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PTSD Growth and Substance Abuse Among a College Student Community: Coping Strategies after 2009 L'aquila Earthquake

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Abstract: Aim of the study was the assessment of coping strategies, specifically substance use and post-traumatic growth (PTG), in 411 college students two years after 2009 L'Aquila earthquake. Post-Traumatic Growth Inventory (PTGI) was used to assess PTG and one question about substance use (alcohol, tobacco, cannabis) was asked to verify if students had modified their use in the post-earthquake compared with the pre-earthquake period. The 77.1% of college students were exposed to L'Aquila earthquake. The PTGI mean score was 35.23, underlining low positive coping strategies among student community. About substance abuse, the 43.8% of college students reported a marked increase in alcohol use, 7.8% in cannabis and the 15.8% reported an increase in nicotine use in the post-earthquake period. Despite these data, 12.5 % of the students reported a decrease in alcohol use after the earthquake and 17.3% of the sample reported a PTG, showing positive behaviors and attitudes after the traumatic experience of the natural disaster (increase of social relationships, appreciation of new future possibilities, and development of a new deep meaning of life). Inferential analysis shows a strong negative correlation between direct earthquake exposure and PTGI total score. In post-disaster settings, a systematic framework of case identification, triage, and mental health interventions, including the improvement of positive coping strategies, like the PTG, should be integrated into emergency medicine and trauma care responses.

Keywords: Coping, earthquake, PTSD growth, substance use, trauma.

INTRODUCTION

At 3.32 a.m., April 6, 2009, central Italy was struck by a 6.3 magnitude earthquake, followed by about 20,000 aftershocks. The earthquake caused serious damage to the 13th century's town of L'Aquila in the Abruzzo region and close medieval villages in the surrounding areas, killing 309 residents, injuring over 1,600 residents, and leaving approximately 70,000 people homeless. About 44,000 people found accommodation in tented camps and a further 20,000 were housed in hotels on the Adriatic Sea coast. Immediately after the earthquake, people affected were damaged both physically and emotionally [1, 2].

Natural disasters are known to exert significant mental health aftermaths, with Posttraumatic Stress Disorder (PTSD), Anxiety and Depression and Substance Use Disorder (SUD) being the most studied and reported consequences often accompanying socioeconomic loss and displacement. Comorbid disorders in general and SUD in particular frequently complicate the course and outcome of PTSD and viceversa. Subjects with co-occurring PTSD and SUD have more severe post- traumatic symptoms than those with PTSD and poorer psychosocial outcomes [3].

Although substance use is a well-documented comorbid factor accompanying PTSD and other psychological disorders, few investigations have specifically documented the prevalence of increased substance use after major disasters like an earthquake [1, 4].

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†In memory of Prof. Rocco Pollice, great Scientist and Professor of Psychiatry.

Research following Hurricane Andrew of August 1992 found only two per cent of area residents reporting alcohol dependence [5]. After 11 September 2001 among a national sample of employed adults, little decrease in alcohol abuse was found [6, 7]. Two weeks after Bam 2003 earthquake, a study conducted on 163 subjects about illicit opium use, documented a reduction [8]. Other investigators found increases in alcohol, tobacco and marijuana consumption after the events of 11 September 2001, revealing that 27 per cent of respondents were consuming more alcohol, tobacco or marijuana in the six month after the disaster than before it [4]. Cepeda *et al.* [3] revealed that rises in alcohol use were positively associated with education. Females and younger evacuees were more likely to have increased alcohol use. Illicit drug use increase was positively associated with resource loss. Decreases in alcohol and illicit drug use were found to be associated with disaster-related exposure.

Furthermore, survivors of trauma also report experiencing positive psychological changes in various dimensions such as personal strength, relations and appreciation of life; cumulatively defined as posttraumatic growth (PTG). The PTG is multifaceted which is manifested through relationships with others, perception of new possibilities, enhanced personal strength, spiritual change, and an increased appreciation for life [9, 10].

There are three dimensions of posttraumatic growth observed most frequently based on previous research. First, relationships with others are improved to some extent. Second, people change their views of themselves after adversity in some way. Third, people's life philosophy is also changed [11].

The recent research has also begun to address the correlates and predictors of growth, with various findings such as

the importance of stress-appraisal, social support, coping strategy and personality variables, increased positive mental health, reduced negative mental health and better subjective physical health [12].

The purpose of present study was the description of different coping strategies, specifically substance use and PTSD growth, among a college student community after 2009 L'Aquila and the correlation with a distress symptomatology and natural disaster variables (i.e. direct exposure).

MATERIALS AND METHODOLOGY

Data collection for the present study was conducted two years after L'Aquila 2009 earthquake from February to October 2011. A total of 411 undergraduate students at L'Aquila University were involved in the psychological screening survey.

