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Posttraumatic stress symptom severity and functional impairment in a trauma-exposed sample: A preliminary examination into the moderating role of valued living☆

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ABSTRACT

Posttraumatic Stress Disorder (PTSD) is associated with functional impairment in social, occupational, and physical domains. Similar to other forms of psychopathology, research suggests the correlation between symptom severity and functional impairment is moderate and this relationship varies across studies. These findings suggest a continued need to identify variables that explain unique variance in functional outcomes over and above PTS symptomology, as well as those that moderate this association. One such variable may be valued living, a primary treatment target in contextual behavioral approaches such as Acceptance and Commitment Therapy (ACT). The present study sought to investigate the association between valued living, PTS symptomology, and functional impairment in a trauma-exposed sample, as well as the moderating effect of valued living in the relationship between symptom severity and functioning. Results confirmed valued living is associated with functional impairment after controlling for PTS symptom severity and other covariates, and valued living does moderate the link between symptoms and impairment in functioning. Findings highlight the importance of the interplay between valued living and symptomology in understanding impairment among trauma-exposed individuals.

1. Introduction

Trauma is ubiquitous, as most adults will be exposed to at least one potentially traumatic event over the course of their lives (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). While most people adapt well following exposure to a potentially traumatic event (Bonanno & Mancini, 2012), posttraumatic stress (PTS) symptoms persist in a subset of individuals. One possible outcome is posttraumatic stress disorder (PTSD), a debilitating condition with a lifetime prevalence of 6.8% (Kessler & Wang, 2008). A diagnosis of PTSD is based on prior exposure to actual or threatened death, serious injury, or sexual violence (referred to as a Criterion A potentially traumatic event), as well as the presence of symptomology in each of four symptom clusters: re-experiencing symptoms, avoidance symptoms, negative alterations in mood and cognition, and alterations in arousal and reactivity (American Psychiatric Association, 2013). Etiological models of PTSD emphasize the roles of classical and operant conditioning, in that environmental stimuli associated with a traumatic event come to elicit strong distress responses in the individual, resulting in the persistent

avoidance of these cues (Keane & Barlow, 2002). Both PTSD and subthreshold PTS symptomology are therefore associated with a range of negative functional outcomes (Marshall et al., 2001).

1.1. The Link between Symptoms and Functional Impairment

In psychopathology, symptoms are generally cognitive, emotional, or behavioral patterns that give rise to distress and impairment, and symptom severity refers to the cumulative total of symptoms and their severity ratings (McKnight, Montfort, Kashdan, Blalock, & Calton, 2016). Functional impairment refers to the interference that occurs in one's life because of symptomology (APA, 2013). The association between symptoms and impairment is embedded in the psychiatric nosology, as diagnoses in the DSM-5 require the presence of symptom-related disability, defined as "clinically significant distress or impairment in social, occupational, or other important areas of functioning" (APA, 2013, p. 21). Symptom severity is a clear indicator of the presence of psychopathology, and meta-analyses reveal moderate to strong associations between functional impairment and both depres-

sive (*Mr* =.50; McKnight & Kashdan, 2009) and anxiety symptom severity (*Mr* =.34; McKnight et al., 2016). Regarding PTS symptomology specifically, the association with global functioning is moderate (*Mr* =.33), with a relatively stronger association found in the occupational domain (*Mr* =.44; McKnight et al., 2016). These findings suggest that while symptom severity is important in understanding one's functioning, substantial variance remains unexplained.

Given the frequency with which symptom severity is defined as the primary outcome in clinical trials and the more infrequent use of functional outcomes (see Becker, Chorpita, & Daleiden, 2011; Watts et al., 2013; Zimmerman et al., 2008), deconstructing the association between symptoms and functioning is of critical importance. When examining psychopathology broadly, variability in these associations appears to be the rule, rather than the exception. While an exhaustive review of symptom-impairment associations is beyond the scope of this article, examples from the anxiety and mood disorders literature highlight this point. Numerous studies show a strong association between depressive symptom severity and impairment (see McKnight & Kashdan, 2009), though much smaller correlations have been found in other samples (Koivumaa-Honkanen et al., 2008). Social anxiety symptom severity has exhibited moderate to strong relationships with impairment (Hambrick, Turk, Heimberg, Schneier, & Liebowitz, 2003), however attenuated associations have also been demonstrated (Hebert, Fales, Nangle, Papadakis, & Grover, 2013). Finally, the link between PTS symptomology and functional impairment is well established across several domains including social and family functioning (Sayers, Farrow, Ross, & Oslin, 2009; Stein, Walker, Hazen, & Forde, 1997), occupational functioning (Stein, McQuaid, Pedrelli, Lenox, & McCahill, 2000), and physical functioning (Vasterling et al., 2008). And yet consistent with the variability found in other disorders, small to moderate associations between symptom severity and functional outcomes have also been demonstrated (Berz, Taft, Watkins, & Monson, 2008; Renshaw, Rodrigues, & Jones, 2008). Taken together, this transdiagnostic variability suggests a continued need to identify moderator variables that influence the association between symptom severity and impairment. One potential moderator may be that of valued living.

