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**The Role of Positive Memory Characteristics on the
Mediation Model of Event Centrality, Deliberate
Rumination and Post-traumatic Growth**

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Abstract

Objective: Based on the theoretical model of post-traumatic growth (PTG) and the Positive Memory-PTSD model, this study aims to investigate the main and moderating effect of different characteristics of positive memory on the mediating effect of deliberate rumination on the relationship between event centrality and PTG of emerging adults during the COVID-19 pandemic. **Method:** 253 emerging adults (76% female; $M_{age} = 22$) completed the self-report survey online, which was distributed via various online channels. RStudio was used to analyse correlation, mediation, and moderated mediation effects. **Results:** Results supported the hypothesis that event centrality, deliberate rumination, and different characteristics of positive memory are positively associated with PTG, respectively. Also, deliberate rumination mediated the relationship between event centrality and PTG. Further, the emotional intensity of positive memory moderated the effect of deliberate rumination on PTG. Finally, the mediating effect of deliberate rumination on the relationship between event centrality and PTG was moderated by the emotional intensity of positive memory. **Conclusion:** Deliberate rumination is particularly important for the development of PTG in people with a low emotional intensity of positive memories. These results advance our understanding of the mechanism of the PTG process. In addition, considering the association of positive memory characteristics with PTG has theoretical and practical implications.

Keywords: Post-traumatic growth, Event centrality, Deliberate rumination, Positive memory, Moderated mediation

The Role of Positive Memory Characteristics on the Mediation Model of Event Centrality, Deliberate Rumination and Post-traumatic Growth

COVID-19 is spreading rapidly and widely worldwide, with a significant impact on people's lives, and physical and mental health (Zhao et al., 2020), both negatively and positively. On the one hand, during the pandemic, people experience mental health problems such as depression, anxiety, insomnia, stress, addiction symptoms, and persistent avoidance behaviours (Bridgland et al., 2021; Ettman et al., 2020; Gubler et al., 2021; Schafer et al., 2022). On the other hand, studies also highlighted that, while affected people may struggle with mental issues, changes in their lifestyle can simultaneously facilitate positive changes, and people are able to engage in many leisure activities that they rarely had time to do before the COVID-19 pandemic, including reading in peace, learning new skills, or enjoying meals with their family (Ng et al., 2020). A variety of concepts have been proposed to describe positive outcomes after traumatic events, but the most well-explicated and widely accepted of these is post-traumatic growth (PTG), proposed by Tedeschi and Calhoun (1996). It is critical to understand how some individuals can experience PTG after a traumatic event like the COVID-19 pandemic because this could inform the prevention and treatment of stress-related disorders (Zoellner & Maercker, 2006). However, the mechanisms underlying the development of PTG are not fully understood.

Tedeschi et al (2018) proposed a theoretical model for the development of PTG, which is developed through a growing body of empirical and clinical research (David et al., 2022). The model highlights the critical effect of event centrality and deliberated rumination on PTG. However, the theoretical model of PTG does not consider the protective role of past positive memories, which have a lasting effect and improve post-trauma mental health (Contractor et

al., 2018). To fill these gaps, first, this study aims to investigate the relationship between positive memory and PTG. Second, the study seeks to explore whether the positive memory moderate the effects of event centrality and deliberate rumination on PTG. Third, the current study intends to investigate if positive memory moderates the mediation effect of deliberate rumination on the relationship between event centrality and PTG in emerging adults during the COVID-19 pandemic. Understanding the factors behind PTG has theoretical implications for filling knowledge gaps and practical implications for us to develop appropriate interventions to facilitate the development of PTG in individuals.

Theoretical background

COVID-19 as a global traumatic event

In March 2020, the World Health Organization (WHO) declared the COVID-19 (coronavirus disease) outbreak a pandemic (WHO 2020). To slow the spread of the infection, many countries have adopted severe restrictions on public life, including the temporary shutdown of schools, businesses, stores, restaurants, and transportation and leisure facilities. These restrictive measures and pandemics have led to severe psychological stress for individuals out of concern for health, economic security, or adjusting to new living conditions (A Yasin, 2020; Bridgland et al., 2021; Schafer et al., 2022). Social distancing also poses a great challenge for many people, as it is not allowed to visit friends and relatives (Brooks et al., 2020).

The COVID-19 pandemic was a global traumatic event (Horesh & Brown, 2020) with negative and positive effects on people's lives and physical and mental health (Zhao et al., 2020). The COVID-19 pandemic results in stress response in the public, whether they were directly exposed to the virus (e.g., the diagnosis of COVID-19) or indirectly (e.g., through the media), or had other negative experiences (e.g., a lockdown, unemployment) (Bridgland et al., 2021). Although not all people were infected with the virus and were exposed to direct life-

threatening situations, fear and loss through indirect exposure and negative experiences are also traumatic stressors and impair mental health of many, if not all (Bridgland et al., 2021).

In addition to negative outcomes, the pandemics can also bring about positive transformations for individuals (Shigemoto, 2021), which is referred to as PTG (Tedeschi & Calhoun, 1996). Understanding PTG in the context of the COVID-19 pandemic is crucial. Theoretically, relevant findings expand our knowledge of PTG in the pandemic context and supplement existing theoretical models. In practice, the research findings help improve training and interventions to better help individuals to adapt to the negative experiences. More importantly, the findings of this study are expected not only to imply on the currently ongoing pandemic specifically, but also more broadly to imply on any future global traumatic events with similar impacts in physic, psychology, society, and finance. However, the factors and the mechanisms of PTG have not been fully studied yet, especially in the context of the COVID-19 pandemic.

A theoretical model of PTG

PTG refers to the positive outcomes that emerge through an intrapersonal transformation following a traumatic experience (Tedeschi & Calhoun, 1996). Traumatic events can produce significant challenge with one's conceptions of self, others, and the world. The cognitive struggle to make sense of the new reality arising from the trauma may contribute to PTG, which means trauma survivors are believed to have developed beyond the previous level of adaptation and psychological functioning (Tedeschi et al., 2018). PTG is considered to occur in five areas: appreciation of life, personal strength, relating to others, spiritual change, and new possibilities. Appreciation of life encompasses cherishing each moment and feeling grateful to be alive. Personal strength is the feeling and knowledge that an individual can handle challenging tasks. Relating to others is about enhancing existing relationships and building new and close relationships. Spiritual change involves a greater

connection and deeper respect for a higher power or better thoughtfulness about existence.

Lastly, new possibilities mean the awareness that there are plenty of options and possibilities in life.

The theoretical model of PTG was first introduced by Tedeschi and Calhoun in 1995 in order to outline the general psychological processes that lead to growth, and that were considered to be a grounding framework (Tedeschi et al., 2018). PTG appears to occur through the emotional suffering and challenge to their core beliefs, which motivates the cognitive processing necessary to enable growth. According to Tedeschi et al (2018) theoretical model of PTG, the development of PTG in individuals exposed to traumatic events depend on a complex interplay of personal characteristics (e.g., personality traits, gratitude, resilience traits, gender, and age), sociocultural characteristics (e.g., material or emotional comfort and support from the outside world as well as culture) and cognitive process (e.g., core belief disruption, event centrality, deliberate rumination, and helpful disclosure). Among these factors, event centrality and deliberate rumination are essential components of the PTG process.

Event centrality refers to the extent to which traumatic events are seen as reference points for understanding new experiences, a turning point in one's autobiographical story, and a key element of an individual's identity (Berntsen & Rubin, 2006). When individuals treat traumatic events as significant turning points in their lives, they are more likely to undergo a range of cognitive transformations and reframing. As Tedeschi et al states that "growth occurs when trauma assumes a central place in the life story" (Tedeschi & Calhoun, 1995, p. 85).

Deliberate rumination is also a necessary component of PTG (Calhoun & Tedeschi, 2006). In PTG studies, researchers proposed two kinds of ruminative responses following a traumatic event: intrusive rumination and deliberate rumination (Tedeschi et al., 2018).

Intrusive rumination is a process by which one automatically re-experiences images,

emotions, and thoughts associated with the trauma. Initially, intrusive rumination is a disturbance that arises from the disruption of core beliefs. These thoughts evolve into a more effortful attempt to process the event later, which the literature has termed deliberate rumination (Tedeschi et al., 2018). Deliberate rumination refers to an intentional process of thinking through which one strives to understand the cause and meaning of an incident. Deliberate ruminations are a vital part of rebuilding one's worldview, establishing new perspectives, and challenging past schemas.

In summary, the combination of event centrality and deliberate rumination triggers PTG (Tedeschi et al., 2018). For successful and adaptive growth, one must treat the traumatic event as a reference point for their lives, then question and explore their old assumptions and traumatic experiences with intentionality and positive reframing. Deliberate rumination reevaluates highly stressful circumstances in such a way that meaning, or growth become potential outcomes.

Positive memory and post-traumatic mental outcomes

Understanding autobiographical memory and its relationship to post-traumatic mental health is crucial, especially in terms of positive memory (Contractor et al., 2018; Contractor et al., 2020; Contractor et al., 2021; Dolan et al., 2020), yet this is not well reflected in Tedeschi et al. (2018)'s theoretical model of PTG. Autobiographical memory is the integration of people's memories of past experiences into an overarching life narrative, which is valuable for guiding future behaviour and decision making, as well as for fostering self-continuity and promoting social interaction (Fivush, 2010). Positive memory refers to the memory of meaningful experiences with favourable consequences, such as graduation, promotion, marriage, the birth of children, etc.(Contractor et al., 2018; Rubin et al., 2008). Research revealed that positive memory is typically more frequent and easier to access in autobiographical memory than negative life events (e.g., unemployment) (Berntsen & Rubin,

2006; Berntsen et al., 2011). A growing number of trauma studies, in particular post-traumatic stress disorder (PTSD) studies, value the influence of positive memories (Askelund et al., 2019; Caldas et al., 2020; Contractor et al., 2020; Contractor et al., 2021; Dolan et al., 2020). The relationship between positive memory and PTSD is well explored and researchers have developed a Positive Memory-PTSD model to explain their relationship (Caldas et al., 2020; Contractor et al., 2019; Contractor et al., 2018; Contractor et al., 2020; Contractor et al., 2021; Dolan et al., 2020). However, no study investigates the relationship between positive memory and PTG so far. Given that positive memories tend to create thematic meaning and temporal structure in our lives and serve as important anchoring events (Berntsen & Rubin, 2006; Berntsen et al., 2011), it is meaningful to explore whether positive memories can buffer the adverse effects of traumatic event, such as the COVID-19 pandemic, and contribute to PTG.

