WORKING DRAFT – NOT PEER-REVIEWED

What doesn't kill you makes you stronger: Sense of coherence moderates growth from stress
amidst the first wave of COVID-19 outbreak

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Abstract

Purpose

This study explored the role of perceived severity of the pandemic, post-traumatic stress and sense of coherence in the development of post-traumatic growth from exposure to COVID-19 among Hong Kong citizens.

Methods

A longitudinal online survey was launched during the first local outbreak in Spring 2020. Time 1 was collected at the peak of the outbreak (Mid-March to early-April) with measurements of post-traumatic stress, perceived severity, and sense of coherence; while Time 2 was conducted at the palliation of the outbreak (late-April to early May) with post-traumatic growth measured.

Moderated mediation models were tested with SPSS PROCESS version 3.30.

Results

Among the 327 participants who completed both T1 and T2 questionnaires, 28.4% exhibited probable post-traumatic stress disorder, while 18.0% experienced significant post-traumatic growth in at least one domain. Post-traumatic growth was more likely among people with higher socio-economic backgrounds and with family or close friends having experienced medical quarantine or being tested positive for SAR-CoV-2. The interaction between sense of coherence and post-traumatic stress significantly mediated the link relationship of perceived severity on post-traumatic growth, such that growth was more likely among participants with higher post-traumatic stress and sense of coherence.

Conclusion

Echoing with the transformational model, our findings highlight the importance of traumatic stress and adaptive coping resources in developing post-traumatic growth. Severe judgments of the novel and challenging pandemic could be conducive to growth, especially when the individuals possess high sense of coherence.

Keywords

COVID-19, post-traumatic growth, sense of coherence, post-traumatic stress, Hong Kong, Chinese

Introduction

The coronavirus disease 2019 (COVID-19) has hit hard globally, leading to more than 13 million cases and half a million deaths by mid-July 2020. The novelty of the coronavirus, the shortage of an effective vaccine and treatment, the seemingly uncontrollable spread of the outbreak, the substantial impacts on our personal and social lives (e.g., home confinement, furlough, social distancing), as well as the severe sequelae on the socio-politico-economic landscape could be devastating to the global community [1].

Post-traumatic stress and growth

The direct and indirect impacts of COVID-19 may entail paramount psychological distress [2]. Scholars have warned of a tsunami of post-traumatic stress disorder (PTSD) as the aftermath of the pandemic [3]. Horesh and Brown reflected COVID-19 as a new type of mass trauma – People tend to show hypervigilance (e.g., to pandemic-related news on social media), avoidant behaviors (or even encouraged), as well as intense anticipatory anxiety toward how the world they knew of will crumble as the aftermath of the pandemic [4]. Those who are infected or unknown of their test results are grappling with possibilities of severe sickness, side- and long-term effects, and even death. Accordingly, elevated percentages of post-traumatic stress (PTS) symptoms related to COVID-19 exposure have been documented in studies across continents (e.g., China (19.1%), U.S. (31.8%), U.K., (16.8%) Italy (7.6%), Spain (15.8%), Lebanon and Tunisia (33.0%)) [5-12].

Despite the psychopathological consequences of natural disasters and traumas increasingly [13], researchers have been asking whether and how people garner benefits and growth from enduring highly challenging events in life. Indeed, post-traumatic growth (PTG),

defined as ‘positive psychological changes as a result of the struggle with highly challenging life circumstances’, have been witnessed among survivors of earthquakes and attacks, first responders, patients with life threatening illnesses, bereaved family members, etc [14-21].

PTG is hypothesized as a result of struggling through challenging events that shatter the worldviews of an individual [14, 22]. The affective blunder of such a stressful event, usually captured by peri- or post-traumatic stress, rather than the mere acknowledgment of the occurrence of the event, motivates constructive cognitive processing, leading to a change in perspectives about oneself, the event, and the world around [15, 18, 23-24]. In other words, the struggles to make sense of and attain meaning from the distressing situation entails growth. Such motivated deliberation may result in refreshed perspectives about one’s strengths and limitations, philosophies and priorities, opportunities in life, relationship with one’s spiritual power, and interpersonal relationships [25-26]. These changes are likely to engender growth that transcends the pre-trauma status.

