5-2012

A Multimodal Approach for the Assessment of Alexithymia: An Evaluation of Physiological, Behavioral, and Self-Reported Reactivity to a Traumatic Event-Relevant Video

Sarah Jo Bujarski
University of Arkansas, Fayetteville

A MULTIMODAL APPROACH FOR THE ASSESSMENT OF ALEXITHYMIA: AN EVALUATION OF PHYSIOLOGICAL, BEHAVIORAL, AND SELF-REPORTED REACTIVITY TO A TRAUMATIC EVENT-RELEVANT VIDEO

A MULTIMODAL APPROACH FOR THE ASSESSMENT OF ALEXITHYMIA: AN EVALUATION OF PHYSIOLOGICAL, BEHAVIORAL, AND SELF-REPORTED REACTIVITY TO A TRAUMATIC EVENT-RELEVANT VIDEO

A thesis submitted in partial fulfillment

of the requirements for the degree of

Master of Arts in Psychology

By

Sarah Jo Bujarski

University of Nebraska

Bachelor of Arts in Psychology, 2007

May 2012

University of Arkansas

Abstract

Evidence suggests alexithymia is often relatively elevated among people suffering from posttraumatic stress symptoms (PTSS). Despite a growing body of research supporting this relation between alexithymia and PTSS, it is unclear whether alexithymia is a unique predictor of emotional reactivity relative to posttraumatic stress symptoms. Furthermore, existing literature is largely limited to retrospective, self-reported symptoms. Therefore, the current study employed a multimodal assessment strategy for measuring emotional reactivity in the context of posttraumatic stress. More specifically, self-report, behavioral, and physiological measures were used to measure emotional responding to a traumatic event-related stimulus among motor vehicle accident victims. It was hypothesized that behavioral and self-reported responding would evidence a negative relation to level of alexithymia, while physiological responding was not expected to relate to levels of alexithymia. Results replicated previous research demonstrating a strong correlation between self-reported PTSS and alexithymia. Also as expected, alexithymia did not predict physiological responding to the stimulus. However, alexithymia was not found to uniquely predict self-reported or behavioral responding above and beyond the influence of PTSS. These findings do not conclusively support alexithymia as a unique predictor of emotional responding relative to PTSS.

Table of Contents

A Multimodal Approach for the Assessment of Alexithymia: An Evaluation of Physiological, Behavioral, and Self-Reported Reactivity to a Traumatic Event-Relevant Video

The experience of a traumatic event can result in both acute and chronic symptoms of distress. Research estimates that the likelihood of experiencing a traumatic event during one's lifetime is as high as 69% (Norris, 1992). In addition, the general population is more likely to experience certain traumatic events than others. In particular, motor vehicle accidents (MVAs) are common. In fact, one population study estimated that MVAs alone result in 28 distressed individuals for every 1,000 adults in the United States (1992). Given MVAs are common and often distressing, understanding factors that relate to post-MVA distress is an important area for continued research.

Alexithymia is defined as difficulties identifying and labeling emotional feelings with a tendency towards externally-oriented thinking (de Vente, Kamphuis, & Emmelkamp, 2006). Alexithymia is a clinically-derived term which literally means "no words for mood." This construct was originally developed by Sifneos (1973) to describe patients with psychosomatic illnesses who responded poorly to traditional psychotherapy. In its early form, clinical criteria for alexithymia consisted of "… a diminished capacity for dreaming, an absence of fantasy production, and verbal output which is concrete, detailed, and repetitious" (Apfel & Sifneos, 1979). The majority of early research on alexithymia was confined within the domain of psychosomatic illness, presumably due to its conceptualization as a dissociation between physiological and subjective symptoms (Martin et al., 1986).

In the late 1980s, research began to examine the relation between alexithymia and posttraumatic stress disorder (PTSD). In a study designed to validate a novel measure of alexithymia, Krystal and colleagues (1986) found a high degree of alexithymia among Vietnam

veterans with PTSD. A recent meta-analysis examining the association between alexithymia and PTSD supported the hypothesis that individuals with PTSD are more likely than those without PTSD to experience symptoms of alexithymia (Frewen, Dozois, Neufeld, & Lanius, 2008).

More recent work demonstrating the presence of elevated alexithymia in the wake of a traumatic event has led to suggestions that alexithymia develops as an emotional response to severe distress experienced during and following a traumatic event (Söndergaard & Theorell, 2004; Yehudua et al., 1997). This conceptualization has been labeled "posttraumatic alexithymia." Despite accumulating evidence of a strong correlation between symptoms of alexithymia and posttraumatic stress symptoms (PTSS), the nature of this association is currently unclear. While some evidence suggests alexithymia is positively correlated with emotional numbing (Badura, 2003) and avoidance (Yehuda et al.,1997), conflicting evidence suggests alexithymia is distinct from numbing symptoms (Ramirez et al., 2001) and more highly associated with hyperarousal and reexperiencing than avoidance (McCaslin et al., 2006). Research further suggests different aspects of alexithymia may evidence specific relations with PTSS. One study suggested that the externally-oriented feature of alexithymia was the most consistent predictor of PTSS (Monson, Price, Rodriguez, Ripley, & Warner, 2004). Collectively, these findings suggest a complex and not well-understood relation between alexithymia and PTSS that warrants additional research to clarify linkages between these constructs.