The Positive Memory-PTSD model was drawn upon to understand the relationship between positive memory and PTG. This model is the result of integrating from various research findings and theory (Contractor et al., 2018), including memory interventions (Moradi et al., 2014; Steel et al., 2015), broaden-and build theory (Fredrickson, 2001), positive psychology interventions (Sin & Lyubomirsky, 2009) and experiments (Rusting & DeHart, 2000). The Positive Memory-PTSD model outlines the beneficial effects that positive memory retrieval and processing may provide for cognitive processes. First, enhanced attention to positive memories may reduce negative affect and improve positive affect (Rusting & DeHart, 2000). Such improved affect may increase adaptive cognitions including a preference for positive thoughts (Fredrickson, 2001), increased positive interpretations of events (Rusting & DeHart, 2000), and elevated self-esteem (Steel et al., 2015). These adaptive cognitions may help to counter trauma cognitions (Contractor et al., 2018). Second, experience of positive affect can broaden individuals' thought and action capabilities (Fredrickson, 2001). This broadening can improve personal resources, ranging from physical

and intellectual resources to social and psychological resources, which in turn cause better life outcomes, for example, forming close relationships and gaining strong social support (Fredrickson et al., 2008), which is an important promoting factor for PTG (Tedeschi et al., 2018).

In addition to the overall positive memory retrieval, the current study also delves into the relationship between different memory phenomenological characteristics and PTG. According to Memory-PTSD model, people who have suffered trauma may have difficulty retrieving and processing specific positive memories (Contractor et al., 2018), which may suggest people have better PTG can retrieve positive memory better. Memory phenomenological characteristics refer to the aspects of memory that allow individuals to subjectively relive the event as they remember it, which include domains such as *valence*, *vividness*, *coherence*, *accessibility*, and *emotional intensity* (Contractor et al., 2019; Luchetti & Sutin, 2016; Sutin & Robins, 2007). *Valance* refers to the degree of rating a memory as positive or negative. *Vividness* refers to remembering many details, as well as experiencing the memories are lucid, clear, and vivid. Vivid memories tend to be highly integrated with our self-concept, interconnected with other autobiographical memories (Blix et al., 2020) *Coherence* refers to the extent to which autobiographical memories are narrated coherently. Narratives can be considered coherent if the sequence in which the events unfolded is clear and information is provided regarding the time and place, they occurred (Vanderveren et al., 2019). *Accessibility* refers to subjective ease of retrieval. *Emotional intensity* refers to the subjective intensity of emotions related to memory. Understanding the relationship between memory characteristics and PTG can add greater details to the existing literature on positive memory and trauma studies. In the meantime, it is beneficial to know the relationship between positive memory and PTG, which can facilitate the future development of positive memory

interventions. However, no research has examined the associations between PTG and these 5 domains, which were examined in this study.

Emerging adults and PTG

The term emerging adulthood was coined by Arnett (2000) to describe and identify the age period from the late teens through the mid- to late 20s (roughly ages 18–25). Arnett (2000) proposed five features that make emerging adulthood distinct: it is the age of identity explorations, the age of instability, the self-focused age, the age of feeling in-between, and the age of possibilities (Arnett, 2004). Emerging adults face many normative transitions (Arnett, 2000; Shanahan, 2000), which are known to be stressful (Duffy et al., 2019), including in their educational and professional development (e.g. important exams, entry into the labour market, financial pressures, and uncertainties), social and romantic relationships, and changes in their living situation (e.g. living away from family for the first time). These normative changes and pressures could be compounded by COVID-19-related stressors and disruptions (e.g., declining labour market and inability to socialize with friends or romantic partners). However, emerging adults enjoy their self-focused freedom from role obligations and restraints, and they take satisfaction in their progress toward self-sufficiency. Arnett (2000) think they also benefit from growing social cognitive maturity, which enables them to understand themselves and others better than they did as adolescents (Arnett, 2004). Thus, well-being improves during the course of emerging adulthood. It is unclear how emerging adults develop PTG during COVID-19 pandemic. To gain a more insight into emerging adults, the current study investigates the cognitive process of PTG in emerging adults in the context of COVID-19 pandemic.

Previous study

Event centrality, Deliberate rumination and PTG

Empirical studies have highlighted the contribution of event centrality and deliberate rumination to PTG (David et al., 2022; Tedeschi et al., 2018). The knowledge of event centrality and deliberate rumination on PTG are well established in the literature. Both event centrality and deliberate rumination have been shown to predict PTG in a wide variety of populations (Cárdenas Castro et al., 2016; Onu et al., 2019; Roland et al., 2014; Wang et al., 2020; Xu et al., 2019; Zhang et al., 2018), after controlling for important predictor variables, such as coping strategies, core belief and PTSD (Brooks et al., 2017; David et al., 2022; Kramer et al., 2020; Zhou et al., 2015), and in cross-sectional (Clauss et al., 2021; David et al., 2022) as well as longitudinal studies (Bakaitytė et al., 2020; Zhou et al., 2015). However, no study to date has examined how event centrality and deliberate rumination affect PTG in the context of COVID-19, which is examined in this study. It would be meaningful to know how the COVID-19 pandemic, as a turning point in most people's lives (Schafer et al., 2022), affects our perception of the event and further help us develop PTG. In addition, due to social distancing and quarantine, individuals may have more time for rumination (Riva et al., 2020), including deliberate rumination. It is critical to consider the relationship between deliberate rumination and PTG during the COVID-19 pandemic.

In addition, deliberate rumination, as an effortful strategy, plays a mediating role between other factors and PTG. Studies showed that deliberate rumination mediated the relationship between event centrality and PTG after a natural disaster (García et al., 2015; García et al., 2016). Event centrality is believed to facilitate deliberate rumination once individuals feel more in control of their responses to distressing events (Brooks et al., 2017). Rumination also rehearses trauma memories such that they remain easily accessible within autobiographical memory. The increased accessibility of these memories, thus, affords more

opportunities to process the underlying meaning and perceived gains from these events (Boykin et al., 2020). This study aims to investigate whether deliberate rumination mediates the relationship between event centrality and PTG during the COVID-19 pandemic, which provides additional knowledge about the mechanism underlying the occurrence of PTG.

Positive memory and PTG

Studies gave evidence on the relationship between the function of autobiographical memory and psychological wellbeing (Dolan et al., 2020; Waters, 2014). Results found that individuals who use their autobiographical memories to serve self, social, and directive functions reported higher levels of purpose and communion and positive relationships (Waters, 2014). In addition, research has shown that both positive and traumatic memories play important roles in the aetiology and maintenance of post-traumatic mental health (e.g., PTSD) (Contractor et al., 2019; Dolan et al., 2020). Further, evidence highlighted the potential beneficial effects of therapeutically targeting positive memories on post-trauma outcomes (Contractor et al., 2018). However, the following gaps exist in trauma research: First, most trauma research has explored the effects of traumatic memories, and fewer studies have focused on the role of positive memories. Second, the previous studies have focused only on the relation between different memory characteristics and PTSD, leaving the relation between different memory characteristics and PTG unexplored. Therefore, the purpose of this study is to investigate the effect of positive memories on PTG during the COVID-19 pandemic.

Regarding the relationship between positive memory and post-trauma mental outcomes, research showed that individuals with severe PTSD have positive memory retrieval difficulties (Contractor et al., 2020; Contractor, Messman, et al., 2022). Evidence indicates that greater PTSD symptom severity associated with less information of positive memory, both among general public (Dolan et al., 2020), university students (Contractor, Messman, et

al., 2022), and male fire-fighters (Bryant et al., 2007; Contractor et al., 2019). In addition, intervention research supports a negative relationship between positive memories and PTSD symptom severity (Miguel-Alvaro et al., 2021). Interventions study also reveals that increasing positive memory recall was useful in reducing emotional disorders (Barry et al., 2019), which indicated positive memory interventions show potential in resolving post-trauma mental problems (Contractor et al., 2020). As a resilience factor, increasing positive memory retrieval may play a positive role in coping with stressor (Contractor, Banducci, et al., 2022) . Moreover, a longitudinal study showed that higher coherence of positive memory was effective in predicting better emotional well-being during the COVID-19 pandemic (Vanaken et al., 2021). This implies that individuals with better autobiographical memory of positive events are likely to have higher PTG, which is examined in this study.

Specific Aspects of Positive Memory and PTG

There are some shortcomings in the research on positive memory characteristics in relation to trauma outcome. First, most studies examining positive memory characteristics have been limited to comparing the characteristics of positive and negative memories rather than examining the characteristics of positive memories as a function of posttraumatic mental outcomes (Byrne et al., 2001; Dolan et al., 2020). Second, some relevant studies had inconsistent results. For example, regarding the relationship between memory valence and PTSD severity, a study showed that greater PTSD severity predicted greater negative value of positive memories (Dolan et al., 2020), yet similar results did not appear in another study (Contractor, Messman, et al., 2022). Besides, there was no correlation between PTSD symptoms and the emotional intensity of positive memory (Dolan et al., 2020). Third, some studies have examined the relationship between positive memory characteristics and PTSD symptom, but not PTG (Contractor et al., 2019; Contractor et al., 2020; Dolan et al., 2020). Regarding accessibility, a negative relationship between positive memory accessibility and

PTSD symptoms was reported in a limited number of studies (Contractor, Messman, et al., 2022; Dolan et al., 2020). Moreover, evidence revealed that the severity of PTSD was significantly inversely related to vividness and valance, controlling for other factors (Dolan et al., 2020). However, no studies so far have explored the relationship between positive memory characteristics and PTG. In summary, the relation between different positive memory characteristics and post-traumatic mental health outcomes is under-researched, especially in terms of PTG. Moreover, the most closely related studies on PTSD have reported inconsistent findings to date. Thus, this study investigates the relationship between different memory traits and the relationship between PTG.