The role of sense of coherence

Some people are more inclined to engage in constructive cognitive processing of a stressful event and discover the benefits of it than others [27]. According to the salutogenesis theory, sense of coherence (SOC) functions as a global orientation to cope with stressors with the general resistance resources (e.g., material, knowledge, social networks, personality, faith and religion, etc.) at one’s disposal [28-30]. In essence, SOC describes the cognitive, behavioral, and motivational impetuses of one’s coping efforts, namely comprehensibility (i.e., perceiving the nature of the stressor as predictable, orderly, and explicit), manageability (i.e., perceiving the stressor as one that can be handled adequately by the resources at one’s disposal), and meaningfulness (i.e., perceiving coping efforts as worthwhile of investing energy and

commitment rather than merely a burden). Previous studies have shown people with higher SOC tends to cope with highly stressful events with more positive reframing, direct action, and social support, and in turn derive greater gains from a stressful situation [19, 31-33].

The current study

This study explored the mechanism toward PTG during the, so far, worst COVID-19 outbreak in Hong Kong. The pandemic experience of Hong Kong is distinctive, as it has been (i) the epicenter of SARS in 2003, a relatively recent coronavirus outbreak likened to COVID-19, as well as (ii) a “City of Tear(gas)” after enduring months-long of intense protests and political turmoil. The SARS experience and the social unrest may have inoculated its citizens with high vigilance and sensitivity under the backdrop of pervasive mental distress in the community and shattered trust to the public authority. In fact, Ni et al reported a prevalence of about 11% for depression and 32% for PTSD in September to November 2019, which the quarter before the first COVID-19 case [34].

Based on the transformational model, one has to experience the event as psychologically “seismic”, meaning that the experience has to be distressing enough, in order for PTG to occur [14]. Hence, PTS may partly explain the link between perceiving COVID-19 as a severe crisis and the subsequent PTG. PTG is however not a necessary outcome of having experienced the affective blunder from a highly stressful event. People with higher SOC may be more likely to engage in constructive cognitive processing of the pandemic through being motivated to seek meaning and confident in comprehending and managing the stressors. Yet, highly resilient people also do not necessarily experience PTG as they may have more resources to cope with the stressor and thus have not experienced the emotional blunder of it. Therefore, we hypothesize that the interaction between SOC and PTS explains the development of PTG, such that people

with higher SOC *and* having experienced greater degree of PTS from the local outbreak may experience more PTG.

This study therefore tested a moderated mediation model with the interaction between SOC and PTS mediating the association between perceived severity of COVID-19 and PTG (Figure 1).

Methods

Design

This study was a part of a longitudinal online survey on the coping and adjustment of Hong Kong adults through the COVID-19 pandemic.

Study context

In 2003, SARS has resulted in 1,755 cases with 299 deaths, including nine healthcare professionals [35]. The outbreak has incurred enormous costs to the economy as well as the society, and a public mental health crisis ensued. Between 1997 to 2018, the city's unemployment rate was highest in 2003 (8.5%). The suicide rate also peaked in that year (HKJC Centre for Suicide Research and Prevention, 2019). One can imagine the appearance of the first COVID-19 case in Hong Kong on January 23 has alarmed the city for another catastrophe.