1.2. The role of valued living

Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999, 2012) is a contextual behavioral treatment that emphasizes mindfulness, acceptance, and behavioral change processes in the service of promoting psychological flexibility. In ACT, the functional association between symptoms and impairment emphasizes the role of experiential avoidance (Hayes, Wilson, Gifford, Follette, & Strosahl, 1996). Psychological symptoms result in functional impairment when a person engages in efforts to minimize or escape these experiences rather than engage in valued life domains. In other words, experiential avoidance is not inherently problematic, it is problematic to the extent that inflexible commitment to avoiding painful experiences often comes at the expense of engaging in activities that are important and meaningful (Wilson & Murrell, 2004). With ACT's emphasis on fostering psychological flexibility, symptom reduction is thereby considered secondary to valued living (Hayes, Levin, Plumb-Vilardaga, Villatte, & Pistorello, 2013). As such, while ACT generally results in a reduction of symptoms across problem areas (Hayes, Luoma, Bond, Masuda, & Lillis, 2006), its underlying theory suggests that valued living may increase (and functional impairment thereby decrease) even in circumstances in which symptoms remain present. For example, in an ACT-based treatment for highly disabled patients with chronic pain, treatment was associated with significant and clinically meaningful changes on a variety of functional outcomes, however patients reported no significant reduction in pain intensity (McCracken, MacKichan, & Eccleston, 2007).

Values are defined as verbally constructed consequences of ongoing

and dynamic patterns of activity, that are both chosen freely and intrinsically reinforcing (Wilson & Dufrene, 2009). Values are considered separate from goals, in that goals can be achieved, whereas values cannot. The compass metaphor is commonly used in ACT to exemplify this distinction: values provide us with direction like that of a compass, whereas goals refer to the points on the map (Hayes et al., 1999, 2012). We strive to move in valued directions; therefore, values establish the behavioral patterns that direct us toward our goals. Acting in the service of our values inevitably brings us in contact with painful and distressing experiences (Hayes et al., 1999, 2012). Consistent with the ACT conceptual model suggesting that rigid attempts to control, escape, or avoid these experiences are incongruent with valued living, research shows negative correlations between valued living and experiential avoidance in both community (Smout, Davies, Burns, & Christie, 2014; Wilson, Sandoz, Kitchens, & Roberts, 2010) and clinical samples (Michelson, Lee, Orsillo, & Roemer, 2011).

Research on constructs related to valued living has demonstrated consistent associations with both symptom severity and functional outcomes across various forms of psychopathology in community and clinical samples. In an undergraduate sample, values consistency (the degree to which a person engages in behaviors that allows them to contact their values) was negatively correlated with psychological distress and environmental difficulties (Wilson, Sandoz, Kitchens, & Roberts, 2010). Graham, West, and Roemer (2015) found valued living to be negatively correlated with anxious arousal, depressive symptoms, and general anxiety in a sample of black students. Additionally, valued living moderated the relationship between racist experiences and symptom severity in this study, as the link between racist experiences and symptomology was only significant at lower levels of valued living. Among treatment-seeking military veterans, increased values consistency was associated with a decreased likelihood of suicidal ideation after controlling for other suicide risk factors (Bahraini et al., 2013). Also, in the treatment of Generalized Anxiety Disorder (GAD), changes in valued living predicted responder status over and above reductions in worry, the core symptom of this disorder (Hayes, Orsillo, & Roemer, 2010).

Regarding indices of well-being, values consistency has exhibited positive relationships with vitality, mental health, and domains relevant to overall functioning (Wilson et al., 2010). Also, in a community sample of college students and older adults, commitment to values was associated with increased satisfaction with life and positive affect (Ferssizidis et al., 2010). Using experience sampling methodology, Kashdan and McKnight (2013) found individuals with Social Anxiety Disorder reported greater self-esteem, meaning in life, and positive emotions on days they devoted effort toward a purpose in life. Overall, theoretical and empirical evidence support the notion that valued living is a behavioral process important in the understanding of psychopathology and well-being.

1.3. PTS symptom severity and valued living

An ACT-based conceptual model of PTSD suggests impairment among those exposed to potentially traumatic events should be reduced when individuals respond to trauma reminders with openness and acceptance, awareness, and committed value-driven actions (Orsillo & Batten, 2005). While there are limited studies documenting the link between PTS symptom severity and valued living using validated measures of values consistency or success, research does generally support this association. In a trauma-exposed sample of African-American adults, participants classified as resilient (defined as the absence of any lifetime DSM diagnosis) reported fewer total lifetime traumas, less avoidant coping, and an increased sense of purpose in life and meaning, as compared to participants with a current DSM disorder (81% of which were diagnosed with PTSD; Alim et al., 2008). Similarly, in a sample of trauma-exposed undergraduate students, Kashdan and Kane (2011) found experiential avoidance moderated the relationship

between PTS symptom severity and posttraumatic growth, suggesting that greater distress is associated with increased growth and well-being when avoidance is low. Additionally, in an experience sampling study of treatment-seeking military veterans, PTSD diagnostic status was found to be insufficient in predicting well-being when considered in the context of personal strivings (Kashdan, Breen, & Julian, 2010). Specifically, veterans with PTSD differed from veterans without PTSD on indices of well-being and self-esteem only when their personal strivings were more characterized by avoidance or emotion regulation as compared to approach (e.g., seeking out rewarding opportunities). These results support the notion that prioritizing behavior toward approach-oriented strivings as opposed to avoidance is critical to well-being, regardless of the degree of PTS symptomology (Kashdan et al., 2010).