Moderating effect of positive memory

Although event centrality is known to predict PTG via deliberate rumination, it is unknown yet what role of positive memory plays in the mediation effect. Studies revealed the protective effects of positive childhood memories with caregivers against the influence of trauma (Merrick & Narayan, 2020; Narayan et al., 2019). The results indicated that positive memory moderated the relationship between maltreatment and PTSD symptoms (Narayan et al., 2019). For individual with less positive and detailed memory, higher levels of maltreatment predicted higher levels of psychopathology. However, for individuals with more positive and elaborate memories, the predictive association was not significant (Narayan et al., 2019). This moderating role of positive memory in PTSD research suggests that positive memories might interact with event centrality and deliberate rumination that affect PTG, which is investigated in the current study. Enhanced understanding of moderating processes of positive memory is imperative to inform theory on development of PTG, and to guide practice aimed at improving PTG.

Moderation effect of Positive memory on the relationship between Event centrality and PTG. Positive memory presumably moderates the relationship between event

centrality and trauma outcome. In a study that explored the impact of the interaction of trauma centrality and coping abilities on PTSD, trauma centrality was related to PTSD symptoms more so among participants with poorer coping abilities (George et al., 2016). Although this study did not directly explore the role of positive memory, according to the Positive Memory-PTSD model (Contractor et al., 2018), positive memory amplifies individuals' cognitive and action abilities, which include coping abilities. Thus, it is reasonable to speculate that positive memory may moderate the relationship between event centrality and PTG. The current study aims to explore whether event centrality is more strongly related to PTG in those with higher positive memories. Further research on the variables that interact with event centrality to produce different effect on PTG will not only enrich our understanding of trauma recovery but also facilitate intervention optimization through the refinement of therapeutic targets.

Moderation effect of Positive memory on the relationship between deliberate rumination and PTG. Positive memory may moderate the effect of deliberate rumination on PTG. Positive memories working as valuable anchoring events incline people to think positively when ruminating and to take active strategies to cope with emotional suffering (Berntsen et al., 2011). One study explored the interaction effect of rumination and the emotional intensity of negative memories on the performance of negative memories (e.g., sensory information) (Colombo et al., 2021). The author found that low rumination could retrieve more sensory information as the emotional intensity of negative memory increased. Although this initial study uncovered an interesting nature of the interaction between rumination and emotional intensity, it is still limited in some ways. First, the definition of rumination in this study was rather equivalent to intrusive rumination. Second, the investigated memories were centered on negative memories, leaving positive memories unexplored. Finally, the effect of the interaction between memory and rumination on mental health was not examined. Although no studies have directly explored the interaction between

positive memory and deliberate rumination, a study demonstrated that gratitude modulates the relationship between deliberate rumination and PTG (Kim & Bae, 2019). Gratitude reinforced the effect of deliberate rumination on PTG. Gratitude may have long-lasting benefits that make people more happy, satisfied, flexible and opening-minded, which enable people to take adaptive coping (Kim & Bae, 2019). Similarly, recalling positive memories also allows individuals to gain greater positive affect and higher adaptive cognition (Contractor et al., 2018). In fact, some study have used writing gratitude journal as a positive memory intervention (Miguel-Alvaro et al., 2021). Evidence also supported a positive relationship between positive memory and gratitude (Ramírez et al., 2014). Given the similarities between outcomes induced by positive memory and gratitude, the interaction pattern between gratitude and deliberate rumination on PTG may also appear between positive memory and deliberate rumination. Thus, it is plausible to speculates that there would be an interaction effect between deliberate rumination and positive memory on PTG, which means positive memory my reinforce the effect of deliberate rumination on PTG.

In addition, positive memory may moderate not only the main effect of deliberate rumination on PTG, but also the mediating effect of deliberate rumination on PTG. Individuals who report better positive memory might be more likely to approach and deliberately engage with positive thoughts and trigger more positive affect (Contractor et al., 2018). Doing so may facilitate PTG by laying the stage for engaging in deliberate meaning making by intentionally thinking about the central event (Cann et al., 2011). As mentioned above, relevant studies mainly focus on the relationship between negative rumination (intrusive rumination) and memory (Colombo et al., 2021; Haspolat & Çırakoğlu, 2021), and the relationship between deliberate rumination and positive memory is still under-researched. To broaden our knowledge on the relationship between rumination and memory, the current study seeks to explore the interaction effect between deliberate rumination and positive

memory characteristics on PTG as well as the moderated mediation effect of positive memory. Studying the interaction effect between deliberate rumination and PTG would be beneficial for future research to examine whether such a component can enhance impact of other therapeutic techniques utilising positive memories.

Emerging Adults and PTG during the Pandemic

A study provided evidence that young people can experience PTG during the pandemic (Chi et al., 2020), which may be related to the following two aspects. On the one hand, the vulnerability of emerging adults makes the COVID-19 pandemic challenging enough for them to significantly undermine or shatter one's assumptions or core beliefs about the world, thus stimulating them to develop PTG. First, 96% of colleges and universities switched to online courses during the pandemic, which created academic uncertainty for students, including delays in graduation, progress on dissertations and increased difficulty in finding jobs (Hartocollis, 2020; Marsicano et al., 2020). Second, young adults typically exhibit a higher frequency of interpersonal contact, and thus social distancing measures (travel restrictions, isolation, and self-isolation) during the COVID-19 pandemic may have had a more profound impact on their daily lives. Third, excessive lack of or incorrect sensationalistic information in the mass media, fear of infection, witnessing the death and suffering of ordinary people in the media, lack of personal bereavement experiences that might help relatives or significant others, and the impossibility of ritualizing loss with funerals are risk factors for developing poor mental health besides social isolation (Schafer et al., 2022).

On the other hand, the emerging adults have adaptive conditions. First of all, researchers indicated the general strengths in health among young people (Masten, 2001; Werner, 1993), and thus it is expected that emerging adults have a relatively low risk of health complications from COVID-19. Then, emerging adults are competent in using social media to

connect with others, and typically do not have caregiving duties (e.g., for children or elderly parents). Thus, they also have the potential to experience adaptation to adversity during the COVID-19 pandemic (Masten, 2001; Werner, 1993). However, as the outbreak of a pandemic is exceedingly rare, little is known about the development of PTG in emerging adults during such a time, which was explored in this study.

Factors that influence PTG during the COVID-19 pandemic (control variables)

In addition to the main variables of this study and demographic variables (such as gender and age), there are some control variables in this study. For example, responses to crisis and trauma are influenced by individual culture (Wilson & Boden, 2008). A study provides insight into how cultural values may play a protective role in mental health during times of crisis (Germani et al., 2020). Individuals who reported higher levels of collectivism experienced less psychological distress and better overall adjustment to the COVID-19 pandemic, despite displaying higher levels of concern about COVID-19 infection. The researcher suggested that those with greater collectivistic values display higher concern for others (Germani et al., 2020). Also, the social connectedness of collectivistic values may be a protective factor for psychological maladjustment (Germani et al., 2020). This highlights the benefit of social connectedness and support in times of crisis. Therefore, culture must be considered in the context of COVID-19 pandemic. The present study controls for country of origin as a cultural variable.

The COVID-19 pandemic has spread widely across the globe, with millions of confirmed cases, and many countries have implemented varying degrees of quarantine measures. And the findings indicated that restriction levels in different countries can affect post-traumatic mental health (Shigemoto, 2021). Therefore, the country of residence of the participants will be collected as one of the control variables in this study. Pandemic-related variables may increase participants' distress and worry, which influence post-traumatic

responses. Therefore, this study also included attention to the news, restriction perception, infection situation as control variables.

The Current study

Based on the theoretical model of PTG (Tedeschi et al., 2018), this study aims to examine the mediating effect of deliberate rumination on the relationship between event centrality and PTG during the COVID-19 pandemic. Although some elements of this model have been previously tested, this is the first study to integrate previously identified predictors during the COVID-19 pandemic. Further, based on the Positive memory- PTSD model, this study investigates the main and moderating effect of positive memory characteristics on the PTG meditation model while controlling for the demographic and pandemic-related variables during the COVID-19 pandemic. Results from this study are expected to add to an understanding of the relationship between PTG and positive memory, with potential implications for PTG and memory-based interventions. Accordingly, four research hypotheses are formulated as below, which is illustrated in **Figure 1**:

Hypothesis 1.1: Event centrality is positively associated with PTG.

Hypothesis 1.2: Deliberate rumination is positively associated with PTG.

Hypothesis 1.3: Positive memory is positively correlated to PTG. Respectively, different characteristics of positive memory (valance, emotional intensity, vividness, accessibility, and coherence) are positively related to PTG.

Hypothesis 2: Deliberate rumination mediate the relationship between event centrality and PTG.

Hypothesis 3.1 Different positive memory characteristics moderate the relationship between event centrality and PTG.

Hypothesis 3.2 Different positive memory characteristics moderate the relationship between deliberate rumination and PTG.

Hypothesis 3.3 Different positive memory characteristics moderate the mediation effect of deliberate rumination on the relationship between event centrality and PTG.

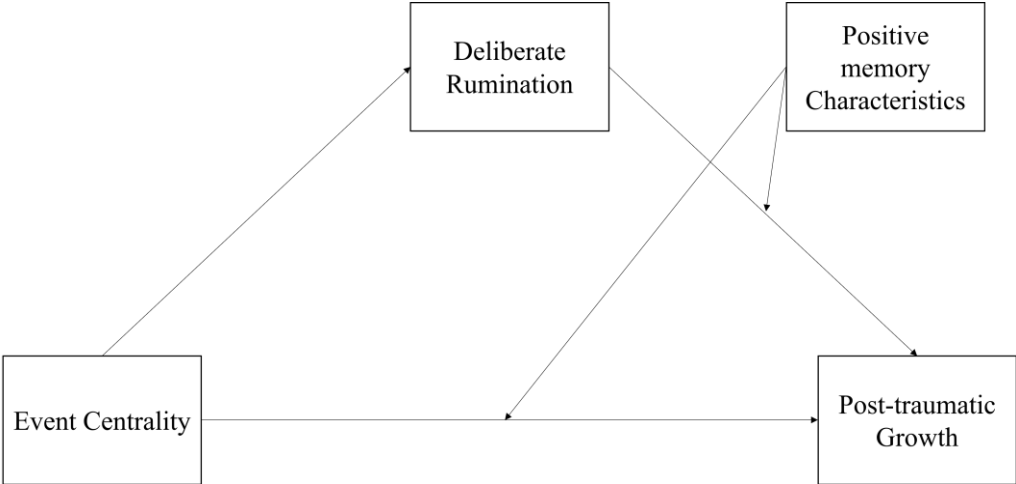


Figure 1. The hypothesized moderated mediation model. For reasons of simplification, 10 control variables (age, gender, employment status, education level, relationship status, countries of residence and origin, extent of concern for Pandemic-Related News, restriction perception and, infection situation) were not reported in the figure.