The current research project has been launched right after the World Health Organization declaring COVID-19 a pandemic, with the first wave of data (T1) collected in mid-March 2020 [36]. At that time, Hong Kong has seen, a worst wave of local outbreak, with an average of more than 30 local cases per day. Between 20 and 31 March, each additional 100 cases only took less than 3 days accumulated. Several infection clusters from karaoke lounges, hotpot restaurants,

gyms, and bars have been identified. Despite the suspension of schools and most public services since the end of January and closure of most borders by early February, the government has stepped up the public health orders in late March by banning gatherings, mandating the closure of high-risk premises and businesses (e.g., cinemas, sport fields, bars, amusement parks, game centres, bathhouses, fitness centres, party-rooms, beauty parlours, massage parlours), and restricting restaurants to cater up to only half of its capacity with adjacent tables at 1.5m apart. By late April (21st of April – 12th of May), the outbreak slowed down to an average of 1 case per day, and we conducted the second wave of the data collection (T2). The third wave of data collection is expected to be held in third quarter of 2020.

Recruitment and participants

Eligible participants are Hong Kong Chinese residents aged 18 or above. Individuals who cannot read traditional Chinese or have no access to the internet were excluded. Conducted as a swift response to the highly versatile situation, participants were recruited through snowballing via social media and email lists. Participants would be rewarded HKD\$50 cash or coupon after completing each time point.

Instruments

Perceived severity. Perceived severity of the outbreak was measured by two items – “On a scale of 1 (not at all) to 10 (extremely severe), how severe do you think the current outbreak is”, and “Compared to SARS in 2003, how severe do you think the current outbreak is on a scale from 1 (much less severe than SARS) to 5 (the same), and to 10 (much more severe than SARS?)”. The two items together achieved good reliability (Cronbach alpha = .75).

Sense of coherence (SOC). The 13-item Sense of Coherence Scale (SOC-13, [37]) was used to indicate the comprehensibility, manageability and meaningfulness dimensions under the salutogenesis model. Participants answered on 7-point scales, and the scale score was obtained from summing up the responses across the items. The Cronbach alpha was .85, indicating good reliability.

Post-traumatic stress (PTS). The 22-item Impact of Event Scale – Revised (IES-R; [38]) was adopted. The scale taps into three major areas of PTSD, including hyperarousal, intrusion, and avoidance. The items were re-worded to specifically measure the impacts of the current outbreak [39]. Participants were asked to refer to their experience in the past seven days, and answered on a 5-point scale running from 0 (not at all) to 4 (extremely). The scale score was derived from summing up the items, and a score above 32 indicates probable PTSD [40]. The scale has excellent reliability ($\alpha = .95$).

Post-traumatic growth (PTG). The 21-item Post-traumatic Growth Inventory (PTGI; [41]) was adopted to indicate positive psychological changes after experiencing a critical event. Participants were instructed to answer based on their experience in the pandemic. According to Ho et al, the Chinese version contains four dimensions, including self (items 8, 9, 10, 11, 13, 19, 21), interpersonal (items 6, 7, 12), spiritual (items 4, 5, 16) and life orientation (items 1, 2) [25]. Participants answered on a 6-point scale running from 0 (none) to 5 (very much). Responses on the items were averaged to form the scale score. The Cronbach alphas of the subscales ranged from .51 (Spiritual) to .87 (Self), while that of the full scale was .94, indicating reasonable reliability.

Demographic characteristics, perceived severity, SOC and PTS were measured at T1, while PTG was measured at T2.

Procedure

Participants who completed T1 in March were contacted for T2 in late April; while those who completed T1 in early April were contacted for T2 in early May. Hence, an approximately one-month gap was sustained across the two sets of data. The data across time points were matched by participants' phone numbers or email addresses of their choices. All participants provided their informed consent before beginning the questionnaire. The study was approved by the Human Research Ethics Committee of University of Hong Kong (EA2003003).

Statistical analysis

Descriptive statistics of perceived severity, PTS, PTG and SOC were explored. Demographic characteristics related to PTG and the associations among the key variables were investigated using unadjusted logistic regressions and Pearson's correlations. Moderated mediation models were tested with PROCESS macro version 3.3 with 5000 bootstrapped samples [42].