Extant research examining how alexithymia relates to PTSS is complicated by heavy reliance on self-report measurement and the limitations of this approach. Indeed, few studies in this domain have utilized a laboratory-based, multimodal approach to assessment, relying instead on self-report and clinical observations. In fact, the majority of existing research examining alexithymia has primarily examined correlations between two self-report questionnaires: namely,

the 20-item Toronto Alexithymia Scale (TAS-20; Bagby, Parker & Taylor, 1994) and the Posttraumatic Stress Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). Correlating self-reported alexithymia with self-reported measures of affect-related experiences is problematic because elevations in self-reported alexithymia, by definition, should reduce the validity of the self-report measure of affect-related experiences, such as self-reported traumatic stress (Vanheule, 2008).

Recently, studies have begun to supplement self-report measurement of affective experience with laboratory-based measurement, with the primary focus on the relations between alexithymia and emotional responding to emotion-eliciting stimuli (Luminet, Rimé, Bagby, & Taylor, 2004). While these studies do not address questions regarding how alexithymia relates to PTSS, they do evidence that multimodal assessment of emotional responding can inform our understanding of how alexithymia relates to emotional reactivity. For instance, research suggests that alexithymia is related to an individual's self-report of emotions. One study indicated that when presented with emotion-eliciting stimuli, individuals with elevated levels of alexithymia self-reported lower levels emotional arousal (Roedema & Simons, 1999). In regards to behavioral measures of responding, research has found that individuals with relatively higher levels of alexithymia show fewer facial expressions and less intense facial expressions in response to stimuli than individuals with low alexithymia symptoms (McDonald & Prkachin, 1990; Troisi, Delle, Chiaie, Russo, & Russo, 1996). These findings coalesce to suggest that persons with relatively elevated levels of alexithymia may express (via self-report and behavior) relatively less emotion in response to standardized emotion-eliciting stimuli.

Research investigating self-report and behavioral measures of responding can be contrasted to evidence regarding physiological reactivity to such stimuli. Here, research has

suggested that relatively elevated levels of alexithymia relate to elevated physiological arousal in response to emotional stimuli (Infrasca, 1997). Existing laboratory-based research on alexithymia, however, is limited in that few studies have measured multiple modes of emotional responding concurrently. Moreover, no study has examined relations between alexithymia and multimodal assessments of PTSS. Thus, multimodal measurement of emotional responding to traumatic event cues is now needed to advance our currently limited understanding of how alexithymia relates to PTSS.

The current study sought to uniquely extend existing research by examining relations between alexithymia and PTSS-related emotional reactivity within a sample of motor vehicle accident survivors. Multimodal assessment of posttraumatic stress-related emotional reactivity elicited by a well-established traumatic-event relevant video presentation method (e.g., Lazarus, Opton, Nomikos, & Rankin, 1965; Holmes, Brewin, & Hennessy, 2004) was employed. As discussed above, this laboratory-based paradigm is advantageous in the current context because it allows for multimodal assessment of emotional reactivity. A second (and related) advantage is that such emotion provocation techniques reduce reliance on retrospective self-report of emotion. In line with previous research, it was hypothesized that alexithymia would positively correlate with PTSS. It was also hypothesized that levels of alexithymia would: 1) negatively relate to self-reported ratings of fear; 2) negatively relate to a behavioral index of fear (i.e., facial expressions) observed during the video; and 3) not relate to physiological reactivity to the video. This pattern of results would suggest that alexithymia is associated with posttraumatic stress-related emotional reactivity independent of posttraumatic stress symptoms.

Method

Participants

Participants for the current study were adults recruited from the University of Arkansas-Fayetteville and the local Northwest Arkansas community. Of the total 90 participants recruited, 60 participants comprised the MVA survivor group. Inclusion criteria for the motor vehicle survivor group required meeting the A1 criterion (i.e., the person has been exposed to an event that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others) for a motor vehicle accident, as defined by the *Diagnostic and Statistical Manual – Fourth Edition Text Revision* (DSM-IV-TR; American Psychological Association, 2000). The majority of participants in the MVA survivor group were female (78.3%) and between the ages of 18 and 71 years of age (M = 32.83, SD = 15.72). The majority of participants in this group reported Caucasian ethnicity (85%) with the remainder reporting African-American (5%), multi-racial (5%), Native Hawaiian/Pacific Islander (1.7%), Asian (1.7%), and "Other" (1.7%). A total of 22 participants (36.7%) in this group met full diagnostic criteria for PTSD.

A comparison group of 30 participants was utilized to assess differences in physiological reactivity during the video-viewing portion of the study. Inclusion in the comparison group required reporting no history of a motor vehicle accident, but meeting the A1 criterion for any other traumatic event (e.g., natural disaster). This comparison group was used to examine associations between alexithymia and physiological responding to the car accident film within a group of participants that would not be expected to evince significant physiological reactions to the film. This approach was adopted to increase confidence that a lack of relation between alexithymia and PTSS among car accident survivors was not due to limited physiological reactivity to the film. The majority of participants in the comparison group were female (63.3%)

and between the ages of 18 and 77. The majority of participants in this group reported Caucasian ethnicity (90%) with the remainder reporting Asian (3.3%), multi-racial (3.3%), and "Other" (3.3%). Among those in the comparison group, only one participant met diagnostic criteria for PTSD.

Exclusion criteria for the entire sample included an inability to provide written informed consent and current suicidal ideation.

Measures

Clinician-Administered PTSD Scale (CAPS). The CAPS (Blake et al., 1995) is a well-established semi-structured clinical interview that indexes criterion A of PTSD as defined by the DSM-IV-TR (A.1: exposure to a threatening event; A.2: peritraumatic fear, helplessness, or horror). The CAPS also measures the frequency and intensity of 17 symptoms of PTSD and allows for a dichotomous index of PTSD diagnostic status. The CAPS has demonstrated good psychometric properties, including test-retest and inter-rater reliability, internal consistency, and convergent and discriminant validity, and is considered one of the gold standards in PTSD assessment (Weathers, Keane, & Davidson, 2001). In the current study, the CAPS was used to measure PTSD symptom severity and identify stressful life events that met the A1 criterion.