Methodology

Participants

The study was conducted in February 2022 using a snowball sampling method by posting the link to the survey on several public and private Facebook pages. Inclusion criteria were: (1) young adults, age 18- 25; (2) fluency in English. An a-priori power analysis is conducted to determine the sample size (with α -level = .05, power = .8, effect size = 0.3) and the final estimate is 251 participants. Finally, there were 253 data after excluding participants didn't pass the attention test and people did not complete the survey. Among the participants (mean age = 22.1, SD =1.96), 76 % of respondents were female and 24% were male. Most of the participants were living in China (32%), the UK (24.9%), and Sweden (10%) during the COVID-19 pandemic. While most of the participants are from China (37.2%), the UK (20.6%), the USA (4.7%). The sample characteristics are presented in Table 1.

Measures

Socio-demographics

First, participants completed a socio-demographic questionnaire that included questions about the participants age, gender, country of origin, country of residence, employment status, and their highest completed education level. The pandemic- related variable, including perception of the restriction level of the COVID- related policy, the extent to which participants followed up on news related to the pandemic and whether participants had been infected with the virus were also be asked. In accordance with the purpose of the study, a series of questionnaires were administered, including the widely known and used Post-traumatic Growth Inventory, Centrality of Event Scale, and Event-Related Rumination Inventory. The Memory Experience Questionnaire-Short Form is a relatively new scale with relatively good reliability and validity (Luchetti & Sutin, 2016).

Post-traumatic Growth Inventory- Short Form (PTGI-SF)

The PTGI-SF (Cann et al., 2010) is a 10-item instrument with good psychometric properties, on which respondents are asked to rate their beliefs about positive self-related changes (e.g., “I appreciate the value of my life more”). Response options ranged from 0 (*did not experience*) to 5 (*Very great degree*) with higher scores denoting a greater level of the PTG. The construction of the scale helped capture information relevant to each of the five factors: relating to others, new possibilities, personal strength, spiritual change, appreciation of life. Each factor is represented with two items in the PTGI-SF. Previous research with the PTGI-SF has demonstrated good international reliability (Cronbach’s $\alpha = 0.89$), construct and predictive validity (Cann et al., 2010). In the present study, the Cronbach alpha internal consistency coefficient was found to be 0.89 for the whole scale.

Memory Experiences Questionnaire-Short Form (MEQ-SF)

This 15-item self-report evaluated five positive memory phenomenological domains: valence, vividness, coherence, accessibility, and emotional intensity (Luchetti & Sutin, 2016). Response options ranged from 1 (*strongly disagree*) to 5 (*strongly agree*) with higher scores denoting a greater level of the measured variable. Using instructions adapted from prior studies (Boyacioglu & Akfirat, 2015; Sutin & Robins, 2007) participants retrieved about one specific positive memory, which they referenced when completing the MEQ-SF. The MEQ-SF has demonstrated desirable psychometric properties as the original long form, such as an acceptable internal consistency (Cronbach’s $\alpha = .79$) and predictive validity (Luchetti & Sutin, 2016). Each short-form scale had good and acceptable internal consistency: valence (Cronbach’s $\alpha = 0.77$), vividness (Cronbach’s $\alpha = 0.77$), coherence (Cronbach’s $\alpha = 0.72$), accessibility (Cronbach’s $\alpha = 0.72$), emotional intensity (Cronbach’s $\alpha = 0.73$).

Centrality of Event Scale

7-items Centrality of Event Scale (CES) was used to assess how central a major life crisis is to an individual's identity and life story (Berntsen & Rubin, 2006). Items are measured on a scale from 1 (*totally disagree*) to 5 (*totally agree*). Examples of items on the CES include "I feel that the COVID-19 pandemic has become part of my identity." and "I feel that the COVID-19 pandemic has become a central part of my life story.". In previous study, the CES has good internal consistency (Cronbach's $\alpha = 0.92$) (Berntsen & Rubin, 2006). The Cronbach's alpha in the present study was 0.81.

Event-Related Rumination Inventory

The Event-Related Rumination Inventory (ERRI) is a 20-item inventory designed to assess repetitive thinking about a traumatic or highly stressful event (Cann et al., 2011). This measure contains a 10-items subscale which measure deliberate or purposeful thinking about the event, such as "I thought about whether I have learned anything as a result of my experience during the COVID-19 pandemic." Ratings are made on a 4-point scale ranging from "Not at all" (0) to "Often" (3). Previous study indicated that ERRI has demonstrated has solid psychometric properties, such as solid reliabilities, predictive validity and construct validity (Cann et al., 2011). The Cronbach's alpha of this subscale was 0.87 in the current study.

Procedure

The data were collected through Qualtrics, an Internet-based survey platform that offers a variety of fraud detection options to improve data quality, including enabling multiple submission prevention and detecting duplicated responses. The first page of the questionnaire informed about the aims of the study and the participants' rights (confidentiality, anonymity, etc.). A pilot test was conducted beforehand with 10 respondents to assess the clarity and the response time of the questionnaires (about 11 min), and data from the pilot study were not

included in the final data analysis. Before doing the MEQ-SF, participants were asked to retrieve a positive event that occurred in the last two years during the COVID-19 pandemic which made them happiest. The specific instructions for retrieving the positive memory were as follows:

Autobiographical memories refer to important events you were personally involved in. Autobiographical memories can be related to many subjects, including your school or professional life, or your experiences in your romantic relationships or family life. Autobiographical memories have primarily emotional content, where positive autobiographical memories make you feel happy, safe, loved, etc. You can usually recall or trace the date of autobiographical memory. We know that the COVID-19 pandemic is harsh and brings us misfortune and inconvenience. However, more or less positive things happened to us during COVID-19, including graduation, marriage, reading in peace, learning new skills, or enjoying meals with our family. We want you to think back to one event that made you feel happiest in the last two years during the COVID-19 pandemic. Take your time to recall the details of the incidents and then do the following questions.

Statistical analyses

RStudio was used to analyse data. First, descriptive statistics were used to summarize the demographic characteristics of participants and COVID-related variables. Second, Pearson's correlation statistics was conducted to investigate the relationships between study variables. Third, Model 4 of the PROCESS macro was adopted to analyse the mediating effect of deliberate rumination in the relationship between event centrality and PTG. Finally, Model 15 was used to test the moderated mediating effect (Hayes 2018). The bias-corrected bootstrapping method was used, and 95% confidence intervals were calculated with 10000 random samples. If the 95% bias-corrected confidence interval for the parameter estimate did

not contain zero, then the effect was statistically significant (Mallinckrodt, Abraham, Wei, & Russell, 2006).

Ethical Considerations

This study was conducted according to the guidelines of the Declaration of Helsinki and its later amendments. This study was approved by the Lund University Psychology Department Ethics Committee. Written informed consent was obtained in advance. The participants were informed about the purpose of the research and assured of their right to refuse to participate in or withdraw from the study at any stage. Anonymity and confidentiality of subjects' data were guaranteed.

Researchers were concerned about the possible negative effects of asking participants to disclose and discuss traumatic events. However, research suggests that although trauma-related research can lead to some immediate psychological distress, this distress is not extreme (Jaffe et al., 2015) and these reactions do not appear to be lasting (Stein et al., 2000). In addition, the questionnaire form of research is less distressing for individuals with a history of trauma or PTSD than interview research. Moreover, individuals often perceive participation in research as a positive experience and do not regret participating, regardless of trauma history or PTS (Jaffe et al., 2015). Furthermore, many programs for the treating of PTSD consider disclosure of trauma to have a therapeutic effect (Stein et al., 2000). Certainly, therapeutic processing of traumatic experiences is more complex than simply thinking and talking about past trauma.

In summary, this study resulted in very little harm to the participants and could even have potential benefits. First, during the recall phase, participants recalled positive memories, and positive memories were generally accompanied by positive emotions (Vanderlind et al.,

2017). Second, the questionnaire used to assess participants' deliberate rumination and PTG in the current study may have little distress compared to the interview study.

Results

Sample Characteristics

The descriptive characteristics of the participants in **Table 1**. The mean age of the participants was 22.1 ± 1.96 (minimum:18, maximum: 25). Among the participants, 75.9% were female, 48.2% were single, 89.7% are or have been in higher education, 72.3% were unemployed student. The participants were composed of people from 45 different countries. Since Collectivism-individualism is the most widely invoked distinction used to explain cross-cultural differences (Triandis & Suh, 2002), the study regrouped participants from different countries into two categories. 58.1% of participants were from collectivist cultures and 41.9% were from individualist countries, while 54.2% of participants reported living in individualist countries and 45.8% in collectivist countries during the COVID-19 pandemic. The results also showed that 30.8% of participants have been infected with the coronavirus, most of the participants sometimes (43.1%) or often (30.8%) followed relevant news during the COVID-19 pandemic, and most of the participants considered the relevant restriction policies to be mild (35.6%) or moderate (34.4%) during the COVID-19 pandemic (**Table 1**).

