Locating event centrality in associations of emotion regulation with posttraumatic stress disorder symptoms and posttraumatic growth in emerging adults

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A B S T R A C T
Previous research suggests that cognitive reappraisal (CR) and expressive suppression (ES) strategies of emotion regulation (ER) are associated with posttraumatic stress disorder (PTSD) and posttraumatic growth (PTG). How the patterns of these associations may vary in the context of event centrality (EC) however requires investigation to help delineate groups for whom the impact of event centrality may be more salient. We examined whether EC would moderate the associations of CR and ES with PTSD symptoms clusters and PTG domains among 388 emerging adults (18-30 year-olds) of Tiv ethnic group who were survivors of armed attack by Fulani herdsmen and were temporarily sheltered in two internally displaced persons’ (IDPs’) camps in North-central Nigeria. They completed self-report measures of the variables. Results indicated that EC strengthened the negative associations of CR and the positive associations of ES with avoidance, hyper-arousal and total PTSD symptoms, but not intrusion symptoms. For the PTG domains, EC only strengthened the positive association between CR and personal strength and weakened the association of ES with greater appreciation of life. These findings suggest that primary intervention programs that incorporate training of armed attack survivors in cognitive reappraisal strategy centered on the traumatic event could be effective in controlling PTSD but be less critical in engendering PTG. They also show that the psychological processes that underlie PTSD and PTG are related but involve nuances even within PTSD, and do not seamlessly set into the Janoff-Bulman’s “strength through suffering” model of PTG. More research is required to test the model.

1. Introduction

Posttraumatic stress disorder (PTSD) and posttraumatic growth (PTG) are typical posttraumatic reactions (Brewin et al., 2000; Elderton et al., 2017; Helgeson et al., 2006). PTSD is characterized by persistent intrusions or recollections of the traumatic event, avoidance of the event reminders and emotional numbing, hyper-arousal and negative cognitions and emotions associated with the traumatic event (Marshall et al., 2013). PTG, on the other hand, is the emergence of positive behavioral tendencies or transformation within the individual after a traumatic experience (Tedeschi and Calhoun, 1996), but such behavioral tendencies are not part of a typical developmental process (Cook, 2017). The positive change can occur in any or five major domains: greater appreciation of life, greater sense of personal strength, improvements in interpersonal relationships, recognition of new possibilities or paths for one’s life, and enhanced spirituality (Tedeschi and Calhoun, 1996).

Some report of PTG may however reflect more of a coping process than verifiable behavioral changes after traumatic experience (Boals et al., 2019; Helgeson et al., 2006; Owens and Fowers, 2018): time for cognitive processing after the traumatic event (Helgeson et al., 2006; Janoff-Bulman, 2004; Tedeschi and Calhoun, 2004), and the capacity of the traumatic event to challenge the person’s assumptive world or core beliefs about one’s life story (Bersniten and Rubin, 2006; Boals et al., 2010; Janoff-Bulman, 2004; Tedeschi and Calhoun, 2004) are particularly critical for the emergence of actual PTG.

Although both PTSD and PTG occur after traumatic experiences, it is not clear whether the same or similar psychological processes underlie their emergence. Positive, negative, curvilinear, and null relationships have been reported between PTSD and PTG (Boals et al., 2010; Wang et al., 2020; Ye et al., 2018; Zhou et al., 2016). Correlation coefficients

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reported in a meta-analysis on PTG and adjustment-related variables were small and medium at best (Helgeson et al., 2006). The inconsistency and surprisingly small effect sizes reflect the need to advance current understanding of the relationships among PTSD, PTG, and related psychological variables. Simultaneous investigations of both PTSD and PTG, including comparisons of their determining factors, has been advanced as a unique way to elucidate their relationship (Lee et al., 2020; Wang et al., 2020; Zhou et al., 2016). This direction is our approach in the present study.

The difficulty in clarifying whether PTSD and PTG share the same or related psychological process may derive from the emotional complexity associated with PTSD (McLean and Foa, 2017). Emotion regulation (ER), related psychological process may derive from the emotional complexity (Grinter et al., 2020; Wang et al., 2020; Zhou et al., 2016). This direction is our approach in the present study.

