Treatment Mechanisms, Community Empowerment, &
Technology Innovations (TCT) Lab
PI: Anu Asnaani, Ph.D.
Department of Psychology
University of Utah
380 S. 1530 E Beh S 802
Salt Lake City, UT 84112
www.empowerlab.psych.utah.edu

Date: June 8, 2022

Dear Esteemed Colleague,

I'd like to express my appreciation to you for taking the time to review my tenure dossier; I am well aware of how many other competing demands you must have on your time, and I am deeply grateful for your willingness to assess my current standing in the field.

My supporting documents cover my work in the research, teaching and service domains, so I will not repeat them here. In addition, my materials review my scholarship across my major areas of scientific interest, including some recent representative publications that are either under review (such as my book examining a cultural humility and social justice approach to culturally competent evidence-based practice with *Oxford University Press*; Asnaani, under review) or already in press (e.g., the main outcome findings from my NCATS mixed methods pilot study in *Journal of Consulting and Clinical Psychology* and another at *Translational Behavioral Medicine* examining the creation of equitable and community-partnered interventions stemming from this data, both of which I served as the senior/corresponding author and my graduate students are the first authors; Kaur et al., in press; Gutierrez Chavez et al., in press).

Instead, I would like to use this opportunity to highlight three papers that are already published that represent each of my major research domains, as exemplars of the type of work I have done, and importantly, reflect the type, breadth, and focus of work I believe are central to my future potential contributions as a scholar in the field.

First, within the area of **treatment mechanisms underlying effective treatment for anxiety-related disorders**, I would like to highlight the findings from my paper published in the *Journal of Affective Disorders* that found that both anxiety sensitivity and emotion regulation significantly mediated the reduction in a range of anxiety-related symptoms over the course of naturalistic CBT in a sample of 247 patients presenting to an anxiety specialty clinic (Asnaani, Tyler, McCann, Brown, & Zang, 2020). Emotion regulation capability (specifically, the tendency to avoid when confronted with a feared stimulus and difficulties controlling this impulse) was shown to be most strongly related to how individuals improved in their symptoms over the course of treatment and may be a particularly important area to more actively target in the context of CBT. While the finding itself is unsurprising (i.e., many of our treatments for anxiety symptoms are exposure-based and directly target avoidance already), these findings were particularly fascinating because they were observed in a naturalistic, large, non-research sample (the main outcomes of which I presented elsewhere; Asnaani, Benhamou, Kaczkurkin, Turk-Karan, & Foa, 2020) who presented with a range of primary anxiety-related diagnoses, received a variety of exposure-based treatments delivered by therapists who greatly varied in their mastery of this treatment approach, and were in treatment for variable lengths of time, providing a unique view into what occurs at a mechanistic level during exposure therapy in naturalistic samples versus randomized controlled

trials. Thus, specifically examining how an individual's difficulties in controlling the impulse to avoid aversive stimuli throughout treatment might provide clinicians insight into the likelihood of success from this treatment approach in broader clinical settings, which I am currently working on extending my examination of in community and non-specialty mental health settings.

Second, as part of my work in the **technology innovations domain**, I completed a previous cross-institutional study with expert colleagues in the *Journal of Child and Adolescent Trauma* that examined the accuracy and psychometrics of an innovative, brief mobile tablet game screen for PTSD in inner city and underserved youth presenting to primary care clinics across Philadelphia (Asnaani et al., 2020). This article nicely fuses my interest in using technology in a way that makes our assessments more accurate and appealing, while ensuring we work to increase accessibility in those community settings which are most likely to benefit from its use and where we can expand our reach (such as primary care settings). While this study focused more on assessment (for the purposes of facilitating more frequent referrals to treatment), it was a particularly fruitful endeavor to work with (and learn from) younger participants and to collaborate with a range of stakeholders and colleagues invested in this work. It also provided my first major foray into bringing the lab into the community as we conducted all study procedures in doctors' waiting rooms and offices, a principle of community-engaged research that I hold in high regard as I continue my current community-based projects where we increasingly bring research procedures to spaces community members are most likely to be open and comfortable to receiving them.

Third, instead of highlighting one of my published or in preparation empirical articles for **my third major area of community-engaged research** (e.g., Asnaani, Charlery White, Majeed, & Phillip, 2020; Asnaani, Gutierrez Chavez, Samuel, Pham, & Charlery White, in prep) I have opted to highlight work published in *The Behavior Therapist* that has centered on the role we can play as advocates within the field of Psychology and ways in which we can more appreciably address ongoing health disparities in underserved communities (Asnaani, Charlery White, & Phillip, 2020). Using my global trauma work in the Caribbean as an example, my colleagues (who are both Black academics with roots in the region) and I delineate our "lessons learned" about the urgency in more actively incorporating advocacy efforts within global research and training efforts in evidence-based treatments. We try to provide examples from our multi-year project in the region about how this can practically be done and the impact such efforts can have at legislative, social, and local capacity-building levels, along with logistical aspects of acquiring funding for such work. This global mental health line of my work has proved to be essential for my continued efforts to engage in high quality community-partnered and equitable research across settings.

Again, thank you for your evaluation of my body of work as exemplified by these three articles and my other attached materials, and I am happy to provide any other information that would be helpful to you in this process.

Sincerely,

Anu Asnaani, PhD
Assistant Professor, Department of Psychology, University of Utah
Email: anu.asnaani@psych.utah.edu

Highlighted Publications (attached):

1. **Asnaani, A.,** Tyler, J., McCann, J., Brown, L., Zang, Y. (2020). Anxiety sensitivity and emotion regulation as mechanisms of successful CBT outcome for anxiety-related disorders in a naturalistic treatment setting. *Journal of Affective Disorders, 267*, 86–95.
2. **Asnaani, A.,** Narine, K., Suzuki, N., Zang, Y., Schwartz, B., Yeh, R., Mannarino, A., Cohen, J., & Foa, E.B. (2020). An Innovative Mobile Game for Screening of Pediatric PTSD: a Study in Primary Care Settings. *Journal of Child & Adolescent Trauma,* 1-10.
3. **Asnaani, A.,** Charlery White, S.R., & Phillip, T.-M. (2020). Mobilizing mental health training efforts to align with advocacy for disenfranchised groups in global contexts: Trauma-related training in the Caribbean as an example. *The Behavior Therapist, 43*(7), 254-260.

Other cited publications:

1. **Asnaani, A**. (under review). *Taking a cultural humility and social justice approach: Seven applied guidelines for evidence-based mental health practice.* Sole authored book submitted in March 2022 to Oxford University Press and currently under peer review.
2. Kaur, K., Gutierrez Chavez, M., Tacana, T., Sanchez-Birkhead, A., Mukundente, V., Napia, E.E., Tavake-Pasi, F., Villalta, J., Lee, D., Sunada, G., Stark, L., Crowell, S., & **Asnaani, A.** (in press). Developing a best practice mental health treatment framework for culturally diverse communities: A mixed-methods approach. *Journal of Consulting and Clinical Psychology.*
3. Gutierrez Chavez, M., Kaur, K., Baucom, K. J. W., Sanchez-Birkhead, A., Sunada, G., Mukundente, V., Tavake-Pasi, F., Napia, E., Villalta, J., & **Asnaani, A.** (in press). Developing equitable interventions for ethnically diverse populations: Mental health and co-occurring physical health concerns in the context of the COVID-19 pandemic. *Translational Behavioral Medicine.*
4. **Asnaani, A.,** Benhamou, K., Kaczkurkin, A.N., Turk-Karan, E., & Foa, E.B. (2020). Beyond the constraints of an RCT: Naturalistic treatment outcomes for anxiety-related disorders. *Behavior Therapy, 51*(3), 434-446.
5. **Asnaani, A.,** Charlery White, S.R., Majeed, I., & Phillip, T.-M. (2020). Trauma education and stigma reduction in global settings: An evaluation of the impact of a one-day trauma psychoeducation workshop with community stakeholders in the Caribbean nation of Saint Lucia. *International Journal of Environmental Research and Public Health, 17*(7), 2255.
6. **Asnaani, A.,** Gutierrez Chavez, M., Samuel, R., Pham, A., & Charlery White, S.R. (in preparation). The impact of a brief training on implementation of evidence-based strategies for trauma by mental health providers and stakeholders in the Caribbean within the context of the COVID-19 pandemic.
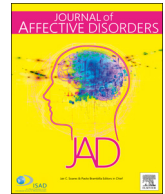
Research paper

Anxiety sensitivity and emotion regulation as mechanisms of successful CBT outcome for anxiety-related disorders in a naturalistic treatment setting

Anu Asnaani[a,*], Jeremy Tyler[b], Jesse McCann[b], Lily Brown[b], Yinyin Zang[c,**]

[a] University of Utah, Department of Psychology, 380 S 1530 E Behavioral Sciences Building, Salt Lake City, UT, United States 84112
[b] University of Pennsylvania, Department of Psychiatry, Center for the Treatment and Study of Anxiety, 3535 Market St, Suite 600 North, Philadelphia, PA, United States 19104
[c] Peking University, School of Psychological and Cognitive Sciences, Beijing Key Laboratory of Behavior and Mental Health, No. 5 Yiheyuan Road, Haidian District, Beijing, China 100871

ARTICLE INFO

ABSTRACT

Background: Numerous randomized controlled trials (RCTs) have examined the efficacy of cognitive behavioral therapy (CBT) in reducing anxiety symptoms. However, relatively fewer studies have examined the effectiveness of CBT in naturalistic treatment settings. There is even less known about the mechanisms underlying successful outcomes in naturalistic samples receiving CBT. This study aimed to examine the absolute and relative mediation of emotion regulation (ER) difficulties and anxiety sensitivity (AS) on anxiety symptom reduction.
Methods: Participants were treatment-seeking patients (N = 247) at an outpatient anxiety clinic. Measures of difficulties in ER, AS, and disorder specific symptoms were administered at baseline, mid, and post-treatment. A composite anxiety score was calculated to measure anxiety disorder symptom severity across anxiety-related diagnoses.
Results: Individual mediation models revealed that both AS and ER significantly mediated the reduction in anxiety-related symptoms over the course of treatment. A multiple mediation model found that ER was the strongest mediator (indirect effect = −1.030, 95% CI = −2.172 to −0.153). Further analyses revealed that the ER subscale of impulse control difficulties (e.g., the tendency to avoid when confronted with a feared stimulus) was the strongest mediator (indirect effect = −0.849, 95% CI = −1.913 to −0.081).
Limitations: This study relied solely on self-report measures of ER, AS, and anxiety pathology, and did not have a control group.
Conclusions: These results suggest that improvement in the ability to control impulses may act as a mechanism of anxiety symptom reduction and may be important to target in CBT with naturalistic samples.

1. Introduction

Anxiety and related disorders (such as posttraumatic stress disorder, PTSD, and obsessive compulsive disorder, OCD) are the most prevalent set of psychiatric disorders in the United States (Kessler et al., 2012; Bandelow and Michaelis, 2015; Remes et al., 2016). Cognitive Behavioral Therapy (CBT) is the gold standard treatment for these disorders, as documented by a number of meta-analyses (Norton and Price, 2007; Hofmann and Smits, 2008; Olatunji et al., 2010). While an abundance of randomized controlled trials (RCTs) illustrate the efficacy of CBT for anxiety, there is a gap in research showing that these findings are generalizable to patients in non-research settings.

A number of researchers have advocated for more effectiveness

research to complement efficacy studies, thereby supporting the generalizability of RCT results in more naturalistic settings (e.g., Leichsenring, 2004; Hunsley and Lee, 2007; Stewart and Chambless, 2009). Indeed, a fair number of naturalistic CBT treatment studies for anxiety-related disorders have emerged in the past decade, all of which have shown significant effectiveness of CBT in improving disorder-specific symptoms in treatment-seeking, non-research or non-randomized samples of patients with primary anxiety symptoms (e.g., van Ingen et al., 2009; Davis et al., 2010; Hans and Hiller, 2013; Asnaani et al., 2019). However, while these and other previous studies have shown that CBT is effective in naturalistic treatment settings, far fewer have focused on determining the underlying mechanisms of the treatment effects. Studying transdiagnostic mechanisms of CBT in

---

* Corresponding author.
** Corresponding author.
  E-mail addresses: anu.asnaani@psych.utah.edu (A. Asnaani), yinyin.zang@pku.edu.cn (Y. Zang).

naturalistic environments is an important step toward a more nuanced understanding of the psychological recovery process compared to simply focusing on symptom reduction.

Anxiety sensitivity (AS), or fear of bodily sensations or experiences related to anxiety (Reiss and McNally, 1985) is a well-supported mechanism of CBT in RCTs. In the expectancy model of fear and AS, sensations are interpreted as dangerous and cue fear of physical, cognitive, or social repercussions (Reiss and McNally, 1985). Because of this increased fear, AS has been theorized to act as a predisposing mechanism underlying the development and maintenance of anxiety-related disorders (Olatunji and Wolitzky-Taylor, 2009; Naragon-Gainey, 2010). Indeed, high levels of AS are present across many anxiety-related disorders (Boswell et al., 2013), including panic disorder (PD; McNally, 2002; Gallagher et al., 2013; Ino et al., 2017), social anxiety disorder (SAD; Kaczkurkin et al., 2018), and generalized anxiety disorder (GAD; Kaczkurkin et al., 2018). In addition, a fair number of studies have examined the role of baseline AS and its subtypes as predictors of post-treatment anxiety-related symptoms, several finding interesting effects on outcome based on initial severity of AS (e.g., Wolitzky-Taylor et al., 2012; Blakey et al., 2017) or important patterns regarding influence of subtype of AS (physical, cognitive, and social concerns) with specific anxiety-related disorders (e.g., Katz et al., 2018; Ino et al., 2017). However, despite consistent evidence of a link between heightened AS at baseline and anxiety-related disorder symptom outcome, considerably less is known about the role of changes in AS or its temporal effects in influencing treatment outcome for anxiety-related disorders. Only a handful of studies have indicated that decreases in overall AS over the course of treatment or changes from pre-post treatment in AS may be uniquely associated with anxiety symptom reduction in the treatment of PTSD, SAD, and PD in individuals receiving CBT (Mitchell et al., 2014; Gallagher et al., 2013; Nowakowski et al., 2016), and no studies to date have examined the temporal impact of individual subtypes of AS on treatment outcome in a mediation analysis.

Emotion regulation (ER), or the process by which people manage their emotional responses (Gross, 2002), is another possible mechanism of CBT for anxiety-related disorders in naturalistic settings. ER includes the process by which individuals manage their emotional responses, the timing of emotional expression, and the manner in which those emotions are displayed (Gross, 2002). Cisler et al. (2010) proposed that two specific ER strategies, emotional suppression (pushing away strong emotions) and negative cognitive appraisal strategies (focusing on the worst potential outcome), may lead to the development and maintenance of anxiety-related disorders. It has been posited that suppression and negative re-appraisal, when used as long-term ER strategies, increase the behavioral, physiological, and cognitive outputs of the fear response when encountering a feared situation, and that the increased fear experienced during this encounter reinforces maladaptive expectations and promotes avoidance of the feared stimuli (Foa and Kozak, 1986; Craske et al., 2008), thus perpetuating anxiety disorder-related impairments. Indeed, deficits in ER abilities have been shown to predict higher anxiety symptom severity when assessed over multiple years (Wirtz et al., 2014), and those individuals diagnosed with an anxiety disorder (Kashdan and Farmer, 2014) are more likely to engage in emotional suppression as a means to manage negative emotions (Dryman and Heimberg, 2018). In trauma-exposed individuals, deficits in ER strategies are associated with higher posttraumatic stress symptoms and more avoidant behavior (Bardeen et al., 2013; O'Bryan et al., 2015). A meta-analytic review testing ER as a transdiagnostic mechanism in anxiety-related disorders showed that in 64 of 67 studies, deficits in ER significantly improved after treatment, regardless of treatment protocol, diagnosis, or ER construct (Sloan et al., 2017). Finally, just handful of studies have examined the impact of specific ER strategies on anxiety outcome and these have focused on only one anxiety-related disorder (SAD; Goldin et al., 2014; Moscovitch et al., 2012), finding that improvements in specific ER strategies (positive

reappraisal) over the course of CBT predict subsequent improvements in SAD and aid in classifications of patients as responders versus non-responders. Given the well-demonstrated relationship between poor ER and anxiety-related disorder severity, as well as the observed improvements in ER during treatment, it is paramount to directly test how ER (and specific strategies) might temporally influence the effectiveness of anxiety-focused CBT across anxiety-related disorders more broadly.

