Personality Factors and Their Impact on PTSD and Post-traumatic Growth is Mediated by Coping Style Among OIF/OEF Veterans

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ABSTRACT Introduction: Traumatic experiences can trigger negative effects such as post-traumatic stress disorder (PTSD). However, some individuals may also experience positive changes following trauma exposure. These changes are known as post-traumatic growth (PTG). Dispositional and situational factors are likely at play in determining both severity of PTSD symptoms and whether and to what degree an individual experiences PTG. This study examined how coping style and personality traits interact to influence PTSD and PTG. Materials and Methods: Two hundred and seventy-one Operation Iraqi Freedom/Operation Enduring Freedom veterans not engaged in mental health treatment completed self-report measures of trauma exposure, personality traits, coping styles, PTSD symptoms, and PTG. The study was approved by the Minneapolis VAHCS Institutional Review Board. Results: Adaptive coping and positive personality traits such as openness were positively correlated with PTG. Maladaptive coping and neuroticism were positively correlated with PTSD symptoms. Regression analyses indicated that an inverted-U (quadratic) curve characterized the relationship between PTSD symptoms and PTG; veterans who reported moderate PTSD levels reported the most PTG. Mediation analyses revealed that adaptive coping partially mediated the relationship between openness and PTG. Maladaptive coping partially mediated the relationship between neuroticism and PTSD symptoms. Conclusion: This study demonstrated that coping style mediated relationships between personality traits and post-trauma outcomes. Our findings are subject to the limitations of the self-report and cross-sectional nature of the data. Longitudinal studies, preferably incorporating coping-oriented interventions, could convincingly demonstrate the impact of coping style on PTSD and PTG. As coping styles can be modified, our findings nonetheless suggest that coping-oriented clinical intervention has potential to reduce PTSD symptoms and promote positive growth following trauma exposure.

INTRODUCTION

Immediately following exposure to a traumatic event, many individuals experience psychological and physiological reactivity in response to reminders of the event. For many, these responses diminish over time, but for some, the event may cause prolonged distress leading to post-traumatic stress disorder (PTSD).[1] In some individuals, coping with post-trauma struggles can lead to positive changes in different areas of life. Post-traumatic growth (PTG) is defined as positive psychological change experienced after a struggle with highly challenging life circumstances.[2] PTG includes developing an increased appreciation for life, greater sense of personal strength, renewed appreciation of relationships, and positive spiritual changes. However, trauma exposure does not directly determine growth – many trauma survivors do not experience such growth; indeed, many only experience post-traumatic stress. Therefore, the way one copes with trauma may determine the mix of PTG and/or PTSD symptoms.

Despite much research on PTG and PTSD, the interrelationship between the two remains unclear. Initial reports described a moderate positive correlation between PTG and trauma exposure severity. Elder & Clipp[3] reported that U.S. World War II and Korean War veterans with the heaviest combat exposure had significant psychosocial dysfunction and the greatest amount of positive change. Subsequently, a curvilinear (inverted-U) relationship has been reported between PTSD symptoms and PTG, such that those who reported moderate PTSD symptom levels reported the most PTG.[4,5] A recent meta-analytic review[6] concluded that there is not only a significant linear relationship but also a stronger curvilinear relationship.

Coping strategies and their relationships to PTG and PTSD have been studied among individuals exposed to a range of traumas. Women with breast cancer who practiced active-adaptive coping experienced greater PTG[7] as did individuals with traumatic brain injuries.[8] Following pregnancy termination due to fetal abnormality, adaptive coping not only provided protection against distress but also promoted PTG.[9] Garnefski et al[10] found that in recent myocardial infarction (MI) patients, 24% of the variance in PTG was explained by cognitive coping strategies. On the other hand, maladaptive coping mechanism use in ambulance personnel predicted more PTSD symptoms including intrusion, hyperarousal, and avoidance.[11] In addition, burn survivors' avoidant coping played a mediating role in the relationship between neuroticism and PTSD.[12]

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Personality traits also influence PTG and PTSD. Neuroticism – a stable characteristic reflecting vulnerability to negative emotional experiences – is not surprisingly a negative predictor of PTG.[13] Neuroticism is also one of the strongest predictors of PTSD.[11] Conversely, personality characteristics including optimism, extraversion, agreeableness, and openness to experiences all have been shown to predict PTG.[13,14] Garnefski et al[10] found that 18% of the variance in PTG could be explained by one's personality, specifically neuroticism, conscientiousness, and extraversion in recent MI patients.

