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Multilevel clinical psychological intervention after the earthquake in Norcia community: a pilot study

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Abstract

Aim of the study was to explore the psychological well-being of Norcia's teachers and students 3 years after the earthquake, and to verify the effectiveness of the Pennebaker's expressive writing intervention (EWI) on a group of high-school students. In the first step of the study a drawing participative action-intervention, lasting three days, was carried out with twelve teachers of primary, middle and high school and their students. From the first step, emerged fear and anxiety related to the earthquake, and that the sense of belonging to Norcia community appeared to be an integrative factor against the dissociative feelings of the trauma. Starting from these results, in the second step of the study, the EWI was carried out on a sample of 18 high-school students. The participants were instructed to write for three days about feelings related to Norcia earthquake (experimental group) and about a non-emotional account of daily activities (control group). Before (T0) and 1 month after (T1) the EWI, levels of anxiety, the depression, the trauma symptom, dissociation, post-traumatic growth were measured. Moreover, the territorial sense of community was assessed at T0. Results of the second steps showed that the writing intervention did not reduce the psychopathological symptoms of the experimental group. However, it emerged that the sense of community could be a protective factor against the depression symptoms and could have an important facilitating role for the post-traumatic growth.

Keywords: Norcia; earthquake; post-traumatic growth; sense of community; expressive writing intervention.

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Introduction

Several previous studies highlighted the high risk of developing post-traumatic stress as a consequence of particularly stressful events with a strong emotional impact. Trauma is an event perceived as threatening and potentially capable of causing physical and psychological damages (Sakuma, 2015) and appears to be one of the etiological factors of psychic disorders and symptoms (Sherin & Nemeroff, 2011).

One of the major events with a strong traumatic impact is the earthquake. On 30 October 2016, one of the largest earthquakes occurred in central Italy (Pisco et al., 2018). The seismic sequence of the Norcia earthquake (Mw 6.5) was characterized by severe seismic tremors (Marzocchi, Taroni, & Falcone, 2017). This was one of the strongest seismic events occurred in Europe in the last thirty years, causing complex surface ruptures over an area of > 400 km^2 (Villani et al., 2018).

Earthquake victims, as well as the victims of other traumatic experiences, have often shown severe psychological consequences including post-traumatic stress disorder (PTSD) (DSM 4-TR, 2010; ICD-10, 1993). Among the most important clinical consequences of earthquakes-related traumatic experiences, there are dissociative symptoms, which include emotional amnesia, numbness, and avoidance of memories (Lanius et al., 2010; Massaro et al., 2018; Stovall-McClough & Cloitre, 2006). This symptomatology could be the consequence of a downregulation of the emotions related to the traumatic event aimed at avoiding perceiving emotions, cognitions and memories linked to the event (Dalenberg & Carlson, 2012; Lanius et al., 2012), to decrease the impact of the emotional reaction. The scale of dissociation subtypes in PTSD involves the measurement of three factors: derealization/depersonalization, loss of awareness, and psychogenic amnesia (Wolf et al., 2017).

Regarding the earthquakes-related traumatic experiences, the subjectivity of the residence time of the post-traumatic disorder in subjects who have lived the same experience is of extreme importance.

The individual differences in the perception of a shared traumatic experience are pivotal for the remission of symptoms. In recent years, there has been increasing interest in investigating the eventual positive effects of traumatic life events. Tedeschi and Calhoun (2004) suggested the term "post-traumatic growth" (PTG) identify positive psychological changes among people who experienced highly stressful and challenging life events. Some variables may or may not interfere with the process of PTG, for example, the presence of anxiety, anger and depression connected with the traumatic events (Taku et al., 2011), as well as the personal condition of online stress during the occurrence of the trauma (Schneider et al., 2019). Tedeschi and Calhoun (2004) found also that people often reported experiencing positive changes since the traumatic events occurred, such as feelings of connectedness with their community members or pleasure in the small everyday things (Jayawickreme & Blackie, 2014).