Finally, considerably little is known about how AS and ER (and their subcomponents) relate to one another in treatment outcome studies for anxiety-related disorders, and about their relative influences on symptom reduction over the course of CBT. However, there is evidence that the interaction between AS and ER may lead to more severe symptoms of anxiety-related disorders (Kashdan et al., 2008) and that deficits in ER may influence the development of clinical symptoms of anxiety-related disorders in individuals with high AS (Eifert and Forsyth, 2005; Kashdan et al., 2008).

Taken together, the existing literature suggests that while there is growing evidence that CBT for anxiety-related disorders is effective for the reduction of fear in naturalistic samples, there is much less known about *how* it is effective in such treatment-seeking populations. Thus, this study was conceived as a way to directly investigate the mechanisms underlying effective CBT in a naturalistic sample of treatment-seeking patients with anxiety-related disorders. Specifically, ER and AS were the two mechanisms of interest. It was hypothesized that: (1) both overall ER and AS would independently mediate the reduction in primary anxiety-related symptoms over the course of CBT. Further, given the relative scarcity of studies examining the relative mechanistic impact of both of these constructs (and their subscales) when taken together, an exploratory aim was to (2) determine whether ER would be a stronger mediator of outcome than AS, or vice versa. Relatedly, a final aim was to explore (3) the effect of the individual subtypes of AS and ER on symptom reduction.

2. Methods

2.1. Participants

Participants were 274 treatment-seeking adults aged 18 and older ($M = 32.49$ years, SD = 12.16 years, ranging from 18 to 71 years old) who received a primary diagnosis of a DSM-5 anxiety or anxiety-related disorder at an outpatient, fee-for-service specialty anxiety clinic in Philadelphia, PA, and finished at least two consecutive assessments from January 2015 – June 2018 (i.e., intake and mid-treatment, or mid-treatment and post-treatment; Asnaani et al., 2019). Other inclusion criteria for this particular study mirrored that of the original primary outcomes study and included patients 18 years or older presenting with a primary anxiety-related disorder that had been ongoing for at least 3 months, and for whom outpatient care requiring weekly or bi-weekly treatment visits was deemed clinically appropriate. Exclusion criteria included active suicidal ideation, symptoms of schizophrenia or current psychosis that were not being sufficiently managed by psychopharmacological regimen, severe autism or intellectual disability, or significant substance use symptoms that were clinically required to be addressed before anxiety treatment. For more details on inclusion/exclusion criteria, see Asnaani et al. (2019).

2.2. Procedure

All study procedures were approved by the Institutional Review Board at the University of Pennsylvania. As part of the clinic's routine procedures, every patient seeking treatment between 2015 and 2017 at the clinic were screened over the phone for treatment appropriateness, thus were screened for potential involvement in this study. Eligible patients received an in-person 2-hour intake evaluation, which consisted of structured and unstructured clinical interview components. Participants completed pre-treatment self-report measurements leading

up to their initial intake through a secure online database (REDCap; Harris et al., 2009). At the time of their intake, participants were briefed on the nature of the study and consented by the evaluating clinician. Self-report data was only used in the current analysis if participants consented to the study. Consented participants began treatment with their assigned clinician and were instructed to complete mid- and post-treatment assessments at weeks 7 and 19 of their treatment respectively. Additional details of these procedures are described in the methods of the larger effectiveness trial (Asnaani et al., 2019).

2.3. Treatments

Participants presented for treatment of a primary anxiety disorder, OCD, or PTSD diagnosis, and all protocols used were evidence-based CBT protocols, and most had an emphasis on exposure-based interventions (approximately 92% of treatments used). Given the naturalistic design of this study, clinicians were not required to use any specific protocol for any given diagnosis. However, clinicians were asked to report what protocol they used during their treatment, which typically included exposure and response prevention for OCD (Ex/RP; Foa et al., 2012) and prolonged exposure for PTSD (PE; Foa et al., 2015), CBT for panic and unspecified anxiety (Craske and Barlow, 2016), CBT for SAD (Hofmann and Otto, 2017), as well as mindfulness for GAD and unspecified anxiety (Orsillo and Roemer, 2011). In addition, it was ensured that patients with a primary diagnosis of OCD or PTSD (almost 50% of the current sample) received these exposure-based protocol treatments through clinic-wide weekly group supervision, and all trainees (who saw approximately 60% of all patients in this study) were monitored by supervised clinicians who ensured (per clinic training guidelines) that all training therapists utilized CBT protocols for patients with other primary diagnoses as per review of audio/video tape of sessions or self-report by trainees. Thus, there was no formal fidelity check of CBT treatment utilization in place for a minority of patients (i.e., approximately 26% of total cases representing disorders outside of OCD or PTSD seen by licensed clinicians who were not receiving peer supervision). For detailed information about clinician experience and training, please see results from the larger effectiveness trial (Asnaani et al., 2019).

2.4. Measures

Anxiety Sensitivity Index (ASI-3). Anxiety sensitivity was assessed using the ASI-3 (Taylor et al., 2007), which includes 18 items that measure three domains of anxiety sensitivity: the fear of physical, cognitive, and social symptoms. Items are rated on a 5-point scale of frequency and severity ranging from 0 (*very little*) to 4 (*very much*). Scores range from 0–72, with higher scores indicating more severe anxiety sensitivity. Internal consistency of ASI-3 in the current sample was good to excellent across total and subscale scores: Cronbach's $\alpha = 0.92$ for the total measure, $\alpha = 0.90$ for the physical concerns subscale, $\alpha = 0.88$ for the social concerns subscale, and $\alpha = 0.91$ for the cognitive concerns subscale.

Difficulties in Emotion Regulation Scale (DERS). Emotion regulation difficulties were assessed using the DERS (Gratz and Roemer, 2004), which includes 36 items that measure difficulty with emotional awareness, problems with clarity (understanding) of emotions, non-acceptance of emotions, difficulties in ability to engage in goal-directed behavior and poor control of impulsive behavior when experiencing negative emotions, and limited access to emotion regulation strategies perceived as effective. Items are rated on a 5-point scale of severity ranging from 1 (*almost never*) to 5 (*almost always*). Scores range from 36–180, with higher scores indicating more significant deficits in the ability to regulate emotions. Gratz and Roemer (2004) reported that the DERS has demonstrated excellent internal consistency (Cronbach's α ranging 0.80–0.89) and test-retest reliability ($r = 0.88$). Of note, the DERS was added a year after data collection was underway, which is

why there are less data-points using this measure compared to the other measures in this study. Internal consistency of DERS in the current sample was good to excellent across total and subscale scores: Cronbach's $\alpha = 0.95$ for the total measure, 0.85 for *the lack of emotional clarity* subscale, $\alpha = 0.93$ for the *limited access to emotion regulation strategies* subscale, $\alpha = 0.81$ for *the lack of emotional awareness* subscale, $\alpha = 0.88$ for the *impulse control difficulties* subscale, $\alpha = 0.90$ for the *difficulty engaging in goal directed behavior* subscale, $\alpha = 0.93$ for the *non-acceptance of emotional responses* subscale.

Percent of Maximum Possible (POMP) Scores of Anxiety. Since the original study included a number of individual symptom measures corresponding to each primary disorder (e.g., SAD, PD, GAD, etc.), we opted to calculate the percent of maximum possible (POMP) scores across all the anxiety symptom measures in order to more reasonably examine reductions in primary symptoms for each individual using a single index of anxiety. This method (along with details on the various individual symptom measures used) are described in detail in the larger effectiveness trial (Asnaani et al., 2019). Briefly here: in order to compare symptom severity on different scales, POMP scores were computed by using the formula

$$[(observed\ score - min\ score)/(max\ score - min\ score)]*100$$

which allowed each scale to be transformed into a metric that ranges from 0 (minimum symptoms possible) to 100 (maximum symptoms possible). We used a composite POMP score of all anxiety symptom measures including Generalized Anxiety Disorder 7-Item Scale (GAD-7), Obsessive-Compulsive Inventory-Revised (OCI-R), Posttraumatic Diagnostic Scale-5(PDS-5), Panic Disorder Severity Scale (PDSS), Penn State Worry Questionnaire (PSWQ), and Social Phobia Inventory (SPIN).

2.5. Data analyses

Lagged mediational analyses were conducted to evaluate the relationship between putative mediators (AS and emotion dysregulation) and anxiety symptoms (POMP scores) from baseline, mid-treatment to post-treatment. In these analyses, the mediator at time point *t* (baseline, mid-treatment) predicted the anxiety symptoms at the next time point *t* + +1 (mid-treatment, post-treatment). Furthermore, time was coded as "1″ for "t" and "2″ for "t + 1″ in the model. This approach controls for the temporal precedence of mediator versus outcome variables in longitudinal designs. In addition, the use of this approach of two possible assessment periods for time point *t* and *t* + +1 along with the inclusion requirement for all subjects to have completed at least two consecutive assessment periods to be included in this study greatly protected against the impact of missing data on the study analyses.

For the first hypothesis, an individual mediator model was used to examine the indirect effect of the mediators separately (Model A in Fig. 1). For example, to test ASI-3 as a mediator, we examined whether total anxiety POMP score at time *t* + +1 was mediated by ASI-3 at time *t*. In this model, time is the predictor variable, ASI-3 is the mediator, and anxiety POMP score was the outcome variable. Similarly, to test emotion dysregulation as a mediator, we examined whether anxiety POMP score at time *t* + +1 was mediated by DERS at time *t*. To test the second hypothesis, a multiple mediator model (Preacher and Hayes, 2008), which can examine the relative strength of the mediation effect between ASI-3 and DERS (Model B in Fig. 1) was applied. In this model, time was the predictor variable, ASI-3 and DERS subscales were mediators, and the anxiety POMP score was the outcome variable. Pairwise contrasts of the indirect effects of the two mediators were examined to assess the significance and magnitude of the mediating effects. Similarly, the multiple mediator model was also conducted for hypothesis 3 to examine the mediating effect of individual subscales of ASI-3 and DERS.

Bootstrapping (with 5000 bootstrap samples) was used to estimate bias-corrected 95% confidence intervals (CI) and confirm the indirect (mediating) effect. Bootstrapping computes more accurate confidence
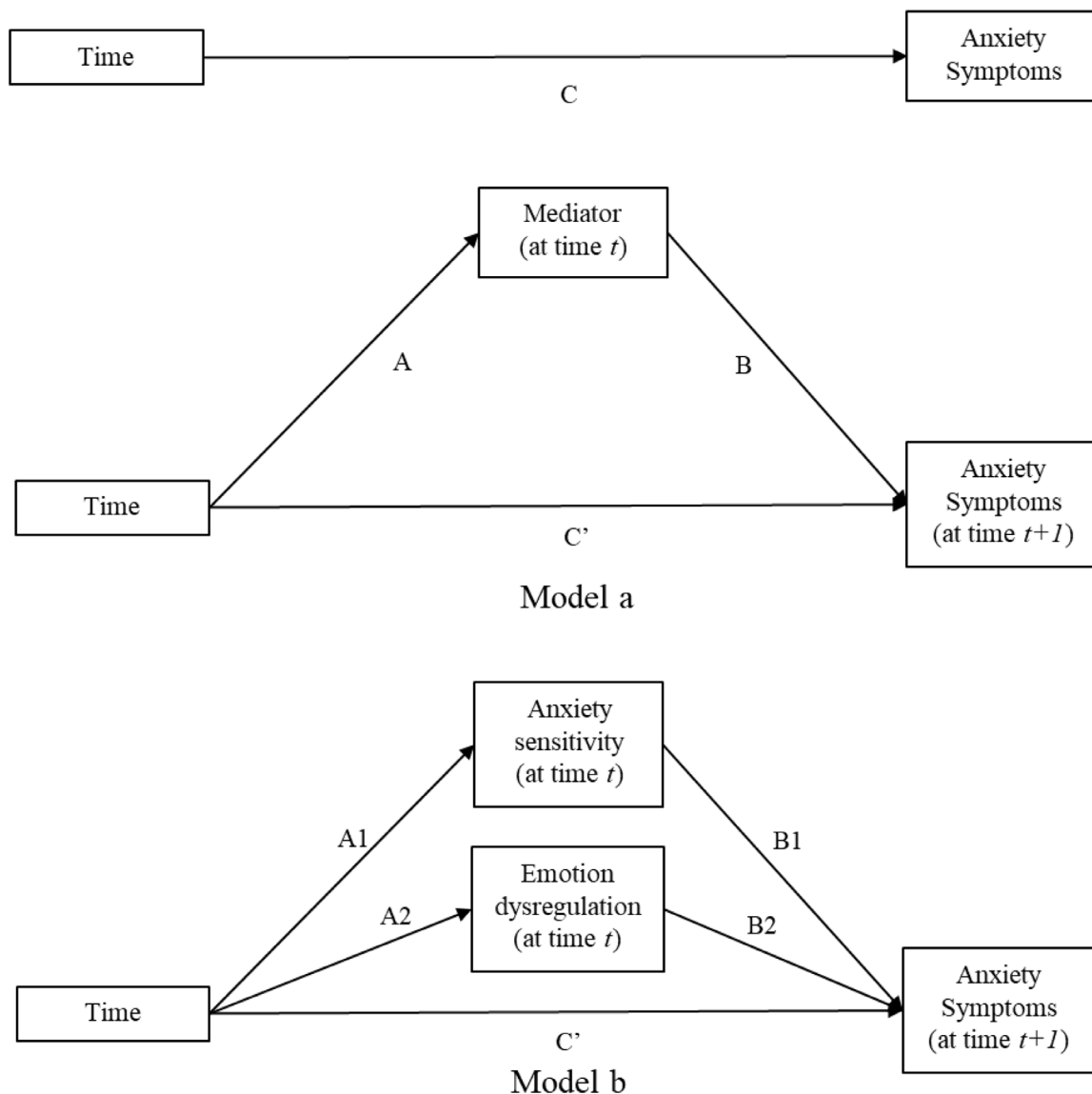
Fig. 1. Hypothesized mediation models.

intervals of indirect effects than the more commonly used methods, such as the causal steps strategy (Baron and Kenny, 1986), as it does not assume that the sampling distribution is normal (Preacher and Hayes, 2008). This is especially relevant for indirect effects, as their distributions are skewed from zero (Shrout and Bolger, 2002). Standardized coefficients were reported as effect size (ES). Analyses were conducted using SPSS, version 25 with an SPSS macro named PROCESS (version 3.3; Preacher and Hayes, 2004; Preacher et al., 2007). Given well-documented differences in anxiety severity/outcome by gender (McLean et al., 2011) and age (Christensen et al., 1999), these demographics were controlled for along with baseline total anxiety POMP score in all analyses.

3. Results

Participants' demographic and clinical characteristics are presented in Table 1, and the descriptive results of study variables at the three time points are reported in Table 2.

3.1. Individual mediator analyses

Indirect effects of time on anxiety POMP change through ASI-3 and

DERS are reported in Table 3 for both individual and multiple mediation models.