Toronto Alexithymia Scale (TAS-20). The TAS-20 (Babgy, Parker, & Taylor, 1994) is the most widely used self-report measure of alexithymia. It is comprised of three factors posited to measure the most salient components of the alexithymia construct: difficulty describing feelings (DDF), difficulty identifying feelings (DIF), and externally-oriented thinking (EOT). Research has replicated this three factor structure in both community (Parker, Taylor, & Bagby, 2003) and clinical (Meganck, Vanheule, & Desmet, 2008) populations. The TAS-20 has shown high internal consistency (Cronbach's alpha = .81), good test-retest reliability (r = .77), and

convergent, discriminant, and concurrent validity (Bagby, Parker, & Taylor, 1994). In the current study, the TAS-20 total score was used to measure level of alexithymia.

Heart Rate. A J&J Engineering I-330-C2 system was used to digitally record physiological data on-line at a sample rate of 1024 samples per second using J&J Engineering Physiolab Software. Raw electrocardiogram data were collected with disposable Ag/AgCl electrodes placed in a standard bilateral configuration on the palmar side of each wrist. Data were processed through a 1-100Hz bandpass filter designed to maximize R-wave frequency. Research in the domain of fear reactivity suggests a strong association between fear responses and heart rate. More specifically, research has demonstrated that exposing individuals to progressively fearful images relates to a corresponding increase in heart rate (Lang, Levin, Miller, & Kozak, 1983). Therefore, the current study utilized heart rate data to index psychophysiological reactivity to the MVA video. More specifically, mean heart rate during the first minute of the video was utilized as the criterion measure. A screening template was used to average heart rate values and remove invalid "noise" from the data. It is notable that equipment failure resulted in the loss of physiological data midway through the study. More specifically, 51.66% of the data were unavailable for analysis, resulting in physiological data for 29 participants in the MVA survivor group. Further, while analyses are presented for consideration, these data should be considered with particular caution, as mean values obtained suggest that equipment problems may have affected the accuracy of collected data.

Visual Analog Scale (VAS). Self-reported fear elicited by the standardized video was obtained using a VAS (Freyd, 1923). After viewing the video, participants were asked to provide ratings of their level of fear by marking a vertical line on a 100 mm rating line ranging from 0 (*no fear*) to 100 (*extreme fear*). Participants were also asked to provide ratings of their level of

anxiety, guilt, shame, sadness, and anger to allow comparisons between self-reported levels of fear and other relevant affective reactions.

Facial Action Coding System (FACS). The FACS (Ekman & Friesen, 1978) was used to score facial actions relevant to detecting emotion. The researcher completed the FACS training course and subsequently passed the final test for certification. The FACS evidences good to excellent inter-rater reliability for spontaneously generated facial behavior (κ = .64 - .82; Sayette, Cohn, Wertz, Perrott, & Parrott, 2001). The current study utilized the FACS to measure behavioral aspects of fearful responding (i.e., facial reactions). The FACS allows for coding several different types of facial expressions (e.g., surprise, fear, disgust). The current study employed the total number of fear expressions during the first minute of the video as an index of behavioral fear reactivity.

Procedure

Eligible participants completed the informed consent process prior to completing the following procedures, which were approved by the University of Arkansas's Institutional Review Board (IRB) prior to data collection. All participants were given the option to withdraw at any point during the study. Only one participant opted to discontinue.[1] Subsequent to the informed consent process, participants completed a brief battery of self-report measures. The CAPS was then administered by the primary investigator, during which participants in the MVA group were interviewed regarding their experience of a motor vehicle accident and participants in the comparison group were interviewed regarding an event meeting the A1 criterion. Participants in the comparison group who reported experiencing multiple events meeting the A1 criterion were interviewed in regards to the event they reported was the most distressing. Following completion

of the CAPS [2], the researcher explained the physiological electrodes placement procedures, applied the electrodes, and provided instructions for the video task.

Participants were asked to provide pre-video VAS ratings prior to beginning the video. During this time, baseline physiological measurements were collected. Participants then independently started the video by clicking on the highlighted desktop icon. This 8.5-min video consisted of a compilation of actual and media-produced scenes depicting car collisions. Previous studies using comparable films (Brewin & Saunders, 2001) have found that no participants reported ongoing distress following the end of the experiment. During the video, physiological measurements were collected and a video camera was utilized to collect facial responding data.

Following the motor vehicle accident video, participants again provided VAS ratings. Upon completion of these ratings, the researcher re-entered the room and removed the electrodes. Once participants were disconnected from the electrodes and allowed the opportunity to wash off the electrode residue, a positively-valenced video was presented. This video was presented to increase the likelihood that participants' level of fear elicited by the motor vehicle accident video was reduced prior to leaving the laboratory. Data collected during this second film was not employed in the current study, but VAS ratings were collected following the presentation of the positive video to allow the researcher to determine the participants' mood before leaving the laboratory. Participants were then debriefed using a standardized debriefing questionnaire and compensated $30 for their time.

Data Analytic Approach

To investigate how measures of emotional responding are inter-related, zero order correlations were conducted with the primary predictor (TAS-20 scores) and outcome variables

(heart rate, FACS scores, and VAS ratings). Each measure of emotional reactivity was evaluated separately, as multiple modes of fearful responding during laboratory-based procedures often are desynchronous (Hodgson & Rachman, 1974). Squared semi-partial correlations (sr^2) and chi-square (χ^2) analyses were employed to index effect size.

