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Paths to Well-Being: Trauma, Rumination, Creativity, and Growth

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A quantitative, cross-sectional research design was used to investigate the parallel-serial mediating roles of deliberate and intrusive rumination and cognitive and emotional creativity in the relationship between trauma history and posttraumatic growth among young adults. Specifically, the direct and indirect pathways through which individuals with a history of trauma can experience positive changes were investigated. Five-hundred and eleven emerging adults were recruited through crowdsourcing. Structural equation modeling was utilized to assess the measurement portion of the model, the relationship among latent variables and indicators, the relationship among latent variables, and model fit as evidence of mediation. A method of bootstrapping was also implemented to assess indirect effects. The results indicated deliberate rumination, and cognitive creativity sequentially mediated the relationship between trauma history and posttraumatic growth. Findings of the study also revealed both deliberate and intrusive rumination mediated the relationship between trauma history and emotional creativity. However, the relationship between emotional creativity and posttraumatic growth was not statistically significant. Overall, the findings elucidate the dynamic interplay between trauma, rumination, creativity, and growth. By distinguishing between the roles of different rumination styles and types of creativity, this study contributes to the broader literature on posttraumatic growth and offers practical implications for interventions aimed at promoting recovery and growth.

Keywords: Trauma, posttraumatic growth, emotional creativity, cognitive creativity, rumination

Epidemiological studies indicate most individuals experience at least one potentially traumatic event in their lifetime (Benjet et al., 2016; Kessler et al., 2017). For example, rates of exposure to natural disasters, interpersonal violence, or serious accidents in community samples often range from 50% to 70% (Benjet et al., 2016). These figures underscore the importance of examining not only trauma exposure, but the cognitive and emotional processes that may follow, which differ widely among individuals. While researchers have considered some protective factors associated with positive growth outcomes after experiencing trauma, such as optimism, social support, and cognitive strategies (Perez-San-Gregorio et al., 2017; Sun et al., 2017; Zeng et al., 2021), there remains unexplained nuances in how cognitive and emotional processes, particularly related to creativity, may serve individuals as they reconstruct their life narrative after a traumatic event. For instance, some researchers found that traumatic events may enable individuals to make meaning of their experiences in creative and life altering ways (Jirek, 2017; Orkibi & Ram-Vlasov, 2019). While trauma exposure remains a globally shared experience, researchers have noted higher risk among university students (Pashak et al., 2023) and associated several trauma events with a median age of 17-24 (Kessler et al., 2017). Therefore, the current study explored an emerging adult population and did not view trauma history as inherently pathological but instead sought to examine protective factors such as emotional and cognitive creativity within a framework of rumination and growth outcomes.

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Posttraumatic Growth

A substantial portion of the literature demonstrates that exposure to traumatic events may cause adverse consequences on individuals' physical and mental health, including symptoms of anxiety, depression, posttraumatic stress (Benjet et al., 2016; Goldstein et al., 2016; Karatekin & Hill, 2019), as well as cardiovascular, neurological, and somatic complaints (Cronholm et al., 2015; Swedo et al., 2023). Nonetheless, research shows that some individuals, despite experiencing traumatic events, may exhibit positive psychological changes, known as posttraumatic growth (PTG), following the event (Tedeschi & Calhoun, 2004). Notably, PTG and posttraumatic stress are not mutually exclusive; individuals may experience both concurrently, either from the same event or across different experiences over time (Zoellner & Maercker, 2006). Recognizing this complexity allows for a more nuanced understanding of how people process trauma and highlights the potential for growth alongside ongoing struggle.

PTG refers to positive psychological changes that occur after experiencing potentially traumatic events, resulting from internal transformation within the individual (Calhoun et al., 2010; Tedeschi

& Calhoun, 2004). This qualitative shift emerges through the process of meaning-making and reinterpretation of one's trauma (Zavala & Waters, 2021). Rather than simply returning to a prior level of functioning, PTG involves thriving in the aftermath of adversity, moving beyond "pre-trauma adaptation" (Cryder et al., 2006, p. 65) and reconstructing life in more fulfilling ways (Calhoun & Tedeschi, 2004; Zavala & Waters, 2021). However, not all trauma survivors experience PTG. Factors such as openness to experience, extraversion, adaptive coping (e.g., positive reappraisal), and strong social support are associated with greater PTG, whereas avoidance-based coping and limited meaning-making resources are linked to lower PTG (Helgeson et al., 2006; Xie & Kim, 2022). Importantly, PTG does not diminish the reality of psychological distress; rather, it offers a new lens to understand the possible profound shifts in worldviews that can arise from trauma (Counselman-Carpenter & Redcay, 2022).

PTG is comprised of five key elements: (1) personal strength that refers to perceiving oneself as stronger and more self-assured and self-reliant after overcoming the traumatic event, resulting in feeling competent in dealing with difficult situations including future traumas; (2) relationships with others that refers to deepening relationships with people who helped the individual during adversity, realizing the importance of relationships, and displaying gratitude for developing a network of social support; (3) new possibilities that indicates developing a capacity for being more optimistic and open to experience, exploring new path in life, and finding new interests that were ignored before the adversity; (4) appreciation of life that represents a newly discovered appreciation for one's existence and a commitment to live a more fulfilling and authentic life; and (5) spiritual growth that suggests although the adverse experience may temporarily enfeeble spiritual beliefs, the struggle to understand the trauma may prompt individuals to rely on their faith and beliefs as coping resources, ultimately resulting in strengthened beliefs (Tedeschi & Calhoun, 1996; Zavala & Waters, 2021). While exposure to adverse experiences disrupts the state of homeostasis, it may also increase creative adaptation by offering new perspectives and altering the interpretation of the experience through incorporating newly developed emotions and cognitions or unconventional ideas (Damian & Simonton, 2015; Orkibi & Ram-Vlasov, 2019; Runco, 1999). In fact, exposure to traumatic events or highly stressful situations may stimulate a chain of responses to enable the individual to adapt to the new circumstances (Zemishlany, 2012). Accordingly, the individual engages in creatively reconstructing their life narrative, while they strive to find a new meaning in the traumatic event and integrate the experience into their life (Jirek, 2017; Orkibi & Ram-Vlasov, 2019). Despite its significance, limited studies have explored factors influencing PTG, such as effective cognitive strategies (e.g., Sun et al., 2017; Zeng et al., 2021).

PTG and Creativity

Traumatic or challenging experiences can create tension and disequilibrium that drive individuals to adapt creatively by reframing their experiences through new perspectives (Runco, 1999). In challenging situations, some individuals can navigate trauma and overcome life difficulties by generating creative ideas and employing diverse strategies. Research demonstrates that greater exposure to and severity of past traumatic events are linked to higher emotional creativity (Averill, 1999, 2000). Orkibi and Ram-Vlasov (2019) found a significant moderate positive correlation between the number of traumatic events and emotional creativity (r = .31) as well as cognitive creativity (r = .23). While their findings indicated a nonsignificant relationship between cognitive creativity and PTG, they reported emotional creativity moderately predicted PTG (β = .33) and mediated the relationship between traumatic events and PTG, with a small indirect effect size (β = .10). Similarly, Forgeard (2013) found the lifetime number of traumatic events significantly predicted perceived creative growth (β = .14) and breadth of creativity (β = .29), reflecting small to approaching moderate effect sizes, respectively. Thomson and Jaque (2018) also revealed that performing artists with greater childhood adversities reported more intense creative experiences compared to those with little to no childhood adversity, with a medium effect size (η^2 = .08). Accordingly, prior research identifies creativity as a mechanism of adaptability, enabling individuals to flexibly navigate challenges by generating novel ideas and perspectives.

