standardized path coefficient. Unadjusted *p-values* are displayed before the slash, holm-adjusted *p-values* are displayed after the slash.

each family of 12 tests. This was based on the logic that the null is being tested 12 times for each set of analyses (i.e., three times each for the four resources variables).

The top half of Table 2 shows correlations between latent changes in resources with measured PPTG. For latent change scores, results using unadjusted *p-values* showed evidence of validity for PPTG as reflecting actual increases in Meaning, Peace, and Faith at T3 and T5 (but not T4). The findings for Meaning and Peace at T5 did not survive adjusting for multiple tests. Neither method demonstrated associations with changes in social support over time. For observed change scores (see Supplemental Table 3), we found little evidence of validity for PPTG, just two positive correlations out of 12 (with Meaning at T2-T3 interval and Faith at T4-T5 interval, and only Faith at T4-T5 survived correcting for multiple tests).

The bottom half of Table 2 shows path coefficients from SEMs relating changes in resources to the dynamic component of PPTG residualized for a general PPTG factor. For latent change scores, unadjusted and adjusted *p-values* showed that changes in Meaning, Peace, and Faith over the T4-T5 interval related positively to T5 residualized PPTG (changes in Faith also related positively at T4 but negatively at T3). For observed change scores (see Supplemental Table 3), evidence was mixed regarding the validity of residualized PPTG as reflecting actual increases in Faith (positive associations at T4 and T5 but negative at T3), as well as limited evidence for the validity of PPTG in terms of reflecting actual increases in Peace (positive associations at T5).

Table 3 shows path coefficients from SEMs relating changes in resources to the PPTG general factor. For latent change scores, changes in Meaning, Peace, and Faith across all intervals tended to related positively to the PPTG general factor, with the exceptions of Peace and Social Support across the T4 to T5 interval, whereas changes in Social Support did not relate to the PPTG general factor. Results were highly similar across unadjusted and adjusted *p-values*, with only the findings for Meaning across the T4 to T5 interval not surviving the correction (the *p-value* changed from .02 to .06). For observed change scores (see Supplemental Table 4), changes in Meaning, Peace,

**Table 3.** Standardized path coefficients relating changes in resources to the general factor of PPTG.

| | Interval | | | | | |
|---|---|---|---|---|---|---|
| | T2-T3 | | T3-T4 | | T4-T5 | |
| Latent change scores | b | p | b | p | b | p |
| Meaning | .43 | <.001/<.001 | .27 | <.001/<.001 | .12 | .02/.06 |
| Peace | .43 | <.001/<.001 | .19 | .003/.02 | .09 | .06/.12 |
| Faith | .65 | <.001/<.001 | .36 | <.001/<.001 | .26 | <.001/<.001 |
| Social Support | .27 | <.001/<.001 | .22 | .003/.02 | .05 | .34/.34 |

and Faith over T2-T3 related positively to the PPTG general factor. Additionally, changes in Social Support across the T3-T4 and T4-T5 intervals related positively to the PPTG general factor.

We conducted Wald tests to examine whether the associations between change scores and occasion-specific variance of PPTG differed from the associations between change scores and the general variance of PPTG. For instance, we compared the associations between (a) changes in resources from T2 to T3 with PPTG at T3 (residualized for the general factor) and (b) changes in resources from T2 to T3 and the general factor of PPTG. Supplemental Tables 5 and 6 show the results of these tests. For latent change scores, associations tended to be either similar (6/12) or higher with the general factor of PPTG (5/12). For observed change scores, associations were generally similar in magnitude (8/12), though some associations were higher for the dynamic component (2/12) and the general factor (2/12).

## Discussion

In a sample reporting moderate amounts of stress and disruption, our results show at best modest and inconsistent support for the validity of PPTG vis-à-vis actual positive changes in psychosocial resources. Depending on the method used, we found evidence for 2 of 12–6 of 12 positive correlations between dynamic PPTG and change in a psychosocial resource. On the other hand, nearly all of the changes in psychosocial resources we found were in the positive direction (i.e., increases), supporting the notion that people were sometimes accurately reporting their positive changes across intervals as the COVID-19 pandemic wore on.