Event centrality, or trauma centrality (Berntsen and Rubin, 2006), is one of the strongest predictors of PTSD symptoms severity (Barton et al., 2013; Chukwuorji et al., 2019; George et al., 2016).

Event centrality can also lead the individual to translate cognitions about the event to action to correct or cope with a traumatic experience, thus increasing the likelihood of growth (Hobfoll et al., 2007). Event centrality was positively related to PTG in samples of undergraduate students (Allbaugh et al., 2016; Boals and Schuettler, 2011; Lancaster et al., 2013) and community-dwelling adults (Cook, 2017; Roland et al., 2014) who had experienced at least one significant traumatic event. However, event centrality did not predict PTG among treatment-seeking adults (Barton et al., 2013), and survivors of 2011 Oslo bombing attack (Blix et al., 2013). Some researchers have suggested a curvilinear relationship between event centrality and PTG, with the greatest amount of PTG taking place at the apex of the curve (Zebrack et al., 2015). Studies on the association between event centrality and PTG in persons exposed to armed attacks in sub-Saharan Africa is however rare, hence the need for the present study. Based on available literature, we expect that higher event centrality would be associated with more severe PTSD symptoms in all clusters, and greater PTG in all domains.

1.4. Survivor characteristics, type of traumatic event and trauma outcomes

Participants in most of the studies relating PTSD and PTG were university students (Allbaugh et al., 2016; Boals et al., 2010; Lancaster et al., 2013).
et al., 2013). Hence, the extent to which their findings relate to minority populations, who might experience different and systemic forms of trauma and different growth trajectories, remains unknown. The present study involved persons who were exposed to extreme human induced trauma. They were internally displaced persons from the Tiv ethnic group in Nigeria who were sacked from their communities and farmlands by intensive random armed attacks from nomadic Fulani herdsmen. The Tiv are resident farmers in the lush vegetation of Benue State, in North-central Nigeria. The nomadic Fulani herdsmen openly pasture their cows and destroy the crops in Tiv farms. They accuse the Tiv of stealing or killing their cattle and use the excuse to spontaneously kill hundreds of the Tiv and destroy their property. Many of them now live in temporary camps made of tents and thatch houses in the more secure and metropolitan Benue State capital, Makurdi. Material and social support available to them are irregular and mainly come from charity organizations and rarely from government agencies. The implementation of the law against open grazing of animals enacted by the Benue State government (Benue Peoples News, 2017) is yet to effectively enable the Tiv IDPs to return to their farms and communities. The attacks on Tiv communities have also persisted and are not only particularly distressing to the Tiv because of the magnitude of the unanticipated violence but also because of displacement from their land. Besides their use of land for farming, land occupies a special cultural significance in Tiv worldview (Chukwuorji et al., 2018).

Although the Tiv IDPs comprised children, adolescents, younger and older adults (Chukwuorji et al., 2016), studying PTSD and PTG among the emerging adults is very crucial because emerging adulthood (18–29-year-olds) has been noted as a highly fluid and critical period when individuals are most prone to exploration of various possible life directions (Arnett, 2000). PTG is more likely to occur during emerging adulthood than in younger or older age (Boyle et al., 2017; Helgeson et al., 2006). The purpose of the current study therefore was to examine if the pattern of associations between emotion regulation strategies and the symptom clusters of PTSD and the domains of PTG is dependent on if the pattern of associations between emotion regulation strategies and the symptom clusters of PTSD and the domains of PTG is dependent on

### 2. Method

#### 2.1. Participants and procedure

Data for this study was part of a larger study of mental health outcomes due to internal displacement in Nigeria. Participants in the present study were 388 emerging adults who were accessed from two major temporary Tiv IDPs’ camps in Markurdi, North-central Nigeria. Inclusion criteria for participation in this study were an age of 18 to 30 years in order to approximate Arnett’s (2000) delineation of emerging adulthood, and the understanding of Tiv language. The requirement for understanding Tiv language was to ensure a uniform cultural exposure among the participants. Official list of registered IDPs in the camps showed that there were 420 eligible emerging adults, but 32 of them declined to participate in the study, mostly citing disinterest. All participants experienced the same episode of violent attacks although their traumatic experiences may differ. The attacks occurred in the preceding six (6) months and led to their displacement. Details of the participants’ demographics are shown in Table 1. Approval for the present research was granted by the relevant institutional research ethics board in the University of Nigeria, Nsukka.