Emotional Creativity

Emotional creativity refers to the capacity to generate emotional responses that are novel, effective, and authentic, diverging from habitual or socially normative reactions (Averill, 1999). Emotional creativity expands beyond experiencing emotions to include the expressive and reflective capacities individuals apply to their inner worlds. According to Averill (2000, 2009), four interrelated components characterize emotional creativity: novelty (i.e., the originality of the emotional response), preparedness (i.e., the individual's emotional sensitivity and willingness to reflect), effectiveness (i.e., the adaptive utility of the response for the self or others), and authenticity (i.e., alignment with one's values and true self, rather than external pressures). Emotional creativity thereby incorporates both process (i.e., how emotions are understood, shaped, and expressed) and outcome (i.e., the value and impact of that expression).

Importantly, emotional creativity is distinct from related constructs like emotional intelligence, which emphasizes convergent problem-solving and regulation strategies. Emotional creativity, by contrast, involves a divergent, flexible engagement with emotional experience, including the capacity to invent or synthesize complex emotional states in response to novel or challenging contexts (Kornilova et al., 2025; Orkibi & Ram-Vlasov, 2019). Emotional creativity is also distinguishable from *positive emotions*; while emotional creativity may often involve the generation or transformation of affective experiences into hope, love, or gratitude, its hallmark lies in its originality and internal coherence, not simply its valence. The constructs of emotional processing and emotional expression relate closely to emotional creativity. Preparedness overlaps with emotional processing in that both require deliberate, active engagement with one's emotional experience, often through cognitive rumination, meaning-making, or emotional disclosure (Iqbal & Utami, 2024). Authenticity, meanwhile, encompasses aspects of emotional expression, as it demands that external displays of emotion are aligned with internal truths. However, emotional creativity goes further, blending these elements into an emergent, often transformative, emotional act. This complexity may help explain why emotional creativity has been found to predict PTG even beyond other emotional competencies (Bulathwatta &

Lakshika, 2023; Zhai et al., 2021).

Empirical studies consistently show that emotional creativity is positively associated with adaptive coping strategies such as planned problem-solving, cognitive reappraisal, and self-control (Oriol et al., 2016), as well as improved psychological wellbeing, such as reduced anxiety, depression, and social functioning (Lattifian & Delavarpour, 2012). Researchers also link emotional creativity to resilience and growth after adversity. For example, healthcare workers during the COVID-19 pandemic who scored high in emotional creativity demonstrated greater PTG, with a moderate effect size (Iqbal & Utami, 2024), and university students with high emotional creativity showed lower trauma symptoms and stronger achievement motivation (Bulathwatta & Lakshika, 2023). Moreover, Forgeard (2025) conceptualized emotional creativity as a key mechanism of change in the context of adversity, enabling individuals to reconstruct meaning and restore emotional balance through novel and authentic emotional expression. In traumatic contexts, individuals with high emotional creativity may be better equipped to transform distress into insight, using emotions not only as reflections of suffering but as tools for renewal. This creative emotional adaptation mirrors key mechanisms underlying PTG, such as openness to experience, deliberate rumination, and existential reevaluation (Tedeschi et al., 2018). Hence, emotional creativity is a uniquely integrative construct incorporating self-expressive authenticity and relational adaptability to facilitate growth in the wake of disruption, particularly salient in contexts of trauma and transformation.

Cognitive Creativity

Creative thinking, or cognitive creativity, is the ability to generate diverse ideas or alternative solutions to problems, a process variable that could enhance flexible forward-thinking (Forgeard & Elstein, 2014; Miller, 2014; Torrance, 1998). This process is often assessed through divergent thinking tasks that prompt individuals to create responses to verbal or visual cues (Miller, 2014). The most recent conceptualization of cognitive processes associated with creativity, developed by Miller (2014), encompasses six creative subprocesses: *brainstorming or idea generation*, generating as many potential responses or solutions as possible, without considering their feasibility, while delaying any criticism or evaluation until all ideas have been generated; *metaphorical/analogical thinking*, transferring ideas or words from one context to another, resulting in a novel combination, transformation, or theoretical perspective that links the current problem to a similar or related situation; *perspective-taking or idea manipulation*, reframing the current perspective or framework to view the situation differently, enabling the discovery of a unique and suitable solution or response to a problematic situation; *imagery/sensory*, the internal experiences of the senses; *incubation*, stepping away from actively working on the problem or situation to allow unconscious processing and the exploration of associations between ideas that could contribute to solving the problem; and *flow*, a state of consciousness that is highly focused, seemingly automatic, and effortless, occurring when an individual is deeply immersed in addressing the problem (Csikszentmihalyi, 2013; Daniels-McGhee & Davis, 1994; Davis, 2004; Houtz & Frankel, 1992; Miller, 2014).

Researchers have linked divergent thinking flexibility to coping and well-being across various populations, with studies showing it moderately predicts coping abilities in young children (Carson et al., 1994). Metzl (2009) found that components of creative thinking, specifically originality and flexibility, significantly predicted reduced clinical stress following Hurricane Katrina. Originality accounted for 12% of the variance in clinical stress, while flexibility explained 13–17% of the variance in both stress and well-being outcomes, reflecting medium effect sizes. Similarly, Keith et al. (2015) found that greater cognitive flexibility was significantly associated with both reduced PTSD symptom severity and increased PTG in veterans, accounting for 16% of the variance in PTSD symptoms and 4% of the variance in PTG. These findings suggest that cognitive creativity is not only a hallmark of adaptive problem-solving but also plays a meaningful role in mitigating stress and fostering posttraumatic growth, serving as a cognitive resource in the aftermath of trauma.

PTG and Event-related Rumination

A comprehensive theoretical model of PTG processes emphasizes the interplay of cognitive, emotional, and social processes that facilitate adaptation after trauma (Calhoun & Tedeschi, 2006; Calhoun et al., 2010; Tedeschi & Calhoun, 2004). This model suggests that PTG arises not simply from experiencing a traumatic event, but from the psychological struggle that follows, particularly when the trauma challenges an individual's core beliefs. The disruption of these foundational beliefs initiates a cognitive processing sequence that includes both intrusive and deliberate rumination. Rumination, a repetitive thought process, can act as both a risk factor for psychological distress and PTSD symptoms through intrusive rumination and as a constructive mechanism fostering PTG through deliberate rumination (Benetato, 2011; Cann et al., 2011; Taku et al., 2012). Intrusive rumination involves involuntary, unwanted thoughts about a traumatic experience that enter one's mind without intentional effort and serves as an initial indicator of the trauma's psychological impact. Deliberate rumination is an intentional effort to reflect, quest for meaning in the traumatic event, explore its implications and benefits, and reframe one's core beliefs, which is critical for facilitating PTG (Cann et al., 2011; Lancaster et al., 2015). Deliberate rumination is a cognitive process that facilitates meaning-making from traumatic events by integrating new information, altering perceptions of self and others, and processing emotions emanated from the event (Resick et al., 2008; Verhaeghen et al., 2014).

Allen et al. (2022), via meta-analysis, found a significant moderate-to-large positive association between deliberate rumination and PTG, with an effect size of r = .45. In contrast, the relationship between intrusive rumination and PTG was small and statistically non-significant, with a pooled effect size of r = .22, and a wide prediction interval suggesting considerable variability across studies. These findings highlight the role of rumination, specifically, deliberate rumination in predicting PTG. While a few studies have examined the relationship between rumination and PTG (Kramer et al., 2020; Rider Mundey et al., 2019), the pathways through which this construct can affect PTG has not been fully explored.

