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► To cite this version:

Emma Gendre, Andrea Soubelet, Stacey Callahan. Trajectories of posttraumatic growth identified from person-centered analyses: A systematic review. *European Journal of Trauma and Dissociation*, 2025, 9 (1), pp.100485. 10.1016/j.ejtd.2024.100485 . hal-04830064

HAL Id: hal-04830064

<https://hal.science/hal-04830064v1>

Submitted on 6 Jan 2025

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Review Article

Trajectories of posttraumatic growth identified from person-centered analyses: A systematic review

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ARTICLE INFO

Keywords:

Perceived posttraumatic growth
 Illusory growth
 Trauma
 Trajectories
 Longitudinal

ABSTRACT

Struggling with a highly stressful or traumatic event can lead to the development of posttraumatic growth (PTG); yet this construct lacks a theoretical consensus. The Janus-Face model incorporates two forms of perceived PTG, constructive and illusory. To examine clinical heterogeneity in PTG, this systematic review aims to identify measurement of illusory PTG, growth trajectories from person-centered analyses, variations by event type, and transitions over time. A search for studies published between 1996 and 2023 was carried out using four databases (PsycARTICLES, PsycINFO, PubMed, ScienceDirect) following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Of the eighteen studies included, eight considered real and illusory PTG, evaluating them indirectly through various measures: PTG, coping, functioning, or distress. Fifteen studies conducted with adults and three with children named PTG trajectories according to the evolution of the level of growth (stable, increasing, decreasing PTG) or according to characteristics such as PTG levels, distress, coping, resources (constructive, illusory, distressed, struggling, resistant PTG). Trajectory inclusion of high or increasing PTG is determined by factors such as sociodemographic variables, perceived distress, active coping, or social support. Trajectories varied by event type and sample, with chronically ill patients showing complex patterns while earthquake-surviving children mostly high PTG. Additionally, trajectory transitions were observed less than two years post-event. The results suggest that perceived growth can take multiple forms that evolve over time. Developing this type of study by integrating different events and additional processes would improve understanding of perceived PTG and provide insight for adaptive interventions.

1. Introduction

Exposure to a traumatic event (TE) or adverse life experience can lead to psychological distress and the development of disorders including posttraumatic stress disorder (PTSD) (van den Berg et al., 2017). The cognitive and affective struggle following an event that has shaken core beliefs can also generate positive psychological changes, grouped under the term posttraumatic growth (PTG). These changes have been observed in five dimensions: appreciation for life (get more out of life, feeling lucky to be alive), relationships with others (more intimate, appreciated, increased sense of compassion), development of personal strength (feeling stronger, able to face difficulties), new possibilities (novel behaviours, triggered as new activities), and spiritual development (existential questioning, reconfiguration of one's beliefs) (Tedeschi & Calhoun, 1996, 2004). The development of PTG requires a three-stage cognitive process: comprehensibility, management of

automatic ruminations, and significance. The individual first seeks to understand what has happened through intrusive ruminations that later become more voluntary. Resources are mobilized to overcome distress, enabling the individual to engage in deliberate ruminations aimed at making sense of the event, elaborating new schemas, and reconstructing their life story (Calhoun & Tedeschi, 2014; Magne et al., 2021).

Nevertheless, the true nature of PTG is controversial. Some theories, including that of cognitive adaptation (Taylor & Brown, 1988), regard growth as a coping strategy. This takes three forms of positive illusions: unrealistic self-evaluations, illusion of control, and unrealistic optimism. Several arguments in favour of possible illusory growth are highlighted in the literature. Firstly, the definition of PTG is unclear regarding the nature of the change. PTG can be described as a change in perspective, but also as a change in personality, identity, or behaviour. The chronology of change in the definition of PTG is not always considered: participants assess PTG by referring to positive changes since shortly

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after the traumatic event or adverse life experience, and not since the period preceding the experience (Boals, 2023). Retrospective self-report using the Post-Traumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996), is susceptible to several cognitive biases such as positive attention bias, downward comparison bias, post-event growth beliefs, social desirability bias, and/or memory bias (overgeneralization of autobiographical memory, imprecision of chronology, or inaccurate recall of previous functioning) (Gower et al., 2022).

Furthermore, perceived PTG has not been associated with actual quantifiable changes pre- and post-event (Corman et al., 2021; Owen & Fowers, 2019). No consensus has been reached on the relationship between PTG and psychological adjustment. Growth can be related to distress positively (Bistricky et al., 2023), negatively (Su & Chow, 2020), or non-significantly (Yu et al., 2022). Although results are inconsistent, meta-analyses have highlighted that PTG was globally unrelated to anxiety and depression (Long et al., 2021), while it was positively related to PTSD (Liu et al., 2017; Marziliano et al., 2020; Schubert et al., 2016). The coexistence demonstrated between PTG and PTSD links with Tedeschi and Calhoun's (2004) model, according to which the development of PTG results from a struggle against distress enabling engagement in a previously presented cognitive process leading to the modification of ruminations and schemas. The temporality is then to be considered: in a first step, trauma-related distress would trigger growth, which in a second step could decrease distress (Tedeschi & Moore, 2021). The type of relationship between PTG and PTSD could also vary according to the level of subjective impact of the traumatic event or adverse life experience. Several studies found that the relationship between growth and PTSD was curvilinear (inverted U-shaped), meaning that only moderate PTSD severity predicted high PTG (Eisma et al., 2019; Na et al., 2021; Weber & Schulenberg, 2023; Wen et al., 2020; Whealin et al., 2020). These data suggest that growth occurs when subjective distress is neither too low nor too intense, where it is possible to manage intrusive ruminations and rebuild core beliefs.

In terms of adaptation, PTG is associated with both adaptive and maladaptive coping strategies such as active and avoidance coping (Dominick, 2022; Fujimoto & Okamura 2021). PTG has also been linked to support for aggressive behaviour (Hobfoll et al., 2007) and dysfunctional attitudes (Liébana et al., 2022). These correlations between distress, maladaptive coping, and PTG, have led some authors to propose that growth might be a coping strategy aimed at maintaining previous schemas (Tennen & Affleck, 1998) as well as restoring meaning to life, regaining a sense of control, and restoring self-esteem (Taylor, 1983). This form of PTG, considered "illusory", is in contrast to that described by Tedeschi and Calhoun (2004), who associate PTG with positive coping and distress-fighting processes leading to the modification of fundamental schemas and improved functioning (see review Zoellner & Maercker, 2006). In other words, PTG according to Tedeschi and Calhoun is viewed as genuine, since it involves real changes in previous schemas, in contrast to illusory PTG.

In relation to these findings, the proposed Janus-Face Model (Zoellner & Maercker, 2006) integrates adaptive and maladaptive processes representing two components of perceived PTG: constructive and illusory. Constructive growth, theorized by Tedeschi and Calhoun, is functional. Illusory growth, conversely, corresponds in part to distorted positive illusions counterbalancing distress, but also reinforce cognitive avoidance and increase long-term distress. In the event of successful adaptation, constructive growth would increase over time. Boals (2023) also postulates that perceived PTG is a mixture of authentic and illusory PTG. Other researchers have defined illusory reports of growth by an assimilation of the event instead of an accommodation of core beliefs (Sumalla et al., 2009), and the result of dissociative mechanisms blocking traumatic material and fragmenting the belief system (benefits versus losses following psychotrauma) (Lahav et al., 2016).