All the measures used in the present research were translated from English into Tiv language using the back-translation method and clarifications with native Tiv IDPs assistants. Details of the translation and adaptation have been discussed in previous research (Chukwuorji et al., 2017). The measures were administered to the identified emerging adults in each of the IDP camps by trained Tiv research assistants who explained the nature of the study to the participants, and what they were required to do. All participants voluntarily signed informed consent.

| Demographic Variable | Description | Statistic |
|----------------------|-------------|-----------|
| Age, years, M(SD)    | Range = 18–30 years | 25.74 (4.29) |
| Gender, n(%)         | Male 187 (48.2) | |
|                      | Female 201 (51.8) | |
| Marital status, n(%) | Married 184 (47.4) | |
|                      | Never married 177 (45.6) | |
|                      | Widow 16 (4.1) | |
|                      | Divorced/Separated 11 (2.8) | |
| Formal education, n(%) | None/Below primary 72 (18.6) | |
|                      | Primary school 57 (14.7) | |
|                      | Junior Secondary school 21 (5.4) | |
|                      | Senior Secondary school 146 (37.6) | |
|                      | Higher education 92 (23.7) | |
| Occupation, n(%)     | Not currently working 143 (36.9) | |
|                      | Farmer 164 (42.3) | |
|                      | Public servant 52 (13.4) | |
|                      | Trader 26 (6.7) | |
|                      | Artisan 3 (0.8) | |
|                      | Christian 371 (95.6) | |
|                      | Muslim 11 (2.8) | |
|                      | African traditional religion 3 (0.8) | |
|                      | Other religious groups 3 (0.8) | |
| Death of close relative in the attack, n(%) | Yes 159 (41.0) | |
| Number of dead relatives in the attack, M(SD) | Range = 0–11 | 0.64 (1.14) |
| Event centrality, M(SD) | Range = 8–35 | 24.92 (5.52) |
| Cognitive reappraisal, M(SD) | Range = 9–30 | 21.44 (4.45) |
| Expressive suppression, M(SD) | Range = 6–20 | 14.44 (3.16) |
| PTSD - Intrusion, M(SD) | Range = 2–21 | 13.50 (4.21) |
| PTSD - Avoidance, M(SD) | Range = 0–15 | 9.79 (3.48) |
| PTSD total, M(SD) | Range = 5–48 | 31.92 (8.12) |
| PTG - Appreciation of life, M(SD) | Range = 1–15 | 8.36 (3.10) |
| PTG - New possibilities, M(SD) | Range = 5–25 | 17.21 (4.53) |
| PTG - Personal strength, M(SD) | Range = 1–20 | 12.45 (4.37) |
| PTG - Spiritual growth, M(SD) | Range = 0–10 | 6.94 (2.51) |
| PTG - Relationship with others, M(SD) | Range = 8–35 | 23.35 (5.46) |
| Global PTG, M(SD) | Range = 28–99 | 68.30 (12.72) |

Note: n = number; M = mean; SD = standard deviation; PTSD = posttraumatic stress disorder; PTG = posttraumatic growth

They were encouraged to answer the questions honestly. For illiterate participants, research assistants read out the questions verbally and they indicated their responses appropriately. Literate participants received the questionnaire forms for completion at their leisure and returned them to the research assistants within 48 h. Participants who omitted items were requested to complete the omitted items in the presence of a research assistant. Participants were verbally appreciated for completing the survey.

#### 2.2. Measures

##### 2.2.1. Emotion regulation questionnaire (ERQ)

Emotion regulation was measured with the 10-item ERQ (Gross and John, 2003). It measures the habitual use of cognitive reappraisal (6 items, e.g., “When I want to feel more positive emotion, I change the way I’m thinking about the situation”) and expressive suppression (4 items, e.g., “I keep my emotions to myself”) on a 5-point scale ranging from strongly disagree (1) to strongly agree (5), with separate scores for each subscale. The two-factor structure has been confirmed for the Tiv version of the ERQ in a previous study on Tiv IDPs with acceptable Cronbach’s α of .73 and .75 for cognitive reappraisal and expressive suppression, respectively (Chukwuorji et al., 2017). In the current
sample, Cronbach’s α of .78 (cognitive reappraisal) and .81 (expressive suppression) were obtained. Scores on cognitive reappraisal subscale can range from 5 to 30, while scores on expressive suppression can range from 4 to 20. Higher scores indicate higher use of the particular strategy.