We aimed to evaluate the relationship between PTSD symptom severity and PTG, and the interaction among personality traits and coping style in predicting PTSD symptoms and PTG in a sample of Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) veterans. Based on the above research, we hypothesized (1) that PTSD and total trauma load would have a negative relationship with PTG. Considering the stability of personality traits, we also predicted that personality would indirectly affect PTG and PTSD through use of either adaptive or maladaptive coping. That is, (2) maladaptive coping would play a mediating role between negative personality traits (such as neuroticism) and PTSD symptoms, and (3) adaptive coping would play a mediating role between positive personality traits (optimism and extraversion) and PTG.

METHODS

Participants

The sample consisted of 271 OIF/OEF veterans registered for health care at a Midwestern Veterans Affairs medical center after return from deployment. Those receiving mental health care at the study's start were excluded; this was therefore a nonclinical sample. All participants provided written informed consent before participating and received monetary compensation. The study protocol was approved by the local institutional review board.

Measures

Total Trauma Load

Total trauma load was calculated from responses to the Deployment Risk and Resilience Inventory (DRRI).[15] Specifically, 8 items from the Prior Stressors subscale (e.g., assault/sexual assault, prior combat, and natural disasters), 12 items from the Combat Experiences subscale assessing specific combat exposure, and 8 items from the Post Deployment Stressors subscale were summed to determine total trauma load.

Post-traumatic Stress Disorder

PTSD symptoms were assessed using the PTSD Checklist – Civilian Version (PCL-C),[16] a 17-item self-report scale assessing each PTSD symptom from the Diagnostic and Statistical Manual for Mental Disorders IV[17] criteria. Participants rate how much they were bothered by each symptom in the past month using a 5-point Likert scale, ranging from "not at all" (1) to "extremely" (5). Item responses are summed to provide an index of current PTSD symptom severity.

Post-traumatic Growth

The Post-traumatic Growth Inventory (PTGI)[2] is an instrument that assesses perceptions of positive psychological change following trauma. It consists of 21 items grouped into five subscales: Personal Strength, New Possibilities, Relating to Others, Appreciation for Life, and Spiritual Change. Items are rated on a 5-point Likert scale, ranging from 0 ("I did not experience this change") to 5 ("I experienced this change to a very great degree"). Appropriate responses can be summed to yield scores for each of the five subscales, and summing all items provides one score reflecting overall positive psychological change.

Coping

The Brief COPE[18] is a self-report questionnaire assessing coping behaviors in response to stressful or traumatic situations based on 28 questions rated on a 4-point Likert scale, ranging from 1 ("I haven't been doing this at all") to 4 ("I've been doing this a lot"). Fourteen subscales are generated representing eight adaptive coping strategies (Positive Reframing, Acceptance, Seeking Emotional Support, Seeking Instrumental Support, Humor, Planning, Active Coping, Religion) and six maladaptive coping strategies (Denial, Venting, Substance Use, Behavioral Disengagement, Self-distraction, and Self-blame).[19] Subscale scores were summed to generate the adaptive coping and the maladaptive coping variables.

Personality

Personality traits were assessed using the Big Five Inventory (BFI),[20] a 44-item self-report measure of the Five-Factor Model personality traits.[21] Participants rate themselves on a variety of characteristics using a 5-point Likert scale, ranging from "disagree strongly" (1) to "agree strongly" (5). The factors are Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. Previous studies have documented high test–retest reliability, internal consistency, and convergent and divergent validity of the overall BFI and its factors.

Optimism

Optimism has been linked to adaptive coping following trauma.[22] The Life Orientation Test – Revised (LOT-R)[23] is a 10-item instrument used to assess individual differences in generalized optimism versus pessimism. Items are rated on a 5-point Likert scale ranging from 1 ("I agree a lot") to 5 ("I disagree a lot"). High values indicate optimism.