Furthermore, research shows that rumination is positively correlated with creativity (r = .21, Wang et al., 2021), and it could moderately contribute to generating creative ideas and products (β =

.38, Cohen & Ferrari, 2010; β = .23, Forgeard et al., 2020). Verhaeghen et al. (2005) found that self-reflective rumination was moderately associated with enhanced creativity, with effect sizes ranging from .29 to .34 across key components such as idea generation and originality, among college students. These findings suggest that individuals who engage in reflective rumination may demonstrate greater creative capacity, likely due to their sustained and deep cognitive engagement with internal experiences. In other words, ruminative thought processes can fuel creativity. While creativity is often conceptualized as a stable trait, contemporary scholarship emphasizes its dynamic, context-responsive nature, particularly following adversity. Cognitive and emotional creativity can be shaped by life experiences, challenges, and meaning-making processes, suggesting that trauma may catalyze shifts in creative thinking and expression. Empirical research supports this view. For example, Thomson and Jaque (2018) found that adults with greater childhood adversity reported higher levels of present-day creative experiences. Forgeard (2013) further demonstrated that trauma-related deliberate rumination fosters creativity, showing creativity to be sensitive to the depth of trauma-related cognitive engagement rather than a static characteristic. Consistent with this framework, trauma first triggers rumination processes that in turn influence creativity. Deliberate rumination facilitates cognitive restructuring and meaning-making, enhancing cognitive and emotional creativity (Allen et al., 2022; Forgeard et al., 2020; Kramer et al., 2020; Orkibi & Ram-Vlasov, 2019; Verhaeghen et al., 2014; Wang et al., 2021), whereas intrusive rumination may deplete cognitive and emotional resources, undermining adaptive outcomes (Allen et al., 2022; Lianchao & TingTing, 2020; Wang et al., 2021). Creativity then serves as a mechanism through which trauma-related processing contributes to PTG, by enabling reinterpretation of trauma and supporting new perspectives and life narratives (Counselman-Carpenter & Redcay, 2022; Zavala & Waters, 2021; Zhou et al., 2019). Thus, creativity is best understood as a mediator, shaped by rumination and facilitating growth. Nevertheless, the association between rumination and creativity has not been examined in a fully developed picture to understand the mechanism of their contribution to the development of PTG.

Present Study

A quantitative, cross-sectional design was employed to examine the parallel-serial mediating roles of deliberate and intrusive rumination, as well as cognitive and emotional creativity, in the relationship between trauma history and PTG among emerging adults. The model explored direct and indirect pathways through which individuals with a trauma history might experience positive changes. Trauma history was the predictor variable, represented as a latent variable with three subscales: crime-related events, general disaster and trauma, and physical/sexual experiences. PTG served as the criterion variable, also a latent variable, with five subscales: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. Two sets of mediating variables were analyzed: deliberate and intrusive rumination in the first set, and cognitive and emotional creativity in the second. All variables were modeled as latent constructs with their respective subscales or questions as observed indicators.

The study investigated whether the identified mediators sequentially explain the relationship between trauma history and PTG. We hypothesized that trauma history would be positively associated with both deliberate rumination and intrusive rumination. We further hypothesized that deliberate rumination would be positively associated with cognitive creativity, emotional creativity, and posttraumatic growth, whereas intrusive rumination would be negatively associated with cognitive creativity, emotional creativity, and posttraumatic growth. Finally, both cognitive and emotional creativity were hypothesized to be positively associated with posttraumatic growth. The proposed temporal sequence, trauma to rumination, followed by creativity, and culminating in PTG, is grounded in both theoretical rationale and empirical evidence.

Method

Participants

Five hundred and twenty-five surveys were retained for data analysis. The minimum age was 18 years old, and the maximum age was 24 years old (M = 21.24, SD = 1.89). The participants were 58.3% (n = 306) White, 22.5% (n = 116) Hispanic/Latino/a/x/e, or of Spanish origin, 8.8% (n = 46) Black/African American, 3.4% (n= 18) Asian/Asian American/Pacific Islander, 1.3% (n = 7) Native American/American Indian/Alaskan Native, 5.7% (n = 30) biracial and multiracial. The participants were 57.5% (n = 302) female, 38.1% (n= 200) male, 3.2% (n = 17) non-binary/gender non-conforming, .6% (n = 3) transgender man, .2% (n = 1) transgender woman, and .4% (n = 2) identified as other. See Table 1 for a summary of demographic characteristics.

Procedure

To ensure a robust analysis and achieve normally distributed data, the researchers adhered to the recommendation that a sample size exceeding 200 participants is required to capture the complexities of the proposed model (Kline, 2023). Additionally, a widely used guideline suggests a participant-to-parameter ratio of 10:1 or higher (Bentler & Chou, 1987) for complex model (i.e., total estimated parameters include number of factor loadings, paths, and co/variances). Accordingly, we aimed to recruit 530 participants. Participants were recruited via Qualtrics Panels using a nonprobability convenience sampling approach. Eligibility criteria required participants to be between 18 and 24 years old, reside in the United States, and endorse at least one traumatic experience. As part of the informed consent process, participants were warned that the survey would include questions about potentially distressing experiences. They were informed that some content could evoke emotional discomfort and were provided with mental health resources (e.g., the National Suicide and Crisis Lifeline) in case they experienced distress. The survey took approximately 15–20 minutes to complete. No direct financial incentives were provided by the researchers; however, Qualtrics compensated participation through its own platform. To ensure data quality, several attention-check items (e.g., “If you are still reading this survey, answer the color orange”; “If you are reading this question, answer ‘strongly disagree”) were embedded throughout the survey to identify inattentive respondents. Of the 600 fully completed surveys returned, 75 were excluded for failing attention checks, resulting in a final sample of 525 participants. This procedure ensured both ethical sensitivity and the integrity of the dataset. A post-hoc analysis following MacCallum and colleagues’ (1996) procedure for statistical power analysis (H_0: RMSEA= .05 vs. H_a: RMSEA= .08,

α= .05) demonstrated adequate power (1-β > .80) for the final sample size. The study received Institutional Review Board approval from the Pennsylvania State University (STUDY00021850).

Table 1. Sociodemographic characteristics of participants

Characteristic	*n* (%)
Age (Years)	
Mean	21.24
Median	21
SD	1.89
Range	6
Race/Ethnicity	
White	306(58.3%)
Hispanic/Latino/a/x/e, or of Spanish origin	118(22.5%)
Black/African American	46(8.8%)
Asian/Asian American/ Pacific Islander	18(3.4%)
Native American/American Indian/Alaskan Native	7(1.3%)
Biracial/Multiracial	30(5.7%)
Gender Identity	
Woman	302(57.5%)
Man	200(38.1%)
Non-binary/Gender Non-conforming	17(3.2%)
Transgender Man	3(0.6%)
Transgender Woman	1(0.2%)
Other	2(0.4%)
Sexual Orientation	
Heterosexual	314(59.8%)
Bisexual	102(19.4%)
Asexual	35(6.7%)
Pansexual	26(5.0%)
Gay	13(2.5%)
Lesbian	12(2.3%)
Queer	4(0.8%)
Prefer Not to Say	13(2.5%)
Other	5(1.0%)
Missing	1(0.2%)
Highest Level of Education	
High school Diploma	298(56.8%)
Bachelor's degree	110(21.0%)
Graduate Degree/ MD/JD	41(7.9%)
GED	30(5.7%)
Other	24(4.6%)
Prefer not to say	22(4.2%)
Never attempted further education beyond what completed	190(36.2%)
First Generation College Student	
No	324(61.7%)
Yes	177(33.7%)
Prefer Not to Say	24(4.6%)
Annual Household Income	
$50,000–$99,999	181(34.5%)
$25,000–$49,999	153(29.1%)
Less than $25,000	122(23.2%)
$100,000–$199,999	51(9.7%)
More than $200,000	18(3.4%)

Note. *N*=525

Instruments

While the present study employed a cross-sectional design, the measurement instruments used were conceptually and temporally structured in a way that reflects a meaningful sequence aligned with the proposed model. Specifically, the trauma history scale assessed participants' prior exposure to potentially traumatic events, establishing trauma as a past event. Rumination variables were measured using items that asked participants to report on their current or past thoughts related to their index trauma, situating rumination as a cognitive and emotional process occurring after trauma exposure. Measures of creativity assessed present-day traits or abilities, while PTG items captured participants' current perceptions of growth. Thus, the temporal framing of the measures aligns with the hypothesized sequence.

