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Reactions to Trauma Research among Women Recently Exposed to a Campus Shooting

Thomas A. Fergus¹, Mandy M. Rabenhorst², Holly K. Orcutt^{1,2}, and David P. Valentiner¹

¹Department of Psychology, Northern Illinois University, DeKalb

²Center for the Study of Family Violence and Sexual Assault, Northern Illinois University, DeKalb

Abstract

The present study examined reactions to an experimental-based trauma study in a sample ($N = 58$) of women recently exposed to a campus shooting. Assessed participant characteristics included posttraumatic stress, depression, and anxiety symptoms, as well as physical exposure to the shooting. Participant reactions were assessed using a multimethod approach, including indices of subjective (self-report) and objective (heart rate, skin conductance, and cortisol) distress. Complementing prior studies, the assessed psychological symptoms tended to share significant correlations with subjective distress. However, among the psychological symptoms, only posttraumatic stress symptoms uniquely predicted subjective distress in regression analyses. Moreover, none of the assessed participant characteristics shared significant correlations with objective distress. Finally, a clear majority (85%) of participants reported they would participate in the study again. Points of convergence and divergence with prior studies are discussed.

Keywords

ethics; trauma research; campus shooting; posttraumatic stress; institutional review board

Over the past decade researchers have examined reactions to participating in trauma-related research, with increased interest directed toward understanding reactions to trauma-related research in the short-term aftermath of a large scale traumatic event (see Boscarino et al., 2004; Galea et al., 2005). Whereas Boscarino et al. and Galea et al. assessed reactions in response to survey studies, the present study examined reactions to experimental-based tasks in the short-term aftermath of a large scale traumatic event. Such an extension is important, as research suggests that experimental-based tasks of trauma-related research are associated with heightened distress (Griffin, Resick, Waldrop, & Mechanic, 2003). Finding relatively low levels of positive reactions to experimental-based studies compared to similar survey studies might provide important information regarding the appropriateness of conducting experimental-based trauma studies in the short-term aftermath of traumatic events. Moreover, determining whether the same participant characteristics associated with distress in response to survey-based studies (e.g., anxiety, depression, physical exposure to trauma, posttraumatic stress; Boscarino et al., 2004; Galea et al., 2005) relate to distress in response to experimental-based studies might lead to improvements in research procedures (e.g., such characteristics might be outlined during informed consent). Finally, whereas Boscarino et al. and Galea et al. only used subjective assessments of participant distress, the relatively low correspondence between subjective and objective indices of distress (e.g., Watson & Pennebaker, 1989) suggests a multimethod approach is warranted.

Method

Participants

The fourth deadliest university shooting in United States history occurred on Northern Illinois University's (NIU) campus the afternoon of February 14, 2008, when a gunman entered a lecture hall and opened fire, killing 5 students, injuring 18 others, and then killing himself.

Participants included 58 women who were enrolled in a longitudinal study of sexual victimization among female undergraduates at NIU at the time of the shooting. Sexual victimization was *not* a recruitment criterion of either the longitudinal or the current study; participants were required to be at least 18-years-old and fluent in English. Of those invited to participate (812 of the original 1,045 participants) in the post-shooting assessment, 691 (85%) completed the online assessment (see Stephenson, Valentiner, Kumpula, & Orcutt, 2009, for fuller description).

Participants' physical exposure to the shooting was coded initially from their response to the question, "Please describe how you learned about the mass shooting that took place on the NIU campus on February 14, 2008." Participants reporting the highest (excluding the subset of women, $n = 15$, in the classroom during the shooting) and lowest levels of exposure were recruited first for participation, followed by participants with moderate exposure levels. Approximately six weeks following the shooting, 173 women were invited to participate in the present study, 77 scheduled an appointment, and 58 participated. The final sample had a mean age of 19.6 ($SD = 1.7$) years and was predominantly Caucasian (81%). The mean length between the campus shooting and participation was 8.8 (range of 6–13; $SD = 2.0$) weeks.