Data Analysis

Correlations were calculated among coping mechanisms, total trauma load, PTSD, BFI, LOT-R, and PTGI scores. Regressions assessed the linear, quadratic, and cubic effects

of PCL scores on PTG. The primary analyses were a series of hierarchical multiple regressions using adaptive and maladaptive coping, personality, and total trauma load to predict PTSD and PTG.

Mediation analyses were performed using the indirect method of Preacher & Hayes[24] utlizing SPSS. This examines a variable's mediation effect while controlling for the effects of other factors in the model. Normality was checked and mediation analyses were conducted using 1,000 bootstrap samples to assess indirect effects of coping style on both PTSD symptoms and PTG. The bootstrap method is preferred in mediation analyses.[24] The "indirect" effect is the amount of mediation accounted for by the mediating variable. The "direct" effect is the effect of the independent variable on the dependent variable in the absence of the mediator. The "total" effect is the sum of the indirect and direct effects, that is, the effect of the independent variable on the dependent variable when the mediator's effect is included. The significance of the indirect effect was determined by assessing the 95% confidence interval (CI) of the sampling distribution of the mean, with CIs that did not include zero considered statistically significant. Full mediation exists if the direct effect of the personality dimension becomes insignificant in the presence of the mediator; partial mediation exists if the effect of personality on PTSD symptoms or PTG is significantly reduced in the presence of the mediator.

RESULTS

The sample was largely male (85%) with age range 19–58 (mean = 31.0, SD = 9.3) yr. The sample was primarily Caucasian (68%); 28% did not provide race/ethnicity data. For their most recent deployment, 33% reported mainly combat duties, 46% reported mainly combat support, and 18% reported noncombat-related duties. Additional descriptive statistics are presented in Table I.

Correlations

Study variable intercorrelations are also presented in Table I. Adaptive coping – but not maladaptive coping – was significantly correlated with PTG, as were the LOT-R, extraversion, agreeableness, and openness. Adaptive coping was also negatively correlated with neuroticism. Total life events and PTSD were not significantly correlated with PTG. PCL total score was positively correlated with adaptive and maladaptive coping, total life events, and neuroticism. PCL total score was also negatively correlated with the LOT-R, conscientiousness, extraversion, and agreeableness. Correlations between adaptive coping and the five PTGI factors were all significant (Table II).

Regression Analyses

Regressions examined the fit of quadratic, cubic, and linear functions to the relationship between PCL and PTG. The quadratic equation was superior to the linear equation, $\beta = -0.34$, $\Delta R^2 = 0.04$, $p = 0.005$. The cubic equation was not significant. Figure 1 graphs the inverted-U-shaped relationship between PCL and PTGI.

Mediation Models

Openness was the personality dimension most predictive of PTG (see Fig. 2), whereas neuroticism was most predictive of PCL (see Fig. 3). Openness and neuroticism served as independent variables for the two mediation models. Adaptive coping significantly predicted PTG, and maladaptive coping significantly predicted PCL; coping styles were therefore analyzed as mediators in their respective models.

In step 1 of this mediation model (Fig. 2), openness significantly predicted PTG (β [SE] = 0.24 [0.23]; $p < 0.01$). Step 2 showed the openness significantly predicted adaptive coping (the mediator) (β [SE] = 0.16 [0.08]; $p < 0.01$). Step 3 showed that the mediator (adaptive coping) – when controlling for openness – significantly predicted PTG (β [SE] = 0.33 [0.16]; $p < 0.01$). Step 4 revealed a meaningful reduction in the significance of the relationship between openness and PTG when the mediator (adaptive coping) was present (β [SE] = 0.18 [0.22]; $p < 0.01$). The bootstrap test indicated that the indirect effect of adaptive coping on PTG was significant (CI = 0.569, 1.28), indicating that adaptive coping