Outcome trials and case studies of treatments that promote valued living also provide useful evidence about links with functional impairment. Blevins, Roca, and Spencer (2011) examined the effectiveness of an ACT-based workshop among returning Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) military veterans. The workshop, which included a valued living component, resulted in improvements in relationship satisfaction as compared to a delayed-intervention control group. Additionally, case studies of ACT for PTSD have documented treatment-associated functional improvement in important life domains (Batten & Hayes, 2005), as well as specific reductions in PTSD, depression, and anxiety symptoms (Twohig, 2009). Behavioral Activation (BA), a contextual behavioral therapy that assists clients in reengaging in meaningful and rewarding patterns of activity (Martell, Addis, & Jacobson, 2001), has also accumulated research support as a treatment for PTSD. In an uncontrolled trial of BA for OIF/OEF military veterans with PTSD presenting in a primary care clinic, treatment was associated with improvements in quality of life, PTSD symptoms, and depressive symptoms (Jakupcak, Wagner, Paulson, Varra, & McFall, 2010). Similarly, in a randomized effectiveness trial of physically injured trauma survivors, BA resulted in PTSD symptom improvement and a trend toward improvement in physical functioning (Wagner, Zatzick, Ghesquiere, & Jurkovich, 2007).

The cumulative research supports the associations between values-related constructs, PTS symptom severity, and functional impairment. But while reliable and validated measures of values have been developed in recent years (e.g., the Valued Living Questionnaire (VLQ; Wilson et al., 2010); the Survey of Life Principles (SLP; Ciarrochi & Bailey, 2008), and the Valuing Questionnaire (VQ; Smout et al., 2014)), research examining valued living in trauma-exposed samples using these measures is lacking. Further, while studies have shown that contextual behavioral processes interact with PTS symptoms in the prediction of functional outcomes (e.g., Kashdan & Kane, 2011), no prior research has examined the interaction between PTS symptom severity and valued living in predicting impairment.

1.4. The present study

The purpose of the present study was twofold: First, we sought to expand our understanding of valued living in a trauma-exposed sample. To this end, we examined the relationship between valued living and several theoretically relevant variables including PTS symptom severity, anxiety-related functional impairment, depressive symptoms, and cumulative trauma history. Second, we sought to examine the main and interactive effects of valued living and PTS symptom severity on anxiety-related functional impairment, after controlling for relevant covariates.

As prior research supports the association between valued living and a range of mental health outcomes (Graham et al., 2015; Wilson et al., 2010) and fewer prior traumatic events have been associated with resilience (Alim et al., 2008), we first hypothesized that increased valued living would be negatively associated with PTS symptom severity, anxiety-related functional impairment, depressive symptoms,

and number of prior Criterion A potentially traumatic events. Next, as changes in valued living have previously predicted functional outcomes over and above mental health symptoms (Hayes et al., 2010), we hypothesized that valued living would be associated with anxiety-related functional impairment, after controlling for PTS symptom severity, depressive symptoms, and number of prior Criterion A potentially traumatic events. Finally, because of the variable associations between PTS symptom severity and impairment (see McKnight et al., 2015) and research supporting the importance of values in relation to well-being among distressed participants (Kashdan et al., 2010), we hypothesized that valued living would moderate the relationship between PTS symptom severity and anxiety-related functional impairment. Specifically, we expected the association between symptoms and impairment would attenuate as valued living increased.

2. Method

2.1. Participants and procedure

Our university institutional review board approved this study prior to data collection. Two hundred fifty-four participants were recruited using the online labor market Mechanical Turk (MTurk), and each were paid $2.00 upon completion. MTurk is an online platform comprised of over 500,000 individuals from over 190 countries who may be recruited to perform tasks for compensation. It has shown to be as reliable as and more diverse than standard internet or undergraduate samples (Buhrmester, Kwang, & Gosling, 2011). To be eligible for recruitment, participants needed to be 18 years or older, living in the United States, able to read and write, and have an MTurk approval rating of 95% or greater (i.e., a history of a high rate of task approvals, which is suggestive of data quality). Participants reviewed and acknowledged understanding of the informed consent document before completing study questionnaires. Inattentive responding and impression management was assessed using three validity items created for this study and interspersed across measure administration (example item: "I sometimes forget my name"). Two participants positively endorsed two out of three validity items and these cases were removed. Next, participants who endorsed at least one DSM-5 Criterion A potentially traumatic event (APA, 2013) were subsequently selected for analysis ($n = 161$; 64% of total valid sample). Twelve cases were then removed based on excessive missing data ($> 20\%$ of items on any primary measure) and mean imputation was conducted on any remaining missing data that did not meet these criteria (15 total variables, or .36% of the dataset). The final sample was comprised of 149 participants, and was 52% female with a mean age of 35.35 ($SD = 9.90$). Participants were 79% Caucasian, 11% African-American, 5% Hispanic, 4% Asian, 1% Native American, and 1% identified as "other." Median range of household income was $40,000 to $59,999 per year.