Considering the conceptual distinctiveness and asynchronicity of growth in PTG domains, an individual model was built for each domain [25, 39]. The statistical significance of a conditional indirect effect (i.e., $p < .05$) was indicated by a pair of 95% confidence intervals excluding zero. The direction of a significant interaction was examined by scrutinizing the effects of the focal predictor (i.e., PTS) at 16th, 50th and 84th percentiles of the moderator (i.e., SOC). Missing values were handled by listwise deletion. All analyses were conducted with SPSS 25.0.

Results

Sample characteristics

Among the 327 participants, 71.9% were female, with an average age of 35.0 (SD=13.5, range = 18 to 73). A majority (68.5%) were university-educated. About half of the sample was married

(47.1%). The median household income was in the range of HKD\$40,000-49,999, which is considerably higher than the population average (at HKD\$27,000). Slightly more than half of the sample (57.2%) were without a religious affiliation. A quarter of the participants had a chronic physical or psychiatric illness, while about half of them (48.3%) were living with a person vulnerable to a serious course of disease in case of COVID-19 infection (e.g., toddler, children, pregnant woman, elderly, person with disability or chronic illness). 35.2% were working in an occupational environment considered as high-risk by the participants (e.g., healthcare, retail, catering and beverage, sanitary, jobs that require travelling aboard etc.).

Five participants (1.5%) were confirmed positive on SARS-CoV-2, and seven (2.2%) had experienced medical quarantine since the outbreak. Twenty participants (6.3%) had a family or close friend being diagnosed positive on SARS-CoV-2 and 36 participants (11.4%) had a family or close friend having experienced medical quarantine. The mean perceived severity was 7.95 (SD=1.52). About 88.4% of participants considered the outbreak at T1 to be more severe than SARS. 28.4% participants scored above 32 on the IES-R and displayed probable PTSD.

Prevalence and correlates of post-traumatic growth

Using the cut-off score of 4 (much) to indicate substantial post-traumatic growth, only seven participants (1.8%) attained such a level of growth on the overall scale [39]. Percentages of participants attaining substantial growth on Self, Interpersonal, Spiritual and Life orientation subscales were 5.5%, 8.3%, 4.0%, and 7.6%, respectively. 18.0% experienced growth in at least one domain, with 13.1% having growth in only one domain, while the ratios tapered off to 2.8%, 1.8% and 0.3% for growth in two, three and all four domains respectively.

Unadjusted logistic regressions were used to explore the demographic correlates of growth in at least one domain of post-traumatic growth (Table 1). Results show that having a monthly household income equal to or above the sample median (HKD\$40,000), being tertiary educated, and with family or close friends under medical quarantine or being tested positive on SAR-CoV-2 were related to higher likelihood of reporting post-traumatic growth. Associations with other demographic factors were non-significant.

Moderated mediation on post-traumatic growth

Table 2 provides the intercorrelations among the key variables. PTS and perceived severity were unrelated to PTG overall and subscales, except positively associated with Life orientation.

Overall PTG, Self and Interpersonal subscales were positively related to SOC. PTS was negatively related to SOC but positively associated with perceived severity.

Table 3 shows the results of the moderated mediation models. Controlling for demographic variables (age, gender, education, income, own chronic health condition, co-residence with a vulnerable person, risk of occupation, and religious affiliation), severity was positively related to PTS. Furthermore, in all models, the interaction between SOC and PTS was significantly associated with PTG. Inspecting the effects of the focal predictor (PTS) at 16th, 50th and 84th percentile of the moderator (SOC), higher levels of SOC was related to more positive links from IES to PTG (Table 4). The interaction between PTS and SOC also mediated the relationship between perceived severity and PTG in all models. In other words, the associations between perceived severity and all domains of PTG were explained by the coupling between SOC and PTS, such that PTG was more likely among individuals with higher SOC as well as PTS and that higher PTS was related to more severe judgments over COVID-19 outbreak. Complete mediation was found with Self, Interpersonal and Spiritual where the direct effects from

perceived severity became non-significant after considering the interaction between PTS and SOC. Incomplete mediation with the direct effects from perceived severity remaining significant was witnessed with Overall and Life orientation.