2.2.2. Centrality of event scale (CES)

The 7-item version of CES (Bernsten and Rubin, 2006) was used to assess event centrality, which is the extent to which the armed attack and forced displacement formed a central component of the emerging adult IDP’s personal identity, a turning point in their life story and a reference point for their everyday inferences. Items are rated on a 5-point scale, ranging from 1 (totally disagree) to 5 (totally agree). In this study, the word “crisis” in the original CES was replaced with “violent attack” in order to specify the trauma of interest. A sample item is: “The violent attack has become a turning point in my life.” Total score on the CES ranged from 7 to 35, with higher scores indicating higher event centrality. The measure has been found to have high internal consistency and a one-factor structure (Barton et al., 2013; Bernsten and Rubin, 2006) which has also been replicated with the Tiv version of the CES among Tiv IDPs in Nigeria, with Cronbach’s α of .86 (Chukwuorji et al., 2017). For the current study, the Cronbach’s α was .88.

2.2.3. Harvard trauma questionnaire (HTQ)

We used Part II of HTQ (Mollica et al., 1992) to measure PTSD symptoms. Respondents rated the extent to which each of the 16 symptoms (e.g., “detachment or withdrawal from others,” and “sudden emotional outbursts”) has bothered them in the last month on a 4-point response scale of “not at all” (0) to “all the time” (3). The summed score provides a score for symptom severity for each of the three symptom clusters of PTSD, namely, intrusion, avoidance, and hyper-arousal. The HTQ has shown high inter-rater reliability (r = .98), high one-week test-retest reliability (r = .89), and Cronbach’s α of .90 (Mollica et al., 1992). Chukwuorji et al. (2017) confirmed the three-factor structure of the Tiv version of the HTQ with good internal consistency among Tiv IDPs: Cronbach’s α of .75, .83, and .83 for intrusion, avoidance, and hyper-arousal, respectively. HTQ’s ranges of scores are: 0–12 for intrusion, 0–21 for avoidance, 0–15 for hyper-arousal, and 0–48 for total PTSD symptoms. Higher scores indicate higher PTSD symptoms.

2.2.4. Posttraumatic growth inventory (PTGI)

The 21-item PTGI (Tedeschi and Calhoun, 1996) was used to measure psychological growth from trauma. The PTGI has been considered to adequately capture the social, cognitive, emotional, physical, philosophical, and spiritual gains of trauma (Mystakidou et al., 2008). It assesses PTG on five domains: appreciation of life (AL), new possibilities (NP), personal strength (PS), spiritual growth (SG), and relationship with others (RO). Sample items include, “I established a new path for my life,” and “I put more effort into my relationships.” All the items are scored on a 6-point Likert scale ranging from 0 (not at all) to 5 (very great degree). High internal consistency coefficients have been reported in previous studies for the PTGI subscales and total scale (Tedeschi and Calhoun, 1996). An overall scale in previous studies for the PTGI subscales and total scale (Tedeschi and Calhoun, 1996). An overall scale in previous studies for the PTGI subscales and total scale (Tedeschi and Calhoun, 1996). An overall scale in previous studies for the PTGI subscales and total scale (Tedeschi and Calhoun, 1996). An overall scale in previous studies for the PTGI subscales and total scale (Tedeschi and Calhoun, 1996).

Demographic information (such as age, level of education, occupation, and the number of close relatives lost in the attacks) were sought from the participants using questionnaire.