The sense of community is the feeling of belonging, similitude, and connectivity of people that feel to be part of a community (Santinello et al., 2009). Mcmillan and Chavis (1986) define this construct as composed by 4 factors: belonging, influence, integration and satisfaction of needs and shared emotional connection. According to "the hypothesis of shared significant events" (McMillan & Chavis, 1986), the more important shared event among the members of a community is the strong bond between them. In this regard, many studies show the strength of the bond between people that live a crisis together (Myers, 1992). Therefore, in front of the earthquake the bond between the members of the community could be strengthened (Gordon, 1991).

For all these reasons, it appears to be extremely important to identify a treatment, indicated for each level of trauma severity, to be applied in emergency, and to intervene on the disorder and symptoms deriving from the traumatic experience of the earthquake.

The narrative exposure technique (NET) seems to reduce the symptoms of traumatic stress with increased resilience and consequent changes in traumatic memories and post-traumatic cognition (Kangaslampi, Garoff, & Peltonen, 2015). Pennebaker's expressive writing technique involves 2-4 writing sessions, in which the participant describes the difficult situations of their life with emotional transport and in the absence of distracting stimuli. Several research studies have shown that the writing intervention reduced physical complaints, anger and suffering in clinical patients, who experienced also greater improvement in social support and employment status (Sayer et al., 2015). Several studies and researches in psychosomatic and health psychology (Pennebaker & Beall, 1986; Solano et al., 2001; 2003) have highlighted the beneficial effects of expressive writing in adapting to traumatic or stressful events and in preventing stress-related illnesses or physical health problems. Describing the difficult situations of the life, and trying to clarify the thoughts and feelings connected to them, helps improve the general state of health, favouring personal efficiency and positively modifying attitudes and interpersonal relationships as well as the sense of community (Solano et al., 2001).

The present study was based on the participative action research model and it involved two steps. The aim of the first step was to explore through a drawing technique the psychological wellness of the Norcia's teachers and students, and to plan an action-research intervention that could facilitate the elaboration of emotional experiences related to Norcia earthquake trauma. Starting from the emotional content emerged from the first step, an expressive writing intervention has been implemented in the second step of the study.

The aim of the second step of the study was to assess the effectiveness of the expressive writing intervention proposed by Pennebaker in a sample of high-school students, randomly assigned to two groups (experimental and control groups). The hypothesis was that in the experimental group there would have been a reduction of the dissociation, anxiety, depression, traumatic symptoms levels and an increase in the post-traumatic growth compared to the control group. Moreover, it has been hypothesized that a high trait anxiety could be a risk factor for the post-traumatic growth, while a high sense of community could represent a protective factor.

Methods

Procedure

The study received the ethical approval from the Ethical Committee of the [edited for blind review] and it was

conducted from November 2018 to June 2019, three years after the earthquake of Norcia. This study was based on the participative action research model, that allows to face the solution of operational problems by developing forms of intervention aimed to positive and participatory change (Benvenuto, 2015). Participatory action research refers to a process whereby the researchers and stakeholders (those who potentially benefit from research results) collaborate in the design and conduct of all phases of the research.

The researchers were directly contacted by the major of Norcia (one of the epicentres of the 2016 earthquake) in order to arrange an intervention focused mainly on adolescents in schools.

The study involved two steps. The first step of the study involved a drawing participative intervention with the teachers of primary, middle, and high school. An expressive art intervention was chosen because it stimulates integrated and creative cognitive-emotional responses to trauma, supporting safety, positive emotional experiences, mastery, coping, and social-communication (Collie et al., 2006; Johnson, Lahad, & Gray, 2010; Kalmanowitz & Ho, 2016; Worrall & Jerry, 2007). Moreover, previous studies reported that figurative arts were acceptable for a diversity of populations impacted by trauma (Baker et al., 2017; Hongo, Katz, & Valenti, 2015).