According to these theoretical perspectives, different PTG patterns may exist, which could partly explain the different relationships between PTG and psychological adjustment. It should be noted that other

factors, such as the subjective impact of trauma, may contribute to the diversity of results. Person-centered analyses are particularly an attractive way for exploring the existence of multiple profiles or trajectories of PTG. They account for clinical heterogeneity regarding the extent and direction of change by identifying coherent groups of individuals with different psychosocial characteristics (Rzeszutek & Gruszczyńska, 2022). Although a growing body of research uses these approaches to examine models of PTSD/PTG, the analyses are mainly cross-sectional, such as Latent Class Analysis or Latent Profile Analysis (see review Fletcher et al., 2023). The understanding of PTG profiles is therefore limited and questions remain regarding their long-term persistence, as well as by what factors may influence them over time. Additionally, it is possible that different types of PTG only emerge and differentiate over the long term, and that genuine growth may also involve profile changes.

A few longitudinal studies exploring these possibilities conducted these cross-sectional analyses over several time points or person-centered longitudinal analyses (Group-Based Trajectory Modeling, Growth Mixture Modeling, Latent Transition Analysis). The work of Pat-Horenczyk et al. (2015, 2016) is often cited to differentiate types of PTG. In their interventional longitudinal study of women with breast cancer, Pat-Horenczyk et al. (2015) proposed an operationalization of the two forms of PTG described by Zoellner and Maercker: constructive PTG is characterized by an increase in both PTG and positive adaptation, and illusory PTG is defined as an increase in PTG only. Long-term adaptation would therefore be a differentiating criterion, while perception of PTG would be similar, whatever the type of growth. In 2016, the same authors used these definitions to identify various classes such as "struggling PTG", "constructive PTG", "resistant", or "distressed". They enriched the operationalization of constructive PTG by adding low probabilities of negative coping, depressive symptoms, and PTSD criteria, distinguishing it from the "struggling PTG" class, which also showed high growth and positive coping. It was also clarified that illusory PTG was not associated with high distress, unlike distressed PTG. However, the distinction between illusory and struggling PTG is still preliminary (Pat-Horenczyk et al., 2016).

Following on from these observations, other studies have identified multiple growth trajectories in a variety of contexts. For example, in women with breast cancer, the following trajectories have been observed: constructive, illusory, or distressed PTG (Cheng et al., 2020a), building on the conceptualizations of Pat-Horenczyk et al. (2016). This observation of plural trajectories is not limited solely to adults suffering from somatic pathologies. A study (Zhou et al., 2019) conducted after an earthquake revealed four distinct trajectories in adolescents: high stable, low stable, decreasing, and increasing. Level of perceived distress and coping type adopted by individuals were predictors of inclusion in these trajectories. Even in studies that focus on changes in PTG levels over time, distress and coping appear to play a major role in trajectory inclusion, referring to the Janus-Face Model and the work of Pat-Horenczyk et al. (2016). Nevertheless, the literature does not offer a clear synthesis of how to assess or determine the trajectory of illusory PTG.

The number and type of trajectories could vary depending on the sample, the nature of the event (e.g. sudden or prolonged), the temporality of the study, and the type of trajectory classification used. The research by Pat-Horenczyk et al. (2016) highlighted transitions between PTG trajectories over time, echoing the postulate of sequential stages proposed by Zoellner and Maercker (2006). The question remains whether there is sufficient evidence in the literature to confirm the instability of growth trajectories.

No systematic review has been carried out, however, to determine whether similar or distinct trajectories exist between studies and how they are characterized. Given the debates on PTG modelling and the assumption of clinical heterogeneity in PTG, the current review examines longitudinal studies using person-centered analyses in order to: 1) identify the measurement of illusory PTG, 2) determine PTG trajectories most often observed and their features, 3) compare trajectories of

individuals with somatic illnesses and earthquake survivors, and 4) explore possible transitions between trajectories.

The research questions formulated were: "How is the 'illusory' aspect assessed?", "How are PTG trajectories identified and characterized?", "Do trajectories vary according to the type of event, such as somatic illness or earthquake?", and "Are trajectories unstable over time?".

2. Method

The review protocol was not registered, as the possibility of recording was discussed when data collection was too far advanced. Despite this limitation, the methodology was followed in accordance with PRISMA guidelines (Gedda, 2015). The complete PRISMA checklist is available in [Appendix 1 \(Supplementary material\)](#).

2.1. Eligibility criteria

Eligibility criteria were discussed between the three authors. Studies were included according to the following eligibility criteria: (1) published in English, (2) published between 1996 (creation of the PTG concept) and 2023, (3) identified PTG trajectories, and (4) applied person-centered analyses. Participants included children, adolescents, and adults. The eligibility criteria were broad to maximize the inclusion of longitudinal studies on PTG that employed person-centered approaches, regardless of the population studied. We use the following definition of the PTG concept: "positive psychological change experienced as a result of the struggle with highly challenging life circumstances" (Tedeschi & Calhoun, 2004, p. 1). Adverse circumstances refer to any event that highly challenges an individual's resources, without necessarily involving exposure to actual or threatened death, serious injury, or violence.

Grey literature such as dissertations was included to reduce publication bias, improve the comprehensiveness of the review, and provide a more balanced view of the available evidence (Paez, 2017). The studies were grouped according to our research hypotheses: measurement of illusory PTG, identification of trajectories, comparison of trajectories according to event type, transitions between trajectories. Within the trajectories category, studies were divided according to the type of modelling: "trajectories named according to the evolution of the PTG level" and "trajectories named according to designated features".

2.2. Search strategy

A search for these studies was carried out by E.G between October 9 and December 14, 2023 using four databases (PsycARTICLES, PsycINFO, PubMed, and ScienceDirect) and from other sources (Google Scholar, bibliography of articles included). These four databases were selected because they offer broad coverage of the review's thematic field, while reducing the risk of redundancy. Moreover, the authors had institutional access to these databases, unlike CINAHL and Cochrane. For grey literature, Google Scholar indexes a large proportion of dissertations (e.g. from one of the largest databases, ProQuest Dissertations & Theses Global) and PsycINFO lists dissertations in the fields of behavioral sciences and mental health.

Keywords were selected to identify longitudinal studies of PTG using person-centered analyses. English terms and synonyms were searched. However, terms such as "benefit-finding" or "thriving" that could be considered synonyms for PTG were not included, as they refer to theoretical models (and measurement tools) different from Tedeschi and Calhoun's original model. The search terms of a review close to the subject (Fletcher et al., 2023) were also examined, and E.G attended a formal training course organized by her university documentation service. Search strategies were tested and adjusted according to the results obtained.

The following keywords entered with the filter "years 1996–2023" were searched in the title and/or abstract of articles in the cited

databases: [{"class" OR "profile" OR "cluster" OR "person-centered" OR "person-centred"}] AND [{"longitudinal" OR "follow-up" OR "time"}] OR [{"trajectories" OR "latent transition" OR "group-based trajectory model*" OR "growth mixture model*"}] AND [{"posttraumatic growth" OR "post-traumatic growth" OR "PTG"}]. The terms "class", "profile", "cluster" or "person-centered" were to be associated with the terms "longitudinal", "follow-up" or "time", as person-centered analyses such as class, profile, or cluster analyses are suitable for cross-sectional designs. Automated search strategies are shown in [Appendix 2 \(Supplementary material\)](#).