TABLE I. Variable Means, Standard Deviations, and Intercorrelations

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1. PTGI total score	50.5	23.9										
2. Adaptive coping	20.6	8.6	0.357**									
3. Maladaptive coping	10.2	5.7	0.092	0.662**								
4. PCL-C total score	35.8	14.4	−0.022	0.267**	0.550**							
5. LOT-R total score	10.2	4.9	0.183**	−0.088	−0.323**	−0.467**						
6. Total life events	9.5	5.1	0.017	0.153*	0.281**	0.470**	−0.241**					
7. Conscientiousness	30.7	4.7	0.100	−0.093	−0.205**	−0.200**	0.372**	−0.099				
8. Extraversion	25.9	6.4	0.182**	0.041	−0.079	−0.209**	0.393**	−0.063	0.228**			
9. Agreeableness	34.4	5.5	0.198**	−0.041	−0.259**	−0.231**	0.339**	−0.244**	0.322**	0.226**		
10. Openness	35.3	6.4	0.237**	0.151*	0.014	−0.013	0.266**	0.007	0.149*	0.333**	0.257**	
11. Neuroticism	21.4	5.9	0.135*	−0.175**	0.377**	0.465**	−0.554**	0.173**	−0.330**	−0.371**	−0.443**	−0.227**

PTGI, Post-traumatic Growth Inventory; PCL-C, Post-traumatic Stress Disorder Checklist – Civilian Version; LOT-R, Life Orientation Test – Revised.
*$p < 0.05$; **$p < 0.01$.

TABLE II. Variable Correlations with PTGI Factors

PTGI Factor	Relation to Others	New Possibilities	Personal Strength	Spiritual Change	Appreciation of Life
Adaptive coping	0.280**	0.310**	0.300**	0.337**	0.253**
Maladaptive coping	0.027	−0.133*	0.112	0.048	0.097
PCL-C total score	−0.148*	0.017	0.036	0.008	0.127*
Total life events	−0.115	0.095	0.091	−0.055	0.115
Conscientiousness	0.094	0.089	0.044	0.061	0.137*
Extraversion	0.216**	0.171**	0.041	0.101	0.159*
Agreeableness	0.255**	0.074	0.120	0.170**	0.130*
Neuroticism	−0.176**	−0.080	−0.074	−0.098	0.175**
Openness	0.206**	0.256**	0.146*	0.149*	0.190*
LOT-R total	0.235**	0.115	0.051	0.183**	0.119

PTGI, Post-traumatic Growth Inventory; PCL-C, Post-traumatic Stress Disorder Checklist – Civilian Version; LOT-R, Life Orientation Test – Revised.
*$p < 0.05$; **$p < 0.01$.

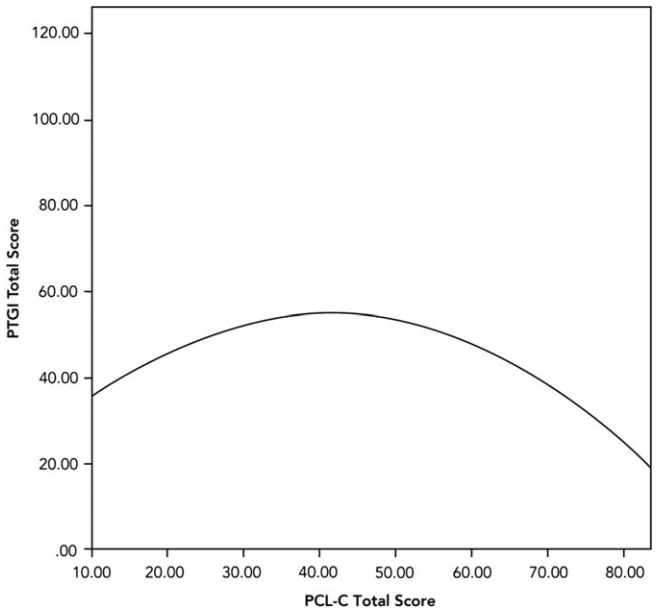

FIGURE 1. Curvilinear relationship between post-traumatic growth and post-traumatic stress disorder symptoms. PTGI, Post-traumatic Growth Inventory. PCL-C PTSD Checklist – Civilian Version.