The drawing participative intervention was structured in three different days (lasted about 3 hours for each day), and it was scheduled as follows. In the first day, teachers firstly shared their earthquake-related memories and emotions in a circle time (Glazzard, 2016). During this circle time it emerged a persistent condition of fear and instability that was still affecting the everyday life in the current present. After the circle time, the following instructions were given to the teachers: "Try to draw the city of Norcia before, during and after the earthquake", thus eliciting the representation of the participants' mental images of the context of the earthquake and its effects during that time. This drawing instruction was chosen because it allows to integrate the traumatic past with the present moment, producing a reflection even on future expectations. For drawings, participants chose from a selection of white paper, pastels or markers. After drawing, the emotions emerged by the drawings were shared in another circle time. At the end of the first day, it was proposed to the teachers to repeat this drawing exercise with their own students, using the same procedural modalities.

After one month, there was the second day of the drawing intervention with teachers who, during the time elapsed since the previous meeting, had carried out the drawing intervention with their students. The teachers showed and shared students' drawings and feelings that emerged in the classroom during a circle time. Finally, during the third day of the drawing intervention there was a restitution meeting on the contents that emerged from the drawing action-intervention.

Starting from contents emerged in the first step of the study, the second step involved an expressive writing intervention following the Pennebaker technique (Pennebaker & Beall, 1986). This second step of the study was carried out in collaboration with the De Gasperi - Battaglia Scholastic Institute of Norcia (Italy). The students who voluntarily accepted to participate were enrolled in the study after having signed an informed consent. Before the writing intervention (T0), the following self-report questionnaires were administrated to the participants: State-Trait Anxiety Inventory Y-1 form (STAI Y-1), Beck Depression Inventory-II (BDI-II), Trauma Symptom Inventory (TSI), Dissociative Experience Scale-II (DES-II), Post-traumatic Growth Inventory (PTGI), and Multidimensional Territorial Sense of Community Scale (MTSOCS).

After the administration of the questionnaires, the participants were randomly assigned to two different groups for the expressive writing task: one group, in which participants were instructed to write for three days "a non-emotional account of their activities in the 24 h prior to their writing session", for about 15-20 minutes *per* day (control group); and the other one, in which participants were instructed to write for three days about their "deepest thoughts and feelings" related to the Norcia earthquake for about 15-20 minutes *per* day (experimental group). The number of writing sessions and the time allotment were chosen on the basis of previous findings that at least three sessions and at least 15 min of writing during each session were needed in order the intervention to be effective (Frattaroli, 2006). On a fourth visit, four weeks after the final writing session (T1), participants once again completed the outcome measures.

Participants

Step 1. Potential teachers were invited to take part in step 1 via a direct contact by the local administration office. People who responded to the invitation were directly contacted by the researchers to make arrangements for the first step. Informed consent was obtained before the first step. Inclusion criteria were age between 18 and 60 years, being teachers in Norcia or in the seismic crater area, as defined by civil protection, when the earthquake hit the region. Exclusion criteria were psychotropic medication use, substance abuse, and presence of neurological diseases.

Step 2. Potential students were recruited through a scholastic communication distributed in the last years of the high school classes of the De Gasperi - Battaglia Scholastic Institute of Norcia. Participation in the study was completely voluntary, and each participant signed informed consent before the administration of the psychological assessment questionnaires started. Inclusion criteria considered age between 18 and 20 years and having been in Norcia or the seismic crater area, as defined by civil protection, when the earthquake hit the region. Exclusion criteria were the same of the first step of the study.

Measures

The State-Trait Anxiety Inventory (STAI) (Spielberger, 1970) is a reliable and valid self-report questionnaire, and it comprises separate self-report scales for measuring state and trait anxiety. The S-Anxiety scale (STAI Y-1) consists of twenty statements that evaluate how the respondent feels "right now, at this moment". The T-Anxiety scale (STAI Y-2) consists of twenty statements that evaluate how the

respondent feels "generally". In responding to the S-Anxiety scale, the subjects choose the number that best describes the intensity of their feelings: (1) not at all, (2) somewhat, (3) moderately, (4) very much so. In responding to the T-Anxiety scale, subjects rate the frequency of their feelings on the following four-point scale: (1) almost never, (2) sometimes, (3) often, (4) almost always. Each STAI item is given a weighted score of 1 to 4. Internal consistency coefficients for the scale have ranged from .86 to .95; test-retest reliability coefficients ranged from .65 to .75 over a 2-month interval (Spielberger et al., 1983).