With regard to the ASI-3 mediation model ($n = 461$ paired consecutive time points were included in the model), the total effect of *Time* on anxiety was significant ($B = -7.701$, SE = 1.146, ES = -0.467, $p < .001$, $R^2 = 46.8\%$) of variance in anxiety (see Table 3). Total ASI-3 reduction significantly mediated (indirect effect = -1.005, $SE = 0.388$, *95%* CI = -1.876 to -0.364, ES = -0.061; direct effect of Time = -6.696, SE = 1.158, *95%* CI = -8.972 to -4.421, ES = -0.406, $R^2 = 48.0\%$) the relationship between Time and decreased anxiety (see Table 3).

For the mediation model of DERS ($n = 313$ paired consecutive time points were included in the model), the total effect of Time on anxiety was significant ($B = -8.677$, SE = 1.460, ES = -0.432, $p < .001$, $R^2 = 48.0\%$). Total DERS reduction significantly mediated (indirect effect = -1.128, *SE* = 0.542, *95%* CI = -2.285 to -0.189, ES = -0.064; direct effect of Time = -8.053, *SE* = 1.706, *95%* CI = -11.410 to -4.696, ES = -0.463) the relationship between Time and decreased anxiety.

Table 1
Demographic and Clinical characteristics of Participants ($N = 274$).

	N/Mean	% /(SD)
Age	32.49	(12.16)
Gender		
Female	162	59.1
Male	110	40.1
Transgender	1	0.4
Other	1	0.4
Race		
White	226	82.5
Asian	15	5.5
Multiracial	15	5.5
Hispanic	6	2.2
African American	11	4.0
Other	1	0.4
Level of Education		
No degree	2	0.7
High school diploma/GED	63	23.0
Associates degree	12	4.4
Bachelor's degree	117	42.7
Master's degree	51	18.6
Doctoral degree	29	10.6
Relationship status		
Single	103	37.6
In a relationship	48	17.5
Living with partner	37	13.5
Married	78	28.5
Separated	2	0.7
Divorced	6	2.2
Employment status		
Full-time	124	45.3
Part-time	33	12.0
Retired	10	3.6
Student	71	25.9
Disabled	6	2.2
Unemployed, looking for work	15	5.5
Unemployed, not looking for work	11	4.0
Others	4	1.5
Primary Diagnosis		
OCD	94	34.3
PTSD	37	13.5
GAD	44	16.1
SAD	32	11.7
Panic disorder (with or without agoraphobia)	24	8.8
Specific phobia	21	7.7
Depression	4	1.5
Others	18	6.6
Currently taking medication		
Yes	112	40.9
No	162	59.1

Note. OCD = Obsessive Compulsive Disorder; PTSD = Posttraumatic Stress Disorder; GAD = Generalized Anxiety Disorder; SAD = Social Anxiety Disorder.

3.2. Multiple mediator analyses

A multiple mediation analysis with total ASI-3 and DERS added as mediators was conducted ($n = 313$ paired consecutive time points). The results (see Table 3) showed that ASI-3 and DERS, taken as a set, significantly mediated the relationship between Time and anxiety (indirect effect = -1.212, *SE* = 0.585, 95% CI = -2.479 to -0.212, ES = -0.069; direct effect of Time = -7.465, *SE* = 1.706, *95%* CI = -10.228 to -4.702, ES = -0.496). However, only total DERS reduction significantly mediated (indirect effect = -1.030, SE = 0.518, 95% CI = -2.172 to -0.153, ES = -0.059) the relationship between Time and decreased anxiety, and total AS did not ($p < 0.05$) (Fig. 2). The model significantly explained 53.3% (R^2, $p < .001$) of variance in anxiety.

3.3. Exploratory mediation analysis with subscales

Individual and multiple mediator analyses were repeated on

Table 2
Means and standard deviations for each measure at baseline, mid-treatment, and post-treatment ($N = 274$).

	Baseline			Mid-treatment			Post-treatment		
	N	M	SD	N	M	SD	N	M	SD
Anxiety Composite (POMP)	274	36.41	16.15	274	28.99	17.08	191	20.90	14.30
DERS Total	185	95.67	26.42	174	90.15	26.09	125	84.79	26.57
DERS Non-acceptance	185	16.23	6.87	174	14.68	6.51	125	13.67	6.60
DERS Goals	185	16.70	5.16	174	15.68	5.13	125	14.46	5.09
DERS Impulse	185	13.71	5.64	174	12.84	5.59	125	11.75	5.18
DERS Awareness	185	15.17	4.75	174	15.24	4.42	125	15.19	4.48
DERS Strategies	185	21.52	8.43	174	19.91	7.69	125	18.35	7.95
DERS Clarity	185	12.34	4.30	174	11.80	3.95	125	11.36	3.92
ASI-3 Total	273	25.37	16.41	260	19.84	16.01	184	16.67	14.12
ASI-3 Physical	273	7.41	6.73	260	5.46	6.22	184	4.41	5.67
ASI-3 Social	273	9.95	6.67	260	8.48	6.10	184	7.64	5.97
ASI-3 Cognitive	273	8.01	6.91	260	5.90	6.47	184	4.62	5.39

Note. Anxiety composite mean scores are represented by calculated *percent of maximum possible* (POMP) scores, and all other mean scores are derived from the raw scores on each individual measure. DERS = Difficulties in Emotion Regulation Scale; ASI-3 = Anxiety Sensitivity Index-3; DERS Total = Total score; DERS Non-acceptance = Non-acceptance of emotional responses subscale; DERS Goals = Difficulty engaging in goal-directed behavior subscale; DERS Impulse = Impulse control difficulties subscale; DERS Awareness = Lack of emotional awareness subscale; DERS Strategies = Limited access to emotion regulation strategies subscale; DERS Clarity = Lack of emotional clarity subscale; ASI-3 Total = Total score; ASI-3 Physical = Physical concerns subscale; ASI-3 Social = Social concerns subscale; ASI-3 Cognitive = Cognitive concerns subscale.

subscales of the ASI-3 and DERS. An individual mediator analysis was applied to 3 subscales of the ASI-3, as well as the 6 emotion dysregulation of the DERS, and the indirect effects of these subscales of ASI-3 and DERS are reported in Table 4 for both individual and multiple mediation models. With regard to the ASI-3, there was significant indirect effect through reduction on social AS (indirect effect = -0.648, SE = 0.303, 95% CI = -1.323 to -0.159, ES = -0.039), and cognitive AS (indirect effect = -0.512, SE = 0.283, 95% CI = -1.154 to -0.046, ES = -0.031). Physical AS did not significantly mediate the relationship between Time and anxiety ($p > .05$).

In terms of DERS, the results showed that reduction on *non-acceptance of emotional responses* (indirect effect = -0.591, SE = 0.351, 95% CI = -1.382 to -0.030, ES = -0.034), *impulse control difficulties* (indirect effect = -1.008, SE = 0.511, 95% CI = -2.144 to -0.114, ES = -0.058), and *limited access to emotion regulation strategies* (indirect effect = -0.970, SE = 0.489, 95% CI = -1.977 to -0.069, ES = -0.055) significantly mediated the relationship between Time and anxiety, while the remaining subscales of the DERS did not (all $ps > 0.05$). All 9 subscales were added simultaneously into the model (see Figure 3). The 9 variables, taken as a set, did not mediate the relationship between Time and anxiety (see Table 4). However, reduction on *impulse control difficulties* of the DERS (indirect effect = -0.849, *SE* = 0.480, 95% CI = -1.913 to -0.081, ES = -0.049) significantly mediated the relationship between Time and decreased anxiety. The model significantly explained 56.4% (R^2, $p < .001$) of variance in anxiety.

Finally, 6 significant pairwise contrasts of the indirect effects were found (Table 4). Reduction on *impulse control difficulties* of the DERS had significantly larger mediating effects than 4 subscales, including ASI-3 cognitive concerns, DERS *non-acceptance of emotional responses*, DERS *difficulty engaging in goal-directed behavior*, and DERS *lack of emotional awareness*. Moreover, DERS *limited access to emotion regulation*

Table 3

Indirect Effects of Time on Anxiety Change through Total Anxiety Sensitivity and Difficulties in Emotional Regulation.

Effects on Anxiety	Variables	Point estimate	SE	Effect size [a]	Bias-corrected 95% CI	
					Lower	Upper
Individual mediator model						
Indirect effect	ASI-3	−1.005	0.388	−0.061	−1.876	−0.364
	DERS	−1.128	0.542	−0.064	−2.285	−0.189
Multiple Mediation model						
Indirect effect	*Total*	−1.212	0.585	−0.069	−2.479	−0.212
	ASI-3	−0.182	0.221	−0.010	−0.731	0.125
	DERS	−1.030	0.518	−0.059	−2.172	−0.153
Contrasts						
ASI-3 vs. DERS		0.848	0.539	−0.048	−0.078	2.052

Note. [a] Effect sizes were reported by standardized coefficients. DERS = Difficulties in Emotion Regulation Scale; ASI-3 = Anxiety Sensitivity Index-3.

strategies and DERS *Lack of emotional clarity* showed significantly larger mediating effects than DERS *difficulty engaging in goal-directed behavior*. No significant differences were found in other pairwise comparisons.

4. Discussion

Consistent with hypotheses, both ER and AS independently mediated the reduction in anxiety symptoms in CBT in a large naturalistic sample of patients with anxiety-related disorders. Reductions in AS and improvements in ER preceded improvements in anxiety-related symptoms. These findings are consistent with significant literature showing strong cross-sectional relationships with ER and AS and high anxiety in non-clinical samples (e.g., Boswell et al., 2013). However, no other study to our knowledge has examined the relative effect of these potential mechanisms of treatment outcome during evidence-based treatments for anxiety and anxiety-related disorders in a naturalistic setting. In the multiple mediation model, only ER emerged as a significant mediator of change in anxiety-related symptoms. Indeed, several studies support ER as a potent mediator of change (e.g., Carl et al., 2018). The current results suggest that one of the ways that CBT (and particularly exposure therapy, as was used for the vast majority of patients in the current study) may be effective for individuals seeking treatment for anxiety-related symptoms is through its ability to improve the way individuals regulate and manage their distressing internal emotional experiences, which in turn influence the reduction of anxiety-related symptoms.

The exploratory analyses allowed for a more detailed look at what specific aspects of both AS and ER are likely to be driving the observed mediating effects. Independent mediation models using the subscales of

the ASI-3 found that reductions in social and cognitive AS significantly influenced subsequent reductions in anxiety symptoms, while for the DERS, it was found that improvement in one's non-acceptance of one's emotional responses, impulse control difficulties, and limited access to healthy emotion regulation strategies were the only significant drivers of subsequent improvement in anxiety-related symptoms. However, when all the subscales were examined in one model, impulse control difficulties (which includes items such as "*When I'm upset, I become out of control*" and "*When I'm upset, I have difficulty controlling my behaviors*") emerged as the only significant mediator of improvement in anxiety-related symptoms. This would suggest that exposure therapy specifically improves one's perception of his or her capacity to control emotional impulses (and extrapolated from this, subsequent behavior), which then conceivably translates to improvement in anxiety pathology and the distress/interference caused from these symptoms.

This is a novel finding, given no previous examinations of the relative influence of ER to AS in anxiety outcome. However, well-established theoretical models explaining how deficits in ER likely maintain and perpetuate anxiety symptoms, as described previously, support this finding (Craske et al., 2008; Cisler et al., 2010). Specifically, maladaptive ER strategies have been posited to perpetuate anxiety-related avoidance by increasing the fear response and reinforcing the maladaptive expectation of a feared situation; thus, the current study shows that improvements in maladaptive ER precede improvements in anxiety pathology (and reductions in avoidance), consistent with this theoretical model. Further, fears around loss of control are identified as a central component of a number of the anxiety disorders, OCD and PTSD (e.g., Hofmann et al., 2008; Gagné and Radomsky, 2017). It would make sense, therefore, that exposure therapy (which behaviorally tests
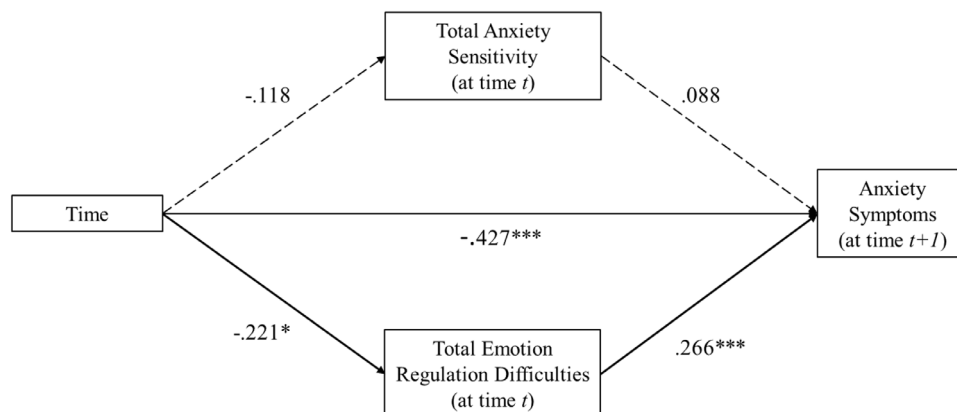

Fig. 2. Parallel Multiple Mediation Model of Time on Anxiety Change through Total Anxiety Sensitivity and Difficulties in Emotional Regulation. Note. Standardized coefficients are presented. *p < .05, ***p < .001.

Table 4

Indirect Effect of Time on Anxiety Change through Subtypes of Anxiety Sensitivity and Difficulties in Emotional Regulation.

Effects on Anxiety	Variables	Point estimate	SE	Effect size[a]	Bias-corrected 95% CI	
					Lower	Upper
Individual mediator model						
Indirect effect	ASI-3 Physical	−0.424	0.271	−0.026	−1.016	0.058
	ASI-3 Social	−0.648	0.303	−0.039	−1.323	−0.159
	ASI-3 Cognitive	−0.512	0.283	−0.185	−1.154	−0.046
	DERS Non-acceptance	−0.591	0.351	−0.034	−1.382	−0.030
	DERS Goals	−0.395	0.297	−0.023	−1.125	0.020
	DERS Impulse	−1.008	0.511	−0.058	−2.144	−0.114
	DERS Awareness	0.033	0.175	0.002	−0.325	0.428
	DERS Strategies	−0.970	0.489	−0.055	−1.977	−0.069
	DERS Clarity	−0.471	0.355	−0.027	−1.277	0.132
Multiple Mediation model						
Indirect effect	Total	−0.938	0.765	−0.054	−2.490	0.499
	ASI-3 Physical	−0.100	0.231	−0.006	−0.646	0.330
	ASI-3 Social	0.088	0.293	0.005	−0.487	0.713
	ASI-3 Cognitive	0.147	0.235	0.008	−0.252	0.720
	DERS Non-acceptance	0.205	0.274	0.012	−0.288	0.832
	DERS Goals	0.474	0.310	0.027	−0.010	1.175
	DERS Impulse	−0.849	0.480	−0.049	−1.913	−0.081
	DERS Awareness	0.002	0.101	0.000	−0.206	0.235
	DERS Strategies	−0.695	0.443	−0.040	−1.708	0.038
	DERS Clarity	−0.211	0.241	−0.012	−0.808	0.122
Contrasts[b]						
	ASI-3 Cognitive vs. DERS Impulse	0.996	0.555	0.057	0.088	2.188
	DERS Non-acceptance vs. DERS Impulse	1.054	0.609	0.060	0.06	2.406
	DERS Goals vs. DERS Impulse	1.323	0.672	0.076	0.193	2.806
	DERS Goals vs. DERS Strategies	1.169	0.639	0.067	0.086	2.577
	DERS Goals vs. DERS Clarity	0.685	0.423	0.039	0.014	1.641
	DERS Impulse vs. DERS Awareness	−0.851	0.489	−0.049	−1.938	−0.052

Note. [a]Effect size were reported by standardized effects. [b]Only significant pairwise comparisons are presented in the table. DERS = Difficulties in Emotion Regulation Scale; ASI-3 = Anxiety Sensitivity Index-3; DERS Non-acceptance = Non-acceptance of emotional responses subscale; DERS Goals = Difficulty engaging in goal-directed behavior subscale; DERS Impulse = Impulse control difficulties subscale; DERS Awareness = Lack of emotional awareness subscale; DERS Strategies = Limited access to emotion regulation strategies subscale; DERS Clarity = Lack of emotional clarity subscale; ASI-3 Physical = Physical concerns subscale; ASI-3 Social = Social concerns subscale; ASI-3 Cognitive = Cognitive concerns subscale.

and often disproves this idea of loss of control when confronted with a phobic stimulus) would improve this specific feature of emotion dysregulation (as measured by the *impulse control difficulties* subscale of the DERS). Thus, it logically follows that a reduction in this maladaptive ER strategy would subsequently reduce phobic avoidance and distress from encountering feared situations. Monitoring individual capacity to regulate strong emotions over the course of treatment more frequently could provide an indication of whether the exposure treatment being delivered is effective. For instance, if we start to see changes in this ER capability, regardless of symptom change, this may serve as a preemptive signal to clinicians that anxiety symptoms are likely to improve later on in treatment and to stay the course with treatment.