Table 1. Descriptive Information on Demographic Variables ($N = 253$)

		Mean (<i>SD</i>)	<i>n</i> (%)
Gender	Female		192(75.9%)
	Male		61(24.1%)
Age		22.1(1.96)	
Education statue	Less than high school		2(0.8%)
	High school diploma		24(9.5%)
	Some College/University		98(9.5%)
	Bachelor's degree		88(34.8%)
	Graduate degree (Master, Doctoral, etc.)		41(16.2%)

Table 1 (continue)

	Mean (<i>SD</i>)	<i>n</i> (%)
Relationship Status		
Single		122(48.2%)
Marriage/in a relation		131(51.8%)
Employment		
Unemployed Student		183(72.3%)
Part time/full time		68(26.9%)
Other		2(0.8%)
Countries of residence (35 countries)		
China		81(32%)
The UK		63(24.9%)
Sweden		24(9.5%)
The USA		11(4.3%)
Germany		10(4%)
Others		64(25.3%)
Collectivism-Individualism (Countries of residence)		
Collectivism Countries		116(45.8%)
Individualism Countries		137(54.2%)
Countries of origin (45 countries)		
The USA		12(4.7%)
China		94(37.2%)
The UK		52(20.6%)
Others		95(37.5%)
Collectivism-Individualism (Countries of origin)		
Collectivism Countries		147(58.1%)
Individualism Countries		106(41.9%)
Extent of Concern for Pandemic-Related News	3.26 (0.88)	
Never		4(1.6%)
Seldom		43(17.0%)
Sometimes		109(43.1%)
Often		78(30.8%)
Always		19(7.5%)
Restriction perception	2.60 (0.99)	
None		32(12.6%)
Mild		90(35.6%)
Moderate		87(34.4%)
Severe		35(13.8%)
Very severe		9(3.6%)
Whether infection of virus		
Yes		78(30.8%)
No		175(69.2%)

Correlation Analysis

The correlations between the study variables are shown in **Table 2**. PTG correlated positively with event centrality ($r = .35, p < .001$), deliberate rumination ($r = .42, p < .001$), which supported the Hypothesis 1.1 and 1.2. Regarding the relationship between PTG and positive memory characteristic, PTG is correlated positively with vividness ($r = .17, p < .01$), accessibility ($r = 0.13, p < .01$), emotional intensity ($r = .33, p < .001$), coherence ($r = .12, p < 0.05$) and valance ($r = .19, p < .001$), which supported the Hypothesis 1.3.

Table 2. Correlations, means and standard deviations of study variables ($n = 253$).

	1	2	3	4	5	6	7	8	9
1. PTG	1								
2. EC	.35***	1							
3. DR	.42***	.58***	1						
4. PM Characteristics	.26***	.12	.16***	1					
5. Vividness	.17**	.06	.16***	.78***	1				
6. Accessibility	.13**	.02	.10***	.79***	.59***	1			
7. Emotional intensity	.33***	.18**	.18***	.55***	.26***	.27***	1		
8. Coherence	.12*	.04	.06***	.79***	.50***	.47***	.31***	1	
9. Valance	.19***	.1	.09***	.56***	.37***	.33***	.13**	.4***	1
M	24.62	22.69	15.92	50.3	7.52	10.06	9.65	12.79	10.35
SD	10.65	5.38	5.93	8.81	2.51	2.68	2.53	2.86	1.65

Note. PTG= post- traumatic growth, EC= event centrality, DR= deliberate rumination, PM = positive memory, EI= Emotional intensity. * $p < .05$, ** $p < .01$, *** $p < .001$.

The Mediating Effect of Deliberate Rumination

Table3. Mediating effects of deliberate rumination in the relationship between event centrality and PTG.

DV	Standardized coefficients				95% CI		
	β	SE	t	F	R ²	Lower	Upper
Total effect	.25	.12	4.33***			.27	.73
EC → PTG							
Direct effect							
EC → DR	.52	.06	9.77***	10.95	.43	.46	.69
DR → PTG	.27	.12	3.95***	7.76	.36	.24	.73
EC → PTG	.11	.13	2.01			-.04	.48
Indirect effect							
EC → DR → PTG	0.14	0.04				.07	.23

Note. PTG= post- traumatic growth, EC= event centrality, DR= deliberate rumination. * $p < .05$, ** $p < .01$, *** $p < .001$. Please refer to **Appendix A** for the complete model.

The mediating effect of deliberate rumination on the relationship between event centrality and PTG was examined. Demographic and COVID-related variables were included as control variables. Only hypothesis-related results were presented in the **Table 3**. The complete results are available in **Appendix A**. As **Table 3** shows, event centrality had a positive effect on deliberate rumination ($\beta = .52, t = 9.77, p < .001$), and deliberate rumination was a significant predictor of PTG ($\beta = .27, t = 3.95, p < .001$). In addition, the mediating effect of deliberate rumination on the relationship between event centrality and PTG was statistically significant ($\beta = .14, 95\% \text{ CI } .07, .23$), which supported the Hypothesis 2. Approximately 36% of the variance in PTG was accounted by the predictors ($R^2 = .36$).

The Moderating Effect of Emotional Intensity

Emotional intensity of positive memory moderates the relationship between event centrality and PTG

The moderating effect of emotional intensity was examined by entering deliberate rumination, emotional intensity, and their interaction terms (i.e., deliberate rumination \times gratitude) into the model. **Table 4** shows that the interaction between event centrality and emotional intensity of positive memory is not significant ($B = 0.07, t = 1.54, p = 0.12$), which means results did not support the Hypothesis 3.1.

Emotional intensity of positive memory moderates the relationship between deliberate rumination and PTG

The interaction between deliberate rumination and emotional intensity of positive memory is significant ($B = -.10, t = -2.14, p = .03$). Overall, the effects of deliberate rumination on PTG became weaker as the level of emotional intensity became higher, which is illustrated at **Figure 4**. At -1SD ($B = .76, se = .18, p < .001$) and mean ($B = .51, se = .12, p < .001$) of emotional intensity, the effect of deliberate rumination was positive and significant. While at

+1SD of the emotional intensity, the effect of rumination was not significant ($B = .27, se = .16, p = .09$). The results supported the Hypothesis 3.2.

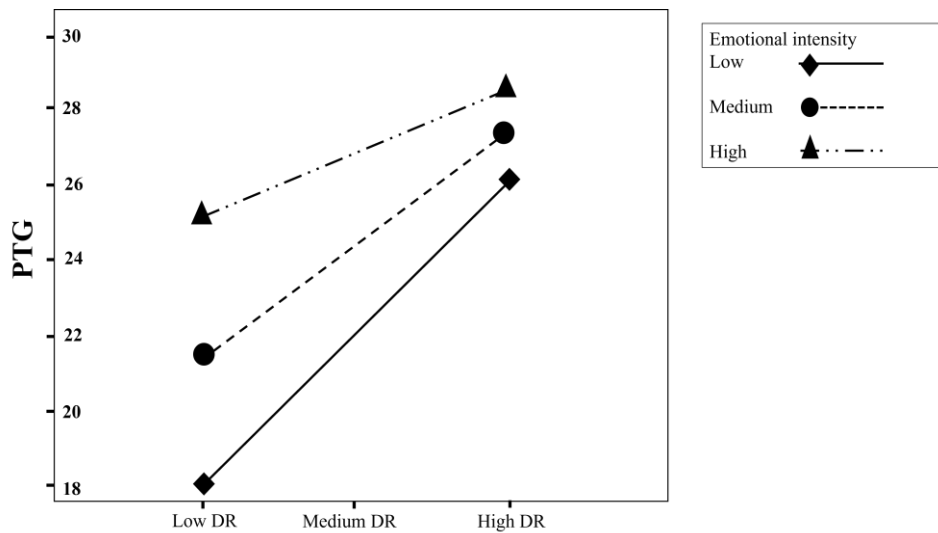


Figure 2. Deliberate rumination moderated the relationship between emotional intensity of positive memory and PTG. DR= deliberate rumination.

Table 4. Moderated mediation analysis for PTG.

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	Model R^2
IV: EC					
DV: PTG					
Mediator: DR					
Moderator: EI					
EC→DR	.58	.06	9.90	.00***	.43
EC→PTG	.20	.13	1.51	.13	.37
DR → PTG	.51	.12	4.15	.00***	
EI→PTG	.96	.25	3.84	.00***	
EC×EI→PTG	.07	.05	1.54	.12	
DR×EI→PTG	-.10	.04	-2.14	.03*	
Conditional effects of the focal predictor (DR) at values of the moderator (EI):					
EI low	.76	.18	4.30	.00***	
EI medium	.51	.12	4.15	.00***	
EI high	.27	.16	1.70	.09	
Boot indirect effect/index Boot SE 95% CI [lower-upper]					
Conditional indirect effects of event centrality on PTG					
EC→DR → PTG					
EI low	.44	.12	.24	.69	
EI medium	.30	.08	.15	.47	
EI high	.16	.10	-.04	.37	
Index	-.06	.03	-.120	-.004	

Note. PTG= post- traumatic growth, EC= event centrality, DR= deliberate rumination, EI= emotional intensity. * $p < .05$, ** $p < .01$, *** $p < .001$

Emotional intensity of positive memory moderates the mediation effect of deliberate rumination on the relationship between event centrality and PTG

Five moderated mediation models were conducted to explore the moderating effect of different memory characteristics. It was observed that the indirect effect of event centrality on PTG through deliberate rumination was significantly moderated only by the emotional intensity of positive memory. Only significant results were presented in the current study, which is illustrated at **Figure 3**. As **Table 4** shows, when emotional intensity was considered as a moderating variable, the direct effect of event centrality on PTG was not significant ($B = .21, t = 1.51, p = .13$). While deliberate rumination had a positive effect on PTG ($B = .51, t = 4.15, p < .001$). Results indicated a significant moderated mediation effect (index = $-.06, 95\% \text{ CI } -.120, -.004$). The moderated mediation effect was significant only for low ($B = .44, 95\% \text{ CI } .27, .73$) and medium levels of emotional intensity, but not high level of emotional intensity. The mediation path from event centrality to PTG via deliberate rumination was significant at low ($B = .44, 95\% \text{ CI } .24, .69$) and medium ($B = .30, 95\% \text{ CI } .15, .47$) emotional intensity level while the mediation path was not significant at high emotional intensity level ($B = .16, 95\% \text{ CI } -.04, .37$). The results partially supported the Hypothesis 3.3.