Measures

Posttraumatic stress symptoms related to the campus shooting were assessed using the Distressing Events Questionnaire (DEQ; Kubany, Leisen, Kaplan, & Kelly, 2000), a 17-item measure that uses a 5-point response option (0 to 4). Depression and anxiety symptoms were assessed using the depression and anxiety scales of the Depression Anxiety Stress Scales-21 Item Version (DASS-21; Lovibond & Lovibond, 1995), 7-item scales that use a 4-point response option (0 to 3). Physical exposure to the shooting was assessed using a 12-item measure that uses a dichotomous response option (0 or 1) and was adapted from a measure created by Littleton, Taquechel, and Axsom (2009). Physical exposure significantly correlated with the DEQ ($r = .37, p = .004$), but not with DASS-21-Depression ($r = .05, ns$) or DASS-21-Anxiety ($r = .24, ns$).

Subjective distress was defined as emotional reactions to the study tasks (following Ferrier-Auerbach, Erbes, & Polusny, 2009) and was assessed using an abbreviated negative affect scale of the Positive and Negative Affect Schedule-Expanded Form (Watson & Clark, 1994). This scale (PANAS-A-NA) contains six negative affect items and uses a 7-point response option (1 to 7). State-like (i.e., moment) time instructions were used. All measures, except DASS-21-Anxiety (Cronbach's $\alpha = .69$), demonstrated adequate internal consistency (α s ranging from .77–.90). Consistent with prior studies (e.g., Boscarino et al., 2004), positive reactions were assessed using the question: *Knowing what I know now, I would participate in this study if given the opportunity*. Agreement was defined as endorsing this item with the response option *agree* or *strongly agree* on a scale ranging from strongly disagree to strongly agree.

Objective distress was assessed by measuring participants' heart rate (HR), skin conductance level (SCL), and cortisol level. AcqKnowledge 3.8.1 (BioPac Systems, Inc.)

was used to gather HR and SCL. Salivary samples were frozen and later analyzed with an assay to detect quantities of cortisol (Salimetrics, LLC). Objective distress in response to study tasks was calculated as participants' maximum HR (beats per minute), maximum SCL (micro-Siemens), and maximum cortisol (microgram/deciliter) at two experimental time-points (during writing and reading for HR and SCL; post-writing and post-reading/recovery for cortisol). HR and SCL were measured continuously and resampled in one-minute and 30-second epochs for writing and reading analyses, respectively. Baseline HR and SCL were defined as the last one-minute epoch of a five-minute resting baseline immediately preceding the start of the experiment. Baseline cortisol measures were from the first saliva sample provided just after signing the informed consent.

Procedure

For this IRB-approved study, all participants were fully informed of the study procedures and signed a consent form agreeing to participate. Participants were seated in a small sound-attenuated room that was equipped with silver silver-chloride electrodes for measuring HR and SCL (electrodes were placed following standard procedures; Fowles et al., 1981). At baseline, participants provided a saliva sample and completed questionnaires, including symptom measures and PANAS-A-NA.

After a 5-minute resting period, participants were given the instructions, "for the next 20 minutes, write about your deepest thoughts and feelings regarding the mass shooting." Following the expressive writing, participants completed a second PANAS-A-NA and provided another saliva sample. After a 2-minute resting period, participants read aloud what they had written. The reading was immediately followed by a 10-minute resting recovery period. After this reading/recovery period, participants completed another PANAS-A-NA and provided another saliva sample. At the conclusion of the study, participants completed a questionnaire assessing reactions to the present study and paperwork to process their compensation (\$40). Participation lasted approximately two hours and participants were debriefed thoroughly.

Results

Participant Characteristics and Distress

Descriptive statistics are presented in Table 1. Most writing and reading/recovery distress scores (i.e., PANAS-A-NA, HR, and SCL) significantly increased from baseline (t -values ranged from 2.99–22.81, $ps < .004$), indicating the experimental tasks engendered distress (average Cohen's $d = 1.52$, range 0.34–2.72). However, cortisol levels (controlling for time of day) were significantly *lower* at post-writing and post-reading/recovery relative to baseline (F -values = 39.21 and 44.26, respectively, $ps < .001$).