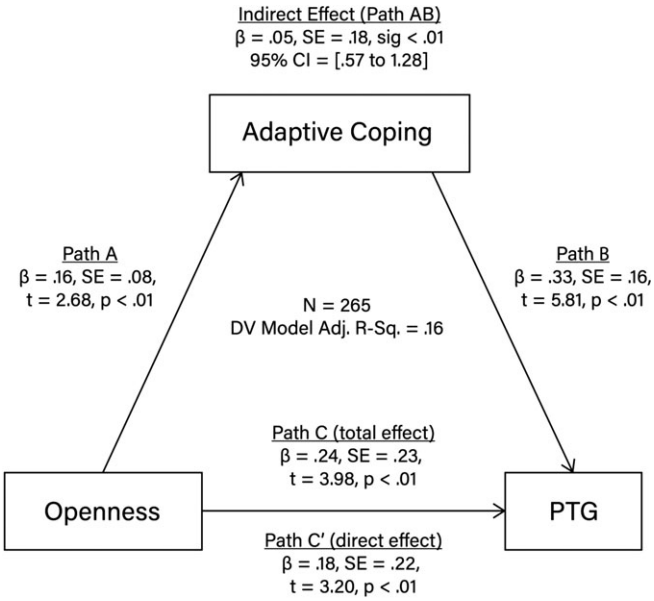

FIGURE 2. The mediating effect of adaptive coping on the relationship between openness and post-traumatic growth. *Note*. Path A shows the significant association between the independent variable (openness) and the mediator (adaptive coping). Path B shows the significant association between the mediator (adaptive coping) and the dependent variable (PTG). Path C depicts the relationship (total effect) between the independent variable (openness) and the dependent variable (PTG) in the absence of the mediator (adaptive coping). Path C' shows the direct effect of the independent variable (openness) on the dependent variable (PTG) when the mediator (adaptive coping) is accounted for. Path AB shows the indirect effect, or the amount of mediation accounted for by the mediating variable.

partially mediated the relationship between openness and PTG.

See Figure 3. The same steps were repeated in examining the relationship among neuroticism, maladaptive coping, and PCL. Step 1 revealed that neuroticism significantly predicted PCL (β [SE] = 0.49 [0.13]; $p < 0.01$). Step 2 showed neuroticism significantly predicted maladaptive coping (the mediator) (β [SE] = 0.37 [0.06]; $p < 0.01$). Step 3 showed that when controlling for neuroticism, maladaptive coping significantly predicted PCL (β [SE] = 0.45 [0.13]; $p < 0.01$). Step 4 showed a meaningful reduction in the regression weight between neuroticism and PCL when maladaptive coping was included (β [SE] = 0.31 [0.13]; $p < 0.01$). A bootstrap test indicated that the indirect effect of maladaptive coping on PCL was significant (CI = 0.88, 1.40), indicating that maladaptive coping partially mediated the relationship between neuroticism and PCL.

DISCUSSION

We sought to explore the relationships between coping style and personality and determine the roles they played in PTSD symptomology and PTG. This study extends the findings of James et al[25] who used the same database with a focus on neuroticism and pre-deployment life events on PTSD, depression, and alcohol misuse.

These findings revealed an inverted-U (quadratic) curve best described the relationship between PTSD and PTG; veterans who reported a moderate level of PTSD symptoms reported the highest levels of PTG, a finding that aligns with