3. Materials

3.1. Demographics questionnaire

A questionnaire designed for the present study assessed participant demographic characteristics including age, sex, race/ethnicity, and household income.

3.2. Valued Living Questionnaire (VLQ)

The VLQ (Wilson et al., 2010) is a two-part instrument designed to assess valued living. Respondents first assign importance ratings in ten domains (e.g., family, work, recreation, and citizenship). Items are rated on a 10-point Likert scale, ranging from 1 (*not at all important*) to 10 (*extremely important*). In the second part, respondents rate how consistent their behavior has been over the past week in the same valued domains, also using a 10-point scale. A valued living composite

score is then calculated using the mean of the products of each item's importance and consistency rating. Studies suggest the measure possesses good test-retest validity, adequate convergent and discriminant validity (Wilson et al., 2010), and sensitivity to treatment-related change (Michelson et al., 2011).

3.3. Brief Trauma Questionnaire (BTQ)

The BTQ (Schnurr, Vielhauer, Weathers, & Findler, 1999) is a 10-item self-report questionnaire initially designed to assess for DSM-IV Criterion A.1 trauma exposure (American Psychiatric Association, 1994). As Criterion A.2 has been eliminated in DSM-5, the BTQ now fully assesses prior Criterion A exposure. The questionnaire consists of 10 items describing different types of Criterion A events. If a participant reports prior exposure to an event, this exposure is scored as positive if they also endorse serious injury, fear of death or serious injury, or witnessing a situation in which another person experienced actual or threatened death or serious injury. The BTQ was derived from the Brief Trauma Interview (BTI; Schnurr, Vielhauer, & Weathers, 1995) and prior research indicates it is a reliable and valid measure of prior trauma exposure (Schnurr, Spiro, Vielhauer, Findler, & Hamblen, 2002). Shnurr et al. (2002) reported good interrater reliability between the BTQ and a participant interview (ϰ range =.60–1.00), and the number of different types of traumas positively correlated with PTSD symptom severity. In the present study, participants who endorsed at least one item on the BTQ were selected for analysis.

3.4. Posttraumatic Stress Disorder Checklist (PCL-5)

The PCL-5 (Weathers et al., Weathers, Blake et al., 2013, Weathers & Litz, 2013). is a 20-item self-report measure designed to screen for the four clusters of DSM-5 PTSD symptoms. Items are rated on a 5-point Likert-type scale ranging from 0 (*not at all*) to 4 (*extremely*), where respondents identify how much they were bothered over the past month by PTS symptoms. While only recently developed, the psychometric properties of the PCL-5 are excellent, demonstrating strong test-retest reliability, internal consistency, and convergent and discriminant validity (Blevins, Weathers, Davis, Witte, & Domino, 2015). Currently, a score of 33 is recommended as the cut-point for a probable diagnosis of PTSD (Bovin et al., 2015).

3.5. Overall Anxiety Severity and Impairment Scale (OASIS)

The OASIS (Norman, Hami Cissell, Means-Christensen, & Stein, 2006). is a 5-item self-report measure designed to assess anxiety severity and functional impairment. Items are rated on a 5-point Likert scale, ranging from 0 (*No; Little or None; None*) to 4 (*Constant ; Extreme; All the Time*), with operational definitions of each rating described for each item. Two items ask the participant to identify the severity and frequency of anxiety (e.g., "In the past week, when you have felt anxious, how intense or severe was your anxiety?"), and three items assess the behavioral impact of symptoms (e.g., "In the past week, how much did your anxiety interfere with your ability to do the things you needed to do at work, at school, or at home?"). The OASIS was selected for the current study because of its emphasis on cross-syndromal anxiety severity and functional impairment, as opposed to specific symptoms. Prior research has revealed strong internal consistency, convergent and discriminant validity, and a unidimensional factor structure (Norman et al., 2006). Analyses of sensitivity and specificity suggest a cut score of 8 as optimal in classifying individuals as having a probable anxiety disorder (Campbell-Sills et al., 2009).

3.6. Patient Health Questionnaire (PHQ-3)

The PHQ-3 is a brief three-item screening measure of core depressive symptoms adapted from the full-length Patient Health Questionnaire (Kroenke & Spitzer, 2002). The PHQ-3 utilizes a 4-point Likert scale in which participants identify their frequency of depressive symptoms over the past week with responses of 0 (*Not at all*), 1 (*Several days*), 2 (*More than half the days*), and 3 (*Nearly every day*). Items assess anhedonia; feeling down, depressed, or hopeless; and fatigue/low energy. Prior research on the full-length and brief versions of the PHQ has demonstrated excellent internal consistency, convergent and discriminant validity, and utility as a brief screening instrument for depression (see Kroenke & Spitzer, 2002).