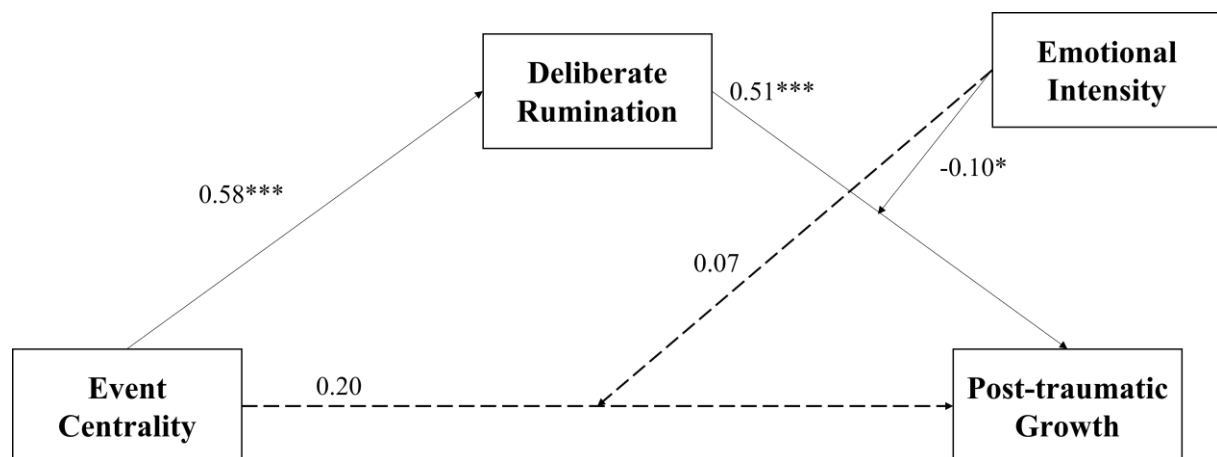


Figure 3. Emotional Intensity moderated the mediating effect of deliberate rumination between event centrality and PTG. $*p < .05$, $***p < .001$.

Discussion

The current study aimed to examine the mediating role of deliberate rumination in the relationship between event centrality and PTG in the context of COVID-19. To expand the existing model of PTG, this study investigated the relationship between positive memory and PTG as well as the moderating role of positive memory in the mediating model on PTG during COVID-19 pandemic among young people in emerging adulthood. Consistent with prior research, both event centrality and deliberate rumination were positively associated with PTG. As predicted, different positive memory characteristics were positively correlated to PTG. In addition, the findings indicated that the effect of event centrality on PTG was mediated by deliberate rumination. Further, emotional intensity of positive memory moderated the relationship between deliberate rumination and PTG. Finally, the mediating effect of deliberate rumination on the relationship between event centrality and PTG was moderated by the emotional intensity of positive memory.

The relationship between the main variables and PTG

The results of this study support the PTG model that was proposed by Tedeschi et al (2018). According to this model, event centrality and deliberate rumination play key roles in the PTG process. As hypothesized, both event centrality (Clauss et al., 2021; Kramer et al., 2020) and deliberate rumination (Cárdenas Castro et al., 2016; Kramer et al., 2020) were positively correlated to PTG in the current study. Individuals differ with respect to the extent to which a traumatic event becomes central to their identity, life story and understanding of the world, and such individual differences is critically related to the development of PTG (David et al., 2022). While previous studies have emphasized the adverse effects of maladaptive rumination on mental health (Haspolat & Çırakoğlu, 2021; Morris &

Shakespeare-Finch, 2011; Newby & Moulds, 2011; Xu et al., 2019; Zhou et al., 2015), the present study highlights the impact of the constructive aspect of rumination on PTG.

Deliberate rumination can help one reconstruct an incident and correct dysfunctional belief about a traumatic event (Kim & Bae, 2019). Then deliberate rumination on the COVID-19 pandemic led to greater understanding and examination of the impact of the pandemic, and by attempting to understand the meaning of the pandemic, individuals are likely to be able to develop PTG (Kramer et al., 2020). It has well been established in the literature that PTG occurs in different countries (Roland et al., 2014), population (Taku et al., 2009; Wang et al., 2020; Xu et al., 2019), and trauma types (Morris & Shakespeare-Finch, 2011; Onu et al., 2019; Xu et al., 2019) after controlling for important variables (David et al., 2022; Kramer et al., 2020; Wang et al., 2020). The current study builds upon previous research and adds to our understanding of the mechanisms underlying the development of PTG in emerging adults during the COVID-19 pandemic.

The results of this study support the Positive Memory-PTSD model that was proposed by Contractor et al. (2018). According to this model positive memory has a protective effect on post-traumatic psychological outcomes. In this study, positive memory was positively correlated with PTG, which demonstrated that individuals who subjectively recalled positive events better exhibited higher levels of PTG. Specifically, individuals with high PTG showed better accessibility, vividness, and coherence in a positive memory, and had stronger emotional intensity and valence. The results suggest that positive memory may make a contribution to buffer the adverse influence of the COVID-19 pandemic and contribute to PTG. Possible reasons are that retrieving positive memories is accompanied by beneficial effects, such as greater positive affect and decreased negative affect (Rusting & DeHart, 2000) and reduced post-trauma maladaptive cognitions (Contractor et al., 2018; Fredrickson, 2001; Rusting & DeHart, 2000). In addition, recalling positive memories broadens an

individual's ability to think and act, and enhances personal resources and social skills, which in turn results in better life outcomes (Fredrickson, 2001; Fredrickson et al., 2008). It also helps people receive greater and more effective social support, which has been constantly reported to relate to PTG (Tedeschi et al., 2018). Although an increasing number of trauma studies have explored the effects of positive memory (Caldas et al., 2020; Contractor et al., 2019; Contractor et al., 2020; Contractor et al., 2021; Dolan et al., 2020; Miguel-Alvaro et al., 2021; Weiss et al., 2019), most of them explored the relationship between positive memory and psychopathology. The PTG model does not adequately address the role of positive memory, which is supplemented by the present study. Building on the Positive Memory-PTSD model, this study revealed the importance of positive memory for PTG, and that the model can explain to some extent the relationship between positive memory and adaptive outcomes. The findings of the current study suggested that the above-mentioned model and theories are not limited to PTSD research but are applicable to PTG research as well. In the future, based on the empirical findings, well-designed study can be conducted to develop a more comprehensive theoretical model of PTG to explain the effect of positive memory by wisely using and learning from the Positive Memory-PTSD model.

Regarding the 5 phenomenological memory characteristics, results indicated that greater PTG were associated with more valence of the retrieved positive memory, the reason of which might be attributable to positive emotion regulation (Weiss et al., 2018) and cognitive factors, e.g., positive self-appraisals (Brown et al., 2011). Similarly, the results showed that PTG were positively correlated to the vividness, accessibility, and coherence of the retrieved positive memory. The finding suggests that for traumatized individuals, better vividness, coherence, and accessibility of positive memories may have the benefit of aligning their current self-appraisals, self- concept, and post-trauma emotional state with positive memories and an associated positive sense of self (Agar et al., 2006; O'Donnell et al., 2007),

thereby facilitating PTG. The results of the current study also revealed a positive correlation between emotional intensity of positive memory and PTG, which is possibly related to positive bias of memory. The previous study by Walker and Skowronski (2009) showed that emotional intensity associated with positive experiences does not subside over time relative to negative emotions. This positive bias of memory is linked to both cognitive and social processes that support a positive view of the self. Accordingly, Walker and Skowronski (2009) speculated that one function of the positive bias of memory may be to induce individuals to be positive and action-oriented so that they may better face and master life challenges. The current study leaves the above potential mechanisms unexplored. Despite it, the current study contributes to the literature by empirically substantiating the relation between specific memory characteristics and PTG, which has only been explored regarding PTSD to date (Contractor et al., 2019; Contractor et al., 2020; Contractor, Messman, et al., 2022).

The Mediation Model

Importantly, the previously observed mediating effect of deliberate rumination on the relationship between event centrality and PTG is verified during the COVID-19 pandemic. The finding suggests that when a traumatic event becomes central to one's identity, the cognitive process, i.e., deliberate rumination, following the event plays an integral role in leading one to achieve PTG. That is, people who treat traumatic events as a reference point for their identity activate deliberate rumination, which subsequently results in PTG. Although a mediating effect emerged, which is consistent with previous studies (Kim & Bae, 2019; Taku et al., 2009; Xu et al., 2019), the direct effect of event centrality on PTG disappeared after the inclusion of the mediating effect. This means that deliberate rumination fully mediated the effect of event centrality on PTG. The finding in the current study may suggest that emerging adults who experienced the COVID-19 pandemic and considered it as a major

turning point in their lives must have experienced deliberate rumination to obtain PTG. Consistent with the PTG theory (Tedeschi et al., 2018), this further highlights a significant role of deliberate rumination in achieving PTG. Deliberate rumination on an event indicates engagement in the process of examining the event and its effects, which may lead to understanding, recovery of previous, or reconstruction of revised core beliefs (Cárdenas Castro et al., 2016). For many people dealing with severe stress in their lives, it is through the process of deliberate rumination that they recognize how they can change and grow. This findings revealed a unique mechanism for the development of PTG in the context of COVID pandemic, which is considered as a unprecedented type of global traumatic event (Iglesias-Sánchez et al., 2020). This unique mechanism may also be applicable to traumatic events with similar characteristics to the COVIDA-19 pandemic.