2.3. Study selection and data extraction

E.G imported the articles into Zotero and examined their eligibility. After excluding duplicates, the eligibility of articles was first assessed by reading the title and abstract. All documents that were not articles or dissertations (e.g. case studies, pilot studies, books or book chapters, comments or discussions), and not written in English, were excluded. Articles and dissertations not measuring PTG or examining trajectories from person-centered analyses were also excluded. Articles matching the eligibility criteria (measurement of PTG at a longitudinal level and based on person-centered analyses) were read in their entirety to confirm or deny eligibility. In case of disagreement, another author was consulted to reach a consensus. The list of articles excluded after full reading and the reasons for exclusion are detailed in [Appendix 3 \(Supplementary material\)](#).

The nature of the data to be extracted was defined by the three authors. The extracted data are summarized in [Table 1](#). It included the following information: study number, study author, publication date, sample characteristics (number of participants at different times, average age, percentage of women, type of event, country), study duration, measures used, results on trajectories (type of statistical analysis, number, proportion and name of trajectories), and results on determinants of trajectory inclusion.

2.4. Bias assessment risk

Two doctoral students (E.G and a voluntary laboratory assistant) independently assessed each study's risk of bias using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies (National Institutes of Health, 2014) consisting of 14 items rated "yes", "no", "cannot determine", "not applicable", or "not reported". Item responses cannot be added together to assess study quality. Each study was assessed on the basis of the details reported and consideration of bias minimization. According to these elements, the quality of the studies was rated as "good" (absence or low risk of bias, valid results), "fair" (risk of bias but insufficient to invalidate the results), or "poor" (high risk of bias, results not reliable enough). The results were pooled and discussed until a consensus was reached.

2.5. Data analysis and synthesis

After data extraction, a comparative analysis of sample characteristics, methodology, trajectories and their specificities was carried out by E.G. The results were summarized in a summary table ([Table 1](#)) and a narrative synthesis, to highlight the main conclusions, as well as any convergences and divergences between the studies. Within the trajectories theme, studies were grouped according to the type of trajectory modeling, based on the total PTG score or on several variables. Furthermore, to explore potential sources of heterogeneity in the results, a specific comparison was made between studies focusing on diseases and those focusing on earthquakes.

Table 1
Identification of post-traumatic growth trajectories and associated factors.

Study	Sample	Design	Measures	Trajectories	Associated factors
Trajectories named according to the evolution of the PTG level					
N°1 Wang et al. (2014)	N _{T1} = 149, N _{T4} = 126 (124 included in the analyses) M _{age} = 48.6 (SD = 7.77) 100 % female Breast cancer surgery - Taiwan	1 day later, 3, 6 and 12 months later	Demographic/medical variables, PTGI, Hospital Anxiety and Depression Scale (HADS), Affects Balance Scale, 36-item Short Form Health Survey (SF-36) (T1 to T4)	4 trajectories (LCGA): low decreasing (n°1, 17.1 %), low increasing (n°2, 16.1 %), high decreasing (n°3, 38.7 %), stable high (n°4, 28.1 %)	Younger, higher level of education, more positive affect at T4, and positive association with psychological adjustment at T2, T3, T4 in stable high PTG. Younger, higher level of education, more positive affect (compared with 1), more depression (compared with 4) at T4, and positive correlation with adjustment at T1, T2 in high decreasing PTG. More anxiety/depression (compared with 4) and positive correlation with adjustment at T4 in low increasing PTG. Negative correlation with adjustment at T1 in low decreasing PTG.
N°2 Danahauer et al. (2015)	N _{T1} = 653, N _{T4} = 564 Median _{ageT1} = 54 (range = 25–96) 100 % female Breast cancer diagnosis - United States of America (USA)	Baseline (within 8 months of diagnosis), 6, 12 and 18 months later	Demographic/medical variables (T1), PTGI, Beck Depression Inventory, Brief-COPE, Illness Intrusiveness Rating Scale, RAND Social Support Scale (T1 to T4)	6 trajectories (LCGA): stable high (17 %), stable moderate (26 %), stable low (5 %), low and moderately increasing (19 %), moderate and moderately increasing (28 %), dramatically increasing (6 %)	Younger, "non-white", treated with chemotherapy, higher levels of illness intrusion, active coping, and depressive symptoms at T1 in "moderate PTG", "high", "dramatically increasing", and "moderate and moderately increasing". Higher levels of social support in "low PTG", "high", and "moderate and moderately increasing".
N°3 Marshall et al. (2015)	N _{T1} = 167, N _{T6} = 144 (156 included in the analyses) M _{ageT2} = 56.80 (SD = 15.98) 75 % female Canterbury earthquakes (2010/2011) -New Zealand	2 months pre-Traumatic Event (TE) ₁ , 1 month post-TE ₁ , 3 and 12 months post-TE ₂	Demographic/clinical variables, PTG/PTD scale adapted from Frazier et al. (2001) (T2 to T4), SF-12 (T1)	3 trajectories for the Personal Strength dimension (LCGA): no growth/depreciation (68 %), depreciation (13 %), growth (19 %) 3 trajectories for the Relationships dimension (LCGA): stable high (11 %), stable moderate (49 %), stable low (40 %)	Younger and with higher level of mental health before TE in PTG than in PTD for Personal Strength. Only women in stable high PTG for Relationships.
N°4 Tsai et al. (2016)	N _{T1} = 3157, N _{T2} = 2157 (1838 included in the analyses) M _{age} = n.d. n.d.% of female Veterans who have experienced at least one TE -USA	Baseline and 2 years later	Demographic/clinical variables (T1), Trauma History Screen (THS, T1 to T2), PTGI-SF (T1 to T2), PTSD Checklist-Specific Stressor Version (PCL-S, T1), Posttraumatic Stress Disorder-Checklist version 5 (PCL-5, T2), many other variables (protocol Tsai et al., 2015, T1)	5 trajectories (two-step cluster analysis): consistently low (n°1, 33.6 %), consistently high (n°2, 14.5 %), moderately declining (n°3, 19.4 %), dramatically declining (n°4, 15.7 %), increasing PTG (n°5, 16.8 %)	Younger, higher level of education (compared with 1, 3, 4), largest number of TE, lower optimism scores, higher extraversion, agreeableness, conscientiousness, spirituality, life purpose, gratitude, more illnesses at T1, and PTSD at T2 (compared with 1) in "consistently high PTG". More men in "consistently low" (compared with 2, 3). Younger (compared with 1, 3, 4), more men (compared with 2), higher level of education (compared with 4), largest number of TE, higher spirituality, life purpose at T1, and PTSD at T2 (compared with 1) in "increasing PTG". More "white" people (compared with 1, 2, 4), higher social connectedness, and lower optimism (compared with 1) in "moderately declining". More number of TE, higher PTSD, agreeableness, spirituality in "dramatically declining". Higher scores for extraversion and spirituality in "moderate" and "dramatically" declining (compared with 1). For stable compared with declining PTG: more "white" people, low level of education, non-retired, largest number of TE at T2, less openness to experience, altruistic behavior, active lifestyle, lower

(continued on next page)

Table 1 (continued)