Discussion

Compared to Ng et al where 47.4% of their sample in China reported PTG in at least one domain, relatively fewer of our participants experienced substantial PTG, despite a comparable proportion of probable PTSD with other studies [5, 6, 9, 39]. Ng et al remarked that the cut-off on PTG was conservative – On a scale from 0 to 5, the cut-off requires an average response of “4”, which is the second highest option [39]. Yet, the responses of our sample clustered around the middle option (i.e., “2”) with a reasonable spread. Such differences may be attributed to the different social contexts where the outbreak happened. Many local citizens opted to stay at home as much as possible during the outbreak [36, 43]. Preventive measures of COVID-19 were mostly volunteered out of fear of infection or intrinsic motivation to comply with the rules [44, 45]. Round-the-clock interaction with families under a tense psyche within the limited space in a local apartment (c.f. the median floor area per head is about 161 square feet) could be a fertile breeding ground for conflicts and distress [46]. In the society-at-large, the pandemic occurred under the backdrop of a sustained period of socio-political instability that has torn the social fabric apart. Although direct comparison of social cohesion between Ng et al with the current study was not possible, the lack of a social environment that encourages collective action and mourning may have hindered PTG development [15, 39, 47]. At the time of data collection, there was yet a consensus regarding how to best curb the pandemic other than draconian social distancing, meaning that little can be done collectively to combat the pandemic other than socially isolating oneself. Local polls have also reported paramount dissatisfaction with the local

authority on their handling of the pandemic [48, 49]. All these may have fueled pessimism and sense of helplessness among the public. Lastly, instead of a pervasive lockdown of businesses, Hong Kong remained largely open during the outbreaks, even though there was a record drop in year-to-year GDP (-8.9%) and quickly rising unemployment [50]. Some industries, such as catering and beverages and retailing, were hit harder than others. Anticipating severe but unequal aftermaths from the pandemic may shred optimism among the citizens, and in turn stifle their PTG [51].

Individuals with higher socio-economic status and with friends and families under greater exposure to the pandemic were more likely to experience growth. All these were in line with the transformational model which stipulates both significant stress exposure and coping resources as impetuses for PTG [14]. While more educated and financially better off individuals may cope with greater informational and material resources, their experience in helping out their friends and families going through quarantine or tests may have afforded them a uniquely challenging learning experience. For example, one probably has to be rather well-off in order to be savvy about different types of surgical masks, as the more efficacious ones can cost more than 1.5 USD each during the peak of the outbreak. In helping out one's family or friends in quarantine, people have to sort out accommodation arrangements, delivery of meals and necessities, navigating the healthcare system to make sure tests were properly done, etc. There is literally no limit as to how 'adequately' one can prepare for the pandemic, and with a more privileged socio-economic position, there could be more things that one could feel obliged to handle.

As hypothesized, our findings show the interaction between SOC and PTS mediated the relationship from perceived severity of COVID-19 to PTG, such that PTG is more likely among people with both high SOC and PTS. In practice, a severe judgment and emotional distress from

the pandemic could be functional, as long as the individuals perceive themselves as capable to make sense and manage the crisis. Of note, incomplete mediation was found with Overall PTG and Life orientation as the outcomes, meaning that some factors other than the coupling of PTS and SOC were acting on the relationships. The Life orientation subscale emphasized one's wish to change life priorities which involves recognizing the status quo as less than desirable [25]. This is unlike other subscales and items that emphasizes appreciation for oneself, one's social circle and spiritual power. To be able to admit that one's status quo is no longer beneficial may require a slightly different set of resources than SOC. Having compassion to accept oneself for being vulnerable to nonoptimal judgments and priorities may facilitate growth in this domain [52].