To test the hypothesis that alexithymia would predict emotional reactivity above and beyond PTSS levels, two hierarchical regression analyses examining physiological and self-report measures of fear as the criterion variables and one binary logistic regression examining a behavioral measure of fear as the criterion were performed. In terms of the hierarchical regressions, covariates for all analyses included CAPS symptom severity levels and baseline levels of each criterion measure entered at step 1 of the regression model. Alexithymia levels (TAS-20 scores) were then entered into step 2. Each measure of emotional responding (physiological and self-report) was then entered as criterion variables in separate analyses. In terms of the binary logistic regression, CAPS symptom severity was entered as a covariate at step 1 and alexithymia level (TAS-20 scores) was entered into step 2. The behavioral measure of emotional responding (e.g., fear expressions during the first minute of the video) was then entered as the criterion variable. All analyses required that all variables of interest had no missing values.

Results

Zero-Order Correlations

Table 1 includes descriptive information for the factors of interest, as well as correlations among factors. As predicted, TAS-20 scores were significantly correlated with CAPS symptom severity (r =.68, $p < .01$). Further, CAPS symptom severity was correlated with the criterion variable of self-reported responding (r = .34, $p < .05$); therefore, CAPS symptom severity was

included as a covariate at step 1 in that regression.

Manipulation Check

Table 2 summarizes descriptive information for each group in terms of each mode of responding. Paired samples *t*-tests were first employed to compare pre- to post-levels of self-reported fear and heart rate collapsed across groups in order to determine if the MVA video elicited emotional responses. These analyses revealed that self-reported fear significantly increased from an average of 9.80 (*SD* = 20.86) to 32.84 (*SD* = 33.97; $t = -7.14$, $p < .01$). In terms of heart rate, there was a significant increase across groups ($M = 116.88$, $SD = 14.29$ versus $M = 123.14$, $SD = 12.38$; $t = -2.52$, $p < .05$). Independent *t*-tests were used to evaluate whether individuals in the MVA group evidenced differential responding to the video compared to the non-MVA comparison group. No significant differences were found between the groups in terms of self-reported ($t = .44$, $p > .05$), physiological ($t = -.51$, $p > .05$), or behavioral reactivity ($t = 1.11$, $p > .05$). One potential explanation for this finding relates to group comparisons of symptoms. More specifically, it was found that the groups did not differ in terms of level of alexithymia ($t = .44$, $p > .05$) or in terms of PTSS ($t = 1.02$, $p > .05$). Thus, it is possible that the groups evidenced comparable responding because they were equally symptomatic.

Primary Hypotheses Tests

Table 3 displays details for the hierarchical regression analyses examining the physiological and self-report measures of fear. Table 4 displays the details for the logistic regression analysis examining the behavioral measure of fear. In terms of the model with heart rate as the criterion variable, the overall regression model did not account for significant variability in heart rate during the first minute of the video [$F(3, 25) = 1.30$, $p > .05$, $R^2 = .13$]. Covariates at step 1 accounted for a non-significant 4.4% of the variance in heart rate during the

first minute of the trauma-relevant video. Neither CAPS symptom severity nor baseline heart rate measures accounted for significant variance. Total TAS-20 score, entered at step 2, accounted for an additional 9.1% of variance, but this was not significant.

In terms of the model with post-video VAS ratings as the criterion, the overall regression model accounted for significant variability in post-video ratings of fear [F (3, 50) = 7.18, p < .01, R^2 = .30] covariates at step 1 accounted for 26.4% of the variance in post-video ratings of fear with baseline ratings of fear accounting for significant variance, but not CAPS symptom severity. Total TAS-20 score, entered at step 2, accounted for 3.7% of additional variance in post-video fear ratings, but this contribution was non-significant.

A binary logistic regression utilized FACS scores during the first minute of the video as the criterion.[3] The analysis demonstrated that a test of the full model against a constant-only model was not statistically significant, indicating that neither CAPS symptom severity nor TAS-20 scores reliably distinguished between those who did and did not display fear expressions during the first minute of the video (χ^2 = .66, p > .05).

Discussion

Mounting evidence suggests alexithymia develops as a response to severe distress experienced during and following a traumatic event (Söndergaard & Theorell, 2004). While this conceptualization of "posttraumatic alexithymia" has been empirically demonstrated in studies utilizing self-report measures of symptoms (Yehuda et al., 1997), few studies have utilized behavioral or physiological measures to examine real-time associations between alexithymia and emotional reactivity to traumatic event cues. Further, research has not attempted to determine whether alexithymia predicts emotional responding above and beyond PTSS severity. The current study sought to extend previous research by utilizing a multimodal assessment strategy to

examine associations between alexithymia and multiple indices of traumatic event-related emotional reactivity within a sample of traumatic car accident-exposed adults.

Results from the current study replicated previous findings in regards to the relation between symptoms of alexithymia and PTSS. More specifically, a large correlation (Cohen, 1992) was observed between self-reported symptoms of alexithymia and self-reported PTSS severity (r = .68). A comparable correlation was also observed in a previous study examining relations between self-reported alexithymia and PTSS among combat veterans (r = .64; Badura, 2003). Taken together, this suggests stability in the relation between self-reported alexithymia and PTSS across different traumatic events. Further, given TAS-20 and PTSS levels shared only about 40% of variance, alexithymia appears to represent a unique construct distinct from PTSS.