Study	Sample	Design	Measures	Trajectories	Associated factors
N°5 Tsai and Pietrzak (2017)	N _{T1} = 3157, N _{T3} = 1538 (2718 included in the analyses) M _{age} = n.d. n.d.% of female Veterans who have experienced at least one TE - USA	Baseline, 2 and 4 years later	Demographic/clinical variables (T1), PTGI-SF (T1 to T3), THS, PCL-S (T1), same variables as their previous study (T1)	3 trajectories (GMM): consistently moderate PTG (12 %), high and increasing PTG (14 %), low and decreasing PTG (74 %)	scores for substance abuse factor at T1, and higher PTSD at T2. Severity of re-experiencing and avoidance symptoms at T1 predicting moderate PTG and high increasing PTG. More men, higher scores of gratitude (compared with decreasing PTG), optimism (compared with moderate PTG), life purpose, spirituality, social support (compared with other 2 groups) in increasing high PTG.
N°6 Bachem et al. (2018)	N _{T1} = 246 and 154, N _{T3} = 212 and 133 M _{ageT1} = 53.5 (SD = 4.6) and M = 50.6 (SD = 6.3) Veterans of the 1973 Yom Kippur War and their wives - Israel	30, 35 and 42 years after TE	Battlefield stressors (before T1), Life events (T1 to T3), PTGI, PTSD Inventory (T1 to T3)	Veterans (GMM): Improved relationships: decreasing (100 %) New possibilities: decreasing (34.1 %), increasing (65.9 %) Personal strength: high reversed u-shaped (65 %), low u-shaped (35 %) Spiritual change: low u-shaped (49.7 %), high u-shaped (36.1 %), medium stable (14.2 %) Appreciation of life: high-decreasing (41.7 %), stable (15.8 %), medium decreasing (42.5 %) For wives different trajectories for New possibilities: decreasing (59.4 %), increasing (40.6 %) Personal strength: high stable (100 %) Spiritual change: increasing (53.9 %), decreasing (11.7 %), stable (34.4 %) Appreciation of life: decreasing (44.5 %), increasing (55.5 %)	PTSD level at T1 predicting only veterans' PTG in spiritual change at T1, their PTSD level at T1/T2 predicting PTG in new possibilities and personal strength at T1/T2, their PTSD level at T1/T2/T3 predicting PTG in relationships and appreciation of life at T1/T2/T3.
N°7 Zhou et al. (2019)	N _{T1} = 391, N _{T4} = 229 M _{ageT1} = 15.28 (SD = 1.81) 57.8 % female Adolescents after the Wenchuan earthquake (2008) - China	1, 1.5, 2 and 2.5 years after TE	Demographic variables, Trauma exposure questionnaire (T1), Modified PTGI (T1 to T4), Child PTSD Symptom Scale (CPSS, T1)	4 trajectories (GMM): high (76.9 %), low-stable (5.7 %), increasing (14 %), decreasing (3.4 %)	Older age, high levels of intrusive, and hyperarousal symptoms at T1 predicting high PTG. Low levels of avoidance symptoms at T1 predicting high PTG and increasing PTG.
N°8 Huang et al. (2021)	N _{T1} = 170, N _{T5} = 165 Young and middle-aged (max age: 59) n.d. % female Stroke - China	1 day before discharge, 3, 6, 9 and 12 months later	Demographic variables, PTGI (T1 to T5)	4 trajectories (GMM): high (26.06 %), low (15.15 %), rapidly increasing (28.48 %), constantly decreasing (30.3 %)	/
N°9 Pięta and Rzeszutek (2022)	N _{T1} = 87, N _{T3} = 71 M _{ageT1} = 41.13 (SD = 11.09) 18.4 % female HIV (treatment duration: M = 7.22, SD = 5.34) - Poland	Baseline, 6 and 12 months later	Demographic/clinical variables (T1), PTGDI-X (T1 to T3), Conservation of Resources-Evaluation, Brief Resilience Scale (T1)	2 trajectories for PTG and 2 trajectories for PTSD (LCGA): increasing (for PTG 51.7 %, for PTSD 19.7 %), decreasing (for PTG 48.3 %, for PTSD 80.3 %)	For PTG trajectories: Lower number of participants with a homosexual orientation in the increasing group than in the decreasing group. Gain of resources predicting a PTG trajectory, while loss of resources predicting a PTSD trajectory.
N°10 Yan et al. (2022)	N _{T1} = 588, N _{T3} = 565 M _{ageT3} = 31.07 (SD = 6.58) 88 % female Frontline nurses and doctors during the COVID-19 pandemic - China	Baseline in march 2020, 12 and 24 months later	Demographic variables (T1), PTGI (T1 to T3), Connor-Davidson Resilience Scale (CD-RISC, T1)	4 trajectories (GMM): fluctuated rise (moderate, low and high, 21.6 %), persistent low (12.9 %), steady increase (27.6 %), high with drop (37.9 %)	More singles in "steady increase PTG". Older, higher level of education, shorter career, less long-term exposure to COVID, and positive association with resilience at T1 in "steady increase PTG", "fluctuated rise", and "high with drop".
Trajectories named according to designated characteristics (PTG level and distress level or associated factors)					
N°11 Pat-Horenczyk et al. (2016)	N _{T4} = 198 M _{age} = 51.80 (SD = 10.85) 100 % female Post breast cancer	Baseline, 6, 12 and 24 months later	Demographic/clinical variables (T1), PTGI, Posttraumatic Diagnostic Scale, Center for Epidemiological Studies Depression Scale, Perceived Ability to Cope with Trauma,	4 trajectories at four times (LCA, LTA): constructive growth (high PTG, 36.71 %, 7.61 %, 14.85 %, 36.49 %), distressed (low PTG, 29.96 %, 35.42 %, 21.21 %, 22.77 %), resistant (low PTG,	High probabilities of positive coping, coping flexibility and low probability of depression/PTSD at T1 in constructive growth. High probabilities of negative coping and depression/PTSD in distressed PTG.

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Table 1 (continued)