The *Beck Depression Inventory II (BDI II)* is a 21-item self-report questionnaire consisting of four statements describing increasing intensities of depressive symptoms (Beck, Steer & Brown, 1996). It includes somatic and cognitive-affective symptoms and each item ranges from 0 to 3 reflecting the patient's feelings in the previous two weeks. A score of 14 or above is indicative of depressive symptoms. Depressive symptoms were categorized as: minimal–moderate depressive symptoms (range 14–19), moderate–severe depressive symptoms (range 20–29), severe depressive symptoms (range 30–63) (Beck, Steer & Brown, 1996). Cronbach Alpha was 0.86 for the somatic factor, 0.65 for the cognitive-affective factor (Montano & Flebus, 2006).

The *Trauma Symptom Inventory* (TSI; Briere, 1995) is the most commonly used self-report measure of posttraumatic symptomatology in adults (Briere & Hedges, 2010). Items ranged from '0' representing no experience of the symptom to '3' representing frequent occurrence in the last 6 months. Internal consistency ranged from 0.71 to 0.83 (Gambetti et al., 2011).

The *Dissociative Experiences Scale II* (*DES II)* (Carlson & Putnam, 2000) is a 28-item self-report scale used to assess the frequency, intensity, and nature of dissociative experiences, and its scores do not correspond to a diagnosis of dissociation. The DES II is based on an analogical assessment: the participants indicate the frequency of the experience described in each item on a 100 mm scale, providing a score ranging from 0 to 100. The total is multiplied by 10 and then divided by 28 (the number of questions) to calculate the average score (Carlson & Putnam, 2000). The scale has good psychometric properties: Cronbach's alpha values were .91 for the total DES score (Massaro et al., 2018).

The *Post-Traumatic Growth Inventory* (PTGI; Tedeschi & Calhoun, 1996) is a 21-item self-report that assesses post-trauma growth and self-improvement. The statements of each item are related to the following five factors: Factor I-Relating to Others; Factor II-New Possibilities; Factor III-Personal Strength; Factor IV-Spiritual Enhancement; Factor V-Appreciation. A sum of the scores indicates the level of post-traumatic growth. Cronbach's alpha was .92 (Prati & Pietrantoni, 2006).

The *Multidimensional Territorial Sense of Community Scale* (MTSOCS) is a 26 items-self report questionnaire with four response modalities (4=strongly agree, 3=agree, 2=disagree, 1=strongly disagree) (Prezza et al., 2009). The MTSOCS is based on McMillan and Chavis's (1986) theory. The internal consistency (Cronbach's alpha) of the total score was .88 (Prezza et al., 2009).

Statistical analyses

The differences between groups (Experimental *vs.* Control) on the scores of the BDI-II, STAI-S, DES-II, PTGI, and TSI at T0 and T1 were computed using the non-parametric Mann-Whitney U test for continuous variables. Moreover, the differences between T0 and T1 on the scores of the BDI-II, STAI-S, DES-II, PTGI, and TSI were computed separately in the Experimental and Control groups using the non-parametric Wilcoxon matched-pairs test.

Moreover, separately on the Experimental and Control Groups, the correlations (Pearson's r) between the State-Trait Anxiety Inventory-trait anxiety (STAI-T), the Multidimensional Territorial Sense of Community Scale (MTSOCS) scores at T0 and the difference between T0 and T1 (Δ= T1-T0) of the scores of the Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory-state anxiety (STAI-S), and Post-traumatic Growth Inventory (PTGI) were performed.

Starting from the significant correlations, multiple regression analyses setting up STAI-T at T0 as predictor were conducted respectively on the difference between T0 and T1 (Δ= T1-T0) of the STAI-S and PTGI (total, NP, and AL). Moreover, multiple regression analysis setting up the MTSOCS at T0 as predictor was conducted on the difference between T0 and T1 (Δ= T1-T0) of the BDI-II.