Trauma History. The Trauma History Questionnaire (THQ; Hooper et al., 2011) was used to assess lifetime exposure to potentially traumatic events. The THQ is a 24-item self-report instrument that captures trauma specific events across three categories: crime-related events (4 items; e.g., "Has anyone ever attempted to or succeeded in breaking into your home while you were there?"), general disasters and trauma (13 items; "Have you ever seen someone seriously injured or killed?"), and unwanted physical and sexual experiences (7 items; "Has anyone, including family members or friends, ever attacked you with a gun, knife, or some other weapon?"). Participants respond with a yes/no answer for each item, indicating the number of occurrences and the approximate age at the time of the event if endorsed. There is no standardized scoring method, and it can be adapted to suit specific clinical or research needs. Although the THQ collects information on frequency and age of occurrence, a substantial proportion of participants left these items blank, resulting in missing data. Consequently, we did not include trauma timing in the present analyses. Thus, participants may have reported on events that occurred either recently or many years prior. For the purposes of this study, scores were calculated by summing the number of endorsed items within each of the three subscales.

The THQ has been validated across diverse populations and settings, showing evidence of convergent validity supported by moderate to strong correlations with other validated trauma inventories (e.g., Traumatic Life Events Questionnaire, Life Events Questionnaire). Cumulative trauma scores were significantly associated with psychological distress and trauma symptoms, indicating that the THQ effectively captures trauma exposure consistent with established clinical measures (Hooper et al., 2011). Researchers demonstrated moderate to high test-retest reliability, with correlation coefficients ranging from .54 to .92 (Hooper et al., 2011; McKenna et al., 2019; Sun et al., 2017). Because the THQ assesses a heterogeneous set of traumatic experiences rather than a single latent construct, internal consistency indices such as Kuder-Richardson-20 should not be interpreted as conventional measures of unidimensional reliability but instead as descriptive indices of response consistency across trauma categories. In this study, the KR-20 coefficient was .79, comparable to prior reports, and consistent with evidence that the THQ is a stable and valid measure of trauma exposure.

Event Related Rumination. The Event Related Rumination

Inventory (ERRI; Cann et al., 2011) is a 20-item self-rated measure used to assess deliberate and intrusive rumination. After completing the THQ, participants were instructed to identify the single most impactful or distressing traumatic event they had experienced (i.e., an index trauma). If they found it difficult to select just one, they were permitted to identify up to two events. The ERRI was then completed specifically in reference to the identified index trauma(s) . Respondents rated the frequency of their ruminative thoughts on a 4-point-Likert scale from 0 (not at all) to 3 (often). The measure includes two subscales: 10 items for intrusive rumination (e.g., "I could not keep images or thoughts about the event from entering my mind"), assessing involuntary thoughts about a traumatic event, and 10 items for deliberate rumination (e.g., "I thought about whether the experience has changed my beliefs about the world"), assessing purposeful reflection on the event. Subscale scores are calculated by summing the respective items, with higher scores indicating greater levels of intrusive or deliberate rumination.

The ERRI demonstrated strong construct validity, with confirmatory factor analyses supporting its two-factor structure. Deliberate rumination significantly predicted PTG (β = .35), while intrusive rumination strongly predicted PTSD symptoms (β = .60), explaining up to 17% of variance in distress outcomes. Discriminant validity was also supported by low correlations between ERRI subscales and personality traits (e.g., r = .02–.24 with Need for cognition and Self-consciousness), indicating that the ERRI assesses event-specific cognitive responses rather than broader dispositional thinking styles (Cann et al., 2011). Reported Cronbach's alpha values for the intrusive and deliberate subscales scores are .94 and .88 (Cann et al., 2011) and .97 and .94 (Kramer et al., 2020), respectively. In the present study, internal consistency was assessed using McDonald's omega (Hayes & Coutts, 2020). Results indicated excellent score reliability, with ω = .95 for the intrusive rumination scores and ω = .93 for the deliberate rumination scores.

Cognitive Processes Associated with Creativity. To assess for cognitive creativity, the Cognitive Processes Associated with Creativity scale (CPAC; Miller, 2014) was utilized. This instrument measures six self-report dimensions of cognitive processes involved in creativity: Idea generation (6 items; e.g., "While working on something, I try to generate as many ideas as possible"), Metaphorical/analogical thinking (4 items; e.g., "If I get stuck on a problem, I make connections between my current problem and a related situation"), Idea manipulation (5 items; e.g., "Looking at a problem from a different angle can lead to a solution"), Incubation (3 items; e.g., "I get solutions to problems when my mind is relaxed"), Imagery/sensory (6 items: "I try to act out potential solutions to explore their effectiveness"), and Flow (4 items; e.g., "If I am intensely working, I am fully aware of the big picture."). The CPAC scale includes 28 items rated on a 5-point-Likert scale from 1 (never) to 5 (always), with higher scores indicating greater engagement in creativity-related cognitive processes.

Miller (2014) confirmed the validity of the CPAC. Construct validity was supported through factor analysis, yielding six theoretically consistent subscales that accounted for 52% of the variance. Convergent validity was established via moderate correlations with the Creativity Styles Questionnaire, indicating alignment with other creativity measures. Discriminant validity was supported by low correlations with unrelated traits such as social desirability, age, and ethnicity, confirming that the CPAC captures cognitive creative processes rather than general self-presentation or demographic effects (Miller, 2014). The overall Cronbach's alpha was reported as α= .86 (Miller, 2014) and α= .90 (Jacquet et al., 2020). In the current study, the McDonald's omega was computed at ω = .91, indicating excellent internal consistency of the total scores.

Emotional Creativity. To assess emotional creativity, the Emotional Creativity Inventory (ECI; Averill, 1999) was administered. The ECI consists of 30 items rated on a 5-point Likert scale ranging from 5 (strongly agree) to 1 (strongly disagree), with higher scores indicating greater emotional creativity. The scale measures three dimensions of emotional creativity: (1) Preparedness (7 items; e.g., "I think about and try to understand my emotional reactions"), (2) Novelty (14 items; e.g., "The range and diversity of my emotional reactions sometimes exceed my ability to describe how I feel"), and (3) Effectiveness/Authenticity (9 items; e.g., "My emotions are a major source of meaning in my life; without them, my life would lack significance"). Averill (1999) provided strong psychometric support for the ECI, reporting high test-retest reliability (r = .91) and solid internal consistency across its dimensions (α = .82–.84). Construct validity was supported through statistically significant correlations with related psychological constructs, including self-esteem, coping strategies, and prior trauma (r = .26–.58), as well as a moderate inverse relationship with alexithymia (r = –.34), indicating that emotional creativity is meaningfully associated with adaptive psychological traits and experiences. Orkibi & Ram-Vlasov (2019) reported Cronbach's alpha value of .92 for the total score. In the current study, the McDonald's omega for the total score was ω = .88, with subscale score reliabilities of ω = .74 (preparedness), ω = .86 (novelty), and ω = .76 (effectiveness/ authenticity), indicating adequate score reliability.

Posttraumatic Growth. The Posttraumatic Growth Inventory-Short Form (PTGI-SF; Cann et al., 2010b) was used to measure positive changes. This 10-item instrument utilizes a 7-point Likert scale ranging from 0 (Not at all) to 6 (To a very great degree), with higher scores indicating greater positive change. The original Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996) consists of 21 items and five subscales: relating to others, new possibilities, personal strength, spiritual change, and appreciation of life. The PTGI-SF retains the five subscales of the original PTGI, with two items from each selected based on factor loadings and content coverage (Cann et al., 2010). The five subscales include: (1) relating to others (e.g., "I have a greater sense of closeness with others"); (2) new possibilities (e.g., "I am able to do better things with my life"); (3) personal strength ("I discovered that I'm stronger than I thought I was"); (4) spiritual change (e.g., "I have a better understanding of spiritual matters"); and (5) appreciation of life (e.g., "I changed my priorities about what is important in life"). Confirmatory factor analyses have supported the same five-factor structure, demonstrating strong convergent validity through significant correlations with the full PTGI (r = .91) and its subscales (r = .70–.85), though total scores are most commonly used due to the limited number of items per subscale. The PTGI has demonstrated good internal consistency (α = .90), score reliability across its

subscales (α = .86–.89), and test-retest reliability, r = .71 (Cann et al., 2010a, 2010b; Kaur et al., 2017). In the current study, the McDonald's omega was ω = .93, indicating excellent internal consistency of total scores.