Additional descriptive analyses indicated that nearly half (44.8%) of participants in the current study reported two or fewer potentially-traumatic events. In addition, the mean level of alexithymia (M = 42.92) was below the empirically-derived cutoff score used to identify individuals with "high" alexithymia (≥ 61; Taylor, Bagby, & Parker, 1992). Because this level of alexithymia was lower than expected given results of previous studies of MVA survivors (M_{TAS} = 79.1, SD = 9.9; Kupchik et al., 2007), the relation between alexithymia level and number of reported potentially-traumatic events was explored. Post hoc analyses indicated alexithymia level was related to number of reported potentially-traumatic events (r = .33, p < .01). This is consistent with previous research suggesting that higher levels of alexithymia are related to repeated exposure to extreme stress (Zeitilin, McNally, & Cassiday, 1993). The relatively low mean number of traumatic events may have been why participants in the current study reported, on average, low levels of alexithymia. Future studies should attempt to determine whether level of alexithymia may increase as a function of multiple traumatic event experiences.

In regards to the first hypothesis predicting that level of alexithymia would negatively relate to self-reported ratings of fear, regression analysis indicated that this prediction was not supported. There was not a unique, significant relation between these two factors. The small-magnitude correlation between level of alexithymia and self-reported fear after controlling for baseline fear ratings and PTSS ($sr^2 = .03$) suggests that the lack of significance was unlikely a result of low power. Post-hoc bivariate correlation analyses, however, indicated that there was a significant correlation between level of alexithymia and pre-video ratings of anxiety ($r = .30$, $p < .05$), fear ($r = .38$, $p < .01$), guilt ($r = .35$, $p < .01$), and sadness ($r = .26$, $p < .05$). More specifically, as level of alexithymia increased, so did each rating of negative affect. Two interesting considerations follow from these observations. First, baseline fear ratings accounted for a relatively large amount of variability in post-video fear ratings. The observation that alexithymia did not emerge as a significant predictor of post-video fear ratings in this regression therefore indicates that while alexithymia was related to pre-video fear, it did not predict *change* in fear resulting from the video. Second, the baseline pattern is consistent with research that posits that alexithymia may mark a deficit in differentiating between negative emotion labels (Lane, Sechrest, Riedel, Shapiro, & Kaszniak, 2000). It is possible that the absence of a unique relation between alexithymia levels and change in self-reported fear is due to difficulty specifically reporting fear levels among those higher in alexithymia, and those relatively lower in alexithymia did not experience much change in fear because of their lower levels of PTSS. Research is needed that further explores how alexithymia relates to self-reported change in specific emotion states relative to general negative affect.

The second hypothesis, which predicted that alexithymia would negatively relate to a behavioral index of fear, also was not supported. Level of alexithymia was not related to number

of facial expressions of fear displays during the first minute of the traumatic event-related video. Importantly, there appeared to be a floor effect for facial reactivity during the video in that few participants evidenced codable facial displays. Indeed, only sixteen (28.1%) individuals in the sample displayed at least one fearful expression during the first minute of the video. Although at least one previous study evaluating emotional responding in alexithymia found that alexithymia related to fewer spontaneous facial expressions, that particular study coded spontaneous facial expressions as only positive or negative (McDonald & Prkachin, 1990) rather than coding expressions of fear specifically. Further, no study has utilized traumatic event-relevant stimuli to elicit emotional responding. Thus, the current study represented a novel attempt to measure facial responding to a traumatic event-relevant stimulus using a standardized coding system. However, the extremely limited variation in facial responding in the current study prevents strong conclusions as to whether alexithymia relates to facial reactivity in response to reminders of a traumatic event. It is possible that coding facial reactivity during longer epochs may have increased variability in codable facial responses. Accordingly, future studies may aim to expand the assessment of facial reactions. Future studies also may aim to sample people with PTSD as well as discern other methods to maximize emotional responding to a video. Together, these methodological extensions would allow for more confidence in concluding whether or not high levels of alexithymia relate to decreased facial responding.

Finally, as hypothesized, alexithymia did not appear to relate to physiological reactivity to the video. It is difficult to place confidence in this pattern, however, because of equipment problems occurring during large portions of the current data collection. Relatedly, there was an additional unexpected finding that the control group evidenced physiological responding comparable to the MVA group, despite the fact that the control group was viewing a stimulus not

relevant to their own traumatic experience. However, this could potentially be due to results suggesting no significant group differences in PTSS severity or alexithymia. Future studies could benefit from utilizing clinical samples and better measures of physiological activity to better elucidate relations between alexithymia, PTSD, and physiological reactivity.

The current study included general limitations that also should be noted. First, the sample was largely comprised of individuals who had experienced non-interpersonal traumatic events (i.e., motor vehicle accidents). Therefore, these findings may not relate to individuals with interpersonal (e.g., sexual assault) traumatic event experiences. Relatedly, levels of alexithymia and PTSS were relatively low in the current sample, and may have therefore obscured potential relations between these variables and measures of responding that would be evident in more symptomatic populations. It will be important for future research to seek populations reporting higher levels of alexithymia and PTSS. Further, although previous studies have successfully utilized the stressful film paradigm to elicit emotional responding among traumatic event-exposed individuals (Holmes, Oakley, Stuart, & Brewin, 2006), the MVA-related video used in the current study was compiled by the investigator and was thus a novel stimulus. While the current results suggested the video successfully elicited an emotional response, research is needed to better understand the properties of the video as an emotion elicitor. Due to the loss of physiological data resulting from equipment difficulties, the current study may have not been sufficiently powered to detect relations between alexithymia and heart rate responding. Thus, replication of the current pattern is needed prior to drawing inferences regarding the relation between alexithymia and physiological reactivity to traumatic event cues. More research utilizing multimodal assessment strategies is necessary to more clearly establish whether the construct of alexithymia adds incremental predictive power above and beyond posttraumatic stress symptoms

in regards to traumatic event-relevant emotional responses.