Practical implications

Horesh & Brown reflected that COVID-19 could mean a new type of trauma given its massive scale, unknown but extensive sequelae, and the intense anticipatory anxiety it engenders [4]. Mental health scientists have advocated for making public mental health support widely accessible to different populations through tele-health and tele-counselling [1, 53, 54]. Our paper suggests that despite the ongoing distress, growth and gains could be attained from adapting to the changed lifestyles and the "new order". Timely, transparent and accurate information about the pandemic is helpful to clear fogs in this highly versatile condition, and assist people to make sense of the situation and view the situation as more manageable. Using Viktor Frankl's meaning triangle, Li highlighted "creativity, mobility, compassion and resilience" as the key coping strategies among Hong Kong public during the first wave of outbreak in Spring 2020 [55]. Mental health interventions that enable individuals to be aware of the signs of their distress,

appreciate their coping efforts, notice small blessings in their everyday lives, and find meaning from their changed lives may also foster well-being.

Limitations

The findings of this study highlights how cognitive evaluation of a critical event (i.e., perceived severity), affective response (i.e., PTS) and personal coping resource (i.e., SOC) interacts to engender PTG in a novel but global health crisis. However, the findings of this study should be considered with the following limitations. Non-random sampling may have resulted in sampling bias that may affect the generalizability of the current findings. In particular, males, middle-aged and elderly persons, and individuals with lower educational attainment and income were under-represented. Individuals of lower socio-economic status may be hit harder by the pandemic due to the precarity of their occupations, the lack of a financial safety net, and lower accessibility to information and support. Hence, the prevalence of PTS reported here could be an underestimation. Moreover, the time gap between PTS and PTG measurements were relatively short, even though the T1 and T2 data captured the peak and the palliation of the first wave of local outbreak. For three reasons, we believed that there has been enough time for PTG from COVID-19 to form among the Hong Kong public. First, the citizens are not foreign to respiratory coronavirus as most adults have lived through the Severe Acute Respiratory Syndrome (SARS) outbreak. Second, news about a lethal viral outbreak has been looming in Hong Kong since the beginning of January 2020 [56]. Third, the citizens reacted quickly with high perceived severity and prevalence of preventive measures (e.g., mask wearing, social distancing, and hand-washing) [36, 43]. All these suggested a relatively high preparedness in the community that could have triggered substantial cognitive processing and behavioral coping among the citizens since the beginning of 2020. However, longitudinal studies with a longer follow-up period are needed to

explore how lasting the PTG will be and whether there are other aspects of growth from coping with, especially the aftermath of, the pandemic (e.g., economic downturn, suspension on personally-significant plans). Lastly, we have no measure on individuals' perception and exposure to the challenging socio-political situation in Hong Kong. Hence, it was difficult to determine the relative impacts of the social unrest and the pandemic.

Conclusion

COVID-19 has become one of the most severe pandemics since the 1918-1920 Spanish influenza. In light of the potential impacts of COVID-19 amidst the precarious socio-political context of Hong Kong, this study explored the mechanism of the development of PTG and the moderating role of SOC using a longitudinal study conducted around the peak and the palliation of, so far, the worst local outbreak in Spring 2020. Our findings show that the interaction between PTS and SOC mediated the link between perceived severity of COVID-19 with PTG. In particular, individuals exhibiting higher levels of PTG at tended to experience greater PTS but also possessed more SOC.

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Figure 1. The proposed framework.

Note. T1 = Time 1; T2 = Time 2.

Table 1. Post-traumatic growth by demographic characteristics (N=327).