This study is not without its shortcomings. First, we relied here on self-report measures of ER, AS, and anxiety pathology, because these measures simultaneously minimize assessment burden on patients while being shown to be highly associated with clinician-administered measures (Sulkowski et al., 2008). Yet, self-report measures are susceptible to response bias (Safer and Keuler, 2002). Future studies should consider other modes of assessment of ER and AS; for instance, psychophysiological tasks and non-verbal measurements of ER (e.g., an IAPS picture task, emotional video clips) can be a good alternative to relying solely on self-report, and has been widely used to examine engagement in various ER strategies (e.g., Asnaani et al., 2013; Macatee and Cougle, 2013). Similarly, several computerized and/or objectively-based instruments (e.g., breath-holding or mirror tracing tasks) exist for the measurement of AS and its related constructs (such as distress tolerance); however, these behavioral paradigms have also yielded mixed indications of mechanistic function of AS or distress

tolerance in anxiety pathology (e.g., Bernstein et al., 2011; Qi et al., 2019). Our clinic originally opted for only self-report to reduce patient burden, but has since incorporated some autonomous, brief, and objective computerized tasks to supplement this self-reported data to measure both ER and AS, and patients have generally responded well to these additional assessment approaches.

In addition, it is important to note that the current study treatment setting, while naturalistic, was still a fee-for-service anxiety specialty clinic where no-show rates might be lower than community mental health centers and where the more homogenous training of the therapists may indicate a greater likelihood of consistent use of CBT. Thus, the current study setting still presents with reasonable generalizability issues regarding all types of naturalistic treatment settings. Furthermore, even in this specialty setting, the research team relied on self-reported CBT use by therapists; previous work has highlighted the utility of live observation/ review of recorded session tapes or expert-coded measures of sessions as a more robust measure of fidelity to a treatment approach than self-report (Wiltsey-Stirman et al., 2015). While video review during supervision was done routinely for all patients with a primary diagnosis of PTSD, this was not done consistently across other diagnoses in this clinic. Finally, other general limitations of this dataset are covered in detail in the main outcome paper, but briefly here include: a lack of racial diversity (although the sample was diverse on other demographics such as employment status and education level), less than ideal data collection rates at post-treatment, and a lack of a control group not receiving CBT.
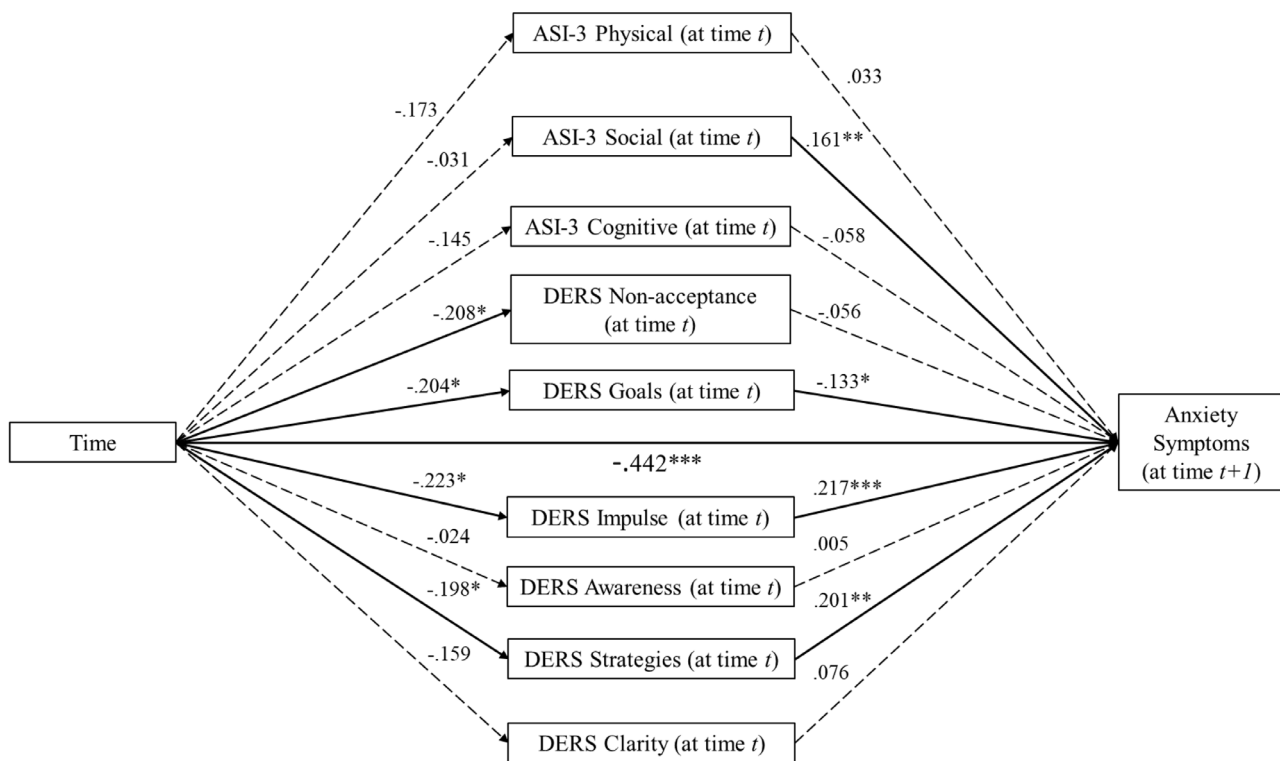
Fig. 3. Parallel Multiple Mediation Model on Anxiety Change through Subtypes of Anxiety Sensitivity and Difficulties in Emotional Regulation. *Note.* DERS Non-acceptance = Non-acceptance of emotional responses subscale; DERS Goals = Difficulty engaging in goal-directed behavior subscale; DERS Impulse = Impulse control difficulties subscale; DERS Awareness = Lack of emotional awareness subscale; DERS Strategies = Limited access to emotion regulation strategies subscale; DERS Clarity = Lack of emotional clarity subscale; ASI-3 Physical = Physical concerns subscale; ASI-3 Social = Social concerns subscale; ASI-3 Cognitive = Cognitive concerns subscale. Standardized coefficients are presented. *$p < .05$, **$p < .01$, ***$p < .001$.

5. Conclusions

This study joins the efforts of a growing number of examinations into the mechanisms underlying effective treatment outcome for anxiety-related disorders (including OCD and PTSD). Importantly, this study incorporated repeated assessments of hypothesized mediators (AS and ER) into routine clinical practice in a naturalistic treatment setting, allowing for the examination of mechanisms underlying improvement in a treatment-seeking sample, as compared to the frequent previous examinations of these variables in cross-sectional data. Additionally, our design allowed for a clinical examination of a transdiagnostic sample using a composite measure of anxiety pathology based on individual symptom measures, allowing for analyses across several diagnostic subgroups. The study utilized a large sample and a sophisticated analytic approach, finding that improvements in ER capability were shown to significantly influence subsequent reductions in anxiety pathology and avoidance. Importantly, this suggests that one way in which CBT (particularly exposure therapy) for anxiety-related disorders might be effective is by enhancing ER, and that ER capability/deficit is likely a valuable mechanistic variable to monitor over the course of treatment for anxiety-related disorders.

Contributors

Dr. Asnaani designed the parent study and oversaw ongoing issues related to data collection, patient issues and IRB reviews for the database as the Principal Investigator for this study. She also spearheaded the interpretation of results, writing the Discussion, editing all sections of the paper, and was primarily responsible for the conceptualization for the current paper. Dr. Tyler currently manages the database from which this data is taken, and he played a significant role in conceptualization of the paper and wrote the Introduction. Mr. McCann

assisted in data management and cleaning, wrote the Methods, and assisted the team in obtaining and summarizing the relevant background literature. Dr. Brown provided a thorough edit of the full draft of the manuscript and supported design and implementation issues for the study during data collection and data analyses. Dr. Zang conducted the statistical analyses for the study, wrote the results, generated the figures, and provided close consultation on the most appropriate statistical approach for the study.

Declaration of Competing Interest

None.

streamlined our processes to make the data collection and database creation what they are today. Further, we are very grateful to the Director of the Center for the Treatment and Study of Anxiety, Dr. Edna Foa, and the entire clinical team who assisted in informing and consenting patients to the study. Last but certainly not least, we would like to deeply thank all the patients seeking treatment at our Center who were willing for us to analyze their deidentified data in order to better understand the efficacy of our treatments on symptom reduction and mechanisms underlying their symptom improvement throughout their treatment at our facility.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jad.2020.01.160.

References

Asnaani, A., Benhamou, K., Kaczkurkin, A.N., Turk-Karan, E., Foa, E.B., 2019. Beyond the constraints of an RCT: naturalistic treatment outcomes for anxiety-related disorders. Behav. Ther. https://doi.org/10.1016/j.beth.2019.07.007.

Asnaani, A., Sawyer, A.T., Aderka, I.M., Hofmann, S.G., 2013. Effect of suppression, reappraisal, and acceptance of emotional pictures on acoustic eye-blink startle magnitude. J. Exp. Psychopathol. https://doi.org/10.5127/jep.028112.

Bandelow, B., Michaelis, S., 2015. Epidemiology of anxiety disorders in the 21st century. Dialogues Clin. Neurosci.

Bardeen, J.R., Kumpula, M.J., Orcutt, H.K., 2013. Emotion regulation difficulties as a prospective predictor of posttraumatic stress symptoms following a mass shooting. J. Anxiety Disord. https://doi.org/10.1016/j.janxdis.2013.01.003.

Baron, R.M., Kenny, D.A., 1986. The moderator-mediator variable distinction in social psychological research. conceptual, strategic, and statistical considerations. J. Pers. Soc. Psychol. https://doi.org/10.1037/0022-3514.51.6.1173.

Bernstein, A., Marshall, E.C., Zvolensky, M.J., 2011. Multi-method evaluation of distress tolerance measures and construct(s): concurrent relations to mood and anxiety psychopathology and quality of life. J. Exp. Psychopathol. 2, 386–399. https://doi.org/10.5127/jep.006610.

Blakey, S.M., Abramowitz, J.S., Reuman, L., Leonard, R.C., Riemann, B.C., 2017. Anxiety sensitivity as a predictor of outcome in the treatment of obsessive-compulsive disorder. J. Behav. Ther. Exp. Psychiatry. https://doi.org/10.1016/j.jbtep.2017.05.003.

Boswell, J.F., Farchione, T.J., Sauer-Zavala, S., Murray, H.W., Fortune, M.R., Barlow, D.H., 2013. Anxiety sensitivity and interoceptive exposure: a transdiagnostic construct and change strategy. Behav. Ther. https://doi.org/10.1016/j.beth.2013.03.006.

Carl, J.R., Gallagher, M.W., Barlow, D.H., 2018. Development and preliminary evaluation of a positive emotion regulation augmentation module for anxiety and depression. Behav. Ther. https://doi.org/10.1016/j.beth.2017.11.008.

Christensen, H., Jorm, A.F., Mackinnon, A.J., Korten, A.E., Jacomb, P.A., Henderson, A.S., Rodgers, B., 1999. Age differences in depression and anxiety symptoms: a structural equation modelling analysis of data from a general population sample. Psychol. Med. https://doi.org/10.1017/S0033291798008150.

Cisler, J.M., Olatunji, B.O., Feldner, M.T., Forsyth, J.P., 2010. Emotion regulation and the anxiety disorders: an integrative review. J. Psychopathol. Behav. Assess. https://doi.org/10.1007/s10862-009-9161-1.

Craske, M.G., Barlow, D.H., 2016. Mastery of Your Anxiety and Panic: Therapist Guide. Oxford University Press, New York. https://doi.org/10.1093/med:psych/9780195311402.001.0001.

Craske, M.G., Kircanski, K., Zelikowsky, M., Mystkowski, J., Chowdhury, N., Baker, A., 2008. Optimizing inhibitory learning during exposure therapy. Behav. Res. Ther. https://doi.org/10.1016/j.brat.2007.10.003.

Davis, L., Barlow, D.H., Smith, L., 2010. Comorbidity and the treatment of principal anxiety disorders in a naturalistic sample. Behav. Ther. https://doi.org/10.1016/j.beth.2009.09.002.

Dryman, M.T., Heimberg, R.G., 2018. Emotion regulation in social anxiety and depression: a systematic review of expressive suppression and cognitive reappraisal. Clin. Psychol. Rev. https://doi.org/10.1016/j.cpr.2018.07.004.

Eifert, G.H., Forsyth, J.P., 2005. Acceptance and Commitment Therapy For Anxiety Disorders: A Practitioner's Treatment Guide to Using Mindfulness, Acceptance, and Values-Based Behavior Change Strategies. New Harbinger, Oakland.

Foa, E.B., Hembree, E., Rothbaum, B., 2015. Prolonged Exposure Therapy For PTSD: Therapist Guide. Oxford University Press, New York. https://doi.org/10.1093/med:psych/9780195308501.001.0001.

Foa, E.B., Kozak, M.J., 1986. Emotional processing of fear. exposure to corrective information. Psychol. Bull. https://doi.org/10.1037/0033-2909.99.1.20.

Foa, E.B., Yadin, E., Lichner, T.K., 2012. Exposure and Response (Ritual) Prevention for Obsessive-Compulsive Disorder: Therapist Guide. Oxford University Press, New York.

Gagné, J.P., Radomsky, A.S., 2017. Manipulating beliefs about losing control causes checking behaviour. J. Obsessive. Compuls. Relat. Disord. https://doi.org/10.1016/j.jocrd.2017.08.013.

Gallagher, M.W., Payne, L.A., White, K.S., Shear, K.M., Woods, S.W., Gorman, J.M., Barlow, D.H., 2013. Mechanisms of change in cognitive behavioral therapy for panic

disorder: the unique effects of self-efficacy and anxiety sensitivity. Behav. Res. Ther. https://doi.org/10.1016/j.brat.2013.09.001.

Goldin, P.R., Lee, I., Ziv, M., Jazaieri, H., Heimberg, R.G., Gross, J.J., 2014. Trajectories of change in emotion regulation and social anxiety during cognitive-behavioral therapy for social anxiety disorder. Behav. Res. Ther. https://doi.org/10.1016/j.brat.2014.02.005.