Generalized Anxiety. The Generalized Anxiety Disorder-7 (GAD-7) is a 7-item measure to screen for diagnostic criteria of Generalized Anxiety Disorder present during the past two weeks (Spitzer et al., 2006). Participants respond on a Likert scale from *not at all* (0) to *nearly every day* (3) and scores are summed ranging from 0 to 21. Higher scores indicate a greater severity of anxiety symptoms. Example items include *trouble relaxing* and *becoming easily annoyed or irritable.* In this study, the McDonald's omega was ω= .92, indicating excellent internal consistency of the total score. These scores were used to describe the level of anxiety among participants and were not entered into the SEM.

Depression. The Patient Health Questionnaire-9 (PHQ-9) is a 9-item measure to screen for depressive symptoms present in the past two weeks (Kroenke et al., 2001). Participants respond on a Likert scale from *not at all* (0) to *nearly every day* (3) and scores are summed ranging from 0-27. Higher scores represent the greater severity of depressive symptoms. Example items include *little interest or pleasure in doing things* and *feeling tired or having little energy.* In this sample, the McDonald's omega was ω= .91, indicating excellent internal consistency of the total score. These scores were used to describe sample depressive symptoms and were not entered into the SEM.

Preliminary Sample Analysis

To contextualize the sample characteristics, we examined the descriptive statistics for the key study variables. Approximately, 22.9% (n = 120) identified one traumatic experience, 31.9% (n = 167) two or three, and 45.2% (n = 238) endorsed four or more traumatic experiences. The average number of traumatic events reported in our sample was M = 4.06 (SD = 3.62), which is slightly above the global average but aligns with the upper range typically seen in emerging adult populations. A finer descriptive analysis revealed that approximately 49.5% of participants (n = 253) reported experiencing at least one crime-related event (e.g., robbery, being threatened with a weapon), with 23.3% reporting one event, 15.7% reporting two, and 10.2% endorsing three or more. Exposure to general disasters and trauma (e.g., serious accidents, natural disasters, witnessing violence) was even more prevalent, with 78.3% (n = 400) reporting at least one such event. Within this category, 23.7% reported one event, while roughly one-third experienced three or more events. In the domain of unwanted physical and sexual experiences (e.g., physical assault, sexual coercion), 43.1% (n = 220) of participants reported at least one incident, with 16.4% endorsing one event and an additional 26.7% reporting two or more. Lastly, while we did not include formal clinical diagnoses or treatment history, participants completed validated self-report measures of psychological distress: the PHQ-9 (Kroenke et al., 2001) for depressive symptoms and the GAD-7 (Spitzer et al., 2006) for anxiety symptoms. In this sample, the mean PHQ-9 score was 14.65 (SD = 6.35) and the mean GAD-7 score was 12.83 (SD = 5.43), both falling within the moderate to moderately severe range. Notably, approximately 45% of participants scored ≥15 on the PHQ-9, and nearly 38% scored similarly on the GAD-7.

Data Analysis

Statistical analyses were completed in multiple steps, beginning with descriptive statistics analyses and assumption testing for the model, followed by internal consistency calculations for the measurement instruments (Brown, 2015). Structural equation modeling (SEM) was utilized to assess whether the hypothesized mediating variables mediated the relationship between predictor and criterion variables and to determine the strength of indirect effects. First, the measurement portion of the model was constructed as a confirmatory factor analysis (CFA) model, using the maximum-likelihood method to estimate parameters based on variance-covariance matrices (Hair et al., 2018). If the model fit is poor, the CFA model should be modified prior to moving to the following steps, which was not the case in this study. After achieving a good measurement model, the structural portion was tested, and the overall fit was computed. A chi-square difference test compared the CFA and structural models, and the structural model was revised based on modification indices (Brown, 2015). To test the significance of indirect effects in the SEM analysis model, we used the bias-corrected bootstrap procedure in AMOS with 5,000 bootstrap samples: a robust approach for testing mediation effects without relying on the assumption of normality in the distribution of indirect effects. AMOS provided estimates for total, direct, and indirect effects, with significance based on 95% bootstrap confidence intervals.

Results included overall model evaluation, statistical tests of prediction, goodness-of-fit indices, and chi-square difference tests. To assess the model's goodness-of-fit, several indices were examined. A χ^2/df of less than 3 or 5 was considered as good or acceptable fit, respectively. Strong model fit was determined by Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) values greater than .95, Root Mean Square Error of Approximation (RMSEA) values below .05, and Standardized Root Mean Square Residual (SRMR) values below .08 (Hu & Bentler, 1999; Kenny, 2024). All analyses were performed using SPSS version 29.0 and SPSS AMOS version 29.0.

The dataset was evaluated for assumptions required prior to model testing. Linearity was assessed using scatterplots, plotting the outcome variable against mediators and independent variables, as well as mediators against independent variables. Univariate outliers were checked using z-scores outside the ±3.29 range, and multivariate outliers were identified by comparing Mahalanobis Distance values to a chi-square distribution (Kline, 2023). Fourteen entries were removed due to multivariate outliers issue, reducing the sample size. All the subsequent analyses were conducted using N= 511. Skewness (acceptable range: ±2) and kurtosis (acceptable range: ±7) were assessed to ensure normality of distributions (Hair et al., 2018), with Q-Q plots and histograms showing no significant normality issues. Homogeneity of variance was confirmed using Levene's test. Multicollinearity was checked through tolerance values (>0.10) and Variance Inflation Factor (VIF) indices (<3), confirming the absence of multicollinearity issues (Kline, 2023). The descriptive statistics including the means and standard deviation, as well as bivariate correlation for each construct used in the study are presented in Table 2. Among the main variables of the study with statistical significance, none exceeded a threshold of .80

and therefore, all variables were retained.

Results

Model Testing

The assessment of the CFA model began with an evaluation of the measurement model. Given the model's complexity, when possible, item parceling was employed in the CFA to reduce estimated parameters and enhance model fit. Higher-order CFAs were first conducted to verify the underlying structure of each construct. Parcels were formed based on the original scales' factor structures, ensuring theoretical coherence and construct validity. This approach provided more stable indicators of the latent variables and improved model reliability, with all parcel loadings falling within acceptable ranges, offering evidence for the convergent validity of the measurements (Hair et al., 2018). All parcel and factor loadings were higher than .700: trauma history (.799-.903), intrusive rumination (.790-.905), cognitive creativity (.792-.895), deliberate rumination (.772-.885), emotional creativity (.886-.890), and PTG (.794-.898). The CFA model demonstrated acceptable model fit (χ^2 = 1393.419; *df* = 614; CMIN/*df* = 2.269; CFI = .960; TLI = .955; RMSEA = .043; SRMR = .049), providing adequate evidence for proceeding with testing the hypothesized structural model.

Next, the relationships between the exogenous (i.e., trauma history) and endogenous (i.e., deliberate and intrusive rumination, cognitive and emotional creativity, and PTG) latent variables were examined. The results revealed good model fit (χ^2 = 1399.211; *df* = 618; CMIN/*df* = 2.264; CFI = .951; TLI = .943; RMSEA = .048; SRMR = .061). Additionally, a χ^2 difference test compared the structural (nested) model with the CFA (parent) model. This test was not statistically significant ($\Delta\chi^2$ (4) = 5.792), indicating that the more parsimonious model (i.e., nested model with fewer estimated parameters and more degrees of freedom) fits the data comparably well to the CFA model, supporting its retention (Schermelleh-Engel et al., 2003). An examination of the hypothesized structural model revealed that several path coefficients were statistically significant, with magnitudes ranging from moderate to large. In line with our hypotheses, trauma history was found to be positively associated with both deliberate and intrusive ruminations. Specifically, trauma history demonstrated a strong positive association with intrusive rumination (β = .792, p < .001) and deliberate rumination (β = .689, p < .001), both indicating large effect sizes. These results underscore the emergence of cognitive processing patterns, both constructive and maladaptive, in the aftermath of significant life stressors. Consistent with our hypotheses, deliberate rumination was positively associated with both cognitive creativity and emotional creativity. Deliberate rumination exhibited a moderate positive relationship with cognitive creativity (β = .401, p < .001) and with emotional creativity (β = .451, p < .001). These findings suggest that reflective and purposeful rumination contributes positively to creative ideation and emotional expressiveness. In contrast, intrusive rumination was hypothesized to negatively predict creative capacities. Supporting this hypothesis, intrusive rumination was significantly and negatively associated with emotional creativity (β = –.237, p = .031), reflecting a small-to-moderate effect size. While the association between intrusive rumination and cognitive creativity was, as expected, negative, indicating that maladaptive rumination may hinder cognitive creativity, it did not reach statistical significance (β = –.205, p > .05).