3.6.1. Data analytic strategy

To examine the associations between valued living and theoretically related constructs, bivariate correlations (Pearson's r) were computed among the VLQ subscales and composite score, PCL-5, OASIS, PHQ-3, and BTQ-measured cumulative trauma exposure. Next, to examine the main and interactive effects of valued living and PTSD symptom severity on anxiety-related functional impairment, a hierarchical multiple regression analysis was conducted. Predictor variables were first centered to minimize multicollinearity. Covariates were entered in the first step (depressive symptoms and number of Criterion A traumas), the PCL-5 was entered in the second step, the VLQ-Composite was entered in the third step, and the interaction term was entered in the fourth step. A significant interaction was tested using simple slopes analysis, in which the association between PCL-5 and OASIS scores was plotted at low (1*SD* below the mean), moderate (mean), and high (1*SD* above the mean) levels of VLQ-Composite scores, and tested to examine whether the simple slopes significantly differed from zero at the .05 level (Hayes, 2013).

4. Results

4.1. Sample characteristics

Trauma exposure details are depicted in Table 1. The most commonly reported trauma types included witnessing a situation in which someone was (or was feared to be) seriously injured or killed (46.3%), serious accidents (38.9%), or being physically assaulted (31.5%). Over half (59.7%) of the sample reported a history of exposure to more than one potentially traumatic event. Reliability analyses were conducted to evaluate the internal consistency of predictor and outcome scales. Cronbach's α was adequate for VLQ-Importance (α=.79), VLQ-Consistency (α=.85), VLQ-Composite (α=.85), and PHQ-3 (α=.84); and excellent for the OASIS (α=.92) and PCL-5 (α=.96). Mean inter-item correlations were acceptable for VLQ-Importance (.29), VLQ-Consistency (.37), and VLQ-Composite (.37); and high for the OASIS (.70), PCL-5 (.54), and PHQ-3 (.64). Means, standard deviations, and ranges for predictor and outcome measures are depicted in Table 2. Results suggest participants endorsed minimal

Table 1
Self-Reported Prior Exposure to Criterion A Stressors.

	Percent endorsing exposure
War zone exposure	5.4%
Serious accident	38.9%
Disaster	27.5%
Life-threatening illness	6.7%
Childhood physical abuse	22.1%
Physical assault	31.5%
Sexual assault	12.8%
Other life-threatening event	8.1%
Violent death of loved one	28.2%
Witnessed life-threat of another	46.3%
Exposure to > 1 Criterion A Stressor	59.7%
Exposure to > 2 Criterion A Stressor	33.6%

Note. N =149.

Table 2
Means, standard deviations, and bivariate correlations.

Measure	1	2	3	4	5	6	7
1. VLQ-Composite	(.85)						
2. VLQ-Importance	.82**	(.79)					
3. VLQ-Consistency	.77**	.36**	(.85)				
4. OASIS	−.46**	−.35**	−.35**	(.92)			
5. PCL–5	−.26**	−.17*	−.28**	.70**	(.96)		
6. PHQ–3	−.44**	−.33**	−.36	.72**	.52**	(.84)	
7. BTQ[a]	.02	.06	−.09	.20*	.24**	.03	–
Mean	49.18	6.84	6.87	4.99	18.79	2.13	2.28
Standard deviation	19.08	1.53	1.86	4.49	17.75	2.36	1.54
Range	10–100	2–10	2–10	0–19	0–60	0–9	1–9

Note. VLQ=Valued Living Questionnaire; OASIS=Overall Anxiety Severity and Impairment Scale; PCL-5=PTSD Checklist −5; BTQ=Brief Trauma Questionnaire; PHQ-3= Patient Health Questionnaire −3.
Cronbach's α in parentheses along the diagonal.
[a] BTQ scores refer to total number of different Criterion A trauma types.
* $p < .05$.
** $p < .01$.

PTSD symptoms, on average (PCL-5 M=18.79, SD=17.75), which is consistent with previous research on non-clinical trauma-exposed samples using the PCL-5 (e.g., M=18.02, SD=17.28; Bardeen & Fergus, 2016). Participants also reported, on average, minimal anxiety severity and impairment (OASIS M=4.99, SD=4.49), which is somewhat lower and more variable than prior research using an undergraduate sample (e.g., M=7.16, SD=3.05; Norman et al., 2006). Higher standard deviations may be due to the broad heterogeneity of outcomes associated with trauma-exposure. The sample did evidence a range of symptomology and impairment, as 25.5% of participants scored 33 or higher on the PCL-5% and 28.2% obtained an eight or higher on the OASIS, each reflecting scores that met or exceeded recommended clinical cut-points.