Following ethics local committee approval, individuals who appeared to satisfy the study inclusion criteria were submitted a description of the study and obtained consent, all eligible subjects completed the study's assessment.

Two study's exclusion criteria: a formal psychiatric diagnosis (including a substance use disorder or dependence) and a current use of psychotropic medication.

All students enrolled, completed a self-report questionnaire including items on socio-demographic characteristic (age, gender, occupation, residence) and the direct exposure to earthquake assessed using 2-point scale (yes=1 and no=0). Substance Use was assessed with one question per substance (alcohol, tobacco, cannabis) asking if the users had increased their use in the post-earthquake compared with the pre-earthquake period. To this aim, a 4-point scale was used (none, less than before, equal to before, greater than before) [2].

The PTSD GROWTH INVENTORY (PTGI) was used to measure PTG. The 21-item scale includes items that assess the degree to which an individual reports specific positive changes attributed to the struggle with a highly stressful event (possible total scores range from 0 to 105). Five empirically derived domains are assessed: Relating to Others (7 items), New Possibilities (5 items), Appreciation of Life (3 items), Personal Strength (4 items), and Spiritual Change (2 items). Cronbach's alphas for the total score have ranged from $\alpha = 0.91$ to 0.93 [13]. According to Jin *et al.* (2014), a PTGI score above 57 (including 57) was considered to indicate a moderate level of post-traumatic growth [14]. First step of our analysis was the study of all described variables described and after we divided the total sample according to the direct exposure to L'Aquila earthquake to study the impact of the natural disaster on positive and negative coping strategies.

STATISTICAL ANALYSIS

The Statistical Package for Social Sciences (SPSS 20) was used.

General descriptive statistics (frequencies and percentages) were used to describe the PTG and substance abuse. One-way ANOVA were performed to compare the substance use and the PTG in the different participant groups (gender and direct exposure to earthquake). Relations between variables were explored by 2-tailed Person's correlation. Statistical tests were considered significant if $p<0.05$.

RESULTS

Demographic Characteristics

The demographic characteristics of 411 college students are presented in Table **1**.

The mean age was 24.22±3.08 years and the sample (53%; N=218) mostly consisted of males. 339 subjects (82.9%) were college students, the others (N=72) were working students: 88.7% were medical students.

At the time of the interview, only 133 students (32.4%) were residing in L'Aquila.

The 77.1% (N=317) of sample was exposure to L'Aquila earthquake.

Table 1. Socio-demographic and earthquake characteristics of study sample (N=411).

	n/mean	%/sd
Gender Male Female	 218 193	 53.0 47.0
Occupation Student Working student	 339 72	 82.9 17.1
Resident in L'aquila Yes No	 133 278	 32.4 67.6
Earthquake Exposure Yes No	 317 94	 77.1 22.9
Mean Age (years)	24.2	± 3.08

Substance Abuse and PTG

Of 411 participants, the prevalence of substance abuse pre- and post-earthquake, showed that 43.8% (N=180) of college students reported, after the 2009 earthquake, an increase in alcohol use and 12.4% (N=51) a reduction; 7.8% (N=32) reported an increase in cannabis use and the 4.4% (N=18) a reduction; at last 15.8% (N=64) of sample reported an increase in nicotine use, and 15.3% (N=63), a reduction (Fig. **1**).

71 participants (17.3%) of sample were considered to have PTG (PTGI score ≥ 57), mainly female (N=42, 59%). For the PTG subscale, only 7% of respondents (N=29) showed an improvement as compared to others, 23.3% (N=96) were open to new possibilities, 23% (N=95) an improvement in their personal life and an increased appreciation for life (Table **2**). The PTGI mean score was 35.23 (SD

± 21.1), which underlines low positive coping strategies among the student community.

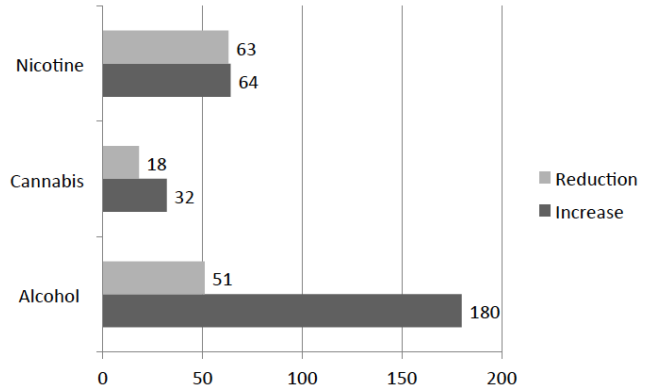

Fig. (1). Substance abuse increase and reduction after the 2009 earthquake.