Furthermore, we hypothesized that deliberate rumination would be positively associated with PTG, whereas intrusive rumination would be negatively associated with PTG. Although the directions of these relationships were consistent with predictions (β = .481, p = .057 and β = –.260, p = .636, respectively), neither association was statistically significant, suggesting insufficient evidence for direct relationships between rumination types and PTG within this sample. Lastly, we examined whether cognitive and emotional creativity were associated with PTG. Cognitive creativity showed a significant positive relationship with PTG (β = .186, p < .001), although the effect size was small. This finding aligns with prior research linking cognitive creativity to adaptive post-trauma outcomes. However, emotional creativity did not show a statistically significant association with PTG, and the path coefficient was negligible (β = .077, p = .232). Collectively, these findings reinforce the nuanced roles of rumination in post-trauma adjustment. While deliberate rumination appears to serve adaptive functions, contributing to creativity and reflective growth, intrusive rumination may inhibit emotional creative capacities and does not appear to facilitate posttraumatic growth. See Figure 1.

To assess for the indirect effects between latent variables, a method of bootstrapping was implemented. Results showed total or net effects as well as specific indirect effects. Findings revealed that deliberate rumination mediated the relationship between trauma history and cognitive creativity (β = .276 [.689*.401], p < .01), representing a large indirect effect size (Cohen, 1988); cognitive creativity mediated the relationship between deliberate rumination and PTG (β = .074 [.401*.186], p < .01), indicating a small-to-moderate effect; and deliberate rumination and cognitive creativity sequentially mediated the relationship between trauma history and

Table 2. Descriptive statistics and bivariate correlations for study variables

Variables	*n*	*M*	*SD*	Min	Max	1	2	3	4	5	6
1. TH	511	4.06	3.62	1	18	1					
2. IR	511	12.21	8.99	3	30	.425**	1				
3. DR	511	12.16	8.48	7	29	.372**	.727**	1			
4. EC	511	101.19	15.72	63	145	.229**	-.227**	.280**	1		
5. CC	511	94.32	15.69	50	140	.088*	-.105*	.174**	.572**	1	
6. PTG	511	22.00	13.06	0	50	.171**	-.294**	.403**	.281**	.290**	1

Note. TH = trauma history; IR = intrusive rumination; DR = deliberate rumination; EC = emotional creativity; CC = cognitive creativity; PTG = posttraumatic growth. ***<.001, **<.01, *<.05 (two tailed).

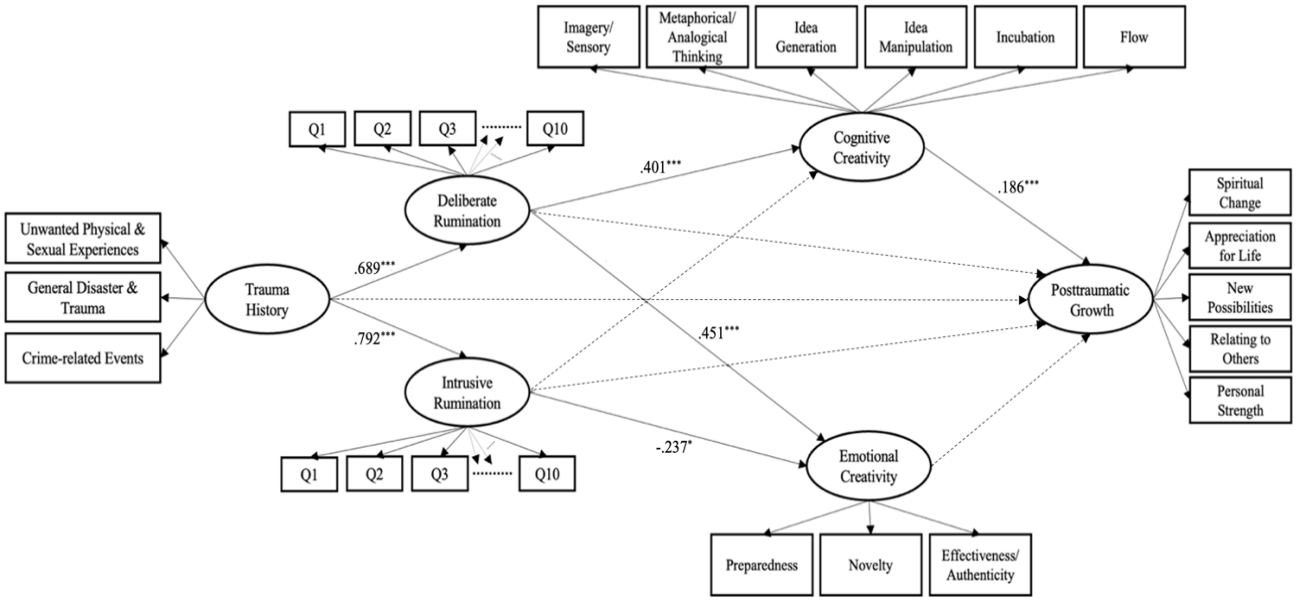

Figure 1. SEM model of trauma, rumination, creativity, and posttraumatic growth
Note. ***<.001, **<.01, *<.05 (two tailed).

PTG (β = .051 [.689*.401*.186], p < .01), showing a relatively moderate and meaningful effect. Moreover, the indirect effect of trauma history and emotional creativity via deliberate rumination (β = .310 [.689*.451], p <.001) was large, while the effect via intrusive rumination (β = -.187 [.792*-.237], p = .04) was moderate and negative. Due to the absence of statistical significance between intrusive rumination and cognitive creativity as well as emotional creativity and PTG, intrusive rumination and emotional creativity did not mediate the relationship between trauma history and PTG in this model. We also evaluated a model with only a direct path from trauma history to PTG, which yielded a significant effect (β = .201, p < .001); however, when the mediators were included, this direct relationship became weaker and non-significant (β = .129, p > .05), indicating that deliberate rumination and cognitive creativity fully and sequentially mediated the relationship between trauma history and PTG. Lastly, the squared multiple correlations (SMC) revealed the extent to which the model explains variance in the endogenous variables. Intrusive rumination and deliberate rumination accounted for 20.3% (R^2 = .203) of the variance in cognitive creativity and 25.9% (R^2 = .259) of the variance in emotional creativity. Additionally, intrusive rumination, deliberate rumination, cognitive creativity, and emotional creativity collectively accounted for 35.6% (R^2 = .356) of the variance in PTG.

Lastly, we investigated group differences across the variables of the study. Because our sample age variability was limited (ages 18–24), it did not permit meaningful subgroup analyses. Individual racial and ethnic subgroups were also too small to support reliable comparisons, and we did not collapse across heterogeneous categories (e.g., "non-White") as this practice obscures meaningful differences and risks reinforcing deficit-based comparisons (Burlew et al., 2019; Yao et al., 2022). Regarding gender identity, while our sample included individuals identifying outside the binary (e.g., non-binary, transgender), subgroup sizes were too small for valid statistical tests. To ensure statistical validity and avoid misrepresentation, we restricted the group comparisons to women and men, where sufficient sample sizes were available.