Study	Sample	Design	Measures	Trajectories	Associated factors
	treatment (at least 3 months) - Israel		Cognitive Emotional Regulation Questionnaire (T1 to T4)	23.11 %, 26.6 %, 43.35 %, 26.58 %, struggling (high PTG, 10.22 %, 30.13 %, 20.59 %, 14.16 %)	Low probabilities of positive/negative coping and depression/PTSD in resistant PTG. High probabilities of positive/negative coping, coping flexibility and depression/PTSD in struggling PTG.
N°12 Chen and Wu (2017)	N _{T1} =928, N _{T2} =757 M _{ageT2} = 12.71 (SD = 2.78) 53.5 % female Children and adolescents after the Ya'an earthquake (2013) - China	8 and 20 months after TE	Demographic variables, Earthquake Exposure Questionnaire (T1), CPSS, PTGI (T1 to T2)	3 trajectories at T1 and T2 (LPA, LTA): struggling (moderate PTG and high PTSD, 21.9 %, 16 %), resilient (low PTG and PTSD, 21.1 %, 12 %), thriving (moderate PTG and low PTSD, 56.9 %, 72 %)	Transitions in trajectories determined by young age (transition "thriving"/"resilient", "thriving" stable), male gender (transition "thriving"/"resilient"), level of loss and injury (transition "thriving"/"struggling", "struggling" stable), subjective fear ("thriving" stable)
N°13 Cheng et al. (2020a)	N _{T1} =248, N _{T3} = 84 M _{ageT3} = 49.80 (SD = 8.71) 100 % female Post breast cancer treatment (at least 3 months) - Taiwan	Baseline, 3 and 7 years later	Demographic/medical variables (T1), PTGI, Mini-Mental Adjustment to Cancer, HADS (T1 to T3)	3 trajectories (LCGA, GMM): constructive PTG (highest degree of PTG, 37.3 %), illusory PTG (decrease then slightly increase with moderate to high levels, 56 %), distressed PTG (low PTG in decreasing, 6.7 %)	More frequent helplessness-hopelessness coping and lower depression scores at T1 in illusory PTG compared with constructive PTG. More single people, more maladaptive coping, and more depressive and anxious symptoms over a longer period in distressed PTG.
N°14 Asmundson et al. (2021)	N _{T1/T2} = 893 M _{age} = 50.9 (SD = 14.0) 48 % female High stress during COVID-19 – Canada, USA	Baseline in march-april 2020 and 4 months later	Demographic variables, Marlowe-Crowne Social Desirability Scale (T1), PTGI, COVID-19 Disability Scale, Alcohol use (T2), COVID Stress Scales, Patient Health Questionnaire-4 (PHQ), Short Health Anxiety Inventory (T1 to T2)	4 trajectories (cluster): real growth (stable or reduced anxiety, depression and stress symptoms over time, moderate functional disability, and high PTG at T2, 32 %), illusory growth (stable or increased symptoms, high functional disability, and high PTG at T2, 17 %), 2 low growths (low symptom reduction and low level of disability, greater stress reduction in second group, 44 %, 7 %)	More pre-existing mental disorders and increased alcohol consumption in illusory growth (compared with low growth/44 %). More women in the second low-growth group (7 %) than in the first low-growth group (44 %).
N°15 Kyutoku et al. (2021)	N _{T1} = 2554, N _{T3} =560 M _{ageT1} = 47.04 (SD = 12.62) 41.6 % female Tohoku earthquake and tsunami (2011) - Japan	6, 12 and 42 months after TE	Demographic variables, Disaster exposure (T1 to T3), PTGI (T1 to T3), World Health Organization Quality of Life-26 (T3)	3 trajectories for total PTG and each dimension PTG (LCGA): PTG ¹ (for total PTG 22.3 %, Relationships with others 11.9 %, New possibilities 3.9 %, Personal strength 7.3 %, Spiritual change/appreciation of life 6.9 %), illusory PTG ² (for total PTG 32 %, Relationships with others 34.8 %, New possibilities 29.5 %, Strength 32.0 %, Spiritual change/appreciation 11.1 %), no PTG (for total PTG 45.7 %, Relationships with others 53.4 %, New possibilities 66.6 %, Strength 60.7 %, Spiritual change/appreciation of life 55.5 %)	Lower quality of life at T3 for illusory trajectory (except for Spirituality/Appreciation dimension) and for no PTG trajectory.
N°16 Baños et al. (2022)	N _{T1} = 459, N _{T4} =162 M _{ageT1} = 35.21 (SD = 13.00) 77.8 % female Strict confinement COVID-19 - Spain	Baseline in march 2020, 1, 2 and 3 months later	Demographic variables, PTGI-SF, Meaning in Life, Questionnaire, Gratitude Questionnaire-6, CD-RISC, Compassionate Love Scale for Humanity, Satisfaction with Life Scale, PHQ-2, Generalized Anxiety Disorder Questionnaire-2, Positive and Negative Affect Schedule, Perceived Stress (T1 to T4)	4 trajectories at four times (cluster): Survival (low-medium to medium-high scores for positive functioning variables and emotional distress, then distress level back to baseline, low to low-medium PTG scores, around 20 %), Resurgent (medium to high scores for positive functioning variables, low-medium to medium-high distress scores, medium to medium-high PTG scores, around 20 %), Resilient (medium-high to high scores for positive functioning variables,	Older age in "thriving" and "resilient" at T1, in "resilient" at T2 and T4, in "resilient" (compared with "survival" and "resurgent") at T3. More men in "resilient" at T2 and T4, more women in "resurgent" at T2.

(continued on next page)

Table 1 (continued)

Study	Sample	Design	Measures	Trajectories	Associated factors
N° 17 Rzeszutek and Gruszczyńska (2022)	N _{T3} =115 M _{Age} = 40.8 (SD = 10.9) 16 % female HIV (treatment duration: M = 5.5 years, SD = 4.7) - Poland	Baseline, 6 and 12 months later	Demographic/medical variables, PTGI (T1 to T3), Brief COPE (T1)	low distress and PTG, around 30 % at the beginning, around 31–37 % over time), Thriving (medium-high to high scores for positive functioning variables, low or low-medium distress scores, low-medium and medium-high PTG scores, around 20 %) 4 trajectories (LGM): rapid change/struggling PTG (steep rise and small decrease, 7 %), curvilinear (small increase and small decrease, 46 %), low stable (22 %), high stable (or real, 25 %)	Only men, older, more recently diagnosed, and with lower CD4 counts in the struggling group. More women, lower level of education, older diagnoses, and more meaning-focused coping at T1 (compared with "struggling") in high stable PTG.
N° 18 Zhou and Wu (2022)	N _{T1} = 876, N _{T3} = 775 M _{AgeT1} = 13.03 (SD = 2.79) 52.2 % female Children and adolescents after the Ya'an earthquake (2013) - China	6, 12 and 18 months after TE	Demographic variables, Trauma Exposure Questionnaire, Subjective Fear Questionnaire (T1), PTGI, CPSS (T1 to T3)	5 trajectories PTG/PTSD (GMM): recovery (decreasing PTG and PTSD, 5.9 %), growth (high PTG and low PTSD, 50.9 %), struggling (high PTG and stable PTSD, 10.4 %), delayed symptoms (moderate PTG and increasing PTSD, 16.1 %), resistant (low PTG in decreasing and stable PTSD, 16.7 %)	Compared with growth group: Female gender, be afraid, and feel trapped predicting struggling trajectory. Female gender, being injured, or having an injured relative predicting delayed symptoms trajectory.

Note. HIV = Human Immunodeficiency Virus; PTSD = Posttraumatic Depreciation; PTGI = Posttraumatic Growth Inventory; PTGI-SF = Short Form; PTGDI-X = Expanded version of the Posttraumatic Growth and Depreciation Inventory; LCGA = Latent Class Growth Analysis; GMM = Growth Mixture Modeling; LGM = Latent Growth Model; LCA = Latent Class Analysis; LTA = Latent Transition Analysis; LPA = Latent Profile Analysis.