4.2. Bivariate associations

Bivariate correlational analyses revealed a pattern of relationships between the VLQ scales and a range of external criterion variables largely consistent with hypotheses. The VLQ-Composite exhibited significant negative associations with the PCL-5 ($r=−.26$, $p < .01$), PHQ-3 ($r=−.44$, $p < .001$), and OASIS ($r=−.46$, $p < .001$). Subscales of the VLQ also exhibited significant and negative associations with the PCL-5, PHQ-3, and OASIS, although correlation coefficients were generally smaller in magnitude (VLQ-Importance r range: −.17, −.35; VLQ-Consistency r range: −.28, −.36). Contrary to expectations, the VLQ-Composite was unrelated to number of prior Criterion A events ($r=.02$, ns). Correlation coefficients are shown in Table 2.

4.3. Main and interactive effects

Prior to primary analyses, linear regression assumptions were checked. The Durbin-Watson test suggested independence of residuals and inspection of the normal P-P residual plot suggested the assumption of normality was met. The degree of multicollinearity among independent variables was deemed acceptable due to low VIF values and tolerance values greater than .10. No variables were identified as outliers based on a Cook's Distance value greater than 1. Results from the hierarchical regression analysis demonstrated the overall model was significantly associated with anxiety-related functional impairment, $R^2=.70$, $F(5, 143) =67.78$, $p < .001$, explaining 70% of the total variance of the outcome. Supporting our hypothesis, after entering covariates and PTS symptom severity, valued living (standardized $\beta=−.17$, $p < .01$) explained an additional 2% of variance in OASIS ratings, $\Delta R^2 =.02$, $F(1, 144) =9.77$, $p < .01$. The addition of the PCL-5×VLQ-Composite interaction term in the fourth step also demon-

Table 3
Hierarchical multiple regression analyses examining the moderating role of valued living on the relationship between PTSD symptom severity and functional impairment.

	OASIS ratings			
	R^2	ΔR^2	β[a]	t
Step 1	.55**	.55**		
BTQ			.09*	1.98
PHQ-3			.44**	7.69
Step 2	.67**	.12**		
PCL-5			.41**	7.33
Step 3	.69**	.02**		
VLQ-Composite			−.17**	−3.34
Step 4	.70**	.01*		
VLQ x PCL-5			−.10*	−2.12

Note. Only variables unique to each step in the model are presented.
BTQ = Total number of different Criterion A trauma types on Brief Trauma Questionnaire; PHQ-3= Patient Health Questionnaire −3; PCL-5=PTSD Checklist-5; VLQ-Composite - Valued Living Questionnaire - composite score; OASIS = Overall Anxiety Severity and Impairment Scale; VLQ x PCL-5=Valued living - PTSD symptom severity interaction term.
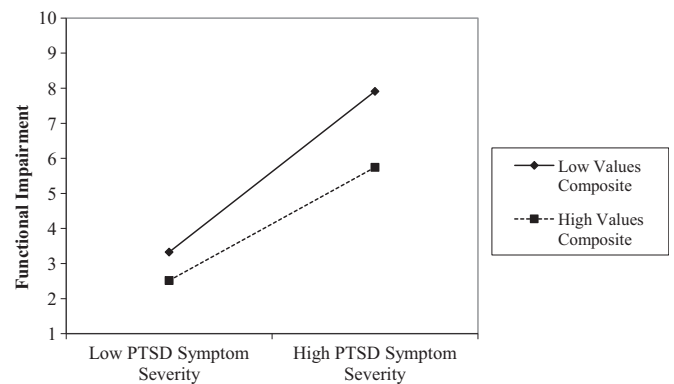[a] All Beta coefficients are standardized.
* $p < .05$.
** $p < .01$.

Fig. 1. *Two-way interaction effect of PTSD symptom severity by valued living in the prediction of functional impairment. Note.* For both PTSD symptom severity and the values composite, low =1 standard deviation below the mean and high =1 standard deviation above the mean.

strated a statistically significant association with anxiety-related functional impairment, $\Delta R^2=.01$, $F(1, 143)=4.51$, $p < .05$. Results are presented in Table 3.

Simple slopes analyses were conducted to examine the significant interaction and results are visually depicted in Fig. 1. Results indicated the strength of the association between PTS symptom severity and anxiety-related functional impairment decreased as valued living increased. When valued living was conditioned at one standard deviation above the mean, $B =.08$, 95% CI [.0425, .1132], $p < .001$; when conditioned at the mean, $B =.10$, 95% CI [.07, .13], $p < .001$; and when conditioned at one standard deviation below the mean, $B =.13$, 95% CI [.09, .16], $p < .001$.