These limitations notwithstanding, the current study represented a novel attempt to clarify relations between alexithymia and posttraumatic stress symptoms, as well as to further evaluate the potential impact of alexithymia on emotional responding. Results that replicated previous research demonstrating a strong relation between PTSS and alexithymia suggests that additional research is needed to develop a more precise understanding of the alexithymia construct as it relates to PTSD. However, the results from the current study do not lend support to the idea that alexithymia relates to real-time emotional reactivity to traumatic event cues.

References

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders (4th Edition-Text Revision)*. Washington, DC: Author.

Apfel, R. J., & Sifneos, P. E. (1979). Alexithymia: Concept and measurement. *Psychotherapy and Psychosomatics, 32,* 180-191. Retrieved from: http://content.karger.com/ProdukteDB/produkte.asp?Aktion=JournalHome&ProduktNr=223864

Badura, A. S. (2003). Theoretical and empirical exploration of the similarities between emotional numbing in posttraumatic stress disorder and alexithymia. *Journal of Anxiety Disorders, 17*, 349-360. doi: 10.1016/S0887-6185(02)00201-3

Bagby, R. M., Parker, J. D., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia Scale: I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research, 38,* 23-32. doi: 10.1016/0022-3999(94)90005-1

Blake, D. D., Weathers, F. W., Nagy, L. M., Kaloupek, D. G., Gusman, F. D., Charney, D. S., & Keane, T. M. (1995). The development of a clinician-administered PTSD scale. *Journal of Traumatic Stress, 8,* 75-90. doi: 10.1002/jts.2490080106

Brewin, C. R., & Saunders, J. (2001). The effect of dissociation at encoding on intrusive memories for a stressful film. *British Journal of Medical Psychology, 74,* 467–472. doi: 10.1348/000711201161118

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159. doi: 10.1037/0033-2909.112.1.155

de Vente, W., Kamphuis, J. H., & Emmelkamp, P. M. G. (2006). Alexithymia: Risk factor or consequence of work-related stress? *Psychotherapy and Psychosomatics, 75*, 304-311. doi: 10.1159/000093953

Ekman, P., & Friesen, W. V. (1978). The facial action coding system: A technique for the measurement of facial movement. Palo Alto, CA: Consulting Psychologists Press.

Foa, E., Cashman, L., Jaycox, L., & Perry, K. (1997). The validation of a self-report measure of posttraumatic stress disorder: The Posttraumatic Diagnostic Scale. *Psychological Assessment, 9,* 445-451. doi: 10.1037/1040-3590.9.4.445

Frewen, P. A., Dozois, D. J., Neufeld, R. W., & Lanius, R. A. (2008). Meta-analysis of alexithymia in posttraumatic stress disorder. *Journal of Traumatic Stress, 21,* 243-246. doi: 10.1002/jts.20320

Freyd, M. (1923). The graphic rating scale. *Journal of Educational Psychology, 14,* 83-102. Retrieved from: http://www.apa.org/pubs/journals/edu/index.aspx

Hodgson, R., & Rachman, S. (1974). Desynchrony in measures of fear. *Behaviour Research and Therapy, 12,* 319-326. Retrieved from http://www.elsevier.com/wps/find/journaldescription.cws_home/265/description#descriptdes

Holmes, E. A., Brewin, C. R., & Hennessy, R. G. (2004). Trauma films, information processing, and intrusive memory development. *Journal of Experimental Psychology: General, 133,* 3-22. doi: 10.1037/0096-3445.133.1.3

Holmes, E., Oakley, D., Stuart, A., & Brewin, C. (2006). Investigating peri-traumatic dissociation using hypnosis during a traumatic film. *Journal of Trauma & Dissociation, 7,* 91-113. doi: 10.1300/J229v07n04_06

Infrasca, R. (1997). Alexithymia, neurovegetative arousal and neuroticism: An experimental study. *Psychotherapy and Psychosomatics, 66,* 276-280. Retrieved from http://content.karger.com/ProdukteDB/produkte.asp?Aktion=JournalHome&ProduktNr=223864

Krystal, J. H., Giller, E. L., & Cicchetti, D. V. (1986). Assessment of alexithymia in posttraumatic stress disorder and somatic illness: Introduction of a reliable measure. *Psychosomatic Medicine, 48,* 84-94. Retrieved from: http://www.psychosomaticmedicine.org/

Kupchik, M., Strous, R., Erez, R., Gonen, N., Weizman, A., & Spivak, B. (2007). Demographic and clinical characteristics of motor vehicle accident victims in the community general health outpatient clinic: A comparison of PTSD and non-PTSD subjects. *Depression and Anxiety, 24,* 244-250. doi: 10.1002/da.20189

Lane, R. D., Sechrest, L., Riedel, R., Shapiro, D., & Kaszniak, A. (2000). Pervasive emotion recognition deficit common to alexithymia and the repressive coping style. *Psychosomatic Medicine, 62,* 492-501. Retrieved from: http://www.psychosomaticmedicine.org/

Lang, P., Levin, D., Miller, G., & Kozak, M. (1983). Fear behavior, fear imagery, and the psychophysiology of emotion: The problem of affective response integration. *Journal of Abnormal Psychology, 92,* 276-306. doi: 10.1037/0021-843X.92.3.276

Lazarus, R. S., Opton, E. M., Nomikos, M. S., & Rankin, N. O. (1965). The principle of short-circuiting of threat: Further evidence. *Journal of Personality, 33,* 622–635. doi: 10.1111/j.1467-6494.1965.tb01408.x