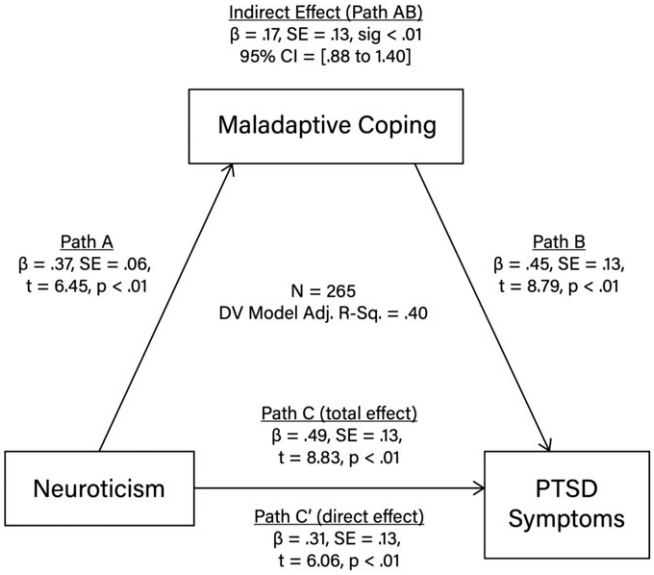

FIGURE 3. The mediating effect of adaptive coping on the relationship between neuroticism and PTSD symptoms. *Note.* Path A shows the significant association between the independent variable (neuroticism) and the mediator (maladaptive coping). Path B shows the significant association between the mediator (maladaptive coping) and the dependent variable (PTSD symptoms). Path C depicts the relationship (total effect) between the independent variable (neuroticism) and the dependent variable (PTSD symptoms) in the absence of the mediator (maladaptive coping). Path C' shows the direct effect of the independent variable (neuroticism) on the dependent variable (PTSD) when the mediator (maladaptive coping) is accounted for. Path AB shows the indirect effect, or the amount of mediation accounted for by the mediating variable.

previous reports.[5–7] Total trauma load did not predict PTG, a finding inconsistent with reports of higher trauma predicting more PTG.[3] Adaptive coping partially mediated the relationship between a positive personality trait (openness) and PTG. Maladaptive coping partially mediated the relationship between a negative personality trait (neuroticism) and PTSD symptoms.

The finding of the curvilinear relationship suggests that PTG may develop when PTSD symptoms are of moderate severity, neither minimal nor severe. Veterans who experience PTG may also be more resilient than their counterparts who do not.[6] These results suggest that focusing on PTG in PTSD treatment may lead to better overall functioning and create a more positive outcome for individuals with moderate PTSD.

As noted above, much research has shown that adaptive coping is more likely to facilitate PTG than maladaptive coping.[8,10] As expected, using adaptive coping was predictive of PTG and use of maladaptive coping was not. In addition, all five PTG factors were significantly correlated with adaptive coping, suggesting that adaptive coping facilitates overall PTG. Furthermore, coping styles played mediating roles in predicting PTSD symptoms and PTG. Thus, these and previous results indicate that promoting adaptive coping styles such as positive reframing and use of instrumental support could be a helpful clinical intervention. Learning and using adaptive coping should help improve trauma survivors' current functioning and long-term adaptation.

The personality factors of Optimism, Agreeableness, Extraversion, and Openness to Experiences were all positively correlated with PTG, whereas Neuroticism was negatively correlated. As these positive factors have been linked to adaptive coping and better overall mental health,[6] they likely play a causal role in developing PTG. Future longitudinal studies could establish their causal role and how they interact with coping and other psychosocial factors.

This study indicates the importance of coping strategies and personality in predicting PTSD symptoms and PTG. Although the results have clinical implications, they are subject to some cautions. First, we used self-report data with an unknown degree of response bias. Assessments based on structured interviews could reduce such bias. As the data collected in this study was cross-sectional, causal relationships have not been shown. Longitudinal studies, preferably incorporating coping-oriented interventions, could convincingly demonstrate the impact of coping style on PTSD and PTG. Our sample was primarily middle-aged Caucasian male veterans; generalizability to other populations requires more research. Our sample was not engaged in mental health treatment and therefore subjects' responses (e.g., trauma exposure and PTSD symptoms) covered a wide range and were normally distributed. This is psychometrically optimal. Variables drawn from mental health samples typically exhibit more restricted ranges (e.g., greater PTSD severity), plus more comorbid mental health disorders. These factors can cloud results.

In summary, this study highlights the importance of coping strategies and personality characteristics in predicting both PTSD and PTG following trauma. Efforts to promote adaptive coping and a more positive outlook are likely to help reduce PTSD symptoms and promote growth following trauma in our nation's military personnel.

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