2.3. Statistical analyses

Data on the study variables were obtained on interval scale. Pearson’s correlations were computed to test relations between the demographic variables and the study variables. Hayes PROCESS macro (version 3.1) for SPSS (Hayes, 2018), which uses a regression-based random sampling bootstrapping, was employed to test the hypotheses. PROCESS is a widely used regression-based path analysis modeling tool for estimating direct effects as well as interactions in moderation models. The advantages of PROCESS over the traditional approaches in tests of moderation hypothesis explains its wide application by mental health researchers in recent times (Su et al., 2020; Wamser-Nannney et al., 2018). Model 1 of PROCESS was used to test our hypotheses. Hayes PROCESS macro simultaneously tests for direct associations and moderation effects while adjusting for multiple tests among the variables. In order to control for Type 1 error arising from running several regression analyses on the same data, we adopted adjusted significance thresholds for PTSD symptoms at α < .0125 and PTG at α < .0083 using the Bonferroni method. The adjustment of α by the Bonferroni method is calculated by .05/m, where m is the comparison time. Our comparison time for PTSD in this study was 4 (3 clusters and total score), whereas it was 6 for PTG (5 domains and total score). Following recommendations (Hayes and Rockwood, 2017), where the moderation effect was significant, we reported the effect size (change in explained variance, ΔR²) associated with the interaction term.

3. Results

3.1. Preliminary results

Table 1 shows that both men and women were almost equally represented in the sample. The participants were aged 18–30 years (mean age = 25.74 years, standard deviation = 4.29). A majority of them had formal education. They were mostly Christians. The largest occupation group comprised farmers. A large proportion lost a close relative in the attacks.

Zero-order correlations in Table 2 show that age was positively related with hyper-arousal and total PTSD symptoms, but negatively related with most PTG domains. Gender (men coded as 1 and women as 2) was not related with any of the study variables. We reclassified education into two levels of primary (coded as 1) and higher education (coded as 2) based on Nigeria’s education system. Education was positively related with higher cognitive reappraisal and negatively related with expressive suppression. Education was also negatively related with all symptoms clusters of PTSD and total PTSD, but was not related to PTG. Number of dead relatives was negatively related to avoidance symptoms. Correlations among event centrality and emotion regulation and among the clusters of PTSD and domains of PTG were low or at best moderate. Total PTSD had low negative correlation with global PTG.

3.2. Event centrality and associations of emotion regulation strategies with PTSD

Tables 3 and 4 show the results of the Process Macro analysis for testing our hypotheses. Table 3 shows that greater use of cognitive reappraisal was associated with lower PTSD symptoms whereas greater use of expressive suppression was associated with higher PTSD symptoms in all the clusters and total PTSD symptoms. When variance due to cognitive reappraisal or expressive suppression was controlled for, greater event centrality was associated with higher PTSD symptoms in all the clusters and total PTSD symptoms. The variance in PTSD symptoms explained by the contributions of both cognitive reappraisal and event centrality were 24% for avoidance (R² = .24), 22% for hyper-arousal and intrusion, respectively, and 36% for total PTSD. On the other hand, the variance in PTSD symptoms explained by the contributions of both expressive suppression and event centrality were 26%
Table 2

| Variables                  | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   | 13   | 14   | 15   | 16   |
|----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Age                        | 0.06 | 0.09 | 0.00 | 0.00 | 0.14 | 0.06 | 0.04 | 0.06 | 0.06 | 0.08 | 0.07 | 0.08 | 0.09 | 0.09 | 0.09 | 0.09 |
| Education                  | -0.03 | 0.01 | -0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Number of relatives killed | -0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Event centrality (EC)      | 0.07 | 0.05 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |
| ER_Cognitive reappraisal   | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ER_Expressive suppression  | -0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PTSD_Intrusion             | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PTSD_Avoidance             | -0.15 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 | -0.18 |
| PTSD_Hyper-arousal         | -0.13 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 | -0.16 |
| PTSD total                 | -0.10 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 | -0.13 |
| PTG_Appreciation of life   | -0.02 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 |
| PTG_New possibilities      | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PTG_Personal strength      | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PTG_Spiritual growth       | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| PTG_Global PTG             | -0.03 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 |