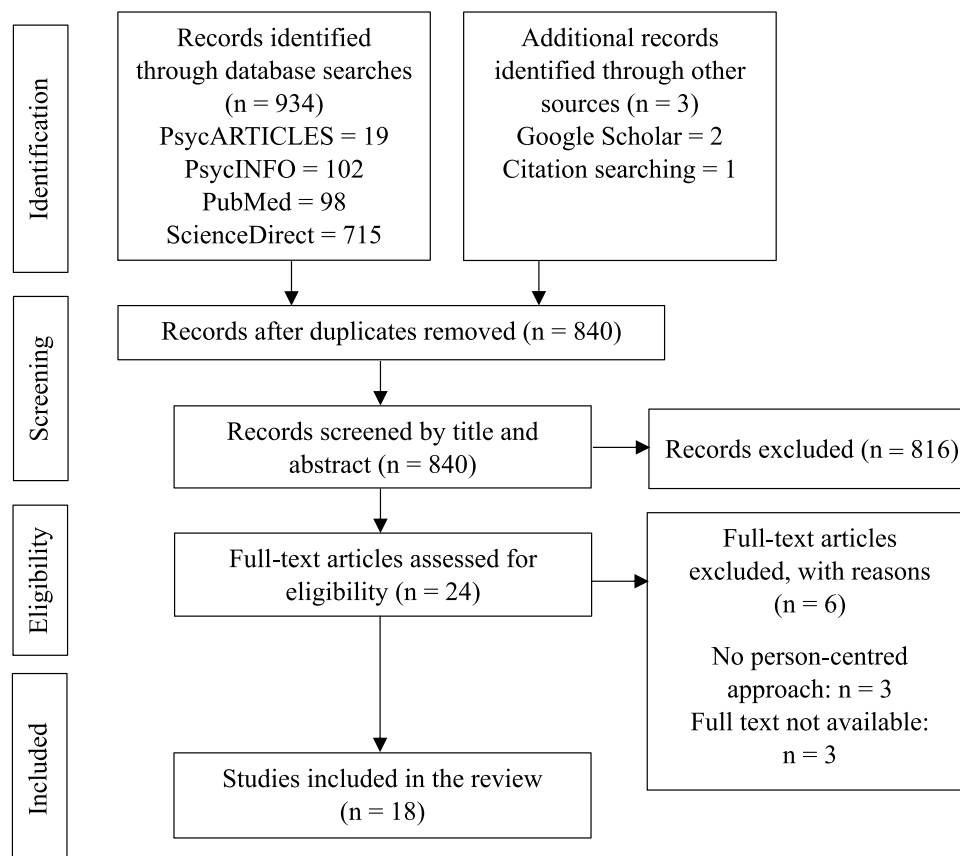


Fig. 1. Flow diagram of selection process.

3. Results

3.1. Study selection

The search process is presented in Fig. 1. After removing duplicates, 840 studies were screened. Subsequently, 816 studies were excluded, as their titles and abstracts did not meet the eligibility criteria. The remaining 24 articles were read, leading to the exclusion of six studies that did not use person-centered analyses or were unavailable in full text (no response from authors). At the end of this stage, 18 studies were included in the review, 17 of which were identified through database searches and 1 was from an included article.

3.2. Study characteristics

Table 1 presents the sample characteristics and measures used in the studies included in the review. A number has been assigned to each study in this table. Between 87 and 3157 participants were recruited at the baseline. Most samples had an average age between 40 and 55 (studies 1, 2, 3, 6, 9, 11, 13, 14, 15, and 17), and included more women than men, or exclusively women (studies 1, 2, 3, 7, 10, 11, 12, 13, 16, and 18). Five studies (studies 3, 7, 12, 15, and 18), including three with children (studies 7, 12, and 18), recruited victims of natural disasters, four (studies 1, 2, 11, and 13) recruited women with breast cancer, three (studies 4, 5, and 6) recruited veterans, three (studies 10, 14, and 16), recruited adults during the COVID-19 pandemic (including one with professionals, study 10), two (studies 9 and 17) recruited adults with Human Immunodeficiency Virus (HIV), and one (study 8) recruited adults following a stroke. Some studies (studies 4, 5, and studies 12, 18) used the same cohorts. Studies ranged from current events (e.g. confinement) to events that took place years earlier (maximum: 30 years).

PTG was assessed predominantly by the PTGI (studies 1, 2, 6, 8, 10, 11, 12, 13, 14, 15, 17, and 18) or by variations like the PTGI-Short Form (studies 4, 5, and 16), the Expanded version of the PTG and Post-traumatic Depreciation Inventory (PTGDI-X; study 9), and the modified Chinese version of the PTGI (study 7). Only Study 3 used another scale adapted from Frazier et al. (2001).

All studies, except Study 8, analyzed covariates included: socio-demographics (e.g., gender, age, level of education, marital status), characteristics of exposure to a traumatic event or adverse life experience, affect, anxiety, depression, PTSD, functional disability, quality of life, coping, perceived social support, personality, resilience, optimism, gratitude, life purpose, spirituality.

3.3. Risk of study bias

Potential bias risk for each study is summarized in Table 2. Quality was graded "good" for 50 % of the studies (studies 1, 2, 6, 7, 10, 12, 13, 15, and 18), "fair" for 39 % of the studies (studies 3, 4, 5, 9, 14, 16, and 17), and "poor" for 11 % of the studies (studies 8 and 11). The "poor" quality rating was assigned in relation to lack of exposure information, failure to measure potential confounding factors (study 8), and lack of procedural clarity (study 11).

3.4. Studies results

The results are presented in Table 1.

3.4.1. Constructive and illusory PTG measurement

Trajectories were modeled according to the evolution of PTG level or according to designated characteristics. The second category considered real and illusory aspects. Illusory growth was inferred indirectly through PTG levels, coping, functioning, and distress. Studies 11 and 13 examined PTG, coping, and distress, while Studies 14 and 16 considered PTG, functioning, and distress. Study 17 assessed PTG and coping, Study 15

evaluated PTG and positive functioning, and Studies 12 and 18 measured PTG and PTSD. Inferring constructive or illusory growth from PTG and distress alone seems insufficient, as both can manifest similarly short term. Studies 11, 12, and 17 measuring coping or distress only at baseline may not capture long-term evolution, where illusory growth could be linked to increased distress and constructive growth could coexist with distress.

PTG differs from resilience: PTG involves surpassing previous functioning, while resilience is returning to pre-event functioning (Alleaume et al., 2023). Studies 12 and 16 defined resilience as low PTG and distress, with moderate/high positive functioning.

3.4.2. Identification of trajectories according to the evolution of the PTG level

Three types of PTG trajectories were identified: 1) stable at low (scores between 10 and 30 out of 105; studies 2, 4, 7, 8, and 10), moderate (40–50; studies 2 and 5), or high levels (60–90; studies 1, 2, 4, 7, and 8); 2) increasing (studies 1, 2, 4, 5, 7, 8, 9, and 10); and 3) decreasing (studies 1, 5, 7, 8, 9, and 10). Study 9 includes posttraumatic depreciation (PTD), representing negative changes in PTG domains (Baker et al., 2008). The proportions of trajectories varied (e.g., "stable" 5 % to 76.9 %), as did those specific to PTG dimensions (studies 3 and 6).

"Moderate to high stable" or "increasing" trajectories are influenced by trauma exposure duration (study 10), ethnicity (studies 2 and 4), education (studies 1, 4, and 10), age (studies 1, 2, 4, 7, and 10), gender, gratitude, spirituality, purpose in life (studies 4 and 5), personality traits (study 4), optimism (study 5), resilience (study 10), social support (studies 2 and 5), active coping, depressive symptoms (study 2), and post-traumatic stress (studies 4, 5, and 7). Low PTG groups experienced fewer TEs (study 4). "Low increasing" and "high decreasing" trajectories showed more long-term depression, while "stable high PTG" was associated with positive adjustment (study 1).

3.4.3. Identification of trajectories according to designated features

Researchers have named trajectories using various criteria, including the Janus-Face Model: constructive/real growth (studies 11, 12, 13, 14, 15, 16, 17, and 18), illusory (studies 13, 14, and 15), distressed (studies 11 and 13), resistant (studies 11 and 18), struggling (studies 11, 12, 17, and 18), resurgent (moderate-high PTG and distress), survival (low-moderate PTG and decreasing distress) (study 16), resilient (studies 12 and 16), recovery (decreasing PTG and PTSD), or delayed symptoms (moderate PTG and increasing PTSD) (study 18). The proportions of trajectories differed (e.g., "constructive" 20 % to 72 %, "illusory" 17 % to 56 %). Constructive PTG features high (studies 11, 13, 15, 17, and 18) or moderate (study 12) PTG. It is associated with meaning-focused (study 17) or positive coping, low depression/PTSD at T1 (study 11), and stable or reduced symptoms over time (study 14). Illusory PTG diverges, with decreases (study 15) or fluctuating PTG (study 13), characterized by helplessness-hopelessness coping, lower depression (study 13), stable or increased symptoms (study 14), and low long-term quality of life (study 15).