Results

Results of step 1

The sample was composed by twelve teachers. From the drawing intervention emerged a strong desire to restore the sense of identity and a need to use the old haunts in order to rebuild a greater sense of community (see Figure 1). In general, older students also reported experiences of fear and anxiety for the future. At the end of the drawing intervention, during the circle time emerged difficulties especially in high school students, with particular reference to depressive and anxious experiences. Moreover, from the drawings emerged dissociative feelings of poor integration between the past traumatic event and the present moment. Furthermore, during the circle time, emerged a need to feel active part of the community, such as feelings of connectedness with the community members.

Results of step 2

The sample was composed by eighteen participants (15 females and 3 males; mean age females M= 18.3 ± 0.6, mean age males M= 18.0 ± 0.0; t(16)= 0.9; p= .375). The participants were randomly assigned to the two groups: 9 to the Experimental Group (M= 18.1 ± 0.3) and 9 to the Control one (M= 18.4 ± 0.7).

The differences between how groups (Experimental *vs.* Control) performed on the scores of the BDI-II, STAI-S, DES-II, PTGI, and TSI at T0 and T1 using the non-parametric Mann-Whitney U test did not show any significant results (see table 1).

Fig. 1. Examples of three different drawings. The instruction was «Try to drwa the city of Norcia before, during and after the earthquake».

Tab. 1. Differences between groups (Experimental vs. Control) on the scores of the Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory-state anxiety (STAI-S), Dissociative Experience Scale-II (DES-II), Post-traumatic Growth Inventory (PTGI), and Trauma Symptom Inventory (TSI) at T0 and T1 performed using the non-parametric Mann-Whitney U test.

		Experimental (N=9)	Control (N=9)		
	Time	M ± SD	M ± SD	Z	p
Depression	T0	7.9 ± 4.8	10.9 ± 9.3	0.40	.691
	T1	7.4 ± 5.5	5.5 ± 5.3	-0.71	.480
State anxiety	T0	37.4 ± 6.1	41.2 ± 7.9	0.93	.353
	T1	39.3 ± 9.5	43.4 ± 5.4	1.19	.233
Dissociation	T0	22.4 ± 14.4	26.4 ± 17.0	0.88	.377
	T1	23.3 ± 15.2	13.3 ± 11.3	-1.50	.133
Post-traumatic growth-total	T0	41.1 ± 18.0	33.7 ± 16.8	-1.11	.270
	T1	28.1 ± 15.0	22.7 ± 12.5	-0.84	.401
Post-traumatic growth-relating to others	T0	13.2 ± 6.2	10.0 ± 5.5	-0.75	.453
	T1	8.1 ± 5.4	6.9 ± 5.2	-0.40	.691
Post-traumatic growth-new possibilities	T0	7.1 ± 5.1	6.6 ± 3.2	-0.13	.895
	T1	7.1 ± 3.8	4.6 ± 3.4	-1.28	.200
Post-traumatic growth-personal strength	T0	9.8 ± 3.0	8.1 ± 4.4	-0.71	.480
	T1	6.0 ± 3.8	5.3 ± 3.3	-0.66	.508
Post-traumatic growth-spiritual change	T0	2.9 ± 2.7	1.4 ± 1.7	-1.24	.216
	T1	1.4 ± 1.9	1.1 ± 1.1	0.13	.894
Post-traumatic growth-appreciation of life	T0	8.1 ± 5.1	7.6 ± 5.2	-0.31	.757
	T1	5.4 ± 3.2	4.8 ± 2.6	-0.26	.791
Trauma symptoms	T0	70.1 ± 35.4	80.4 ± 13.8	0.53	.596
	T1	62.0 ± 32.7	54.0 ± 35.6	-0.40	.691

The differences between T0 and T1 on the scores of the BDI-II, STAI-S, DES-II, PTGI, and TSI computed separately in the Experimental and Control groups, using the non-parametric Wilcoxon matched-pairs test, showed the following results (see table 2). In the experimental group, the significant differences between T0 and T1 were found on the PTGI total, relating to others, and personal strength scales, where the participants showed a higher score at T0 compared to T1 (see table 2). In the control group the significant differences between T0 and T1 were found on the BDI-II and DES-II scales, where the participants showed a higher score at T0 compared to T1 (see table 2).