Gratz, K.L., Roemer, L., 2004. Multidimensional assessment of emotion regulation and dysregulation: development, factor structure, and initial validation of the difficulties in emotion regulation scale. J. Psychopathol. Behav. Assess. https://doi.org/10.1023/B:JOBA.0000007455.08539.94.

Gross, J.J., 2002. Emotion regulation: affective, cognitive, and social consequences. Psychophysiology. https://doi.org/10.1017/S0048577201393198.

Hans, E., Hiller, W., 2013. A meta-analysis of nonrandomized effectiveness studies on outpatient cognitive behavioral therapy for adult anxiety disorders. Clin. Psych. Rev. https://doi.org/10.1016/j.cpr.2013.07.003.

Harris, P.A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., Conde, J.G., 2009. Research electronic data capture (REDCap)-A metadata-driven methodology and workflow process for providing translational research informatics support. J. Biomed. Inform. https://doi.org/10.1016/j.jbi.2008.08.010.

Hofmann, S.G., Otto, M.W., 2017. Cognitive Behavioral Therapy For Social Anxiety Disorder, 2nd ed. Routledge, New York. https://doi.org/10.4324/9781315617039.

Hofmann, S.G., Smits, J.A.J., 2008. Cognitive-behavioral therapy for adult anxiety disorders: a meta-analysis of randomized placebo-controlled trials. J. Clin. Psychiatry.

Hunsley, J., Lee, C.M., 2007. Research-informed benchmarks for psychological treatments: efficacy studies, effectiveness studies, and beyond. Prof. Psychol. Res. Pract. https://doi.org/10.1037/0735-7028.38.1.21.

Ino, K., Ogawa, S., Kondo, M., Imai, R., Ii, T., Furukawa, T.A., Aakechi, T., 2017. Anxiety sensitivity as a predictor of broad dimensions of psychopathology after cognitive behavioral therapy for panic disorder. Neuropsychiatr. Dis. Treat. https://doi.org/10.2147/NDT.S121360.

Kaczkurkin, A.N., Fitzgerald, H., Tyler, J., Asnaani, A., 2018. The contribution of anxiety sensitivity to obsessive–compulsive and anxiety symptoms in a naturalistic treatment setting. Cognit. Ther. Res. 42, 661–673. https://doi.org/10.1007/s10608-018-9909-6.

Kashdan, T.B., Farmer, A.S., 2014. Differentiating emotions across contexts: comparing adults with and without social anxiety disorder using random, social interaction, and daily experience sampling. Emotion. https://doi.org/10.1037/a0035796.

Kashdan, T.B., Zvolensky, M.J., McLeish, A.C., 2008. Anxiety sensitivity and affect regulatory strategies: individual and interactive risk factors for anxiety-related symptoms. J. Anxiety Disord. https://doi.org/10.1016/j.janxdis.2007.03.011.

Katz, D., Laposa, J.M., Rector, N.A., 2018. Anxiety sensitivity, obsessive beliefs, and the prediction of cbt treatment outcome for ocd. Int. J. Cognit. Ther. https://doi.org/10.1007/s41811-018-0007-z.

Kessler, R.C., Petukhova, M., Sampson, N.A., Zaslavsky, A.M., Wittchen, H.U., 2012. Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the united states. Int. J. Methods Psychiatr. Res. https://doi.org/10.1002/mpr.1359.

Leichsenring, F., 2004. Randomized controlled versus naturalistic studies: a new research agenda. Bull. Menninger Clin. https://doi.org/10.1521/bumc.68.2.137.35952.

Macatee, R.J., Cougle, J.R., 2013. The roles of emotional reactivity and tolerance in generalized, social, and health anxiety: a multimethod exploration. Behav. Ther. https://doi.org/10.1016/j.beth.2012.05.006.

McLean, C.P., Asnaani, A., Litz, B.T., Hofmann, S.G., 2011. Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. J. Psychiatr. Res. https://doi.org/10.1016/j.jpsychires.2011.03.006.

McNally, R.J., 2002. Anxiety sensitivity and panic disorder. Biol. Psychiatry. https://doi.org/10.1016/S0006-3223(02)01475-0.

Mitchell, M.A., Capron, D.W., Raines, A.M., Schmidt, N.B., 2014. Reduction of cognitive concerns of anxiety sensitivity is uniquely associated with reduction of ptsd and depressive symptoms: a comparison of civilians and veterans. J. Psychiatr. Res. https://doi.org/10.1016/j.jpsychires.2013.10.013.

Moscovitch, D.A., Gavric, D.L., Senn, J.M., Santesso, D.L., Miskovic, V., Schmidt, L.A., McCabe, R.E. and Antony, M.M., 2012. Changes in judgment biases and use of emotion regulation strategies during cognitive-behavioral therapy for social anxiety disorder: distinguishing treatment responders from nonresponders. Cognit. Ther. Res. 10.1007/s10608-011-9371-1.

Naragon-Gainey, K., 2010. Meta-analysis of the relations of anxiety sensitivity to the depressive and anxiety disorders. Psychol. Bull. https://doi.org/10.1037/a0018055.

Norton, P.J., Price, E.C., 2007. A meta-analytic review of adult cognitive-behavioral treatment outcome across the anxiety disorders. J. Nerv. Ment. Dis. https://doi.org/10.1097/01.nmd.0000253843.70149.9a.

Nowakowski, M.E., Rowa, K., Antony, M.M., McCabe, R., 2016. Changes in anxiety sensitivity following group cognitive-behavior therapy for social anxiety disorder and panic disorder. Cognit. Ther. Res. https://doi.org/10.1007/s10608-015-9750-0.

O'Bryan, E.M., McLeish, A.C., Kraemer, K.M., Fleming, J.B., 2015. Emotion regulation difficulties and posttraumatic stress disorder symptom cluster severity among trauma-exposed college students. Psychol. Trauma Theory, Res. Pract. Policy. https://doi.org/10.1037/a0037764.

Olatunji, B.O., Cisler, J.M., Deacon, B.J., 2010. Efficacy of cognitive behavioral therapy for anxiety disorders: a review of meta-analytic findings. Psychiatr. Clin. North Am. https://doi.org/10.1016/j.psc.2010.04.002.

Olatunji, B.O., Wolitzky-Taylor, K.B., 2009. Anxiety sensitivity and the anxiety disorders: a meta-analytic review and synthesis. Psychol. Bull. https://doi.org/10.1037/a0017428.

Orsillo, S.M., Roemer, L., 2011. The Mindful Way Through Anxiety: Break Free from Chronic Worry and Reclaim Your Life. Guilford Press, New York.

Preacher, K.J., Hayes, A.F., 2008. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behav. Res. Methods. https://doi.org/10.3758/BRM.40.3.879.

Preacher, K.J., Hayes, A.F., 2004. SPSS and sas procedures for estimating indirect effects in simple mediation models. Behav. Res. Methods, Instruments, Comput. https://doi.org/10.3758/BF03206553.

Preacher, K.J., Rucker, D.D., Hayes, A.F., 2007. Addressing moderated mediation hypotheses: theory, methods, and prescriptions. Multivariate Behav. Res. https://doi.org/10.1080/00273170701341316.

Qi, J., Rappaport, L.M., Cecilione, J., Hettema, J.M., Roberson-Nay, R., 2019. Differential associations of distress tolerance and anxiety sensitivity with adolescent internalizing psychopathology. J. Clin. Child Adolesc. Psychol. https://doi.org/10.1080/15374416.2019.1602838.

Reiss, S., McNally, R.J., 1985. The expectancy model of fear. Theor. Issues Behav. Ther.

Remes, O., Brayne, C., van der Linde, R., Lafortune, L., 2016. A systematic review of reviews on the prevalence of anxiety disorders in adult populations. Brain Behav. https://doi.org/10.1002/brb3.497.

Safer, M.A., Keuler, D.J., 2002. Individual differences in misremembering pre-psychotherapy distress. personality and memory distortion. Emotion. https://doi.org/10.1037/1528-3542.2.2.162.

Shrout, P.E., Bolger, N., 2002. Mediation in experimental and nonexperimental studies: new procedures and recommendations. Psychol. Methods. https://doi.org/10.1037/1082-989X.7.4.422.

Sloan, E., Hall, K., Moulding, R., Bryce, S., Mildred, H., Staiger, P.K., 2017. Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: a systematic review. Clin.

Psychol. Rev. https://doi.org/10.1016/j.cpr.2017.09.002.

Stewart, R.E., Chambless, D.L., 2009. Cognitive-behavioral therapy for adult anxiety disorders in clinical practice: a meta-analysis of effectiveness studies. J. Consult. Clin. Psychol. https://doi.org/10.1037/a0016032.

Sulkowski, M.L., Storch, E.A., Geffken, G.R., Ricketts, E., Murphy, T.K., Goodman, W.K., 2008. Concurrent validity of the yale-brown obsessive-compulsive scale-symptom checklist. J. Clin. Psychol. https://doi.org/10.1002/jclp.20525.

Taylor, S., Zvolensky, M.J., Cox, B.J., Deacon, B., Heimberg, R.G., Ledley, D.R., Abramowitz, J.S., Holaway, R.M., Sandin, B., Stewart, S.H., Coles, M., Eng, W., Daly, E.S., Arrindell, W.A., Bouvard, M., Cardenas, S.J., 2007. Robust dimensions of anxiety sensitivity: development and initial validation of the anxiety sensitivity index-3. Psychol. Assess. https://doi.org/10.1037/1040-3590.19.2.176.

van Ingen, D.J., Freiheit, S.R., Vye, C.S., 2009. From the lab to the clinic: effectiveness of cognitive-behavioral treatments for anxiety disorders. Profess. Psych. Res. Prac. https://doi.org/10.1037/a0013318.

Wiltsey-Stirman, S.W., Gutner, C.A., Crits-Christoph, P., Edmunds, J., Evans, A.C., Beidas, R.S., 2015. Relationships between clinician- level attributes and fidelity-consistent and fidelity-inconsistent modifications to an evidence-based psychotherapy. Implement. Sci. https://doi.org/10.1186/s13012-015-0308-z.

Wirtz, C.M., Hofmann, S.G., Riper, H., Berking, M., 2014. Emotion regulation predicts anxiety over a five-year interval: a cross-lagged panel analysis. Depress. Anxiety. https://doi.org/10.1002/da.22198.

Wolitzky-Taylor, K.B., Arch, J.J., Rosenfield, D., Craske, M.G., 2012. Moderators and non-specific predictors of treatment outcome for anxiety disorders: a comparison of cognitive behavioral therapy to acceptance and commitment. J. Consult. Clin. Psych. https://doi.org/10.1037/a0029418.

ORIGINAL ARTICLE

An Innovative Mobile Game for Screening of Pediatric PTSD: a Study in Primary Care Settings

Anu Asnaani[1] · Kevin Narine[2] · Noah Suzuki[2] · Rebecca Yeh[3] · Yinyin Zang[2] · Billie Schwartz[4] · Anthony Mannarino[5] · Judith Cohen[5] · Edna B. Foa[2]

Abstract

Childhood is a developmental period associated with high risk of posttraumatic stress disorder (PTSD). Available validated pencil-and-paper diagnostic tools can be difficult for younger children to engage with given format and length. This study investigated psychometric properties of a briefer, more interactive game version of the Child PTSD Symptom Scale for DSM-5 (CPSS-5). Participants ($n = 49$) were children attending primary care appointments between 8 to 12 years of age who were exposed to a DSM-5 Criterion A trauma. Participants completed the 6-item screening version of the CPSS-5 delivered in mobile tablet game format (the *CPSS-5 Screen Team Game)* and a self-report version of the full CPSS-5 (CPSS-5-SR) before their medical appointments. The mobile game showed adequate internal consistency ($\alpha = 0.79$), was significantly positively correlated to the total CPSS-5-SR ($r = .74, p < .001, n = 49$), and with the total of the six identical items of the CPSS-5-SR ($r = .79, p < .001$, n = 49), demonstrating good convergent validity. Receiver operating characteristic (ROC) analyses revealed a cut-off score of 9 on the screening game as indicative of probable PTSD. Implementation of this screening game into primary care settings could be a low-burden method to greatly increase the detection of pediatric PTSD for referral to appropriate integrated care interventions.

Keywords PTSD · Screening · Children · Mobile technology · Integrated care

Trauma exposure is a common occurrence in childhood with exposure rates estimated to be as high as 60% by the end of adolescence (McLaughlin et al. 2013). Exposure to traumatic events has been associated with a host of life difficulties including the development of posttraumatic stress disorder (PTSD), increased incidence of depression and suicidality, dysregulation of immune function with subsequent high risk for many medical disorders, poor school performance, and problematic behaviors such as aggression and delinquency (Santiago et al. 2017; Brown et al. 2009). Of youth who are exposed to trauma, up to 16% go on to develop PTSD (Alisic et al. 2014), which is particularly concerning given that PTSD is a debilitating psychiatric disorder associated with well-documented emotional, physiological, and behavioral difficulties (Kessler et al. 2012). Further, studies comparing children with and without PTSD have found significant deficits in overall cognitive functioning including poorer general intelligence and executive function (De Bellis et al. 2009; Malarbi et al. 2017), increased risk for suicidality (Flannery et al. 2001), and neurobiological consequences associated with learning and memory (Carrion et al. 2001; Carrion et al. 2009; Carrion et al. 2010) among children with PTSD. Fortunately, treatments such as trauma-focused cognitive behavioral therapy for children (Mannarino et al. 2012) are highly effective in treating PTSD. To reduce the risks and long-term consequences associated with PTSD in children, early and accurate detection of PTSD in youth is of paramount importance.

✉ Anu Asnaani
anu.asnaani@psych.utah.edu

1 Department of Psychology, University of Utah, 380 S. 1530 E BEH S 502, Salt Lake City, UT, USA

2 Department of Psychiatry, University of Pennsylvania, Philadelphia, PA, USA

3 Clinical Psychology Department, La Salle University, Philadelphia, PA, USA

4 Department of Child and Adolescent Psychiatry and Behavioral Sciences, Children's Hospital of Philadelphia, Philadelphia, PA, USA

5 Department of Psychiatry, Drexel University College of Medicine/ Allegheny Health Network, Pittsburgh, PA, USA

To date, there are several measures to assess for PTSD in children using the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM-5; American Psychiatric Association 2013) criteria. These tools include the self-report, interview, and screen versions of the Child PTSD Symptom Scale for DSM-5 (CPSS-5; Foa et al. 2018), the interview and self-report versions of the University of California at Los Angeles Posttraumatic Stress Disorder Reaction Index (UCLA-RI; Steinberg et al. 2004), and the Clinician-Administered PTSD Scale for DSM-5 Child/Adolescent Version (CAPS-CA-5). Although these measures have been shown to be psychometrically sound to screen and assess for pediatric PTSD, there are a few challenges to administering them. For instance, paper and pencil self-report assessments are lengthy and complicated with a substantial number of items and multiple scale points to choose from (Brewin et al. 2002). This has potential to be especially challenging for younger children (8–12 years), some of whom may not have adequate reading and writing skills to understand and complete these forms (Yule 1992), or may be particularly reticent to report on symptoms stemming from traumatic experiences due to embarrassment, shame and/or traumatic avoidance (Kozlowska and Hanney 2001). Further, in some service delivery settings, comprehensive diagnostic assessments for PTSD may not be feasible to administer due to competing demands, time constraints, or staff shortages (Brewin et al. 2002). These logistical barriers could limit the widespread use or applicability of existing measures.

Brief sensitive screeners for PTSD represent one potential strategy to effectively and efficiently identify children who may benefit from mental health services while minimizing the need for additional personnel and organizational resources. There are a few benefits of developing such briefer measures. First, brief screeners reduce the comprehension barriers that young children may experience when completing lengthy, thorough self-report measures. Second, they can be easily implemented in a wide variety of healthcare settings by professionals with limited training in conducting psychodiagnostic assessments (Brewin et al. 2002). To our knowledge, no study has examined the accuracy and feasibility of screening for PTSD using a brief screen in primary care and other community-based settings.