We examined gender differences on the study variables using independent-samples t-tests. Women reported statistically significant higher levels of intrusive rumination than men (M = 12.86, SD = 9.35 vs. M = 11.13, SD = 8.42), t(500) = 2.12, p = .035, Cohen's d = .19. No statistically significant gender differences were found for deliberate rumination (M = 12.40, SD = 8.62 vs. M = 11.67, SD = 8.40), t(500) = 0.94, p = .347, Cohen's d = .09; cognitive creativity (M = 94.96, SD = 15.71 vs. M = 92.53, SD = 16.46), t(500) = 1.66, p = .097, Cohen's d = .15; emotional creativity (M = 101.57, SD = 16.21 vs. M = 100.11, SD = 15.99), t(500) = .99, p = .321, Cohen's d = .09; posttraumatic growth (M = 22.01, SD = 12.87 vs. M = 22.50, SD = 13.42), t(500) = –0.40, p = .687, Cohen's d = –.04; and trauma history (M = 4.06, SD = 3.64 vs. M = 4.64, SD = 5.13), t(500) = –1.48, p = .139, Cohen's d = –.14, between women and men, respectively. To further evaluate demographic influences, we re-estimated the SEM including gender as a covariate predicting the mediating and the outcome variables. The pattern of results remained unchanged, with deliberate rumination and cognitive creativity continuing to mediate the association between trauma history and PTG. All direct effects of gender were nonsignificant (ps > .05), with standardized coefficients ranging from β = .06 to .09, indicating that the model is robust across gender groups.

Discussion

The primary aim of the present study was to quantitatively examine the mechanisms of change through which individuals with a history of trauma may experience positive changes. The study's findings provided insights into the interplay between trauma history, rumination, creativity, and posttraumatic growth. Overall, the results confirmed significant associations between the main variables, particularly, shedding light on the mediating roles of deliberate rumination and cognitive creativity.

First, to better interpret and understand our findings, we contextualized our participants' characteristics. Our findings highlighted the widespread prevalence of trauma exposure among participants, underscoring the importance of examining posttraumatic psychological processes in a non-pathologizing, context-sensitive manner. While there is no universal average for trauma exposure, as it varies by assessment tool and population, large-scale studies consistently show high prevalence. The World Mental Health Survey Consortium reported that 70.4% of adults worldwide experienced at least one traumatic event and 30.5% endorsed multiple traumas, with an average of 3.2 events (Benjet et al., 2016). Recent research continues to support these findings. Pashak et al. (2023) reported high rates of trauma exposure among college students (M = 6.88, SD = 14.27), emphasizing the widespread nature of such experiences in this population. In a non-clinical sample of participants aged between 18–51 years old using the Trauma History Questionnaire, Johnston et al. (2025) reported a mean of 2.7 traumatic events among their participants. Our results are broadly consistent with nationally representative findings from the Adverse Childhood Experiences Study (Felitti et al., 1998) and WHO World Mental Health Surveys (Kessler et al., 2017), further supporting the generalizability of the sample's trauma exposure. For posttraumatic growth, PTG levels vary across populations (e.g., M = 16.8, Kang et al., 2023; M = 12.64, Lewis et al., 2022), with the current sample reflecting moderate levels of growth (M = 22, SD = 13.05). Additionally, the prevalence of anxiety and depressive symptoms observed among participants indicated a considerable mental health burden within the sample. Although it cannot be definitively determined that the severity of these symptoms is directly attributable to trauma history, the results underscore the relevance of examining trauma-related cognitive and emotional processes among individuals experiencing elevated distress, even outside of clinical treatment settings, where individuals may or may not be receiving treatment or hold a formal diagnosis.

The results confirmed that trauma history strongly predicts both intrusive rumination and deliberate rumination, underscoring the central role of rumination in the aftermath of traumatic experiences. These findings align with prior research indicating that trauma often triggers a cycle of cognitive processing (Cann et al., 2011; Treynor et al., 2003) and suggesting that individuals often engage in reflective processes either deliberately to make sense of the event or intrusively as part of the natural psychological impact (Calhoun & Tedeschi, 2006). Supporting this, Kim et al. (2017) reported a moderate-to-strong relationship between childhood trauma and rumination (β = .56) in a non-clinical sample of adults. Similarly, Rodenas-Perea et al (2022) found a moderate positive relationship between childhood trauma and ruminative thoughts (β = .36), and a strong relationship with intrusive thoughts (β = .60) among participants from the general population. These converging findings emphasize the consistent role of trauma exposure in shaping ruminative cognitive styles.

Furthermore, as hypothesized, intrusive rumination negatively predicted emotional creativity with a moderate effect size. This finding is consistent with prior literature indicating that maladaptive rumination, particularly when involuntary and repetitive, tends to exhaust cognitive and emotional resources essential for flexible, creative thinking (Cohen & Ferrari, 2010; Trani, 2021). Intrusive rumination often involves involuntary revisiting of distressing thoughts and events, which narrows attentional focus and limits an individual's ability to engage in adaptive, divergent thinking. Emotional creativity, characterized by the capacity to generate novel, authentic, and contextually meaningful emotional responses, requires cognitive flexibility and openness, traits that are diminished by persistent intrusive thoughts. Such rumination may reinforce rigid emotional schemas, such as self-blame or hopelessness, which inhibit innovative reinterpretation of emotional experiences. Although the current findings showed a negative coefficient between intrusive rumination and cognitive creativity, as expected, this relationship did not reach statistical significance. This aligns with earlier work suggesting that intrusive rumination may more strongly impair emotion-related domains of creativity than cognitive ideation (e.g., Forgeard et al., 2020).

Conversely, deliberate rumination emerged as a positive and significant predictor of both emotional and cognitive creativity. The effect sizes were in the moderate range, with a slightly stronger association for emotional creativity. These findings are in line with growing empirical evidence that deliberate rumination, purposeful, reflective thinking about a traumatic experience, facilitates creative expression and problem-solving by promoting cognitive restructuring and emotional insight (Allen et al., 2021; Forgeard, 2013; Watkins & Roberts, 2020). For example, Forgeard et al. (2020) found that deliberate rumination was moderately and positively correlated with emotional creativity and cognitive creativity among trauma-exposed individuals, suggesting that reflective cognitive engagement with difficult experiences can open space for novel emotional expression and ideational fluency, enabling individuals to make sense of trauma in innovative ways. The current study reinforces this pattern by demonstrating the distinct contributions of both rumination styles to different aspects of creativity, highlighting deliberate rumination as a key facilitator of adaptive and generative thinking in the aftermath of trauma.

Additionally, cognitive creativity significantly predicted PTG, albeit with a small effect size, reinforcing its role as a psychological mechanism through which individuals transform adversity into meaningful personal change. This finding aligns with prior empirical work suggesting that cognitive creativity supports adaptive meaning-making and flexible reinterpretation of traumatic events (Conner & Silvia, 2015; Silvia et al., 2014). For instance, Conner et al. (2018) found that creative thinking was significantly associated with PTG, particularly in domains involving new possibilities and personal strength, with effect sizes in the small-to-moderate range. Such creativity may enable individuals to reframe previously overwhelming experiences in ways that promote growth-oriented beliefs and behaviors. In contrast to expectations, emotional creativity was not a significant predictor of PTG in the current model. While emotional creativity involves the ability to experience and express emotions in novel, complex, and authentic ways, it may not directly contribute to the structural cognitive transformations typically associated with PTG, such as reappraising one's core beliefs or redefining relationships. However, this finding diverges from prior research (Forgeard, 2013; Orkibi & Ram-Vlasov, 2019; Rezaee Vessal et al., 2022; Zhai et al., 2021) that reported emotional creativity significantly predicted PTG, indicating its potential role in facilitating adaptive meaning-making and psychological

transformation following adversity. The nonsignificant result in the present study may be due to the simultaneous inclusion of both emotional and cognitive creativity in the model, which could have introduced shared variance and attenuated the distinct predictive power of emotional creativity. Additionally, measurement overlap or sample-specific factors may have influenced these findings, warranting further future explorations to clarify the unique contributions of each creativity domain to PTG.