Tab. 2. Differences between T0 and T1 on the scores of the Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory-state anxiety (STAI-S), Dissociative Experience Scale-II (DES-II), Post-traumatic Growth Inventory (PTGI), and Trauma Symptom Inventory (TSI) performed separately in the Experimental and Control groups using the non-parametric Wilcoxon matched-pairs test.

	Experimental (N=9)			Control (N=9)		
	T0 M ± SD	T1 M ± SD	p	T0 M ± SD	T1 M ± SD	p
Depression	7.9 ± 4.8	7.4 ± 5.5	.554	10.9 ± 9.3	5.5 ± 5.3	**.043**
State anxiety	37.4 ± 6.1	39.3 ± 9.5	.779	41.2 ± 7.9	43.4 ± 5.4	.213
Dissociation	22.4 ± 14.4	23.3 ± 15.2	.173	26.4 ± 17.0	13.3 ± 11.3	**.038**
Post-traumatic growth-total	41.1 ± 18.0	28.1 ± 15.0	**.044**	33.7 ± 16.8	22.7 ± 12.5	.066

	Experimental (N=9)			Control (N=9)		
	T0 M ± SD	T1 M ± SD	p	T0 M ± SD	T1 M ± SD	p
Post-traumatic growth-relating to others	13.2 ± 6.2	8.1 ± 5.4	**.018**	10.0 ± 5.5	6.9 ± 5.2	.110
Post-traumatic growth-new possibilities	7.1 ± 5.1	7.1 ± 3.8	1.000	6.6 ± 3.2	4.6 ± 3.4	.161
Post-traumatic growth-personal strength	9.8 ± 3.0	6.0 ± 3.8	**.038**	8.1 ± 4.4	5.3 ± 3.3	.110
Post-traumatic growth-spiritual change	2.9 ± 2.7	1.4 ± 1.9	.075	1.4 ± 1.7	1.1 ± 1.1	.500
Post-traumatic growth-appreciation of life	8.1 ± 5.1	5.4 ± 3.2	.059	7.6 ± 5.2	4.8 ± 2.6	.069
Trauma symptoms	70.1 ± 35.4	62.0 ± 32.7	.407	80.4 ± 13.8	54.0 ± 35.6	.110

Only the correlational analyses performed on the Experimental Group between the STAI-T, the MTSOCS at T0 and the difference between T0 and T1 (Δ= T1-T0) of the scores of the BDI-II, STAI-S, and PTGI showed significant results. The STAI-T score at T0 was positively associated with the Δ STAI-S score, and it was negatively associated with the Δ PTGI total, new possibility, and appreciation of life scores. Moreover, the MTSOCS score was negatively associated with the Δ BDI-II score (see table 3). The correlational analyses performed on the Control Group did not show any significant results.

Tab. 3. Correlations (Pearson's r) between the State-Trait Anxiety Inventory-trait anxiety (STAI-T), the Multidimensional Territorial Sense of Community Scale (MTSOCS) at T0 and the difference between T0 and T1 (Δ= T1-T0) of the scores of the Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory-state anxiety (STAI-S), and Post-traumatic Growth Inventory (PTGI) of the experimental and control groups.