4.4. Analysis using modified OASIS

Because the OASIS is a measure of anxiety severity and impairment, it includes two items assessing frequency and severity of anxiety in addition to the three impairment items. Therefore, to reduce the potential for criterion contamination, we removed the two frequency/severity items and re-analyzed our data with a revised 3-item impairment-focused OASIS as the dependent variable. Correlational analyses indicated this revised measure was significantly associated with the PCL-5 ($r=.67$, $p < .001$) and VLQ-5 ($r=−.43$, $p < .001$) at magnitudes similar to that of the full OASIS. Next, another hierarchical regression

analysis was conducted. This model explained 65% of the total variance in OASIS-Impairment, R^2=.65, $F(5, 143)$=53.18, $p < .001$. Valued living remained a significant predictor of OASIS-Impairment (standardized β=−.15, $p < .01$) after controlling for covariates and PTS symptom severity, and the addition of the PCL-5×VLQ-Composite interaction term explained incremental variance in the outcome, ΔR^2 =.02, $F(1, 143)$ =7.71, $p < .01$. These results suggest findings are likely not attributable to the confounding of anxiety severity and functional impairment in the dependent variable.

5. Discussion

While exposure to potentially traumatic events is common, outcomes are heterogeneous (Bonanno & Mancini, 2012) and PTS symptom severity demonstrates variable associations with functional impairment (McKnight et al., 2016). The identification of psychological processes that may influence resilience and impairment is therefore important so that the assessment and treatment of emotional disorders may be optimized. The present study sought to preliminarily examine the role of one such process, valued living, as it related to PTS symptom severity and anxiety-related functional impairment. Results were largely supportive of our hypotheses. Sixty-four percent of recruited participants reported at least one prior Criterion A trauma, consistent with US epidemiological data on the prevalence of traumatic events (Kessler et al., 1995). Among trauma-exposed participants, valued living was negatively associated with PTS and depressive symptomology, as well as anxiety-related functional impairment. At the multivariate level, valued living significantly predicted anxiety-related functional impairment after controlling for the total number of Criterion A potentially traumatic events, depressive symptoms, and PTS symptoms. Finally, valued living moderated the relationship between PTS symptom severity and anxiety-related functional impairment. Specifically, the link between symptom severity and impairment weakened as valued living increased.

PTS symptom severity was positively correlated with functional impairment, and the magnitude of the association was strong (r=.70). The strength of this correlation may be due to our use of the OASIS as the functional impairment assessment instrument. Given the OASIS is a measure of anxiety severity and impairment (with items expressly referencing the frequency and severity of anxiety, as well as the impact of anxiety on the person's life), PTS symptom scales are likely to exhibit stronger correlations with this instrument as compared to more general measures of functioning. However, this correlation remained strong (r=.67) after removing the two frequency and severity items from the OASIS, suggesting the magnitude of the relationship is likely not the result of criterion contamination.

Given the magnitude of the above association, it is notable that valued living still predicted anxiety-related functional impairment after controlling for PTS symptom severity, depressive symptoms, and cumulative Criterion A potentially traumatic events. The current study therefore contributes to the expanding literature on the role of contextual behavioral processes in trauma-related outcomes in community samples, including experiential avoidance (Kashdan & Kane, 2011), cognitive fusion (Bardeen & Fergus, 2016), and mindfulness (Thompson & Waltz, 2010). To our knowledge, this is the first study to demonstrate the unique contribution of valued living in the prediction of impairment among trauma-exposed participants, over and above other known correlates. Results are in line with prior research examining valued living and mental health outcomes in community samples (Graham et al., 2015; Wilson et al., 2010). While this is a non-clinical sample, and caution should be made in generalizing to more symptomatic populations, results are also consistent with studies documenting the preliminary efficacy of ACT in the treatment of PTSD (Batten & Hayes, 2005; Orsillo & Batten, 2005).

Findings are consistent with the theoretical principles of ACT for PTSD (Orsillo & Batten, 2005) as well, where valued living is a primary focus as opposed to treatment goals grounded in the reduction of symptoms. ACT targets psychological processes that facilitate psychological flexibility, such as being open, aware, and able to maintain or modify behaviors in the service of one's values (Hayes et al., 2013). While symptom reduction often occurs, it is not considered the *sine quo non* of treatment success. Implicit here is the idea that a person may exhibit functional improvement without necessarily demonstrating a corresponding decrease in certain symptomology. Our findings provide tentative support for this suggestion in a non-clinical sample. When conditioned at high levels of valued living, the link between PTS symptoms and anxiety-related functional impairment was weakened as compared to when this association was conditioned at low levels of valued living.

In considering these findings in relation to the philosophical stance in ACT, we are reminded of the two-scales metaphor (Hayes et al., 1999), a common technique in this treatment modality. This metaphor conveys the message that when willingness is high, symptoms are free to fluctuate while the person is also free to modify their behavior in the service of their values. Although experiential acceptance/willingness was not directly assessed in this study, previous research has demonstrated a negative association between nonjudgmental acceptance and PTS symptomology in a non-clinical trauma-exposed sample (Vujanovic, Youngwirth, Johnson, & Zvolensky, 2009), and acceptance is associated with positive outcomes following exposure to trauma (see Thompson, Arnkoff, & Glass, 2011). It is possible that higher valued living may be indicative of a greater willingness to *have* symptoms, thereby attenuating their debilitating effects. Future research examining the interplay between valued living and experiential acceptance in the prediction of functional impairment among individuals with PTS symptomology is needed to specifically address this question.