Correlations between participant characteristics and distress are presented in Table 2. The increased possibility of a Type I error associated with these tests was addressed using the False Discovery Rate (FDR; Benjamini & Hochberg, 1995). As shown, psychological symptoms, but not physical exposure, tended to correlate significantly with subjective distress at post-writing and post-reading/recovery. However, none of the participant characteristics shared significant correlations with any index of objective distress.

Hierarchical multiple regression analyses were used to further examine significant correlations. The variables were entered using an a-priori order of entry to elucidate whether significant relations between participant characteristics and subjective distress would hold after controlling for baseline levels of subjective distress and the other significant psychological symptom predictor(s). Specifically, baseline PANAS-A-NA was entered into

Step 1 of both regression models. Because only the DEQ and DASS-21-Anxiety correlated significantly with post-writing PANAS-A-NA (Table 2), only these two psychological symptom measures were included in Step 2 of the regression model predicting post-writing subjective distress. Because all three psychological symptom measures (DEQ, DASS-21-Depression, DASS-21-Anxiety) correlated significantly with post-reading/recovery PANAS-A-NA (Table 2), they were all included in Step 2 of the regression model predicting post-reading/recovery subjective distress.

Within post-writing subjective distress analyses, baseline PANAS-A-NA ($r = .66$) significantly predicted post-writing PANAS-A-NA scores ($R^2 = .44, p < .001$). The DEQ (partial $r = .33, p = .012$), but not DASS-21-Anxiety (partial $r = -.16, ns$), incrementally contributed to the prediction of post-writing PANAS-A-NA scores ($\Delta R^2 = .06, p = .038$). Within post-reading/recovery subjective distress analyses, baseline PANAS-A-NA ($r = .65$) significantly predicted post-reading/recovery PANAS-A-NA scores ($R^2 = .42, p < .001$). However, the DEQ (partial $r = .25, p = .067$), DASS-21-Depression (partial $r = .07, ns$), and DASS-21-Anxiety (partial $r = -.13, ns$) did not incrementally contribute to the predicting of post-reading/recovery PANAS-A-NA scores ($\Delta R^2 = .04, ns$).

Positive Appraisals of Study

The majority ($n = 49$; 85%) of participants agreed with the statement: *Knowing what I know now, I would participate in this study if given the opportunity*. None of the participant characteristics correlated significantly with this item (r s ranged from $-.07$ – $.15, ns$).

Discussion

The present study further examined associations between participant characteristics and distress in response to an experimental-based trauma study that occurred in the short-term aftermath of a large scale traumatic event. Of note, the experimental tasks of this study tended to induce at least moderate distress. Extending prior trauma-related studies using survey-based designs (Boscarino et al., 2004; Galea et al., 2005), posttraumatic stress symptoms emerged as the most robust predictor of such distress. Thus, individuals who are experiencing heightened levels of posttraumatic stress symptoms in the aftermath of traumatic events appear especially likely to find experimental-based studies distressing. Nonetheless, a clear majority of participants (85%) reported positive reactions to the present study, with the percentage consistent with those seen in response to similar non-experimental designs (e.g., 76%; Boscarino et al., 2004). Researchers might consider communicating such potential risks and benefits to participants during informed consent processes of experimental-based trauma studies.

Surprisingly, none of the participant characteristics correlated significantly with HR, SCL, or cortisol, which were used as indices of objective distress. However, it should be noted that the magnitude of relations between posttraumatic stress and both HR and SCL was consistent with Pole (2007), who investigated relations between posttraumatic stress disorder (PTSD) and psychophysiological variables. Specifically, Pole identified a weighted mean effect size of $r = .22$ for the PTSD-HR relationship and $r = .19$ for the PTSD-SCL relationship following idiographic trauma cues. As such, our small sample size and Type I error correction might have resulted in too low of power to detect relatively small relationships between participant characteristics and objective distress. Moreover, our indices of objective distress were used in somewhat non-traditional ways, which may have limited their utility for identifying potentially valid relationships between our study variables. Thus, additional work in this line of research is clearly warranted before firm conclusions are drawn.