	N (%)	% of participants with growth in at least 1 domain of PTG	95% CI of OR
Gender			
Female	235 (71.9%)	18.7%	0.62-2.25
Male	92 (28.1%)	16.3%	--
Age in years			
18-39	207 (63.3%)	16.9%	0.36-1.97
40-59	79 (24.2%)	20.3%	0.41-2.70
60-79	41 (12.5%)	19.5%	--
Education			
University or more	224 (68.5%)	21.4%	1.13-4.60*
Less than university	103 (31.5%)	10.7%	--
Monthly family income			
HKD\$40,000 or more	170 (52.0%)	25.3%	1.60-5.56**
Less than HKD\$40,000	157 (48.0%)	10.2%	--
Marital status			
Married	154 (47.1%)	17.5%	0.53-1.65
Not married	173 (52.9%)	18.5%	--
Religious affiliation			
Yes	140 (42.8%)	20.0%	0.72-2.22
No	187 (57.2%)	16.6%	--
Own chronic health condition			
Yes	82 (25.1%)	22.0%	0.75-2.61
No	245 (74.9%)	16.7%	--
Live with a vulnerable person			
Yes	158 (48.3%)	19.6%	0.70-2.16
No	169 (51.7%)	16.6%	--

In a high-risk occupation				
Yes	115 (35.2%)	19.1%	0.62-2.01	
No	212 (64.8%)	17.5%	--	
Oneself as confirmed case ^a				
Yes	5 (1.6%)	40.0%	0.50-18.39	
No	310 (98.4%)	17.7%	--	
Oneself experienced medical quarantine ^a				
Yes	7 (2.2%)	14.3%	0.09-6.35	
No	308 (97.8%)	18.2%	--	
Family/ close friends as confirmed case ^a				
Yes	20 (6.3%)	45.0%	1.66-10.71**	
No	295 (93.7%)	16.3%	--	
Family/close friends experienced medical quarantine ^a				
Yes	36 (11.4%)	33.3%	1.21-5.58*	
No	279 (88.6%)	16.1%	--	

Note. 95% CI of OR = 95% confidence interval of odds ratio. PTG = post-traumatic growth.
HKD\$40,000 = USD\$5159.

^a Missing information from twelve participants.

*p<.05; **p<.01.

Table 2. Descriptive statistics and intercorrelations among key variables (N=327).

	Mean (SD)	1	2	3	4	5	6	7	8
1. PTG-Overall	53.18 (17.13)	1.00	-	-	-	-	-	-	-
2. PTG-Self	18.33 (6.49)	0.94** *	1.00	-	-	-	-	-	-
3. PTG-Interpersonal	8.01 (2.83)	0.82** *	0.72** *	1.00	-	-	-	-	-
4. PTG-Spiritual	6.90 (2.84)	0.76** *	0.68** *	0.56** *	1.00	-	-	-	-
5. PTG-Life orientation	5.08 (1.98)	0.63** *	0.48** *	0.48** *	0.49** *	1.00	-	-	-
6. PTS	24.13 (13.93)	0.03	-0.06	0.01	0.07	0.24** *	1.00	-	-
7. SOC	56.24 (10.87)	0.17**	0.23** *	0.13*	0.08	-0.06	-0.45** *	1.00	-
8. Perceived severity	7.95 (1.53)	0.11	0.08	0.04	0.09	0.17**	0.22** *	-0.02	1.00

Note. PTG = post-traumatic growth, PTS = post-traumatic stress, SOC = sense of coherence, SD = standard deviation.

*p<.05; **p<.01; ***p<.001

Table 3. Moderated mediation models on post-traumatic growth (N=327).