Table 2. Prevalence of PTG two years after L'Aquila earthquake.

Post Traumatic Growth Inventory (PTGI)	n	%
Total score >57	71	17.3%
Relation to Others >21	29	7%
New Possibilities >15	96	23.3%
Personal Life >12	95	23%
Appreciation >9	95	23%

Chi-square tests were performed to compare the prevalence of PTG and substance abuse in different participant groups: were reported statistical differences between men and woman in alcohol abuse ($p<0.00$; $f=27.4$) and cannabis ($p<0.00$; $f=26.2$) with higher frequencies among men; not differences in nicotine abuse ($p<0.123$; $f=2.31$) were reported. No statistical differences by gender in PTGI total score were reported, but there were differences in all PTGI subscales such as in "relating to others" ($p>0.002$; $f=9.897$), "new possibilities" ($p>0.013$; $f=6,192$), "personal strength" ($p>0.006$; $f=7.604$), "spiritual change" ($p>0.000$; $f=12.503$) and "appreciation of life" ($p>0.000$; $f=21.74$),

In accordance with the direct exposure to earthquake, the only statistical difference between the two groups was in alcohol abuse ($p>0.042$; $f=4.178$). The bivariate regression showed that direct earthquake exposure was negatively associated with PTGI score ($p>0.038$; r: -0.103), not revealing other associations.

DISCUSSION

The aim of our study was the description of positive and negative coping strategies among a college student community, specifically substance use and PTSD growth, two years after 2009 L'Aquila. The most interesting result of our study was that our young sample, to cope a collective trauma such as a natural disaster occurs in L'Aquila, employed predominantly negative coping strategies, that is by increasing substance abuse, mainly alcohol compared to cannabis use that instead had a small increase (about 4%).

This finding is in line with Hurricane Andrew studies [5] reporting, among a general population sample, alcohol dependence. Instead, after 11 September 2001 and Bam 2003 earthquake, a little decrease in alcohol abuse and cannabis abuse was found, respectively [7, 8].

However, as already mentioned, the international literature about substance abuse after a traumatic event, specifically a natural disaster, is quite controversial.

The study results are in line also with our previous study [2] that showed a marked increase in substance abuse among people who survived a catastrophic earthquake. Pollice and colleagues (2011), reported that young participants reacted to emotional distress by turning to substance use in the absence of other, more adaptive coping mechanisms: such as the positive coping strategies of young survivors were not analyzed in that study. Another substantial difference between the two studies was that in the previous survey only young people seeking help in a psychiatric service and the SMILE service were enrolled and not only a general population sample, but the results were, unfortunately, very similar. This result maybe emphasizing a typical style of life and the coping strategies learnt by all young people of L'Aquila, regardless of the psychiatric diagnosis.

Moreover, in the previous study had revealed gender differences in substance abuse that have not been recognized in this study among a general population sample. People experienced positive personal and psychological changes in the aftermaths of trauma, despite the psychological distress associated with potentially traumatic event.

Post-traumatic growth (PTG) has been defined as "positive change that an individual experiences as a result of the struggle with a traumatic event" [15].

Several empirical studies have demonstrated a positive growth after several different types of traumatic events, for example, following terrorist attacks [16]. The PTG construct is based on an increased appreciation of life, the ability to set new life priorities, a sense of increased personal strength, the ability to identify new possibilities, an improved closeness in intimate relationships or a positive spiritual change [13].

However, most PGT literature has focused on the serious medical illness survivors, with very few examining earthquake survivors [17].

Another goal of this study is the evaluation of PTG coping strategy among 411 college students: in our sample, however, the prevalence of a positive coping traumatic event was very low (PTGI total score was 35 with a range from 0 to 95), underling a clear attitude, as already described, toward negative coping based on substance abuse. The most indicative result in this direction was the negative correlation between the direct exposure to 2009 L'Aquila earthquake and the PTGI score. Finally, it gender difference was not detected in post traumatic growth (PTG) but several other international studies demonstrated that females report more growth than males [18].

The limitations of study lie in the fact that no comparisons have been made with a population of older people that may have presented different coping strategies and perhaps a greater tendency towards a post-traumatic growth. Another limitation was the lack of psychopathological picture of the subjects evaluated with respect to at least the anxious-depressive symptomatology, and the correlations with coping strategies: this is the focus of our future research.

In conclusion, our results could provide a basis for effective post-disaster psychological interventions in order to study the mental health of disaster survivors, to assess the psychopathology and to early detect the development of clinical disorders as anxiety, depression and substance signify how the comorbidity between these disorders and PTSD is clinically relevant [19]. At the same time it seems necessary, as primary prevention in a post disaster setting on general population, to provide programs to improve positive coping strategies like a post traumatic growth.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

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