	Δ Depression	Δ State anxiety	Δ Post-traumatic growth-total	Δ Post-traumatic growth-relating to others	Δ Post-traumatic growth-new possibilities	Δ Post-traumatic growth-personal strength	Δ Post-traumatic growth-spiritual change	Δ Post-traumatic growth-appreciation of life
Experimental group at T0 (N=9)								
Trait anxiety	-.1436	**.7056***	**-.7650***	-.3283	**-.7331***	-.4261	-.3201	**-.8351****
Sense of community	**-.7590***	-.2701	.0666	.4824	-.1763	-.1523	-.2947	.2440
Control group at T0 (N=9)								
Trait anxiety	-.2280	.5947	.1670	.3941	.0481	.1338	.3617	-.1162
Sense of community	.5739	-.0368	.4597	.3147	.4501	.5633	-.2557	.5263

Note. * p < 0.05; ** p < 0.01.

Starting from the significant correlational analyses, the multiple regression model performed with the STAI-T score at T0 as predictor on the difference between T0 and T1 (Δ= T1-T0) of the STAI-S and the PTGI (total, new possibility, and appreciation of life) scores showed the following results (see table 4).

Tab. 4. Multiple regression model with the State-Trait Anxiety Inventory-trait anxiety (STAI-T) at T0 as predictor on the difference between T0 and T1 (Δ= T1-T0) of the State-Trait Anxiety Inventory-state anxiety (STAI-S) and the Post-traumatic Growth Inventory (PTGI) of the experimental group (N=9).

	R= .76; R^2= .58; adj R^2= .57; p= .016			
	Beta	B	t (7)	p
Trait anxiety at T0	**Δ state anxiety**			
	.71	.62	2.63	.034
	Δ post-traumatic growth-total			
	-.76	-1.20	-3.14	.016
	Δ post-traumatic growth-new possibilities			
	-.73	-.41	-2.85	.025
	Δ post-traumatic growth-appreciation of life			
	-.83	-.34	-4.01	.005

The regression model was significant and the STAI-T score at T0 resulted as significant predictor of the Δ STAI-S and the Δ PTGI total, new possibility, and appreciation of life scores. Moreover, the multiple regression models performed with the MTSOCS at T0 as predictors on the difference between T0 and T1 (Δ= T1-T0) of the BDI-II showed the following result (see table 5).

The multiple regression model was significant and the MTSOCS score at T0 resulted as significant predictors of the Δ BDI-II.

Tab. 5. Multiple regression models with the Multidimensional Territorial Sense of Community Scale (MTSOCS) at T0 as predictors on the difference between T0 and T1 (Δ= T1-T0) of the Beck Depression Inventory-II (BDI-II) of the experimental group (N=9).

	Δ Depression			
	Beta	**B**	**t(7)**	**p**
Sense of community at T0 R= .76; R^2= .58; adj R^2= .51; p= .018	-.76	-.32	-3.08	.018

Discussion

From the first step of the study, it emerged that in the teachers and students of Norcia there were feelings of fear and anxiety related to the earthquake that persisted and affected their lives still in the present moment. The participants stressed the static nature of life after the earthquake, and the difficulty to integrate the traumatic event in the present moment. From the participants' report emerged that being part of Norcia community could be a useful integrative factor against the dissociative feelings deriving from the trauma. These findings were used in the second step of the study to plan the intervention.

The results of the second step of the study showed that the writing expressive intervention did not produce a reduction of the psychopathological symptom levels in the experimental group compared to the control group. Differently to the hypotheses, in the control group there was a significant reduction of the depressive and dissociative symptoms from T0 to T1, and, in the experimental group, there was a reduction of post-traumatic growth from T0 to T1. These findings suggested that there was an effect of the treatment on the post-traumatic growth, which seems to decrease over the time only in the experimental group. Moreover, regarding the decrease of depressive and dissociative symptoms in the control group, it could be hypothesized that the neutral writing could have had a positive impact because participants may have perceived the daily writing task as a form of care by the researcher psychologists in an intervention requiring less emotive involvement. Moreover, as suggested in previous studies (Nolen-Hoeksema, Larson & Grayson, 1999; Earnhardt et al., 2002), it could be hypothesized that the writing instructions received by the control group may have served as a distraction by focusing the attention on the description the daily activities, reducing the rumination and the depressive symptoms. Another potential explanation could be that the control group could have expected to feel better just by volunteering for the study, regardless of what their participation involved. As previously suggested, there is ample empirical evidence that self-healing often begins with an expectation of improvement and the confidence that the treatment will help (Harrington, 1997; Earnhardt et al., 2002). This self-healing effect could not have been present in the experimental group because the expressive writing may have the potential to activate negative schemas and facilitate rumination (Yasinski, Hayes, & Laurenceau, 2016; Pavlacic et al., 2019; Giovanetti et al., 2019), with negative thoughts activated unintentionally, which can reactivate exposure to the stressful experience (Qi et al., 2019). A similar phenomenon has already been discussed by Littrell (1998), who argues that, in some cases, encouraging an emotional experience can be counterproductive if a new meaning to the evoked emotional material is not provided. Finally, in the interpretation of the present results it has to be taken into consideration the possible denial developed by the students of Norcia towards the seismic event; this would lead to a raising of the defences when asked to express their emotions related to the earthquake.