The model also provided robust statistical evidence for the hypothesized mediating effects of deliberate rumination. Deliberate rumination mediated the relationship between trauma history and both cognitive and emotional creativity, underscoring its role in promoting adaptive processes. This finding suggests that deliberate rumination may enable individuals to redirect their focus towards constructive outcomes (Allen et al., 2021; Xu et al., 2024; Zhou et al., 2015) and, therefore, facilitate adaptive mechanisms such as creative thinking and emotional expression, which are essential components of coping and meaning-making. Additionally, cognitive creativity appears to be a crucial link connecting deliberate rumination to PTG. These findings emphasize the nuanced role of creativity in post-trauma adaptation (Orkibi & Ram-Vlasov, 2019; Runco & Acar, 2012). The current findings extend previous research by demonstrating that experiencing trauma is associated with enhanced cognitive adaptability, which is essential for generating creative ideas (Damian & Simonton, 2015). Additionally, trauma is linked to deliberate mental processes that signify early efforts to reconstruct fundamental beliefs disrupted by the traumatic event (Cann et al., 2011; Hanley et al., 2017; Orkibi & Ram-Vlasov, 2019). Lastly, the sequential mediating pathways between trauma history, deliberate rumination, cognitive creativity, and PTG underscore the complex interplay of cognitive processes in shaping trauma outcomes. Notably, the moderate to large indirect effects observed in this study, particularly indirect effects exceeding β = .25 via deliberate rumination, may represent meaningful targets for interventions. Deliberate rumination appears to enhance adaptive creativity that facilitate growth, whereas intrusive rumination may hinder creativity and, in turn, limits growth potential, though its direct association with PTG was nonsignificant in the current study. These findings are consistent with previous research identifying deliberate rumination as a precursor to PTG (Cann et al., 2010a; Taku et al., 2015; Rider Mundey et al., 2019).

Limitations, Future Directions, and Implications

Our study provides valuable insights; nonetheless, several limitations warrant consideration. First, since random sampling was not feasible, generalizations should be made cautiously. Next, while SEM supports tentative causal inferences, the study's nonexperimental, cross-sectional design prevented determining causality. Although the model was grounded in theory and empirical evidence, our research design does not allow us to establish temporal ordering among the variables. For instance, it is equally plausible that experiencing PTG over time may enhance one's capacity for creativity. To better understand the directionality of these relationships, future research should employ longitudinal or experimental designs. As such, interpretations of mediation effects should be made with caution. Further, a limitation concerns the timing of trauma exposure. Although the THQ requests the approximate age at which each event occurred, substantial missing data prevented us from analyzing trauma recency. As a result, participants' index traumas may have taken place either recently or many years before the study. Because the processes of rumination and PTG likely unfold differently depending on when the trauma occurred, the absence of timing data constrains interpretation. Future longitudinal research should incorporate trauma timing to better capture these developmental trajectories. Also, the reliance on retrospective self-report measures might have introduced potential response and recall biases, particularly regarding subjective constructs like rumination and creativity. Future research should incorporate task-oriented creativity measures, such as the Abbreviated Torrance Test for Adults (ATTA; Goff & Torrance, 2002), to validate the findings. Also, our study did not explore pathways between the dimensions of constructs, leaving gaps in understanding how these domain influence mechanisms of change. We recommend that future research focus on addressing this gap as well as explore which specific traumatic events are most closely associated with the development of creativity. Additionally, cultural factors impacting PTG and creativity (e.g., generating novel, culturally appropriate responses) need exploration, given the role of cultural differences in shaping concepts of growth and creativity (Orkibi & Ram-Vlasov, 2019; Vazquez et al., 2014; Glaveanu & Tanggaard, 2014; Kwan et al., 2018). Future research is also recommended to examine the moderating roles of creativity and ruminating to shed light on their potential buffering impacts in the relationship between trauma symptoms and PTG.

Another limitation of the present study is the absence of a direct measure of posttraumatic stress symptoms. While trauma exposure was thoroughly assessed using the THQ, we did not include a symptom-based screening tool such as the PTSD Checklist (PCL-5), which limited our ability to describe our participants' current trauma-related symptom profiles. This distinction is critical, as trauma exposure alone does not indicate whether an individual is experiencing ongoing symptoms such as re-experiencing the traumatic event, heightened arousal, or avoidance of trauma-related cues. Future research should incorporate validated PTSD symptom measures as such data enable more detailed subgroup analyses, such as testing whether structural models function equivalently across individuals with and without elevated posttraumatic symptoms. Although the present study included validated measures of depression and anxiety for general psychological distress, the addition of trauma-specific symptom screening is recommended to more comprehensively capture the diversity of posttraumatic experiences. Lastly, while gender analyses indicated that women reported slightly higher intrusive rumination than men, consistent with prior findings on gender and repetitive negative thinking (Johnson & Whisman, 2013), it did not alter the mediation pathways, suggesting that the trauma–rumination–creativity–PTG sequence is robust across the two gender identity groups. Because the sample was restricted to emerging adults and individual racial/ethnic subgroups were too small for reliable multigroup analyses, we did not examine potential group differences across age and race/ethnicity groups. Future research with larger and more diverse samples is needed to clarify how demographic factors may shape pathways to posttraumatic growth using multigroup analyses.

Despite these limitations, the study's findings have several

implications. Theoretically, our findings support the dual-process model of rumination, demonstrating the distinct roles of deliberate and intrusive rumination in posttraumatic adaptation processes. The current findings also expand the understanding of creativity as a key mechanism linking rumination to growth, particularly in the context of deliberate rumination. Practically, these results highlight the potential benefits of interventions targeting rumination patterns to support creativity and growth. For example, mindfulness-based cognitive therapy techniques that promote deliberate rumination while mitigating intrusive rumination may enhance recovery and resilience among trauma survivors (Liehr et al., 2010; Pennebaker, 1997; Garland et al., 2015). Additionally, the findings underscore the potential value of incorporating creativity into therapeutic settings. Interventions designed to enhance cognitive and emotional creativity, such as art therapy, may serve as useful tools for facilitating posttraumatic growth (Garland et al., 2007; Kern & Perryman, 2016; Rowe et al., 2017; Schouten et al., 2015). Future studies are recommended to explore the potential of creativity programs to help individuals cope with distressing emotions and thoughts resulting from trauma and adverse experiences.

Lastly, clinicians may apply current findings to how clients may be encouraged to incorporate creative practices into their self-care routines. For example, research on expressive writing has demonstrated that narrating emotional experiences through journaling is associated with reduced distress and enhanced cognitive processing related to traumatic events (e.g., Armstrong, 2017). Creative expression through visual art or performance has also been linked to improved emotional regulation, a greater sense of coherence, and deeper meaning-making among trauma survivors (e.g., Rowe et al., 2017). These self-guided practices not only promote psychological growth but also reflect individual agency in navigating posttraumatic challenges. Nevertheless, access to the material, psychological, and social resources necessary to engage in these practices is not evenly distributed. Individuals living under conditions of structural oppression, such as systemic racism, economic deprivation, gender-based marginalization, or forced displacement, may lack the time, space, or psychological safety required to explore these creative outlets (Glaveanu & Tanggaard, 2014; Vazquez et al., 2014). These environmental constraints shape what Glaveanu (2015) terms *affordances* for creativity; socioculturally mediated opportunities for creative engagement that are often unequally available. For instance, communities exposed to chronic violence or intergenerational trauma may face limited access to safe forms of self-expression, thus reducing opportunities for adaptive coping and posttraumatic growth. Future research should explore how such structural barriers moderate the relationship between creativity and trauma recovery, and how expanding access to creative affordances informally can support more inclusive healing pathways.

Compliance with Ethical Standards

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Ethical Approval. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study received Institutional Review Board approval from the Pennsylvania State University (STUDY00021850).

Informed Consent. Consent was obtained from all participants included in the study.

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