Mobile technology offers a creative way to assess for PTSD in children. The development and use of a game version of a screening measure is particularly appealing for younger children in order to keep them engaged in the measure to accurately and reliably screen for PTSD, while providing some in-built reinforcement for completion of the measure via play. Technological formats have the capability to automatically guide children through sensitive questions and minimizes the time burden for professionals to administer and score assessments.

To address the need for both a briefer and engaging PTSD measure for younger children, we created a mobile screening version of the CPSS-5. The self-report and interview versions of the CPSS-5 are psychometrically tested valid and reliable measures of DSM-5 PTSD symptomology in trauma-exposed youth (Foa et al. 2018). In this previous psychometric study of the CPSS-5, there were 6 most frequently endorsed DSM-5 items (i.e., being emotionally upset when reminded of the trauma, avoidance of thoughts/feelings about the trauma, experiencing strong upsetting feelings, hypervigilance, concentration difficulties, and sleep difficulties) found on the CPSS-5 among children with a likely diagnosis of PTSD, which were adopted per verbatim from paper-and-pencil format into a newly created mobile game screen format of the CPSS-5. These six items have previously showed good internal consistency and test-retest reliability in a wider age span of children aged 8 years to 18 years (Foa et al. 2018) but have not been specifically examined in detail in younger children between the ages of 8 years and 12 years.

The primary aim of the current study was to therefore examine the psychometric properties (internal consistency and convergent validity) of the screener version of the CPSS-5 in comparison to the validated full version of the CPSS-5. A secondary aim was to assess the feasibility, ease of comprehension, and acceptability of this CPSS-5 screener when delivered in a mobile game format (which retained the item wording of the 6 most frequently endorsed items on the CPSS-5 from previous psychometric studies interspersed with brief interactive game activities to ensure engagement) to younger children between the ages of 8 and 12 years old. In addition, we aimed to derive a cut-off score on the game screen that suggests probable PTSD, given the usefulness of such a feature in helping providers more easily identify children in need of PTSD treatment services. We were interested in testing this mobile measure in settings where the vast majority of youth seek healthcare services, i.e., primary care pediatric offices, in order to evaluate the sensitivity and specificity of the screen within a diverse community sample (all of whom endorsed trauma exposure but with varying levels of PTSD symptomatology) which would most benefit from the implementation of such screening.

Methods

Participants

Participants were 53 children who initially endorsed exposure to a Criterion A trauma and whose parent indicated they were in the age range of 8 to 12 years old. Four participants were excluded due to either not endorsing a Criterion A trauma upon further inquiry during study procedures ($n = 2$), revealing that they were not in the age range after the study

procedures were complete ($n = 1$) or reporting inconsistent traumas on the self-report versus the *CPSS-5 Screen Team Game* ($n = 1$). The final sample for analysis therefore consisted of 49 participants ($M = 9.78$, $SD = 1.43$) who endorsed exposure to a Criterion A trauma at least one month before participating. Twenty-three of these participants were male (46.9%) and 26 were female (53.1%). The sample included 45 participants identifying as Black (91.8%), 2 identifying as Hispanic (4.1%), and 2 identifying as White (4.1%). The subject pool presented a broad range of trauma types: 17 identified an index trauma of having a close family member (e.g., parent) or family friend being hurt or killed (34.7%), 14 of having been beaten up or physically bullied (28.6%), 9 of having been in an accident (e.g., car accident or other man-made accident) (18.4%), 3 of having been in a natural disaster (6.1%), 3 of having been robbed (6.1%), and 3 of having been touched in a way they did not like or experiencing sexual abuse (6.1%). In keeping with the full CPSS-5 and DSM-5, participants could meet Criterion A by experiencing the identified trauma themselves, directly witnessing these events happening to others, or hearing about them happening to close family or friends (APA 2013), with the vast majority of participants endorsing personally experiencing the identified target trauma.

Participants between the ages of 8 and 12 years who initially endorsed trauma exposure were recruited from waiting rooms at two different primary care pediatric clinics of the Children's Hospital of Philadelphia ($n = 47$) and one community mental health center ($n = 6$). Exclusion criteria were: (1) no history of Criterion A trauma, and (2) difficulty reading or speaking English by the participants or their parents. Full participant flow of recruitment for study is shown in Fig. 1. The majority of the data was collected from January to June 2018. Participants and their parents or legal guardians provided informed assent/consent for all study procedures. Assent/consent forms and study procedures were approved by the Institutional Review Board at the University of Pennsylvania and the Children's Hospital of Pennsylvania.

Measures

The Child PTSD Symptom Scale - Self-Report Version for DSM-5 (CPSS-5-SR) (Foa et al. 2018)

The CPSS-5-SR is 27-item self-report measure used to assess PTSD symptoms based on DSM-5 criteria. This is a revision of the original interview version of the CPSS, which was based on DSM-IV criteria. The measure first provides examples of traumatic events and asks respondents to identify the event they have experienced that is the most currently distressing (i.e., the index trauma). From there, the measure presents 20 items corresponding to DSM-5 symptoms of PTSD, asking respondents to answer in reference to the index trauma. For each item, respondents were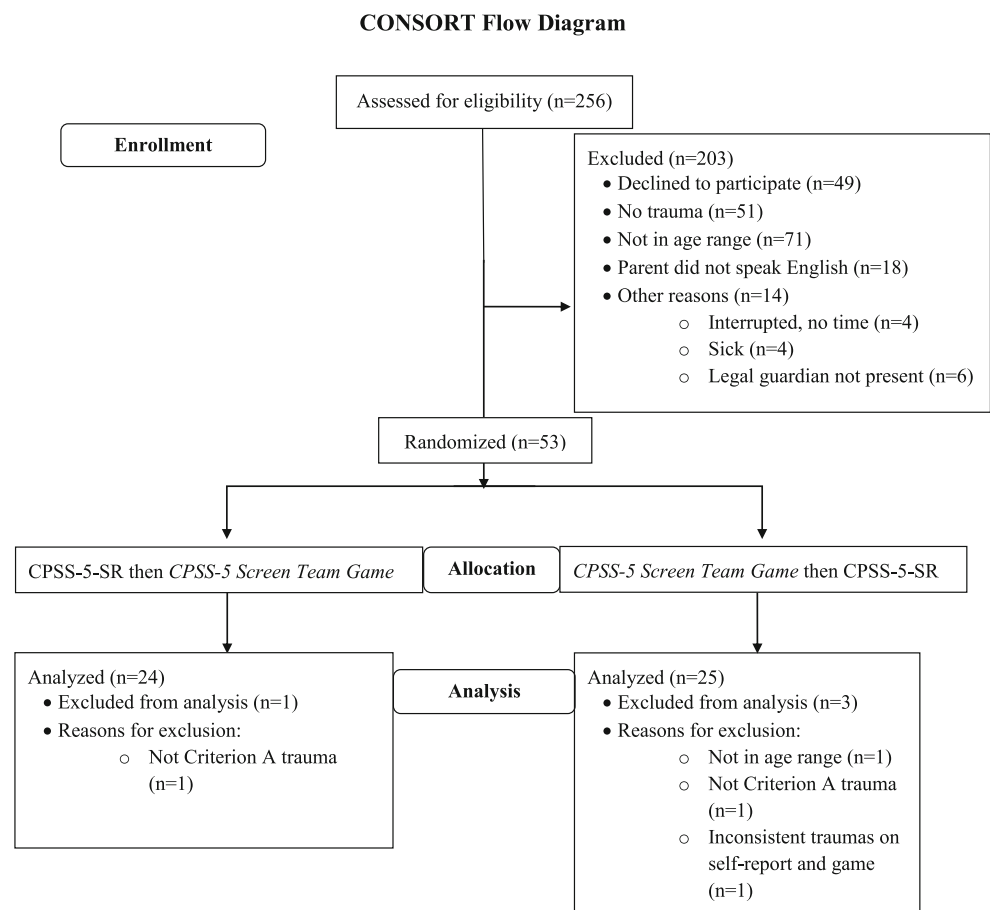 asked how much or how frequently they were bothered by each symptom in the past month on a scale from 0 (not at all) to 4 (6 or more times a week/almost always).

Ratings for the first 20 items can be totaled to yield severity scores, which range from 0 to 80. These items can also be broken down into each of the four DSM-5 PTSD symptom clusters: intrusion (items 1–5), avoidance (items 6–7), changes in cognition and mood (items 8–14), and increased arousal and reactivity (items 15–20). The final seven items assess impairment in functioning and the impact that the symptoms endorsed in the previous section have on 7 activities of daily functioning relevant to children (e.g., fun things you want to do, doing your homework, relationships with friends). These items are rated as either 0 (absent) or 1 (present) and can be summed to calculate a total impairment score, which does not factor into the overall severity score. A copy of the CPSS-5-SR is available upon request from the Center for the Treatment and Study of Anxiety.

CPSS-5 Screen Team Game The *CPSS-5 Screen Team Game* is a mobile game adaptation of the CPSS-5 Screener, which comprises of the 6 most highly endorsed items by children with likely PTSD previously identified on the original psychometric study of the CPSS-5 (see below), in the form of a beach-themed game intended for use on tablet or mobile devices. The game was developed through a collaboration between Allegheny Health Network's Center for Traumatic Stress in Children & Adolescents, the University of Pennsylvania, and Carnegie Mellon University's Entertainment Technology Center (ETC). The ETC comprises of a group of graduate students and faculty in cross-disciplinary fields such as computer technology and graphic design at Carnegie Mellon university, which is well known for its expertise in these areas and experience in applying such skills to address issues relevant to public health domains (such as the lack of engaging assessment options for youth with trauma histories). The ETC therefore collaborated closely with the academic research partners to create the *CPSS-5 Screen Team Game,* which introduces a variety of aquatic characters who guide players through an overview of trauma type and ratings of the 6 DSM-5 screener symptoms of PTSD. Each task is punctuated with a variety of activities intended to keep respondents engaged (e.g., swiping squid ink away from the screen to reveal questions, opening clam shells to find pearls, etc.).

The 6 DSM-5 symptoms of PTSD used in the game were those found to be those most frequently endorsed by participants with a PTSD diagnosis in the original psychometric study of the CPSS-5-SR (Foa et al. 2018). These items consisted of 1 item from Criterion B (endorsement of emotional distress when reminded of the trauma), 1 item from Criterion C (avoiding thoughts/feelings about the trauma), 1 item from Criterion D (frequently occurring strong, upsetting feelings) and 3 items from Criterion E (hypervigilance, concentration difficulties, and difficulties with sleep). For more details on the statistical selection of these items, please refer to the original psychometric study (Foa et al. 2018).

Fig. 1 CONSORT flow diagram
showing recruitment for study

CONSORT Flow Diagram

Enrollment

Assessed for eligibility (n=256)

Excluded (n=203)
- Declined to participate (n=49)
- No trauma (n=51)
- Not in age range (n=71)
- Parent did not speak English (n=18)
- Other reasons (n=14)
  - Interrupted, no time (n=4)
  - Sick (n=4)
  - Legal guardian not present (n=6)

Randomized (n=53)

Allocation

CPSS-5-SR then *CPSS-5 Screen Team Game*

CPSS-5 Screen Team Game then CPSS-5-SR

Analysis

Analyzed (n=24)
- Excluded from analysis (n=1)
- Reasons for exclusion:
  - Not Criterion A trauma (n=1)

Analyzed (n=25)
- Excluded from analysis (n=3)
- Reasons for exclusion:
  - Not in age range (n=1)
  - Not Criterion A trauma (n=1)
  - Inconsistent traumas on self-report and game (n=1)

Each item on the *CPSS-5 Screen Team Game* was rated on the same scale as the CPSS-5-SR, i.e., from 0 to 4. Upon completion of all items, there was an unrelated bonus matching game as a reward to participants, consistent with current data on the importance of gaming elements to ensure maximum engagement with mobile platform applications, and based on evidence for the utility of play reinforcements for younger children when discussing difficult or distressing psychological topics (Baranowski et al. 2016; Schaefer 1993; Kemmis-Riggs et al. 2017). Password-protected scores were then generated that were only accessible by assessors. The game was developed and field-tested with school students of a similar age group in Pittsburgh, particularly around engagement with the overall seaside theme and interactive, non-trauma related game elements interspersed throughout the task; youth feedback related to usability and satisfaction of these gaming elements and overall design was incorporated into the game design prior to finalization.

Procedure

Given the explicit interest of this study in examining the utility of the *CPSS-5 Screen Team Game* in detecting cases of potential PTSD across a wide subsection of children with trauma exposure (regardless of presence or absence of PTSD symptoms), clinic staff were requested to alert the research team when all children in the age range checked in for their appointments. Parents of these potential participants were then approached by study staff in waiting rooms who described the study and gauged interest in participation while families waited for the start of their medical appointments. To ensure privacy and confidentiality, study staff ensured that when approaching potential participants that no other potential participants/families were in earshot, which was not frequently a problem because of the large size of the recruitment clinics where patients often sat in separate sections of the waiting rooms. If potential participants were in close proximity, they would be asked more vaguely about whether they were interested in hearing about a potential research study (without mention of trauma), and then were invited to join the study staff in a separate room provided by each clinic for this purpose to describe the study in more detail. All participants and their families were given the option for privacy regardless of who was around, although only a minority of families utilized this option. Further, in the case where multiple participants were approached at the same time by multiple members of the research team, two different research assistants would assist each child in separate areas of the waiting

room or in separate medical examination rooms until all study procedures were complete to prevent cross-contamination of data or discussion about procedures until all participants had completed their participation in the study.

After determining interest and eligibility, members of study staff briefed parents on the benefits (including compensation to the child) and risks of the study (i.e., asking their children to answer questions about sometimes upsetting symptoms related to trauma experience) and received signed consents from parents or legal guardians and assents from the participants. If a child did not provide assent, they were not enrolled in the study even if consent from a parent or guardian was obtained. Parents or guardians were asked to allow their children to complete study procedures on their own. Participants were randomized to begin with either the self-report version of the CPSS-5 (CPSS-5-SR) or the tablet game (*CPSS-5 Screen Team Game*).

While children completed the first task, parents were asked to report demographic data. Study team members were trained to remind participants to answer each question with their respective index traumas in mind and were available during each task to answer any questions that arose. After completing the first measure, participants were instructed to complete the second. When possible, study staff received qualitative data regarding both the game and self-report measure after completion. If CPSS-5-SR severity scores of participants were at or above 11 (mild symptoms), study team members were trained to inform their primary care providers, provide parents with the Philadelphia Alliance for Child Trauma Services (PACTS) referral list, and to assist in making first appointments for therapy if parents were interested. If a child reported abuse or neglect, the principal investigator (author A.A.) was informed and reports were filed with the Department of Human Services. Participants were compensated with $10 for their time and effort, as briefed in the beginning of the study. In total, each visit took approximately 15 to 25 min to complete and occurred either before or in between services being provided as part of the participants' medical visits.

Data Analysis

Psychometric analyses included examination of internal consistency of the 6 items on the *CPSS-5 Screen Team Game* as measured by Cronbach's coefficient (α), convergent validity of the *CPSS-5 Screen Team Game* with the full 20-item self-report version of the CPSS-5 (CPSS-5-SR) as measured by Pearson's correlation coefficient (r), and convergent validity of the *CPSS-5 Screen Team Game* items with the identical 6 items on the CPSS-5-SR as measured by Pearson's correlation coefficient (r). In addition, receiver operating characteristic (ROC) analysis was utilized to ascertain the cut-off score on the *CPSS-5 Screen Team Game* that is most indicative of

probable PTSD. Qualitative data regarding the acceptability, usefulness, and feasibility were examined.