The VLQ-Composite largely demonstrated patterns of associations consistent with hypotheses, however valued living was unrelated to the number of Criterion A potentially traumatic events. Although increased cumulative traumatic experiences confer risk for PTSD (King, King, Foy, Keane, & Fairbank, 1999) and have been associated with a decreased sense of purpose in life (Alim et al., 2008), our results may possibly be explained by the heterogeneity of outcomes following exposure to potentially traumatic events (Bonanno & Mancini, 2012). Resilience in response to stressors is highly prevalent, even among individuals exposed to several potentially traumatic events (Bonanno et al., 2012). Conversely, a multitude of pathways may result in disengagement with values, irrespective of a person's history of potentially traumatic events. Taken together, the multifactorial influences on valued living combined with the commonality of human resilience following stressful events may explain the near zero correlation between number of Criterion A events and valued living in this study.

6. Limitations

There are several limitations to this study that warrant discussion. First, causal inferences cannot be made due to the cross-sectional nature of the study. Future research should use longitudinal designs to stringently test the hypothesis that changes in value-driven behavior temporally precede changes in functional impairment among individuals with PTS symptomology. Second, our sample was comprised of community participants that reported lower levels of distress and impairment on average. Considering this, findings should be considered highly preliminary and the generalizability of these results to more distressed clinical samples is unknown. Third, the study was administered online, resulting in an uncontrolled environment, though research suggests data collected via MTurk demonstrates comparable reliability in relation to traditional face-to-face designs (Buhrmester et al., 2011; but see also Rouse, 2015). We attempted to address this limitation by restricting recruitment to MTurk workers with 95% approval ratings as well as through the inclusion of validity items to

assess for attentiveness (resulting in the removal of two cases). This approach resulted in internal consistency ratings that were generally high.

Another limitation is that constructs of interest were exclusively measured via self-report, resulting in the possibility of inflated correlation coefficients due to mono-method bias. Future research should employ the Clinician Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., , 2013a, , 2013b), the gold standard assessment tool in this domain which also prompts the person to consider symptoms in relation to a specific Criterion A event. Relatedly, participants were only screened for prior exposure to a Criterion A potentially traumatic event. Future research should assess trauma history beyond just the presence or absence of traumatic stressors, as factors such as length of time since trauma exposure (Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992) and recent or ongoing stressors (Friedman, Resick, & Keane, 2014) also predict outcomes.

Although objective measures of functioning are ideal, the use of the OASIS as the criterion variable in this study may be viewed as a strength as its items specifically link functioning with anxiety. This measure therefore orients participants to consider the relationship between mental health symptoms and disability, as compared to a more global measure of impairment such as the WHODAS 2.0, which assesses disability associated with both physical and mental disorders (see Konecky, Meyer, Marx, Kimbrel, and Morissette (2014) for a critique). Additionally, to further increase confidence in our results, we re-analyzed the data after removing the anxiety frequency and severity items from the OASIS to create a purer measure of functional impairment separate from symptom severity. Results of analyses using the modified OASIS did not impact our overall findings. Future research may benefit from the use of experience sampling methodology (ESM) to assess functional impairment and valued living. ESM may provide for a more fine-grained contextual analysis of these variables, including the ability to test temporal associations across days and weeks. Finally, this study examined values in relation to the total score of PTS symptoms and their severity ratings. Given the multidimensional nature of PTS symptomology and the heterogeneity that exists in its presentation (e.g., complex PTSD; Cloitre et al., 2009), future research should examine the role of valued living as it relates to individual subscales of PTS measures, as well as specific PTSD diagnostic variants.

7. Clinical implications

In considering the potential applicability of the current study to clinical domains, results may be relevant to contextual behavioral treatments for PTSD. Among current evidence-based treatments for PTSD, exposure procedures that undermine avoidance responses are considered an important therapeutic element (Institute of Medicine, 2007). In ACT, exposure-based approaches for PTSD do not target the reduction of distress, but instead are used in the context of committed value-driven behavior, as recently described by Thompson, Luoma, and LeJeune (2013). The present study is supportive (albeit preliminarily) of the rationale for this approach, as well as future research examining exposure in the context of valued living for individuals with PTS symptomology.

8. Conclusions

The present study sought to investigate valued living as a condition that affects the association between PTS symptom severity and functional impairment in a trauma-exposed sample. This research was a preliminary step in expanding our understanding of the association between valued living, PTS symptomology, and functional impairment, and to our knowledge, is the first study to demonstrate that PTS symptoms interact with valued living in the prediction of overall impairment. Findings should be considered preliminary given study

limitations and require replication in clinical samples. However, the present study adds to the existing literature linking trauma-related outcomes to contextual behavioral processes and strengthens the basis for continued investigation into the effectiveness of ACT technologies in the treatment of trauma-exposed individuals. In addition, we hope this research will shine more light on the need to move beyond the exclusive use of symptom inventories in psychopathology research and treatment. Valued living demonstrates incremental validity over and above PTS and depressive symptom severity in the prediction of functional impairment, and the link between symptoms and impairment varies as a function of engagement in one's values.

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