Distressed and resistant PTG show low scores (studies 11 and 13), sometimes decreasing (studies 13 and 18). Distressed PTG group reports maladaptive (study 13) or negative coping, high post-traumatic (study 11) and depressive symptoms (studies 11 and 13), and prolonged symptoms (study 13). Resistant PTG shows low coping and symptoms at T1 (studies 11 and 18). Conversely, struggling group has achieved rapid growth (study 17), with features opposite to resistant PTG. This group has been recently diagnosed (study 17) or has experienced a high-impact event (study 18). Coping flexibility is key for struggling and constructive trajectories (study 11).

3.4.4. Comparing trajectories of individuals with somatic illnesses and earthquake survivors

We focused on two events: somatic illness and earthquakes. The most represented trajectories varied by pathology type (cancer versus HIV)

Table 2
Assessment of risk of study bias.

Authors	Goal stated	Population specified	Eligible persons at least 50 %	Similar population/uniform eligibility criteria	Sample size justification	Exposure assessed prior to outcome	Time-frame to see an effect	Different levels of exposure	Exposure measures defined, valid, reliable	Repeated exposure assessment	Outcome measures defined, valid, reliable	Blinding of assessors ¹	Follow up rate	Statistical analyses	Quality rating
1.Wang et al. (2014)	YES	YES	YES	YES	NO	YES	YES	NA	NA	NA	YES	NA	YES	YES	Good
2.Danhauer et al. (2015)	YES	YES	YES	YES	NO	YES	YES	YES	YES	NA	YES	NA	YES	YES	Good
3.Marshall et al. (2015)	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NR	YES	YES	Fair ²
4.Tsai et al. (2016)	YES	YES	YES	YES	NO	NO	YES	YES	YES	YES	YES	NA	NO	YES	Fair ³
5.Tsai and Pietrzak (2017)	YES	YES	YES	YES	NO	NO	YES	YES	YES	NO	YES	NA	NO	YES	Fair ³
6.Bachem et al. (2018)	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NR	NO	YES	Good
7.Zhou et al. (2019)	YES	YES	YES	YES	NO	NO	YES	YES	YES	NA	YES	NA	NO	YES	Good
8.Huang et al. (2021)	YES	YES	NR	YES	YES	YES	YES	NO	YES	NA	YES	CD	YES	NO	Poor ⁴
9.Pięta and Rzeszutek (2022)	YES	YES	NR	YES	NO	NO	YES	YES	YES	NA	YES	NA	YES	YES	Fair ⁵
10.Yan et al. (2022)	YES	YES	NR	YES	NO	YES	YES	YES	YES	NO	YES	NA	YES	YES	Good
11.Pat-Horenczyk et al. (2016)	YES	YES	CD	YES	NO	YES	YES	YES	YES	NA	YES	NA	NR	YES	Poor ⁶
12.Chen and Wu (2017)	YES	YES	NR	YES	NO	NO	YES	YES	YES	NA	YES	NA	YES	YES	Good
13.Cheng et al. (2020a)	YES	YES	YES	YES	NO	YES	YES	YES	YES	NA	YES	NA	NO	YES	Good
14.Asmundson et al. (2021)	YES	YES	NR	YES	NO	YES	YES	YES	YES	YES	YES	NA	YES	YES	Fair ⁵
15.Kyutoku et al. (2021)	YES	YES	YES	YES	NO	YES	YES	YES	YES	YES	YES	NA	NO	YES	Good
16.Baños et al. (2022)	YES	YES	NA	YES	NO	YES	YES	YES	NO	NA	YES	NA	NO	YES	Fair ⁷
17.Rzeszutek and Gruszczyńska (2022)	YES	YES	NO	YES	NO	YES	YES	YES	YES	NA	YES	NA	NO	YES	Fair ⁵
18.Zhou and Wu (2022)	YES	YES	YES	YES	NO	NO	YES	YES	YES	NA	YES	NA	YES	YES	Good

Note. CD: Cannot Determine; NA: Not Applicable; NR: Not Reported.

¹ NA when self-reported.

² No justification for the non-use of time 1 and 2 data.

³ Quality of recruitment procedure debatable.

⁴ Lack of exposure information, no measurement of associated factors.

⁵ Brief procedure.

⁶ Lack of procedural clarity.

⁷ Lack of exposure information.

and study duration (1–2 years versus 7 years), ranging from constructive (study 11) to illusory (study 13), curvilinear (study 17), decreasing (studies 1, 8, and 9), and/or increasing (studies 2, 8, and 9). Few patients were in “struggling” (studies 11 and 17) and long-term “distressed” trajectories (study 13), the latter being observed only in cancer patients. After earthquakes, children showed high PTG (studies 7, 12, and 18), unlike adults who reported little (studies 3 and 15). “Low” or “decreasing” PTG was often uncommon in sick adults (studies 2 and 8) and children after earthquake (studies 7, 12, and 18). There is variability between events and within groups based on sample and study design, as well as trauma type (direct/veterans versus secondary/wives, study 6).

3.4.5. Transitions between trajectories

From latent transition analyses, Study 11 found that transitions mainly occurred 6 to 12 months after cancer treatment, with an improving trend: 89.95 % transitioned from constructive to struggling PTG after 6 months, while at 12 months, almost half progressed to constructive PTG. At 24 months, class stability probabilities were high, 85.37 % for constructive PTG. Similarly, Study 12 highlighted class stability 20 months post-earthquake in children, 88 % for resilient and 80 % for thriving. Only 21 % and 12 % transitioned from struggling to resilient and from thriving to resilient, respectively. Male gender and young age promote the “thriving”/“resilient” transition, while young age and moderate fear help stabilize “thriving” class. Significant loss and injury impact struggling class.

4. Discussion

The current review aimed 1) to identify the measurement of illusory PTG, 2) summarize the posttraumatic growth trajectories identified by person-centered analyses and their features, 3) compare trajectories of individuals with somatic illnesses and earthquake survivors, and 4) explore the probability of transition between trajectories over time.

Initially, the evaluation of the “illusory” and “real” aspects of PTG was explored. The number of studies that analyzed trajectories in terms of these concepts was limited (8 out of a total of 18 studies). Other studies did not presume that trajectories were a function of the real or illusory dimension of PTG and instead considered PTG score patterns. Illusory PTG was reported indirectly, by measuring variables associated differently with illusory and real PTG, such as short- and long-term distress and coping. This approach is based on the Janus-Face Model, which proposes that illusory growth is characterized by continued maladaptive coping and increased distress in the long term. On the other hand, there is no consensus on the combinations of variables used to identify illusory growth, which makes it impossible to formulate a clear conclusion on this subject. Some studies provide insufficient evaluation, focusing solely on PTG and coping or distress, sometimes in the short term only. This raises questions about the validity of the results, as constructive PTG can coexist with distress, and post-traumatic distress may persist even in the long term (Tedeschi et al., 2015). It would have been relevant to assess cognitive engagement and cognitive processing, based on the challenging of core beliefs and ruminations, which are essential to the development of PTG (Tedeschi & Calhoun, 2004).