	Block 1	Block 2				
	Outcome: PTS B (SE)	Outcome: PTG- Overall B (SE)	Outcome: PTG-Self B (SE)	Outcome: PTG- Interpersonal B (SE)	Outcome: PTG- Spiritual B (SE)	Outcome: PTG-Life orientation B (SE)
Gender	3.70 (1.67)*	0.25 (0.10)*	0.29 (0.11)**	0.31 (0.11)**	0.20 (0.11)	0.14 (0.12)
Age	-0.97 (0.06)	0.01 (0.00)	0.01 (0.00)*	0.00 (0.00)	0.01 (0.00)**	-0.00 (0.00)
Education	3.61 (1.79)*	0.10 (0.10)	0.05 (0.12)	0.16 (0.12)	0.14 (0.12)	0.03 (0.13)
Income	-0.83 (0.26)**	0.02 (0.02)	0.01 (0.02)	0.01 (0.02)	0.02 (0.02)	0.03 (0.02)
Own chronic health condition	1.73 (1.82)	-0.01 (0.10)	0.01 (0.12)	-0.01 (0.12)	0.02 (0.12)	-0.08 (0.13)
Live with a vulnerable person	1.94 (1.50)	0.05 (0.09)	0.04 (0.10)	0.10 (0.10)	0.03 (0.10)	-0.07 (0.11)
In a high-risk occupation	1.99 (1.57)	0.19 (0.09)*	0.23 (0.10)*	0.07 (0.11)	0.21 (0.10)*	0.04 (0.11)
Religious affiliation	1.23 (1.53)	0.07 (0.09)	-0.00 (0.10)	-0.14 (0.10)	0.58 (0.10)***	0.05 (0.11)
Perceived severity	1.59 (0.50)**	0.06 (0.03)*	0.06 (0.03)	0.03 (0.03)	0.05 (0.03)	0.09 (0.04)**
PTS		-0.06 (0.02)***	-0.06 (0.02)**	-0.07 (0.02)***	-0.05 (0.02)**	-0.04 (0.02)
SOC		-0.01 (0.01)	-0.01 (0.01)	-0.02 (0.01) *	-0.02 (0.01)*	-0.02 (0.01)
PTS x SOC		0.00 (0.00)***	0.00 (0.00)***	0.00 (0.00)***	0.00 (0.00)**	0.00 (0.00)**
Model summary:						
Δr^2	0.1052***	0.1484***	0.1457***	0.1130***	0.2073***	0.1199***

Note. PTG = post-traumatic growth, PTS = post-traumatic stress, SOC = sense of coherence, B = unstandardized coefficient, SE = standard error.

*p<.05; **p<.01; ***p<.001

Table 4. Moderation and conditional indirect effects on post-traumatic growth at 16th, 50th and 84th percentile of SOC (N=327).

	PTG-Overall: LLCI, ULCI	PTG-Self: LLCI, ULCI	PTG- Interpersonal: LLCI, ULCI	PTG- Spiritual: LLCI, ULCI	PTG-Life orientation: LLCI, ULCI
Effects of PTS on PTG at:					
16 th percentile SOC	-0.0159, 0.0024	-0.0212, - 0.0004	-0.0217, - 0.0001	-0.0157, 0.0048	-0.0046, 0.0179
50 th percentile SOC	-0.0015, 0.0127	-0.0069, 0.0092	-0.0041, 0.0126	-0.0020, 0.0139	0.0088, 0.0262
84 th percentile SOC	0.0091, 0.0291	0.0028, 0.0256	0.0089, 0.0325	0.0072, 0.0295	0.0170, 0.0416
Indirect effects by PTS from perceived severity at:	Bootstrapped LLCI, ULCI	Bootstrapped LLCI, ULCI	Bootstrapped LLCI, ULCI	Bootstrapped LLCI, ULCI	Bootstrapped LLCI, ULCI
16 th percentile SOC	-0.0307, 0.0063	-0.0416, 0.0020	-0.0431, 0.0014	-0.0291, 0.0091	-0.0093, 0.0359
50 th percentile SOC	-0.0019, 0.0250	-0.0116, 0.0170	-0.0062, 0.0238	-0.0040, 0.0283	0.0079, 0.0538
84 th percentile SOC	0.0074, 0.0611	0.0005, 0.0541	0.0070, 0.0701	0.0060, 0.0627	0.0138, 0.0877
Mediated moderation	0.0004, 0.0036	0.0003, 0.0037	0.0005, 0.0045	0.0004, 0.0034	0.0002, 0.0034

Note. PTG = post-traumatic growth, PTS = post-traumatic stress, SOC = sense of coherence, LLCI = 95% lower level of confidence interval; ULCI = 95% upper level of confidence interval