Notes: *p < 0.05, **p < 0.01, ***p < 0.001; ER = emotion regulation; PTSD = posttraumatic stress disorder symptoms; PTG = posttraumatic growth; Gender: male = 1, female = 2; Education: no formal and primary education = 1, secondary and higher education = 2.
Intrusion involves automatic and unwanted recall of emotion-laden memories (Seligowski et al., 2015) had linked greater expressive suppression with PTSD avoidance and hyper-arousal PTSD symptoms. It could equally enable the person to observe hitherto unnoticed scenarios as well as inner capacity or resources that sustain the individual to overcome traumatic experience and thus could activate PTG. The probable dual role of cognitive reappraisal in mitigating negative trauma outcomes and as well facilitating sources that sustain the individual to overcome traumatic experience comes and fostering of PTG (Seligowski et al., 2015). Cognitive reappraisal may inhibit attention to intrusions, independent of event centrality, and expressive suppression may worsen intrusions due to its ineffectiveness in controlling them irrespective of the event centrality.

Event centrality only moderated the relationship between cognitive reappraisal and increased personal strength domain of PTSD, and worsened the relationship between expressive suppression and greater appreciation of life. On why the positive relationship between expressive suppression and greater appreciation of life became negative in the context of event centrality, expressive suppression support appreciation of life under low event centrality but not under high event centrality such as the highly devastating Fulani herdsmen attacks. It has also been shown that violent death of a close relative presents a special challenge to the Tiv based on cultural prescriptions regarding grieving (Chukwuorji et al., 2018). In this study, number of dead relatives was negatively related to avoidance symptoms (Table 2), probably suggesting distress from inability to fulfill familial responsibility of burying their dead relatives and achieve foreclosure with their dead relatives (Chukwuorji et al., 2018). Thus, effort at suppressing the trauma memory would generate excessive anxiety rather than supporting greater appreciation of life.

Our findings support the general precepts of models on the critical role of event centrality in the emergence of PTG (Janoff-Bulman, 1992, 2004; Bernsten and Rubin, 2006; Tedeschi and Calhoun, 2004). However, our results in Table 2 show that intrusion is positively related to both avoidance and hyper-arousal. The individual’s avoidance or negative reactions in approaching salient trauma-related (environmental and cognitive) cues seem to represent efforts to limit the probability of the occurrence of intrusions. Thus, while avoidance and hyper-arousal would be prone to the individual evaluating the event centrality while applying an emotion regulation strategy, intrusions, due to their automatic occurrence, would not accommodate the evaluation of the memory content before they are fully generated. Cognitive reappraisal may inhibit attention to intrusions, independent of event centrality, and expressive suppression may worsen intrusions due to its ineffectiveness in controlling them irrespective of the event centrality.

### Table 3

| Predictor | Intrusion B | t  | p    | 95% CI | Avoidance B | T  | P    | 95% CI | Hyper-arousal B | t  | p    | 95% CI | PTSD total B | t  | p    | 95% CI |
|-----------|-------------|----|------|--------|-------------|----|------|--------|-----------------|----|------|--------|-------------|----|------|--------|
| CR * EC  | 0.00        | -0.06 | 0.529 | [.02, .01] | 0.03 | 2.57 | .011 | [.05, .01] | 0.02 | 2.57 | .011 | [.04, .01] | 0.05 | 2.80 | .005 | [.09, .02] |
| EC       | 0.17        | 7.25  | 0.000 | [.13, .22] | 0.19 | 5.31 | .000 | [.12, .26] | 0.17 | 5.56 | .000 | [.11, .23] | 0.53 | 8.01 | .000 | [.40, .66] |
| CR       | 0.00        | 0.00  | 0.000 | [0.50, 0.50] | 0.04 | 3.13 | .002 | [.02, .07] | 0.04 | 8.47 | .002 | [.01, .06] | 1.46 | 3.03 | .003 | [.03, .13] |
| CR * EC  | 0.00        | 0.00  | 0.000 | [.00, .00] | 0.00 | 0.00 | 0.000 | [.00, .00] | 0.00 | 0.00 | 0.000 | [.00, .00] | 0.00 | 0.00 | 0.000 | [.00, .00] |
| EC       | 0.17        | 7.25  | 0.000 | [.13, .22] | 0.19 | 5.31 | .000 | [.12, .26] | 0.17 | 5.56 | .000 | [.11, .23] | 0.53 | 8.01 | .000 | [.40, .66] |
| CR * EC  | 0.00        | 0.00  | 0.000 | [0.50, 0.50] | 0.04 | 3.13 | .002 | [.02, .07] | 0.04 | 8.47 | .002 | [.01, .06] | 1.46 | 3.03 | .003 | [.03, .13] |
| EC       | 0.17        | 7.25  | 0.000 | [.13, .22] | 0.19 | 5.31 | .000 | [.12, .26] | 0.17 | 5.56 | .000 | [.11, .23] | 0.53 | 8.01 | .000 | [.40, .66] |
| CR * EC  | 0.00        | 0.00  | 0.000 | [0.50, 0.50] | 0.04 | 3.13 | .002 | [.02, .07] | 0.04 | 8.47 | .002 | [.01, .06] | 1.46 | 3.03 | .003 | [.03, .13] |