Additional caveats surrounding the present study should be noted. First, only a subset of individuals who were involved in the campus shooting participated in the study. Consequently, differences in participants who did and did not participate may have influenced results. Further, our sample excluded from recruitment participants (15/691 = 2.2% of eligible) who were physically present in the classroom at the time of the campus shooting. The decision to not recruit these women was based in part on their experiences being qualitatively different than the other eligible participants, thus making group comparisons tenuous. Nonetheless, reactions from these women would have been informative for further understanding reactions to the present research. Second, with the exception of HR and SCL, post-reading distress was assessed after a 10-minute recovery period. Thus, some indices of distress in response to reading aloud one's thoughts and feelings related to the shooting might have been minimized by our assessment point. Third, extending these findings to reactions in response to other distressing tasks likely will be informative. Finally, participants endorsed relatively low levels of symptomatology and consisted of primarily Caucasian female undergraduate students. The present results may thus have limited generalizability to other groups of interest (e.g., treatment-seeking trauma victims). Limitations notwithstanding, these data add to the growing body of literature supporting the appropriateness of conducting experimental-based studies in the short-term aftermath of a large scale traumatic event. Such research is critical for preventing long term adjustment problems and reducing mental health care costs.

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Table 1

Descriptive Statistics.

Variable	Baseline			Writing			Reading/Recovery		
	Range	Mean	(SD)	Range	Mean	(SD)	Range	Mean	(SD)
1. DEQ	0 – 38	12.43	(9.71)	-	-	-	-	-	-
2. DASS-21-Depression	0 – 14	3.36	(3.40)	-	-	-	-	-	-
3. DASS-21-Anxiety	0 – 12	2.55	(2.68)	-	-	-	-	-	-
4. Physical Exposure	0 – 6	2.79	(2.17)	-	-	-	-	-	-
5. PANAS-A-NA	6 – 25	10.57	(4.92)	6 – 33	14.53	(7.04)	6 – 28	12.43	(6.12)
6. Heart Rate (BPM)	50.6 – 106.1	76.06	(10.87)	83.1 – 119.1	102.45	(8.54)	77.9 – 119.5	101.99	(10.11)
7. Skin Conductance (µS)	0.28 – 13.5	3.78	(3.46)	0.42 – 15.9	8.31	(4.27)	0.42 – 19.0	10.82	(4.74)
8. Cortisol (µg/dl)	0.04 – 1.46	0.30	(0.29)	0.20 – 0.56	0.16	(0.11)	0.10 – 0.66	0.12	(0.10)

Note. $N = 58$. DEQ = Distressing Events Questionnaire; DASS-21 = Depression, Anxiety, and Stress Scale-21-item version; PANAS-A-NA = Positive and Negative Affect Schedule-Abbreviated-Negative Affect; BPM = beats per minute; µS = micro-Siemens; µg/dl = micrograms/deciliter.

Table 2

Correlations between Participant Characteristics and Distress.

Variable	DEQ	DASS-D	DASS-A	Phy Exp
1. Maximum PANAS-A-NA – Writing	.45	.31	.35	.17
2. Maximum Heart Rate (BPM) – Writing	.25	.17	.16	.14
3. Maximum Skin Conductance (μS) – Writing	.07	–.27	–.16	–.03
4. Maximum Cortisol (μg/dl) – Writing ^I	–.09	–.14	–.13	.22
5. Maximum PANAS-A-NA – Reading/Recovery	.39	.38	.36	.04
6. Maximum Heart Rate (BPM) – Reading/Recovery	.30	.10	.13	–.02
7. Maximum Skin Conductance (μS) – Reading/Recovery	.23	–.20	–.06	.02
8. Maximum Cortisol (μg/dl) – Reading/Recovery ^I	–.19	–.19	–.09	.16

Note. $N = 58$. **Bolded** correlations significant at $p < .008$ (two-tailed; experimental-wise alpha correction). PANAS-A-NA = Positive and Negative Affect Schedule-Abbreviated-Negative Affect; BPM = beats per minute; μS = micro-Siemens; μg/dl = micrograms/deciliter; DEQ = Distressing Events Questionnaire; DASS = Depression, Anxiety, and Stress Scale-21 item version (D = Depression; A = Anxiety); Phy Exp = Physical Exposure.

^I = Controls for time of day.