Results

Internal Consistency

The total *CPSS-5 Screen Team Game* score ($n = 49$) demonstrated adequate internal consistency (Cronbach's $\alpha = .79$) with the average item–total correlation for the 6 items on this measure being .40 (range = .09–.66).

The internal consistency of the CPSS-5-SR total score (n = 49) was excellent ($\alpha = .94$), with the average item–total correlation for the 20 items on this measure being .42 (range = .11–.76). Internal consistencies of the subscales on the CPSS-5 ranged from adequate to good, except the avoidance scale (intrusion subscale: $\alpha = .88$; avoidance subscale: $\alpha = .61$; negative alterations in cognitions and mood subscale: $\alpha = .88$; and alterations in arousal and reactivity subscale: $\alpha = .79$).

Convergent Validity

Convergent validity between the *CPSS-5 Screen Team Game* and full CPSS-5 was good with a high correlation between the two, $r (49) = .74$, $p < .001$. Further, the convergent validity between the *CPSS-5 Screen Team Game* total score and the total of the identical 6 items from the CPSS-5 was high, $r (49) = .79$, $p < .001$.

ROC Analysis

To identify probable PTSD cutoff scores on the *CPSS-5 Screen Team Game*, we conducted ROC analysis based on meeting of diagnostic criteria on the CPSS-5-SR, which aided us in maximizing the total number of true positive and true negative cases. More broadly, ROC analysis allows us to balance the sensitivity (identification of true positives) and specificity (identification of true negatives) of the scale along a dimensional axis (see Table 1) in children with PTSD versus those without PTSD, to generate a curve (see Fig. 2). The area under the ROC curve (referred to as the AUC) therefore represents the overall accuracy of the *CPSS-5 Screen Team Game* in predicting PTSD diagnosis. In the current data, the AUC for the *CPSS-5 Screen Team Game* was .82 (95% confidence interval: .65 to .99), which indicated accurate detection of probable PTSD diagnosis using this screen at a rate higher than random chance (0.50). A score ≥ 8.5 on the *CPSS-5 Screen Team Game* was associated with high sensitivity (.80) and good specificity (.69) for a probable diagnosis of PTSD. We opted to prioritize sensitivity given the importance of accurately detected true cases of PTSD in this youth sample over the concern of correctly identifying children without the

Table 1 Correlations between CPSS-5-SR and CPSS-5-G total and subscale scores

Measures	1	2	3	4	5	6	7	8	9	10	11
1. CPSS-5-SR total	–										
2. CPSS-5-SR intrusion	.785***	–									
3. CPSS-5-SR avoidance	.519***	.368**	–								
4. CPSS-5-SR changes in mood and cognition	.729***	.631***	.269	–							
5. CPSS-5-SR arousal and hyperreactivity	.767***	.567***	.326*	.627***	–						
6. CPSS-5-G total	.741***	.650***	.440**	.551***	.587***	–					
7. CPSS-5-G emotionally upset when reminded	.602***	.599***	.344*	.409**	.338*	.743***	–				
8. CPSS-5-G avoidance of thoughts/feelings	.550***	.487***	.420**	.402**	.487***	.754***	.447**	–			
9. CPSS-5-G strong upsetting feelings	.521***	.414**	.297*	.380**	.364*	.722***	.505***	.662***	–		
10. CPSS-5-G being very careful/on lookout	.352*	.212	.147	.303*	.450**	.584***	.332*	.380**	.349*	–	
11. CPSS-5-G concentration difficulties	.603***	.477**	.388**	.488***	.484***	.779***	.440**	.490***	.446**	.231	–
12. CPSS-5-G sleep difficulties	.509***	.569**	.267	.399*	.316*	.637***	.478**	.226	.202	.088	.644***

CPSS-5-SR = Child PTSD Symptom Scale Self-report for DSM-5; CPSS-5-G = *Child PTSD Symptom Scale for DSM-5 Screen Team Game*

***$p < .001$; **$p < .01$; *$p < .05$

disorder (specificity). A score of 9 can be used as a cutoff point for identifying probable PTSD diagnosis on the *CPSS-5 Screen Team Game*.

Qualitative Feedback

The study team started collecting formal qualitative feedback ratings from participants around half-way through the study but found that this additional data collection was either not feasible during the limited time available to spent with participants or too burdensome given the young age group of participants. This information was collected only intermittently from the remainder of participants, for a total of 10 participants who either provided (1) ratings on a scale of 1 to 5 (with 5 denoting more positive ratings of each quality indicator) around the ease of completion, how understandable and how enjoyable the game was versus the paper-and-pencil full CPSS-5-SR; or (2) open-ended feedback and non-prompted descriptors around these same quality indicators. This subset of participants reported generally high/positive ratings (4 or 5) in terms of feasibility, comprehension and enjoyment for the game screening version. This was reflective more broadly of our observations of significant interest in playing the game expressed by both children recruited to the study and those not recruited (siblings of participants, other children not meeting eligibility criteria, etc).

Discussion

This is the first study to our knowledge to examine the psychometric properties and utility of a brief game screen measure of PTSD in young children, and to do so using a technology innovation implemented in community primary care settings. The *CPSS-5 Screen Team Game* performed generally quite well, with high internal consistency and good convergent validity with the full-length CPSS-5, while being rated as considerably more enjoyable and easier to understand and complete by the subset of participants from whom we were able to obtain qualitative data in the study. The identification of a cut-off score of 9 (with a sensitivity of .80 and specificity of .89) on this measure was found to be a reliable and accurate indicator of likely PTSD, which is a utility of the scale that has significant implications for the swift detection of this disorder in this vulnerable and often undertreated population. Of note, our previous psychometric study also conducted an ROC analysis on our 6 screen items from the full self-report version of the CPSS-5, and found a higher cut-off score of 13 for identification of likely PTSD (sensitivity = .88; specificity = .82; Foa et al. 2018). Indeed, in the current study, if we had picked a score based on maximization of both sensitivity and specificity, the score would have also been a 13 as found in our previous psychometric study (as shown in Table 2). However, we opted to choose the score that maximizes sensitivity, because in primary care and other front-line community settings in which we hope this game screening measure will be implemented, we believe that the accurate detection of children who are likely to have PTSD is important to triage additional intervention. This outweighs the necessity to make sure a child does not have the diagnosis.

Overall, this study presented with several distinct strengths and improvements over previous work in the area of PTSD assessment in youth. First, brevity is particularly desirable given the limitations on attention span and concentration ability within the context of the developmental stage of children targeted in the current study (McKay et al. 1994). However, equally important is the accuracy of a brief measure to detect likely PTSD in order to provide further intervention more efficiently and effectively for this at-risk population of trauma-exposed children. To this end, this brief game screen

Fig. 2 Receiver Operator Characteristic Curves for the *Child PTSD Symptom Scale for DSM-5 Screen Team Game* Relative to the Child PTSD Symptom Scale for DSM-5 Self-Report diagnosis. *Note.* The diagonal line in the diagram indicates a prediction rate of 50% (i.e. chance). ROC = receiver operating characteristic
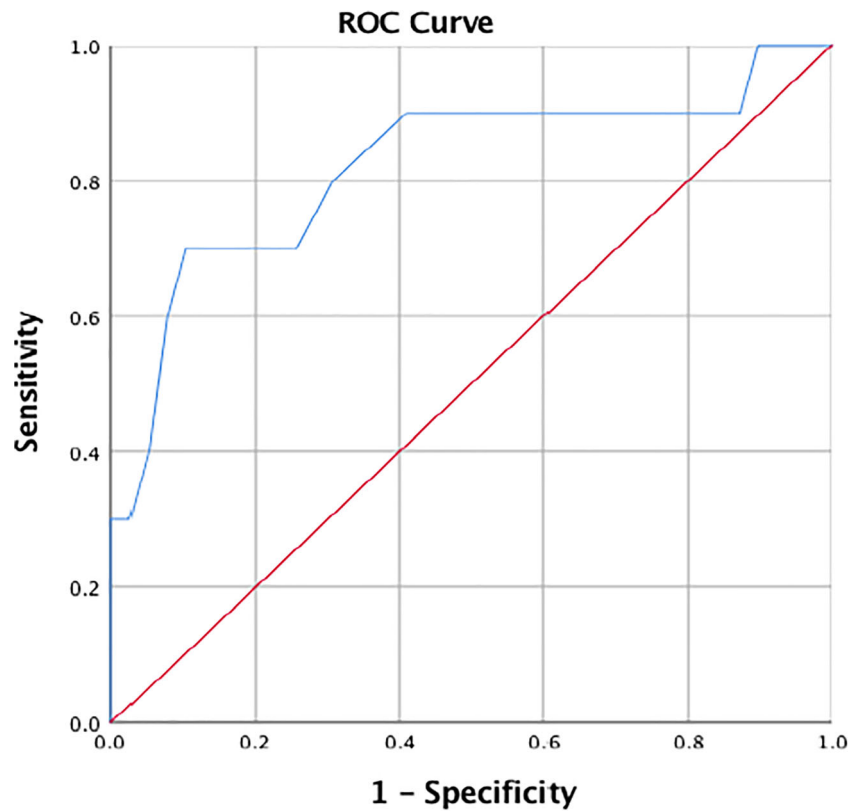
performed quite well given its psychometric properties of the measure compared to the full CPSS-5.

The demonstrated ecological validity of the measure in the current study given the recruitment of participants from community-based, front-line healthcare settings for young children (as opposed use of a specialty Psychology clinic setting or a convenience/non-representative sample in previous psychometric studies; e.g., Foa et al. 2001; Gonzalez et al. 2016) is a notable strength of the current study. The diversity of the current sample not only in terms of demographics, but also in terms of types of trauma exposure and level of associated symptoms following this exposure, was a strength of the current sample, which garners greater confidence in the utility of this measure in detecting previously unassessed cases of PTSD in youth in community settings. Finally, the use of a game-enhanced version of a screening measure is innovative and instrumental in improving the engagement in mental health assessment in a young population who otherwise might be reticent to share their experiences related to trauma exposure or find traditional self-report methods to be complex/difficult to follow (e.g., Gonzalez et al. 2016).

Limitations

This study was not without limitations. For instance, it would have been helpful from a statistical point of view to have a larger sample size (i.e., a minimum of 100 respondents; Anthoine et al. 2014). As shown in our participant flow diagram, there was a five-fold greater sample (over 250 children) potentially available for recruitment into the study (and who were actually approached to participate) than was actually enrolled in the study. Notably, only 25% of those who did not participate personally denied (or their parents denied) having experienced a trauma. About 40% of potential participants were unable to participate due to reasons outside of not meeting the age and trauma exposure criteria for the study, the majority of which involved the parents simply declining to allow their children to participate. One obvious reason for this was reliance on English as the only language in this study given the high proportion of immigrants/s generation children recruited in community primary care clinics and consequently, there were several parents who could not consent to study procedures for this reason to allow their children to participate. While we did not directly assess why other (majority) English-speaking parents were hesitant to enroll their children in the study, we could assume that at least part of the reason for this is the stigma around trauma exposure and mental health treatment in childhood broadly (Pescosolido et al. 2007), and specifically for families coming from racial/ethnic minority backgrounds, as the vast majority of this sample was (Butler 2014).

Difficulty in recruiting for our last and current psychometric studies of the CPSS-5 highlight some of the formidable obstacles

Table 2 Coordinates of the CPSS-5-G ROC curves

Positive if ≥	Sensitivity	Specificity
−1.0	1.000	1.000
.50	1.000	.897
1.5	.900	.872
2.5	.900	.795
3.5	.900	.667
4.5	.900	.564
5.5	.900	.487
6.5	.900	.436
7.5	.900	.410
8.5	**.800**	**.308**
9.5	.700	.256
10.5	.700	.231
11.5	.700	.154
12.5	.700	.103
13.5	.600	.077
14.5	.400	.051
16.5	.300	.026
19.5	.300	.000
21.5	.100	.000
23.0	.000	.000

Bold font indicates that the cutoff value maximizes both sensitivity and specificity. CPSS-5-G = *Child PTSD Symptom Scale for DSM-5 Screen Team Game*; ROC = receiver operating characteristic

to collecting this type of data in community settings with trauma-exposed children who are from diverse demographic backgrounds, and undoubtedly, this has certainly contributed to the significant lack of data examining the psychometric properties and generalizability of measures designed to detect PTSD in young children overall. It is notable that taken together, these two psychometric studies now have a combined sample of more than 100 participants, which provides more robust support for the self-report version of the CPSS-5.

We were unable to examine other desirable psychometric properties of the scale (particularly test-retest reliability and divergent reliability) due to constraints on the type of sample we were recruiting, i.e. community samples for which we had to fold our research objectives into standard medical care, as families were unlikely to return in a reasonable timeframe for retest and were less willing to complete a number of measures (such as a semi-structured interview or clinician-administered measure) in the short time they had available to participate before their scheduled doctors' visits. Our original psychometric study did include these and other important psychometric features (including comparison of the self-report and clinician-administered versions of the CPSS-5) (Foa et al. 2018). Therefore, we did not deem these to be as important compared to other design features (e.g., brevity, feasibility of single assessment visits) for the present study.

Conclusions

This study raises a number of important clinical implications within this area of detection of PTSD in at-risk youth. First, there is a high documented burden and detriment to quality of life in youth as a result of undetected and untreated mental health symptoms following trauma exposure specifically (e.g., Santiago et al. 2017; Malarbi et al. 2017). Therefore, a measure such as the *CPSS-5 Screen Team Game* that is appealing to this age group, and yet able to detect PTSD symptoms with little to no clinician involvement, presents significant benefits. As we intended when designing the study and deliberately choosing primary care settings to test this measure, the *CPSS-5 Screen Team Game* has the potential to be used in similar health settings to identify those younger children who are otherwise suffering with post-traumatic symptoms and provide an opportunity to provide treatment through integrated care, or to refer them to effective interventions that would alleviate these symptoms.

In addition, health services in the United States (including most insurance plans) are set up to strongly encourage and financially support well visits for children at multiple time points during their development. Providers in these primary healthcare settings are already so stretched for time and resources that it is difficult for them to assess for the full spectrum of mental health issues, and primary care teams have reported concerns around the utility of adding mental health screening to their practice (Brown and Wissow 2010). Thus, such a brief, interactive, and easy to understand game screen has the practical ability to provide clinical data to providers about PTSD symptoms, while not further burdening them to conduct the assessment of these symptoms since patients can complete it while in the waiting room before their appointments. The identification of a cut off score on this measure gives clinicians a quick way to decipher the results of this measure, which has been an ongoing hurdle in the interpretation of mental health screens in pediatric primary care in general (Wissow et al. 2013). To make this application as useful as possible in the future, the *CPSS-5 Screen Team Game* should be updated to include a summary page for clinicians that provides interpretation of the scores and recommendations for next clinical steps, for the formation of more accurate treatment plans within the integrated pediatric care framework.

This measure has the ability to be used in settings outside of primary care, such as in school counselors' offices and community health centers; however, it must be ensured that there are processes in place to address any positive cases of PTSD identified by the game and provide feedback on treatment options for these positively screened children. This requirement may limit the full range of settings in which this application can be used but will ensure that children are not simply identified as having probable PTSD with the measure and then left without the care they deserve.

Compliance with Ethical Standards

Ethical Standards and Informed Consent All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation at the University of Pennsylvania and the Children's Hospital of Pennsylvania and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients being included in the study.

Disclosure of Interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

References

Alisic, E., Zalta, A. K., van Wesel, F., Larsen, S. E., Hafstad, G. S., Hassanpour, K., & Smid, G. E. (2014). Rates of post-traumatic stress disorder in trauma-exposed children and adolescents: Meta-analysis. *The British Journal of Psychiatry, 204*(5), 335–340.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: American Psychiatric Association.