Our expectation that event centrality would be associated with PTSD symptoms clusters and total PTSD symptoms, and with lower PTSD in personal strength, but positive association with greater appreciation of life, partially supported our hypothesis. Previous findings (Seligowski et al., 2015) had linked greater expressive suppression with PTSD symptoms. Being a response-focused strategy intended to mitigate an already activated emotion process (Gross and John, 2003), expressive suppression is unlikely to enable the person to achieve inhibitory control (Brewin, 2001) over trauma memory. Rather, it can generate negative emotions in the individual once its failure to control trauma memory and incongruence between inner experience and outer presentation (Gross and John, 2003). Our finding that expressive suppression was positively associated with greater appreciation of life was not anticipated.

Our findings linking cognitive reappraisal with less deleterious trauma outcomes and fostering of PTG (Seligowski et al., 2015). Cognitive reappraisal, as an antecedent process that intervenes to control the full generation of an emotion-laden cognition (Gross and John, 2003), could be a critical part of the strategy through which the individual achieves effective inhibitory control (Brewin, 2001) over intrusion, avoidance, and hyper-arousal PTSD symptoms. It could equally enable the person to observe hitherto unnoticed scenarios as well as inner capacity or resources that sustain the individual to overcome traumatic experience and thus could activate PTG. The probable dual role of cognitive reappraisal in mitigating negative trauma outcomes and as well facilitating positive trauma outcomes may partly explain the negative correlation between PTSD and PTG as shown in Table 2. Previous findings have also shown that PTSD and PTG may be only indirectly related through some cognitive processes, including fear and guilt (Wang et al., 2020), self-blame, and problem solving (Ye et al., 2018).

### Table 3

PROCESS Macro results predicting PTSD symptoms from Event Centrality and Emotion Regulation (cognitive reappraisal and expressive suppression).

- **Cognitive reappraisal (CR) and Event centrality (EC)**
  - CR: -0.14, 0.000 (95% CI [-0.20, 0.01])
  - EC: 0.17, 0.000 (95% CI [0.13, 0.22])
  - CR * EC: 0.00, 0.000 (95% CI [0.02, 0.01])

- **Event centrality (EC) and Expressive suppression (ES)**
  - EC: 0.17, 0.000 (95% CI [0.12, 0.22])
  - ES * EC: 0.00, 0.000 (95% CI [0.02, 0.02])
PTG and PTG. They definitely involve more than the variables undertaken in this study. For instance, fear and guilt (Wang et al., 2020), self-blame, problem solving, wishful thinking (Ye et al., 2018), and rumination (Allbaugh et al., 2016; Wang et al., 2020) have been identified as potent variables in manifestation of PTSD and PTG. Bernsten and Rubin’s mnemonic model (Bernsten and Rubin, 2006) seems to identify the turning point to the divergent psychological processes that result in opposite outcomes of PTSD and PTG bordering on event centrality: PTSD could be an outcome of scenarios where the traumatic event is interpreted as disruptive (Cann et al., 2010; Janoff-Bulman, 1992), whereas PTG would emerge in scenario where the traumatic event is interpreted as a challenge requiring coping resources (Boals et al., 2019; Owenz and Fowers, 2018) or adjustment of life trajectories. Therefore, it is possible for a person to emerge from PTSD and encounter PTG.