Luminet, O., Rimé, B., Bagby, R. M., & Taylor, G. M. (2004). A multimodal investigation of emotional responding in alexithymia. *Cognition and Emotion, 18,* 741-766. doi: 10.1080/02699930341000275

Martin, J. B., Pihl, R. O., Young, S. N., Ervin, F., et al. (1986). Prediction of alexithymic characteristics from physiological, personality, and subjective measures. *Psychotherapy and Psychosomatics, 45,* 133-140. Retrieved from: http://content.karger.com/ProdukteDB/produkte.asp?Aktion=JournalHome&ProduktNr=223864

McCaslin, S. E., Metzler, T. J., Best, S. R., Liberman, A., Weiss, D. S., Fagan, J., & Marmar, C. R. (2006). Alexithymia and PTSD symptoms in urban police officers: Cross-sectional and prospective findings. *Journal of Traumatic Stress, 19,* 361-373. doi: 10.1002/jts.20133

McDonald, P. W., & Prkachin, K. M. (1990). The expression and perception of facial emotion in alexithymia: A pilot study. *Psychosomatic Medicine, 52,* 199-210. doi: 00333174/90/5202-0199$02 00/0

Meganck, R., Vanheule, S., & Desmet, M. (2008). Factorial validity and measurement invariance of the 20-item Toronto Alexithymia Scale in clinical and nonclinical samples. *Assessment, 15,* 36-47. doi: 10.1177/1073191107306140

Monson, C. M., Price, J. L., Rodriguez, B. F., Ripley, M. P., & Warner, R. A. (2004). Emotional deficits in military-related PTSD: An investigation of content and process disturbances. *Journal of Traumatic Stress, 17,* 275-279. doi: 10.1023/B:JOTS.0000029271.58494.05

Norris, F. H. (1992). Epidemiology of trauma: Frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology, 60,* 409-418. doi: 10.1037/0022-006X.60.3.409

Orr, S. P. (1997). Psychophysiologic reactivity to trauma-related imagery in PTSD: Diagnostic and theoretical implications of recent findings. *Annals of the New York Academy of Sciences, 821,* 114-124. Retrieved from http://www.wiley.com/bw/journal.asp?ref=0077-8923

Parker, J. D., Taylor, G. J., & Bagby, R. M. (2003). The 20-item Toronto Alexithymia Scale III. Reliability and factorial validity in a community population. *Journal of Psychosomatic Research, 55,* 269-275. doi: 10.1016/S0022-3999(02)00578-0

Ramirez, S. M., Glover, H., Ohlde, C., Mercer, R., Goodnick, P., Hamlin, C., & Perez-Rivera, M. I. (2001). Relationship of numbing to alexithymia, apathy, and depression. *Psychological Reports, 88,* 189-200. doi: 10.2466/PR0.88.1.189-200

Roedema, T. M., & Simons, R. F. (1999). Emotion-processing deficit in alexithymia. *Psychophysiology, 36,* 379-387. doi: 10.1017/S0048577299980290

Sayette, M. A., Cohn, J. F., Wertz, J. M., Perrott, M., & Parrott, D. (2001). A psychometric evaluation of the facial action coding system for assessing spontaneous expression.

Journal of Nonverbal Behavior, 25, 167-185. Retrieved from: http://www.springerlink.com/content/104925/

Sifneos, P. E. (1973). The prevalence of 'alexithymic' characteristics in psychosomatic patients. *Psychotherapy and Psychosomatics, 22,* 255-262. Retrieved from: http://content.karger.com/ProdukteDB/produkte.asp?Aktion=JournalHome&ProduktNr=223864

Söndergaard, H. P., & Theorell, T. (2004). Alexithymia, emotions, and PTSD; findings from a longitudinal study of refugees. *Nordic Journal of Psychiatry, 58,* 185-191. doi: 10.1080/08039480410006214.

Taylor, G., Bagby, R., & Parker, J. (1992). The revised Toronto Alexithymia Scale: Some reliability, validity, and normative data. *Psychotherapy and Psychosomatics, 57,* 34-41. Retrieved from: http://content.karger.com/ProdukteDB/produkte.asp?Aktion=JournalHome&ProduktNr=223864

Troisi, A., Delle Chiaie, R., Russo, F., & Russo, M. A. (1996). Nonverbal behavior and alexithymic traits in normal subjects: Individual differences in encoding emotions. *Journal of Nervous and Mental Disease, 184*, 561-566. doi: 10.1097/00005053-199609000-00008

Vanheule, S. (2008). Challenges for alexithymia research: A commentary on 'The construct of alexithymia: Associations with defense mechanisms'. *Journal of Clinical Psychology, 64*, 322-337. doi: 10.1002/jclp.20467

Weathers, F. W., Keane, T. M., & Davidson, J. R. (2001). Clinician-Administered PTSD Scale: A review of the first ten years of research. *Depression and Anxiety, 13,* 132-156. doi: 10.1002/da.1029

Weathers, F. W., Ruscio, A. M., & Keane, T. M. (1999). Psychometric properties of nine scoring rules for the Clinician-Administered Posttraumatic Stress Disorder. *Psychological Assessment, 11,* 124-133. doi: 10.1037/1040-3590.11.2.124

Yehuda, R., Steiner, A., Kahana, B., Binder-Brynes, K., Southwick, S. M., Zemelman, S., & Giller, E. L. (1997). Alexithymia in holocaust survivors with and without PTSD. *Journal of Traumatic Stress, 10*, 93-100. doi: 10.1023/A:1024860430725

Footnotes

[1] The participant reported to the researcher that he had received an important phone call and needed to discontinue the study after completing the CAPS interview and the subsequent questionnaire battery. The participant received full compensation ($30). Although the participant later contacted the researcher and attempted to reschedule their appointment, the session was unable to be completed due to scheduling conflicts.