The Moderated Mediation Model

Contrary to expectation, there was no significant interaction effect of event centrality and positive memory on PTG. That is, there was no difference in the effect of event centrality on PTG for different levels of emotional intensity of positive memories. Event centrality is believed to facilitate the shift from intrusive rumination to deliberate rumination once individuals feel more in control of their responses to distressing events (Brooks et al., 2017). According to Positive Memory-PTSD model (Contractor et al., 2018), positive memories result in more positive affect and adaptive cognition and are accompanied by helpful personal resources and better coping abilities. Previous study demonstrated an interaction of event centrality and coping abilities on PTSD symptom (George et al., 2016), which, however, was not detected in the current study. A possible reason for the nonsignificant results is that the effect of event centrality was completely mediated by deliberate rumination. Therefore, there was no moderating effect between event centrality and positive memory (or other moderators) on PTG in the current moderated mediation model. Another possible reason for the non-

significant interaction may be found from the order of the measurements presented to the participants. During data collection, the participants were first asked to recall positive memories during COVID-19 pandemic and then to report about their event centrality on the pandemic. Hence, the participants' report of event centrality might have been influenced by their recall on positive memories. Studies indicated that event centrality may have distinct valence (positive or negative), and that different valences of event centrality has distinctive effects on post-trauma response (George et al., 2016). Therefore, if the participants' report of even centrality was biased towards positive valence due to their recall on positive memories, this might have been confounded the result, hence no significant interaction. In addition, research also suggested that a small sample size may affect interaction effect (Clauss et al., 2021). Regardless, future research needs to further explore the factors that interact with event centrality. Research clarifying whether variables interact with event centrality to produce distress or growth is warranted because focusing on malleable variables (e.g., event centrality, coping process, positive memory retrieval) rather than stable characteristics (e.g., demographic characteristics, trauma characteristics) has practical impact for therapeutic target. Future research should further explore the impact of the interaction between event centrality and positive memory/other moderator on posttraumatic responses. Although no significant effect was detected, the present study is the first to explore the effect of the interaction of positive memory and event centrality on PTG, which paves the way for future studies further to detail this relation.

The findings of the current study further our understanding of the specific role that positive memory play, by depicting the moderating effect of emotional intensity of positive memory between the deliberate rumination and PTG. Deliberate rumination was associated with PTG to a greater extent among those with lower emotional intensity than those with higher emotional intensity. That means deliberate rumination is particularly important for the

development of PTG in people with low emotional intensity, highlighting the protective role of deliberate rumination. As suggested by the theoretical model of PTG (Tedeschi et al., 2018), encouraging survivors to adopt a meaningful, flexible deliberate rumination that minimizes trauma buffer against adverse reactions. Previous study investigated the interaction between rumination and the emotional intensity of negative memories, indicating that these two factors interactively influence the performance of negative memories, e.g., sensory information of the memory (Colombo et al., 2021). The present study complements the existing knowledge with the interaction of deliberate rumination and emotional intensity of positive memory on a posttraumatic response, PTG. In line with the expectation, positive memory is associated with greater PTG, which may stem from higher positive affect and adaptive cognition and is accompanied by useful personal resources and better coping skills. For emerging adults with high memory emotion intensity, the moderation effect was not significant and the level of PTG was high regardless of the level of deliberate rumination. This may indicate that, for participants with high emotional intensity of positive memory, the effect of positive memory was significantly protective, regardless of the participants' level of deliberate rumination since they did not need much deliberate rumination to obtain high levels of PTG. These findings imply that the development of interventions that consider both the emotional intensity of positive memories and deliberate rumination can effectively address different situations and provide more comprehensive protection for those who have experienced trauma.

The present study also showed that the mediating effect of deliberate rumination on PTG varies as a function of the level of memory emotional intensity, which may result from the interaction of deliberate rumination and emotional intensity. The mediating effect of deliberate rumination was strongest for participants with low emotional intensity of memory while among those with high emotional intensity of memory, the mediation effect of

deliberate rumination was not significant. When emotional intensity is low, the benefits that accompany recalling positive memories become weaker, and individuals may not be able to increase positive emotions and be more vulnerable to negative emotions. In addition, people with low emotional intensity of positive memories may also think negatively and be reluctant to adapt active coping to solve problems and be unwilling to seek social support. In contrast, deliberate rumination buffers the adverse effects of low emotional intensity and helps individuals to reconstruct their perceptions of the traumatic event. For those whose emotional intensity is low, a potential strategy to help them is to facilitate and encourage their deliberate rumination.

Notably, the present study explores the moderating effect of different memory characteristics by constructing five moderated mediation models, and the only significant results was obtained regarding of emotional intensity. This implies that the interplay of emotional intensity of memory and deliberate rumination has a potential to help emerging adults adapt better to COVID-19 pandemic. It is necessary to further consider the possible reasons why emotional intensity would stand out for emerging adults. Previous research revealed that the emotional intensity was associated with emotion regulation (Zimmermann & Iwanski, 2014). These results are in accordance with other studies showing that the emotional intensity is associated with the use of specific emotion regulation strategies (Rivers, Brackett, Katulak, & Salovey, 2007). In addition, Zimmermann and Iwanski (2014) revealed age differences that people in emerging adulthood report more social support seeking and more adaptive regulation with high emotional intensity of positive emotion. Thus, they have a higher competence in their individual and social emotion regulation, eventually associated with the successful completion of developmental tasks of establishing stable relationships (Roisman et al., 2004) that makes them more emotionally stable compared to middle adolescents (Soto et al., 2011). These findings suggested that emerging adults can benefit

from training programs that involve positive memory intervention and promote deliberate rumination, especially in the context of the global challenge crisis such as the COVID-19 pandemic.

Implications

The findings of this study offer some theoretical implications. First, the findings are applicable to future global traumatic events with similar features to COVID-19. Distinct from other traumatic events (e.g., natural disasters, and sexual assault), the COVID pandemic is considered as a global traumatic event (Horesh & Brown, 2020). The pandemic has features that include government-mandated quarantine and isolation measures (defined as lockdowns) as well as fear of infection, reduced social activity, lack of access to necessities, and economic loss (Brooks et al., 2020). Although countries are gradually returning to a normal trajectory with the process of vaccination and herd immunization (Cihan, 2021; Roghani, 2021), there is no guarantee that similar global health crisis will not occur in the future. The current efforts among researchers to better understand the implications of COVID-19 engender lessons for the future so that the public, society, and governments can be better equipped to similar emergencies that may arise again. Second, the present study once again provided empirical evidence for the mediating model of event centrality affecting PTG through deliberate rumination as well as it enriches the understanding of the performance of this mediation model in different population and trauma type. The finding in the current study is complementary to the theoretical model of PTG, not only because the role of positive memory is taken into account, but also because it enriches our understanding of the development of PTG among the emerging adult population in the context of COVID-19 pandemic. In addition, it considers in depth the main effect and the moderating effect of different memory characteristics on PTG, giving us a more comprehensive understanding of how individual differences in positive memory affect PTG. Third, the present study

contributes to the refinement of the theoretical model of PTG by integrating the positive memory-PTSD model. The current version of theoretical model of PTG is unable to effectively explain the relationship between PTG and positive memory. In contrast, the positive memory-PTSD model is generally applicable to studies that explain the relationship between positive memory and psychopathology, such as PTSD. In the present study, however, empirical evidence is provided for integrating the two models.

The findings of this study are clinically relevant. First, based on the results of this study, deliberate rumination can be considered as a promising element when developing interventions to increase PTG. That is, the content of the intervention can include how to guide the individual to reconstruct the event and correct dysfunctional beliefs about the traumatic event by engaging in the process of examining and evaluating the traumatic experience. This may lead to understanding the meaning of the trauma and restoring or reconstructing revised core beliefs. Second, in line with the findings of this study, specific positive memory techniques can be developed to recall positive memories in clinical work. Due to the positive relationship between different memory characteristics and PTG, the development of positive memory interventions to improve PTG can start from memory characteristics. Interventions can address how to improve memory vividness, how to make memory more accessible, how to have more coherent memory, what factors enhance positive emotional intensity, and how to improve memory efficacy. Third, this study found the interaction effect of deliberate rumination and emotional intensity of positive memory on PTG in a population of the emerging adult. This implies that when helping young people who have experienced trauma, tailored advice could be given depending on the situation. In particular, interventions related to deliberate rumination can be prioritized for young people with very low emotional intensity of positive memory.

Limitation and future direction

This study has several limitations. First, self-report measures were used to collect data in the present study, which may involve response biases and social desirability effects (Van de Mortel, 2008). Thus, future studies should employ multi-method assessments of the variables of interest. Second, this study only considered the relationship between the five positive memory characteristics and PTG, but there are other positive characteristics that may also affect PTG, including memory counts and visual perspective. Future studies should consider the effects of different positive characteristics on PTG to provide a comprehensive understanding. Third, as this study used a cross-sectional research design, inferences cannot be drawn about the causality of the relationship between positive memory and PTG. Future studies should use intervention research design to test the validity of the present findings in order to determine the protective effect of positive memory retrieval. Fourth, although the findings increase our understanding of PTG in emerging adults during the COVID-19 pandemic, the findings may not be generalizable to other populations, such as the elderly and adolescents. Fifth, participants were only asked to recall one autobiographical memory, so I could not examine whether there were similarities or differences across different autobiographical memories. Sixth, in this study, the participants were asked to recall positive memories in their minds and were not asked to dictate or write down positive memories. Studies showed that the way positive memories are recalled has different effects (Miguel-Alvaro et al., 2021). Future research should further explore the impact of the recall approach. Finally, the present study only provides a preliminary correlation between PTG and positive memory characteristics, and the mechanism behind it needs further study in the future.

Conclusion

In summary, the current study aimed to investigate cognitive factors and mechanisms that might enhance PTG during the COVID-19 pandemic. As expected, the findings indicate

that event centrality, deliberate rumination, and positive memory are positively correlated with PTG during the pandemic. In addition, the association between event centrality and PTG is mediated by deliberate rumination. Further, the mediating effect of deliberate rumination on the relationship between event centrality and PTG was moderated by the emotional intensity of positive memory.