The most consistent association of PPTG with increases in a psychosocial resource appeared to be for meaning in life. People who reported they experienced growth from the pandemic often *had* actually increased in their sense of meaning in life. Perhaps there is something especially noticeable about increases in feeling that one's life is comprehensible and purposeful (Steger, 2021). Increases in a sense of meaning in life during the extensive disruptions brought on by COVID-19 likely gave a tremendous boost to individuals' wellbeing and quality of life (Li et al., 2021).

On the other hand, dynamic PPTG was singularly unrelated to increases in social support at any interim using any method to assess this association. Thus, people's retrospective accounts of relationship change may be particularly inaccurate. Relatively few associations between dynamic PPTG and increases in faith were demonstrated, and in fact, PPTG was in several instances associated with declines in faith, counter to previous research that has shown spiritual change to be the most likely change reflected in PPTG (e.g., Frazier et al., 2009).

It should be noted that all of the statistically significant correlations found in this study were quite modest, categorized as small effect sizes (Cohen, 1988); these effect sizes are similar to other studies that have reported positive associations between perceived post-traumatic growth and growth in some resources (e.g., Iimura & Taku, 2018). Further, these results are tempered by the inconsistencies we found in results across measures and occasions. Some of the coefficients were indeed negative, most were null, and a few were positive. This variation – especially combined with small effect sizes – suggests that our modest support for the validity of PPTG could be due to sampling error or random variation as well as due to actual associations between perceptions of growth in relation to the pandemic and actual increases in psychosocial resources.

This study is one of the first to separate out and examine a traitlike component to PPTG (cf. Jaya-wickreme et al., 2022), and thus, findings regarding PPTG's traitlike qualities are noteworthy. Generally, this component, especially with regard to latent variables, was associated with increases in nearly every resource at every time point. Further, the effect sizes were somewhat larger for traitlike PPTG than for dynamic PPTG. In fact, the effect sizes for statistically significant associations with dynamic PPTG were quite small. These results suggest that a personality-like tendency to perceive positive changes in psychosocial resources from adverse circumstances is related to actual growth in those resources over time, at least in the midst of an ongoing pandemic, while the small

magnitude of the spotty findings with dynamic PPTG suggests that people are indeed minimally capable of accurately reporting changes in their psychosocial resources retrospectively.

### *Limitations and future research directions*

Limitations of this study must be considered when interpreting these results. While comprising a reasonable sample for the questions posed here regarding validity of PPTG, MTurk workers do not constitute a nationally representative sample, and it is hard to know how well these results would generalize to a representative sample in the US or other locations. We used an abbreviated version of the PTGI to assess PPTG and it is impossible to know how results might have differed if the full PTGI had been used. We were able to examine only a limited set of resources; aspects of PPTG such as appreciation for life were not included. The FACIT-Sp is a suboptimal measure of meaning, peace and faith as it is conceptualized as both a resource and a measure of wellbeing (McLouth et al., 2021). We did not examine PPTG in the context of mental or physical health; it is possible that, regardless of its verdicality, perceptions of growth might provide a boost to health, which may have implications for clinical settings or interventions (Roepke et al., 2018). Our sample, while moderately stress and experiencing many kinds of life disruption, may not generalize to people dealing with other types of stressful or traumatic situations. Finally, given the exploratory nature of this study, many statistical tests were conducted without correction; doing so would likely have rendered fewer associations statistically significant, demonstrating even less support for the validity of PPTG.

In spite of these limitations, our results have important implications for future work on PPTG, including studies aiming to determine validity. Much more research is needed to examine the validity of PPTG, and our results suggest that more consideration of the specific methods by which PPTG is studied is warranted. Methods that avoid measurement error (latent difference) should provide more accurate measurement of change. Further, understanding the traitlike dimension of PPTG is likely to prove fruitful, illuminating an important individual difference.

## Conclusions

The study of PPTG has proliferated without attention to validity. Many studies have examined PPTG following many different types of adversity, typically considering it an accurate reflection of experienced positive changes. Our results suggest that such views are largely wrong. Perceptions of growth at best occasionally reflect small changes in resources but often are entirely inaccurate. Elsewhere (Park & Boals, 2021), we have argued that PPTG may have important meanings aside from its accuracy, but it is important to note that these perceptions largely do not connote actual change.

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