In this regard, it could be interesting to report the other findings of the present study, that suggested that only in the experimental group there was an association between trait-anxiety before the intervention and the change over time of the state-anxiety. Higher scores in trait-anxiety were associated with an increase of state-anxiety at T1. This finding is consistent with other studies present in the literature (Mertens, Zane, Neumeyer & Grossman, 2017; Li & Lopez, 2019) and suggest that for people who already tend to have anxiety, written expressive disclosure may be contraindicated if the other psychological supports are not provided. Moreover, higher scores in trait-anxiety before the intervention were associated with a decrease of post-traumatic growth from T0 to T1. According with the initial hypotheses, this finding suggests that anxiety may be a risk factor for post-traumatic growth. There is previous contrasting evidence about this association. Previous studies (Peng et al., 2019) reported an inverse correlation between anxiety and post-traumatic growth, while other studies (Jaarsma et al., 2006; Leong Abdullah et al., 2015) did not found this correlation. The present findings on the Norcia population would seem to support a negative association between anxiety and post-traumatic growth. These findings suggested that, when people are stimulated to describe their feelings concerning traumatic experience, anxiety could obstruct the positive change underlying post-traumatic growth.

Finally, the results of the present study showed that, only in the experimental group, high levels of sense of community before the intervention were associated with a decrease of the depression from T0 to T1. Confirming the initial hypothesis, these findings highlight that the sense of community may play a protective role against depression and facilitate the occurrence of beneficial effects of the intervention (Lai et al., 2020). This interpretation is also supported by other previous studies (Li et al., 2011; Moscardino et al., 2010), that showed that the effect of earthquake-associated distress is contingent upon the level of sense of community. Previous findings highlighted the protective role of individuals' sense of community as a resource against traumatic-related stressors and suggested that attempts to build trust and a sense of belonging to the new community could help to reduce distress (Li et al., 2011; Moscardino et al., 2010), supporting also the qualitative findings of the first

step of the study where the main outcome was the emerging importance of being part of the Norcia community.

The present study had some limitations. Firstly, the follow-up of 1-month was briefer than the 4-month follow-up utilized in some of Pennebaker's research. Other studies (Pennebaker, 1993; Smyth, 1998) have argued that immediately after the expressive writing intervention there may be a deterioration from the initial condition. Future research could involve an expansion of time from one month to at least four months to explore delayed effects of this intervention. Finally, the sample size of the present study is very small, making the results to be interpreted as only preliminary indications for subsequent action-researches with larger samples.

In conclusion, this study suggested that, in a sample of students exposed to the earthquake trauma, the expressive writing seems not to be effective in reducing psychopathological symptoms. However, this study highlighted the importance of an initial assessment before an expressive writing intervention, suggesting that for people who already tend to have trait anxiety, expressive writing may be not particularly indicated. Finally, this study points out that, when the trauma-related experiences are stimulated by the writing, a strong sense of community could have an important facilitating role for post-traumatic growth.

Compliance with Ethical Standards

Conflict of interest
The authors declare that they have no competing interests.

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Ethical Approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent
Informed consent was obtained from all individuals participants included in the study.

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