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Appendix

Appendix A. Mediation model, total, direct, and indirect effects

	95% Confidence Level		Standardized Estimate		
	Lower	Upper			
Total effect					
EC →PTG	0.2738	0.7306	0.2535	***	$R^2= 0.3169$
EI→ PTG	0.4458	1.4676	0.2273	***	$F= 6.8442$
Coherence→ PTG	-0.5816	0.4086	-0.0232		
Vividness→ PTG	-0.5002	0.7648	0.0312		
Accessibility→ PTG	-0.3628	0.7218	0.0468		
Valance→ PTG	0.0603	1.6056	0.1336	*	
Gender →PTG	-2.7971	2.6325	-0.0033		
Age →PTG	-1.0145	0.4212	-0.0547		
ES →PTG	-1.9802	3.6416	0.0348		
RS →PTG	0.4000	5.2095	0.1318	*	
CO →PTG	-8.2614	-1.2526	-0.2208	**	
CR →PTG	-2.9815	4.4880	0.0353		
Education →PTG	-1.1013	1.7714	0.1049		
MU →PTG	-1.1592	1.7283	0.0278		
RP →PTG	2.0109	2.3833	0.1024	*	
Infection →PTG	1.6454	7.1286	0.1906	**	
Direct effect					
EC → DR	0.4615	0.6948	0.5240	***	$R^2 = 0.4261$
EC →PTG	-0.0427	0.4826	0.1111		$F= 10.9497$
DR → PTG	0.2444	0.7319	0.2719	***	$F= 7.7551$
EI→ PTG	0.4512	1.4429	0.2250	***	
Coherence→ PTG	-0.5003	0.4630	-0.0050		
Vividness→ PTG	-0.5440	0.6852	0.0166		
Accessibility→ PTG	-0.4357	0.6205	0.0241		
Valance→ PTG	0.0252	1.5261	0.1244	*	
Gender →PTG	-2.9998	2.2770	-0.0145		
Age →PTG	-0.8935	0.5035	-0.0360		
ES →PTG	-2.1205	3.3401	0.0255		
RS →PTG	0.2375	4.9108	0.1210	*	
CO →PTG	-9.0045	-2.1530	0.0338	**	
CR →PTG	-2.9036	4.3457	0.0704		
Education →PTG	-0.5910	2.2569	-0.2589		
MU →PTG	-1.5348	1.2904	-0.0101		
RP →PTG	-0.6400	1.8978	0.0586		
Infection →PTG	1.4785	6.8056	0.1799	**	
Indirect effect					
EC → DR → PTG	0.0683	0.2295	0.1417		

Note. PTG= post- traumatic growth, EC= event centrality, DR= deliberate rumination, ES= Employment status, EI= emotional intensity, RS= Relationship status, CO=Culture of origin, CR= Culture of residence, MU= Media usage, RP= Restriction perception. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Appendix B. Moderated mediation model for PTG

	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	Model <i>R</i> ²
IV: EC					
DV: PTG					
Mediator: DR					
Moderator: EI					
EC→DR	0.58	0.06	9.90	0.00***	0.43
EC→PTG	0.20	0.13	1.51	0.13	0.37
DR → PTG	0.51	0.12	4.15	0.00***	
EI→PTG	0.96	0.25	3.84	0.00***	
EC×EI→PTG	0.07	0.05	1.54	0.12	
DR×EI→PTG	-0.10	0.04	-2.14	0.03*	
Control					
Coherence→ PTG	-0.02	0.24	-0.07	0.94	
Vividness→ PTG	0.07	0.31	0.22	0.83	
Accessibility→ PTG	0.12	0.27	0.45	0.65	
Valance→ PTG	0.75	0.38	1.97	0.049*	
Gender →PTG	-0.20	1.33	-0.15	0.88	
Age →PTG	-0.17	0.35	-0.47	0.64	
ES →PTG	0.48	1.38	0.35	0.73	
RS →PTG	2.66	1.18	2.25	0.03*	
CO →PTG	-5.26	1.74	-3.03	0.003**	
CR →PTG	0.51	1.83	0.28	0.78	
Education →PTG	0.90	0.72	1.24	0.22	
MU →PTG	0.09	0.72	0.13	0.90	
RP →PTG	0.59	0.64	0.92	0.36	
Infection →PTG	4.39	1.35	3.26	0.001**	
	Boot indirect effect/index	Boot SE	95% CI [lower-upper]		
Conditional direct effect(s) of event centrality on PTG					
EI low	0.01	0.18	-0.33	0.36	
EI medium	0.20	0.13	-0.06	0.47	
EI high	0.39	0.18	0.02	0.76	
Conditional indirect effect					
EC→DR → PTG					
EI low	0.44	0.12	0.24	0.69	
EI medium	0.30	0.08	0.15	0.47	
EI high	0.16	0.10	-0.04	0.37	
Index	-0.06	0.03	-0.120	-0.004	

Note. PTG= post- traumatic growth, EC= event centrality, DR= deliberate rumination, EI= emotional intensity, ES= Employment status, RS= Relationship status, CO=Culture of origin, CR= Culture of residence, MU= Media usage, RP= Restriction perception. **p* < 0.05, ***p* < 0.01, ****p* < 0.001.

Appendix C Research materials

Questions and Scales for study Socio-demographics and Covid- related variables

1. Please indicate your gender.
(Female – Male – Nonbinary gender identity)
2. How old are you? (Answer number)
3. Country of original: Which country are you from? (typing)
4. Country of residence: Which country are you living during the Covid-19 pandemic? (The country where you have lived the longest in the past year.) (typing)
5. Employment Status (Part time- Full time- Self-employment- Retired- Unemployed- Unemployed student- Others)
6. Highest completed education level. (Primary school- Junior high school- Senior high school- Undergraduate-Graduate)
7. What is your relationship status? Single- Living with significant other- Married- Divorced/Separated- others

Covid- related variables

8. How often do you follow the news regarding Covid-19 in the media? (Never - almost never- sometimes - often - almost always)
9. How do you perceive the level of restrictions in your area to prevent the pandemic? (Including, quarantine policies, no-travel policies, closure of schools and universities, forced home offices, elimination of cultural and sports activities, transportation restrictions, etc.) (None- Mild - Moderate – Severe- Very severe)
10. Have you been infected (symptom and self-test or diagnosed in the hospital) by the virus during the COVID -19 pandemic? (Yes- no)

The Post-Traumatic Growth Inventory-Short (PTGI-S)

On 11 March 2020, WHO declared Novel Coronavirus Disease (COVID-19) outbreak as a pandemic and reiterated the call for countries to take immediate actions and scale up response to treat, detect and reduce transmission to save people's lives. In this section, we would like to know about different aspects of your positive changes during the COVID- 19 pandemic (in the last 2 years or compare the positive changes before and after the COVID- 19 pandemic) Please indicate how much, from 0 (I did not experience this change as a result of the event) to 5 (I experienced this change to a very great degree as a result of the event), you agree with the statements below.

1. I changed my priorities about what is important in life. Appreciation of Life
2. I have a greater appreciation for the value of my own life. Appreciation of Life
3. I am able to do better things with my life. New Possibilities
4. I have a better understanding of spiritual matters. Spiritual Change
5. I have a greater sense of closeness with others. Relating to Others
6. I established a new path for my life New Possibilities
7. I know better that I can handle difficulties. Personal Strength
8. I have a stronger religious faith. Spiritual Change
9. I discovered that I'm stronger than I thought I was. Personal Strength
10. I learned a great deal about how wonderful people are. Relating to Others

Memory Experiences Questionnaire--Short Form MEQ-SF

Autobiographical memories refer to important events you were personally involved in. Autobiographical memories can be related to many subjects, including your school or professional life, or your experiences in your romantic relationships or family life. Autobiographical memories have primarily emotional content, where positive autobiographical

memories make you feel happy, safe, loved, etc. You can usually recall or trace the date of an autobiographical memory. We know that the COVID-19 pandemic is harsh and brings us misfortune and inconvenience. However, positive things happened to us during COVID-19 as well, including reading in peace, learning new skills, or enjoying meals with their family. We want you to think back to one event that made you feel happiest in the last two years during the COVID-19 pandemic. Take your time to recall the details of the event and then do the following questions. Please consider each item and indicate on how much the description applies to the way you remember the positive event during the COVID-19 pandemic by choosing a number between 1 (strongly disagree) and 5 (strongly agree).

1. My memory for this positive event is very vivid. Vivid
2. My memory for this positive event is very detailed. Vivid
3. My memory for this positive event is dim (R). Vivid
4. The order of this positive event in the memory is clear. Coherence
5. This positive memory that occurred once at a particular time and place, not a summary or merging of many similar or related events. Coherence
6. This positive memory comes back to me in bits and pieces, not as a logical, coherent story (R). Coherence
7. This positive memory is a blending of many similar, related events rather than a specific memory about a particular event (R). Coherence
8. This positive memory was easy for me to recall. Accessibility
9. It was difficult for me to think of this positive memory (R). Accessibility
10. I had to think for a while before I could recall the positive event (R). Accessibility
11. My emotions are very intense concerning this positive memory. Emotional intensity
12. The memory of this positive event evokes powerful emotions. Emotional intensity
13. This positive memory does not evoke strong emotions in me (R). Emotional intensity
14. The overall tone of this memory is positive. Valance
15. The overall tone of this memory is negative (R). Valance

The short version of Centrality of Event Scale

Please think about the period from the outbreak of the Covid-19 pandemic to the present and answer the following questions in an honest and sincere way, by choosing a number from 1 (totally disagree) to 5 (totally agree).

1. I feel that the COVID-19 pandemic has become part of my identity.
2. The COVID-19 pandemic has become a reference point for the way I understand myself and the world.
3. I feel that the COVID-19 pandemic has become a central part of my life story.
4. The COVID-19 pandemic has colored the way I think and feel about other experiences.
5. The COVID-19 pandemic permanently changed my life.
6. I often think about the effects the COVID-19 pandemic will have on my future.
7. The COVID-19 pandemic was a turning point in my life.

Event Related Rumination Inventory

Deliberate items After an experience like the COVID- 19 pandemic, people sometimes, but not always, deliberately and intentionally spend time thinking about their experience. Indicate for the following items how often, if at all, you deliberately spent time thinking about the issues indicated during the COVID-19 pandemic. Please choose from 0 (Not at all) to 3 (Often).

1. I thought about whether I could find meaning from the COVID- 19 pandemic.

2. I thought about whether changes in my life have come from dealing with the COVID- 19 pandemic.
3. I forced myself to think about my feelings about the COVID- 19 pandemic.
4. I thought about whether I have learned anything as a result of my experience during COVID- 19 pandemic.
5. I thought about whether the experience during the COVID- 19 pandemic has changed my beliefs about the world.
6. I thought about what the COVID- 19 pandemic might mean for my future.
7. I thought about whether my relationships with others have changed following the COVID- 19 pandemic.
8. I forced myself to deal with my feelings about the COVID- 19 pandemic
9. I deliberately thought about how the COVID- 19 pandemic had affected me.
10. I thought about the COVID- 19 pandemic and tried to understand what happened.