The implications of trauma type and demographic characteristics in trauma outcomes need to be noted. The mean score of the participants on PTSD (31.92) as shown in Table 1 is almost double the minimal endorsement of symptoms on the 17-item HTQ used to measure PTSD symptoms in this study. Interpersonal traumas (such as armed attack) have been linked to stronger emotions that may overwhelm the person and result to PTSD symptoms, compared to non-interpersonal traumas (e.g., illness, natural disaster) which are more likely to generate lower levels of emotions and thereby more likely to facilitate PTG than PTSD symptoms (Wamser-Nanney et al., 2018). The intensity of the armed attacks and the short period for assessment after the armed attack could explain the less clear pattern of results we obtained on PTG compared to PTSD.

Our findings also show that PTSD symptoms seemed worse among older emerging adults, and PTG seemed higher among younger emerging adults (Table 2). Higher education was positively related with higher cognitive reappraisal and negatively related with expressive suppression, implying that those who had higher education are more likely to use cognitive reappraisal and less likely to use expressive suppression. Higher education was negatively related with all PTSD symptoms clusters and total PTSD, but was not related to PTG.

One of the practical implications of our findings is that psychological intervention programs that seek to control PTSD among armed attack survivors similar to the participants in this study may consider training them in cognitive reappraisal skills. Accentuating event centrality in such persons being trained in cognitive reappraisal skills may be beneficial. Those who apply expressive suppression would need to be trained to inhibit it and learn cognitive reappraisal strategy. One way to limit the use of expressive suppression and increase the adoption of cognitive reappraisal could be by providing social support to traumatized populations (Tedeschi and Calhoun, 2004; Ye et al., 2018). With social support, people are more likely to expose their emotions to others and to vent negative feelings, thereby decreasing the probability of expressive suppression (Zhou et al., 2016). Intervention programs also need to note our finding that older persons and the less educated seem to be more vulnerable to PTSD symptomatology. Or does the negative relationship between education and PTSD symptoms indicate that persons with higher education are more likely to dismiss symptoms reported by the less educated? This requires further research.

4.1. Limitations of the study

The cross-sectional design of this study requires caution in interpreting predictive directions among the variables in this study. Future study may consider comparative and longitudinal designs and the use of experience sampling methods not only to overcome this challenge but also to enable the investigation of the suggestion that the process of cognitive processing involved in posttraumatic growth is convoluted and changes in its quality over time (Tedeschi and Calhoun, 2004). The participants were assessed for PTG only six (6) months after the armed attack. Perhaps a clearer result with PTG would have been obtained with
longer duration after the attack. Another limitation of the study is that we did not control for cumulative trauma. In addition to the substandard environment in which the measures were administered on the participants and expected response bias observed in self-reports, research assistants helped illiterate participants in completion of the measures, and some literate participants completed the measures in the absence of the research assistants. We note the possible response bias that can arise from this procedure. Again, our inclusion criterion of understanding of Tiv language for participants may have extremely limited our sample complexity and therefore warrants caution in the generalization of the findings. We also note that Tiv culture relating to attachment to the land from which they were displaced, and inability to perform rituals related to grieving due to their displacement (Chukwuorji et al., 2018), may also have influenced the participants’ reaction to trauma. It remains to be
seen whether the findings of this study will be replicated in other cultures.

4.2. Conclusion

Our study was based on an area where the literature is scanty. It has however demonstrated that PTSD and PTG have different interactively predictive processes. We note that event centrality is critical in the associations of cognitive reappraisal and expressive suppression strategies of emotion regulation with PTSD symptoms in an emerging adult. How event centrality becomes critical in the facilitative or obstructive relationship of cognitive reappraisal and expressive suppression, respectively, with aspects of PTG is however less clear. We therefore suggest that more studies are required in this area. Psychological interventions that train survivors in application of cognitive reappraisal strategy centered on the traumatic event would reduce PTSD symptoms, especially among those with high event centrality. Event centrality may be less critical in engendering PTG through emotion regulation.

Informed consent

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

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Ethical approval

Ethical clearance for the study was granted by the psychology research ethics review committee of the University of Nigeria, Nsukka.

Declaration of Competing Interest

John E. Eze, Chuka Mike Ifeagwazi and JohnBosco Chika Chukwuorji declare that they have no conflict of interest.

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