[2] It should be noted that an additional procedure, the script driven imagery task, occurred following the CAPS interview and prior to the MVA video. Participants completed an additional battery of self-report measures not utilized in the current analyses, in order to ensure a 30 minute break between the script presentation and the MVA video. Data gathered from the script procedure was not used in evaluating the hypotheses of the current study.

[3] In order to evaluate whether additional variance in the number of FACS facial expressions coded would result in a significant relation between alexithymia and facial responding, the total number of expressions displayed during the first and final minute of the video were totaled and a dichotomous variable was created (0 = displayed no fear expressions during the video, 1 = displayed a fearful expression during the video). While this increased the sample size of participants displaying a codable fear expression from 16 to 19, the logistic regression model still did not reliably distinguish between those who did and did not display fear expressions ($\chi^2 = .17$, $p > .05$).

Table 1.

Correlations among Alexithymia Level, Posttraumatic Stress Symptom Severity, Heart Rate, FACS score, and Self-Report Ratings of Fear Within the MVA-Survivor Group

	Mean (*SD*)	Range	1	2	3	4	5	6	7	8
1. TAS-20	45.98 (13.00)	23-79	-	.68**	.10	.05	.02	.12	.40**	.14
2. Posttraumatic Stress Symptoms	31.84 (18.81)	0-84	-	-	-.07	-.17	-.03	.08	.41**	.34*
3. Heart Rate (Baseline)	117.37 (14.81)	92.59-145.79	-	-	-	-.09	.12	.01	-.06	.18
4. Heart Rate (First Minute)	122.35 (13.54)	95.13-144.41	-	-	-	-	.03	.03	-.09	.08
5. FACS Fear (Minute 1)	.35 (.61)	0-2	-	-	-	-	-	.16	.07	.21
6. FACS Fear (Final Minute)	.11 (.31)	0-1	-	-	-	-	-	-	.12	-.00
7. VAS Fear Rating (Pre)	5.96 (16.55)	0-75	-	-	-	-	-	-	-	.46**
8. VAS Fear Rating (Post)	32.37 (36.04)	0-100	-	-	-	-	-	-	-	-

Note. $n = 51$; TAS-20: Toronto Alexithymia Scale (Bagby, Parker, & Taylor, 1994); FACS: Facial Action Coding System (Ekman & Friesen, 1978); VAS: Visual Analog Scale (Freyd, 1923). In terms of correlations related to the physiological variables, $n = 26$.
* $p < .05$; ** $p < .01$.

Table 2.

Means and Standard Deviations for Physiological Responding, Facial Expressions of Fear, and Self-Reported Fear Ratings in the MVA-Survivor Group and the Comparison Group

	MVA-Survivor		Comparison	
	Mean (*SD*)	Range	Mean (*SD*)	Range
1. TAS-20	45.98 (13.00)	23-79	44.69 (11.85)	25-79
2. Posttraumatic Stress Symptoms	31.84 (18.81)	0-84	28.03 (17.59)	2-72
3. Heart Rate (Baseline)	117.37 (14.81)	92.59-145.79	117.06 (14.19)	87.60-146.42
4. Heart Rate (First Minute)	122.35 (13.54)	95.13-144.41	124.09 (11.03)	104.29-145.42
5. FACS Fear (Minute 1)	.35 (.61)	0-2	.18 (.39)	0-1
6. FACS Fear (Final Minute)	.11 (.31)	0-1	.05 (.21)	0-1
7. VAS Fear Rating (Pre)	5.96 (16.55)	0-75	14.72 (26.62)	0-88
8. VAS Fear Rating (Post)	32.37 (36.04)	0-100	28.88 (30.06)	0-88

Note. n = 51 for MVA-Survivor Group; n = 25 for Comparison Group; TAS-20: Toronto Alexithymia Scale (Bagby, Parker, & Taylor, 1994); FACS: Facial Action Coding System (Ekman & Friesen, 1978); VAS: Visual Analog Scale (Freyd, 1923).

Table 3.
Associations between Level of Alexithymia and Physiological and Self-Report Measures of Fear

	ΔR^2 (each predictor)	*t*	*β*	sr^2
Dependent Variable: Heart Rate in First Minute of Video				
Step 1				
	.04			
Posttraumatic Stress Symptoms		-.97	-.18	.03
Baseline Heart Rate (Pre-Video)		-.57	-.11	.01
Step 2	.13			
Level of Alexithymia		1.61	.42	.09
Dependent Variable: Post-Video Ratings of Fear				
Step 1	.26**			
Posttraumatic Stress Symptoms		1.55	.20	.03
Pre-Video Ratings of Fear		2.96	.39	.12**
Step 2	.03			
Level of Alexithymia		-1.63	-.26	.03

Note. *n* = 27 for physiological criterion; *n* = 54 for self-report criterion. β = standardized beta weight; sr^2 = Squared semipartial correlation.

Table 4.
Association between Level of Alexithymia and Behavioral Measure of Fear

	β	95% CI	OR	*p*
Dependent Variable: Fear Expressions in First Minute of Video				
Covariates				
PTSD Symptoms	-.01	.93 – 1.02	.98	>.05
Primary Predictors				
TAS Symptoms	.02	.96 – 1.09	1.02	>.05

Note. *n* = 55. β = standardized beta weight; 95% CI = Confidence Interval; OR = Odds Ratio.