In the first category of findings, ten studies identified between three and six trajectories named on the basis of changes in PTG level (stable, increasing, decreasing). These studies then assessed the potential determinants of membership of these different trajectories. They seem to be determined by coping, distress (anxiety, depression, PTSD; in line with the Janus-Face Model, Zoellner & Maercker, 2006), sociodemographic and clinical factors, and psychosocial resources (personality traits, optimism, gratitude, spirituality, life purpose, resilience, social support). Trajectories of stable high or increasing growth are positively influenced by the following factors: young or old age, ethnic minority, high level of education, lower duration and severity of exposure, greater number of traumatic events, higher levels of extraversion, agreeableness, conscientiousness and the other resources mentioned above,

adaptive coping, higher short-term distress. But it is impossible to say that these trajectories have the same status, given their difference in the evolution of the PTG level, which is a criterion used for modeling PTG score trajectories. Conversely, decreasing PTG is determined by low levels of resources and more depressive symptoms in the long term.

As for the second category of results, eight other studies identified between three and five trajectories named on the basis of designated characteristics, considering both real and illusory aspects of PTG. Constructive trajectory is defined by adaptive coping, coping flexibility, and higher short-term distress than the illusory PTG. The high PTG trajectory linked to better adjustment could echo constructive PTG (study 1). Illusory PTG is characterized by maladaptive coping, greater substance use, higher distress, and lower long-term quality of life. A study not included in the review (Cheng et al., 2020b) demonstrated that illusory growth as a predictor subsequently leads to more anxiety, depression, hopelessness-helplessness, and anxious preoccupation than constructive growth. It remains to be clarified, however, whether the evolution of the level of growth for the illusory trajectory is increasing, decreasing, or stable. Other perceived growth trajectories were observed, such as resistant PTG (low growth, coping skills, and symptoms), distressed PTG (low growth, maladaptive coping, high distress), or struggling PTG (moderate to high growth, coping flexibility, adaptive/maladaptive coping, distress).

Results diverge according to event type (e.g. somatic illness versus earthquake), as well as sample and longitudinal design for the same type of event. In the case of illness, the most frequent trajectories appear to be quite varied (constructive, decreasing, curvilinear, etc.), and the “distressed” trajectory was observed only within samples of people with cancer. These data confirm the specificity of PTG in a context of serious chronic illness, where the threat to their health is a dynamic process, linked to the past, present, and future at the same time (Edmondson, 2014). After an earthquake, PTG is observed to be high in children and low or even absent in adults. Growth levels would indeed be higher in young people than in adults, due to a combination of factors such as the impact on child development, the perception of the event as more threatening or the lower likelihood of a cumulative response to trauma exposure (Ferris & O’Brien, 2022). The number and types of trajectories may also vary according to the type of trauma (e.g. primary versus secondary, study 6) and within the same study between PTG dimensions (e.g. study 3). The concept of perceived growth is therefore complex and manifests in various forms at different times.

Transitions in trajectories were observed in two studies (studies 11 and 12), notably from constructive to “struggling” growth after 6 months and vice versa after 12 months. Around two years after the event, trajectories are mostly stable. These transitions support the postulate of sequential stages of post-traumatic adaptation, such as illusory growth and constructive growth (Tedeschi & Calhoun, 2004; Zoellner & Maercker, 2006). Given the frequent transitions for struggling PTG and its characteristics (high PTG with adaptive/maladaptive coping, coping flexibility, and high distress), Study 11 hypothesizes that struggling PTG observed at a certain point in the study is a transitional, malleable state that can lead to constructive or illusory growth. It is suggested that the process leading to PTG is ongoing or that PTG is difficult to achieve (study 17). Additionally, it is possible that the struggling PTG at follow-up has succeeded an initial illusory PTG (study 12). The difference between these two forms of PTG is still poorly documented.

These results suggest that PTG is a non-uniform, dynamic and multidimensional concept. Its development varies considerably according to personal, contextual, and temporal factors. Unlike resilience, which is stable (Bonanno et al., 2011), growth can fluctuate or stagnate and can be transient or sustainable in the case of genuine long-term growth. The level of PTG therefore does not simply increase, as assumed by the PTG model. Given the plurality of trajectories, PTG could sometimes represent real psychological changes, and sometimes a short-term palliative coping strategy. This heterogeneity in growth helps to explain the variability in the nature of the relationship between PTG

and psychological adjustment, as well as the possible short-term coexistence of distress and adaptive coping to develop real, moderate to high PTG. The internal resources, coping strategies, and psychological symptoms that determine membership of these trajectories are targets for intervention. External resources, in particular satisfaction with the social support provided by the environment, are also major factors to consider if we are to foster conditions conducive to enduring PTG. It is essential to study PTG over the long term to better understand its different aspects, variations, and development contexts, while recognizing the singularity of post-traumatic growth experience.

This review has several limitations. The selection of articles may be influenced by publication bias (i.e., studies with significant results more likely to be published). Some studies for which the full text was not accessible could not be included, and others may have been omitted if the authors used terms considered synonymous with "posttraumatic growth", even though they are often conceptually different. In addition, the methods and samples of the eighteen studies diverge. This limits the generalizability of results on growth patterns, particularly for men and non-targeted populations (victims of sexual assaults, terrorist attacks, etc.). The models in these studies focus on one type of trauma, on the analysis of predictors of trajectories sometimes at single-time of study, and do not incorporate variables such as accommodation of core beliefs, ruminations, dissociation, and positive irrational beliefs or positive illusions. Events following initial trauma are rarely assessed, whereas exposure to new events can be a factor influencing growth trajectories (study 4).

Nevertheless, to our knowledge, this review is the first on PTG trajectories identified from person-centered analyses. We recommend further studies of this type, ideally prospective, integrating and measuring different traumatic events, including those occurring after Time 1, and processes not previously studied. Developing research on PTG trajectories could enable improved interventions by identifying potential target groups, optimal intervention timing, modifiable factors facilitating constructive growth (such as reducing maladaptive coping strategies), and anticipating risks (such as increased illusory PTG).

5. Conclusions

This study focused on PTG trajectories identified by person-centered analyses, a statistical approach that distinguishes different subgroups of individuals. It first explored how real and illusory aspects of PTG are apprehended. The assessment of illusory PTG was indirect, relying on measures of PTG, coping, functioning, or distress. Differences in indicator selection highlighted the need to harmonize the operationalization of real and illusory growth. Moreover, few studies model trajectories according to real or illusory dimensions, focusing instead on overall levels of PTG.

This synthesis illustrates the clinical heterogeneity of PTG. Various patterns, characterized by coping, distress, and resources, among others, have been observed (e.g. stable, increasing, decreasing, or constructive, struggling). These trajectories can vary according to the type of event. Chronically ill patients followed more complex PTG trajectories, possibly due to prolonged exposure to stress, while children who survived an earthquake mainly showed a high PTG trajectory. Intra-group variability was also observed.

PTG profiles can be flexible, particularly during the first year after the event, influenced by several factors. Although very few studies have examined this topic, this underlines the importance of prompt psychological care to prevent or alleviate post-traumatic symptoms and promote resilience or PTG trajectories.

In conclusion, this review paves the way for a more accurate and nuanced assessment of PTG trajectories in different traumatic contexts over the long term. Longitudinal studies including different traumas and processes are needed to improve understanding of growth patterns and adapt interventions.

Data availability

The review protocol and detailed data are available from the corresponding author upon reasonable request.

CRediT authorship contribution statement

Emma Gendre: Writing – original draft, Methodology, Investigation, Conceptualization. **Andrea Soubelet:** Writing – review & editing, Supervision, Conceptualization. **Stacey Callahan:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no competing interests.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Acknowledgements

We are grateful to Sébastien Ferrandez for his help in assessing study quality.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.ejtd.2024.100485](https://doi.org/10.1016/j.ejtd.2024.100485).

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