Anthoine, E., Moret, L., Regnault, A., Sébille, V., & Hardouin, J. B. (2014). Sample size used to validate a scale: A review of publications on newly-developed patient reported outcomes measures. *Health and Quality of Life Outcomes, 12*, 1–10.

Baranowski, T., Blumberg, F., Buday, R., DeSmet, A., Fiellin, L. E., et al. (2016). Games for health for children—Current status and needed research. *Games for health journal, 5*(1), 1–12.

Brewin, C. R., Rose, S., Andrews, B., Green, J., Tata, P., McEvedy, C., et al. (2002). Brief screening instrument for post-traumatic stress disorder. *The British Journal of Psychiatry, 181*(2), 158–162.

Brown, J. D., & Wissow, L. S. (2010). Screening to identify mental health problems in pediatric primary care: Considerations for practice. *International Journal of Psychiatry in Medicine, 40*(1), 1–19.

Brown, D. W., Anda, R. A., Tiemeier, H., Felitti, V. J., Edwards, V. J., Croft, J. B., & Giles, W. H. (2009). Adverse childhood experiences and the risk of premature mortality. *American Journal of Preventive Medicine, 37*, 389–396.

Butler, A. M. (2014). Shared decision-making, stigma, and child mental health functioning among families referred for primary care–located mental health services. *Families, Systems & Health, 32*(1), 116–121.

Carrion, V. G., Weems, C. F., Eliez, S., Patwardhan, A., Brown, W., Ray, R. D., & Reiss, A. L. (2001). Attenuation of frontal asymmetry in pediatric posttraumatic stress disorder. *Biological Psychiatry, 50*(12), 943–951.

Carrion, V. G., Haas, B. W., Garrett, A., Song, S., & Reiss, A. L. (2009). Reduced hippocampal activity in youth with posttraumatic stress symptoms: An FMRI study. *Journal of Pediatric Psychology, 35*(5), 559–569.

Carrion, V. G., Weems, C. F., Richert, K., Hoffman, B. C., & Reiss, A. L. (2010). Decreased prefrontal cortical volume associated with increased bedtime cortisol in traumatized youth. *Biological Psychiatry, 68*(5), 491–493.

De Bellis, M. D., Hooper, S. R., Spratt, E. G., & Woolley, D. P. (2009). Neuropsychological findings in childhood neglect and their relationships to pediatric PTSD. *Journal of the International Neuropsychological Society, 15*(6), 868–878.

Flannery, D. J., Singer, M. I., & Wester, K. (2001). Violence exposure, psychological trauma, and suicide risk in a community sample of dangerously violent adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(4), 435–442.

Foa, E. B., Johnson, K. M., Feeny, N. C., & Treadwell, K. R. (2001). The child PTSD symptom scale: A preliminary examination of its psychometric properties. *Journal of Clinical Child Psychology, 30*(3), 376–384.

Foa, E. B., Asnaani, A., Zang, Y., Capaldi, S., & Yeh, R. (2018). Psychometrics of the child PTSD symptom scale for DSM-5 for trauma-exposed children and adolescents. *Journal of Clinical Child & Adolescent Psychology, 47*(1), 38–46.

Gonzalez, A., Monzon, N., Solis, D., Jaycox, L., & Langley, A. K. (2016). Trauma exposure in elementary school children: Description of screening procedures, level of exposure, and posttraumatic stress symptoms. *School Mental Health: A Multidisciplinary Research and Practice Journal, 8*(1), 77–88.

Kemmis-Riggs, J., Dickes, A., & McAloon, J. (2017). Program components of psychosocial interventions in foster and kinship care: A systematic review. *Clinical Child and Family Psychology Review, 1*, 13–40.

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research, 21*(3), 169–184.

Kozlowska, K., & Hanney, L. (2001). An art therapy group for children traumatized by parental violence and separation. *Clinical Child Psychology and Psychiatry, 6*(1), 49–78.

Malarbi, S., Abu-Rayya, H. M., Muscara, F., & Stargatt, R. (2017). Neuropsychological functioning of childhood trauma and post-traumatic stress disorder: A meta-analysis. *Neuroscience & Biobehavioral Reviews, 72*, 68–86.

Mannarino, A. P., Cohen, J. A., Deblinger, E., Runyon, M. K., & Steer, R. A. (2012). Trauma- focused cognitive-behavioral therapy for children: Sustained impact of treatment 6 and 12 months later. *Child Maltreatment, 17*(3), 231–241.

McKay, K. E., Halperin, J. M., Schwartz, S. T., & Sharma, V. (1994). Developmental analysis of three aspects of information processing: Sustained attention, selective attention, and response organization. *Developmental Neuropsychology, 10*(2), 121–132.

McLaughlin, K. A., Koenen, K. C., Hill, E. D., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Kessler, R. C. (2013). Trauma exposure and posttraumatic stress disorder in a national sample of adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*(8), 815–830.

Pescosolido, B. A., Perry, B. L., Martin, J. K., McLeod, J. D., & Jensen, P. S. (2007). Stigmatizing attitudes and beliefs about treatment and psychiatric medications for children with mental illness. *Psychiatric Services, 58*(5), 613–618.

Santiago, C. D., Raviv, T., & Jaycox, L. (2017). *Creating healing school communities: School based interventions for students exposed to trauma.* Washington, DC: American Psychological Association.

Schaefer, C. E. (1993). In C. E. Schaefer (Ed.), *The therapeutic powers of play.* Lanham: Jason Aronson.

Steinberg, A. M., Brymer, M. J., Decker, K. B., & Pynoos, R. S. (2004). The University of California at Los Angeles post-traumatic stress disorder reaction index. *Current Psychiatry Reports, 6*(2), 96–100.

Wissow, L. S., Brown, J., Fothergill, K. E., Gadomski, A., Hacker, K., Salmon, P., & Zelkowitz, R. (2013). Universal mental health screening in pediatric primary care: A systematic review. *Journal of the American Academy of Child & Adolescent Psychiatry, 52*(11), 1134–1147.

Yule, W. (1992). Post-traumatic stress disorder in child survivors of shipping disasters: The sinking of the 'Jupiter. *Psychotherapy and Psychosomatics, 57*(4), 200–205.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

parenting program in urban poverty. *American Journal of Community Psychology, 62*(3–4), 449–463. https://doi.org/10.1002/ajcp.12274

Lehmann, U., Van Damme, W., Barten, F., & Sanders, D. (2009). Task shifting: The answer to the human resources crisis in Africa? *Human Resources for Health, 7*(1), 49. https://doi.org/10.1186/1478-4491-7-49

Meyers, D. C., Durlak, J. A., & Wandersman, A. (2012). The Quality Implementation Framework: A synthesis of critical steps in the implementation process. *American Journal of Community Psychology, 50*(3–4), 462–480. https://doi.org/10.1007/s10464-012-9522-x

Orkin, A. M., McArthur, A., Venugopal, J., Kithulegoda, N., Martiniuk, A., Buchman, D. Z., … Upshur, R. (2019). Defining and measuring health equity in research on task shifting in high-income countries: A systematic review. SSM - *Population Health*. https://doi.org/10.1016/j.ssmph.2019.100366

Purtle, J., Brownson, R. C., & Proctor, E. K. (2017). Infusing science into politics and policy: The importance of legislators as an audience in mental health policy dissemination research. *Administration and Policy in Mental Health and Mental Health Services Research, 44*(2), 160–163. https://doi.org/10.1007/s10488-016-0752-3

Santa Barbara County Promotores Network (n.d.). *About us.* https://sbcpromotoresnetwork.weebly.com/about.html

Schneider, H., & Lehmann, U. (2016). From community health workers to community health systems: Time to widen the horizon? *Health Systems & Reform, 2*(2), 112–118. https://doi.org/10.1080/23288604.2016.1166307

Sharma, N., Harris, E., Lloyd, J., Mistry, S. K., & Harris, M. (2019, December 17). Community health workers involvement in preventative care in primary health care: A systematic scoping review. *BMJ Open.* https://doi.org/10.1136/bmjopen-2019-031666

· · ·

Correspondence to Corinna Klein, Gevirtz School, University of California, Santa Barbara, CA 93106; cklein@ucsb.edu

SCIENCE FORUM

Mobilizing Mental Health Training Efforts to Align With Advocacy for Disenfranchised Groups in Global Contexts: Trauma-Related Training in the Caribbean as an Example

Anu Asnaani, *University of Utah*

Su-Anne R. Charley White, *HERStoire Collective, Castries, Saint Lucia*

Tammi-Marie Phillip, *Butler Hospital, Providence, RI*

THE CARIBBEAN, a region comprised of 13 sovereign states, 17 dependent territories, and approximately 43 million persons, represents an area rich in diversity of all forms. While this region has made significant strides in a number of health care sectors, mental health progress has fallen behind. Historically, the Caribbean region followed the British model of mental health delivery, initially focusing on institutionalization and then later de-institutionalization once more effective psychotherapeutic and psychopharmacologic interventions became available (Hickling & Gibson, 2005). This model, however, remained highly centralized to mental health hospitals and major cities within the region, with limited outreach and community-based mental health resources, a pattern that continues to exist today. A report published by the World Health Organization (WHO) found that although roughly one quarter of the total disease burden in Latin America and the Caribbean is due to mental or neurological disorders, countries within these regions, on average, only spend about 4.3% of their health budget on mental health (World Health Organization, 2011). More recent studies have actually put this number closer to 2%, only the minority of which is allocated to outpatient, community mental health centers (Phillip, 2017).

As a result of this limited budgetary allocation for mental health care systems, the treatment infrastructure across the Caribbean remains deficient. Specifically, there is a lack of governmental funding to support a greater network of providers (who are, as a result, very overburdened in these settings; WHO, 2011), and relatedly, a lack of funding to provide essential training in effective treatments and crisis management to these overburdened providers (Caldas de Almeida & Horvitz-Lennon, 2010; Jarero et al., 2014). Another barrier to more widespread dissemination of evidence-based practices (EBPs) in particular has been a glaring lack of resources related to conducting high-quality research on factors impacting EBP utilization or implementation in this region (Razzouk et al., 2008; Sharan et al., 2009), which further impedes systematic roll-outs of EBPs in the region. This, coupled with the low numbers of providers (psychiatrists/psychologists, psychiatric nurses, and social workers), has led to limited access to effective treatments in the area (Caldas de Almeida & Horvitz-Lennon, 2010).

The current lack of legislation and national oversight to provide services and to protect the rights of those with mental health disorders in the Caribbean further compounds these issues. For instance, Saint Lucia, an independent island nation in this region (and one of the main countries of focus in this article), has none of the following: mental health policies outlining triage of services, strategic plans that outline national mental health education or awareness campaigns, legislation that protects the rights and safety of individuals seeking mental health treatment, or an overarching national mental health authority/council. These deficits exist even though several documents to address some of these deficiencies have been drafted (but not enacted) in the past decade (Francis et al., 2018). Current governmental budgets for mental health cater primarily to emergency or disaster situations, with little provisions for the daily mental health care of the citizens (WHO, 2009), similar to the majority of other countries in this region

(WHO, 2011). Of most concern, these reports highlight the fact that the vast majority of the countries in the Caribbean last updated their mental health legislation prior to the 1960s, which predates the current conventions for human rights.

This legislative weakness in ensuring the protection of human rights is particularly worrisome given that there still exist, quite prominently, laws that criminalize whole subsections of the population—specifically, those who identify as being part of the LGBTQ+ (lesbian, gay, bisexual, transgender, queer and related sexual or gender minorities) community across the region (Government of Saint Lucia, 2005; Human Rights Watch, 2018a; Jackman, 2017). This ongoing criminalization of LGBTQ+ citizens (specifically, with current legal codes outlining 5- to 10-year imprisonment terms for actual or even intended consensual sexual activity between two members of the same sex) has led to a notable number of individuals fleeing the region to seek asylum in the United States and Europe where there are human rights in place to protect members of this community (Alessi, 2016; Phillip & Williams, 2013). Governing bodies have argued that while these laws are technically in place, they are not enforced. However, the fact that no antidiscrimination laws exist to protect these individuals or to buffer ongoing stigma towards individuals identifying as LGBTQ+ means this group is still at constant risk for real threats to their safety by Caribbean societies at large (Human Rights Watch, 2018a, 2018b). Needless to say, the lack of legislation protecting human rights violations towards the LGBTQ+ population (and others, specifically women and youth; United Nations Development Programme, 2012), combined with the lack of mental health legislation, creates significant concern for those individuals with mental health disorders in such vulnerable communities in the Caribbean.

Other complicating factors underlying these deficient mental health laws include ongoing stigma about mental health more broadly (i.e., that expressing mental health concerns is a sign of weakness or other moral failing) in this region (Dudley-Grant, 2016; Yorke et al., 2016), low treatment-seeking rates for mental health (Pan American Health Organization & Caribbean Community [CARICOM] Secretariat, 2006), and disparate access to mental health care in various parts of this island archipelago (Sharpe & Shafe, 2015). Thus, given these various factors impacting the current state of the poor mental health legislation and treatment infrastructure in this global setting, we believed that it was of paramount importance to establish a partnership between research scientists (who have psychological science expertise on implementation of EBPs) and regional advocates (who have public health and policy expertise) to make implementation efforts in the region maximally effective and culturally responsive.

Establishing Advocacy Partnerships

Given a number of priority areas in mental health, it is important to discuss here briefly why trauma-related psychopathology and training were chosen for the partnership we established with advocates for mental health reform in the region (the specifics of which will be discussed in detail below). First, given very high trauma exposure rates across the Caribbean and world (Benjet et al., 2016), coupled with a fairly significant proportion of trauma-exposed individuals going on to develop posttraumatic stress disorder (PTSD) or a number of other mental health problems (e.g., generalized anxiety, specific phobias, depression, substance use; Asnaani et al., 2010; Himle et al., 2009; Kessler et al., 2012; Pilgrim & Blum, 2012; Sabri et al., 2013), this area was regarded by public health advocates and providers on the ground as an important area for collaboration for the Caribbean region. Notably, there exists robust evidence for psychological treatments for trauma-related symptoms, with significant support for cognitive behavioral treatments (CBT) for PTSD symptoms in particular (one of the most common psychological sequelae following trauma exposure; American Psychiatric Association, 2013). Finally, given the well-documented higher rates of trauma and subsequent mental health burden in the youth, women, and LGBTQ+ individuals in the Caribbean specifically (Asnaani et al.; Himle et al.; Pilgrim & Blum), this area was deemed to be an important focus of mental health advocacy and education.

It is also important to acknowledge that the current partnership described in this paper came from a growing call from colleagues in the public health domain for clinical researchers to engage in direct social justice and advocacy activities (Horne et al., 2019). In order to more appreciably address the inordinate and well-documented mental health disparities in underresourced and underrepresented communities, this type of engagement is crucial (Desai et al., 2019; Kirmayer & Pedersen, 2014). Several advocacy frameworks have emerged to guide psychologists to conduct such work, such as one by Hodges and Ferreira (2013) that identified three levels of policy work (provider-, system-, and funder-levels) along with five action domains (Intervention Intent, Communication, Administrative Leadership, Staff Development and Support, and Evaluation) at which advocacy efforts can be most successful.

As a result of this call, the first author (A.A.), a clinical researcher working in outpatient- and community-based settings, started to follow the work of public health advocates and educators to better understand how their expertise could be integrated into such advocacy frameworks to broaden the impact of treatment-oriented research studies in mental health. In the summer of 2018, the work of a Saint Lucian public health advocacy group dedicated to improving the sexual and reproductive health (SRH) of women in the region, the HERStoire Collective (www.herstoirecollective.com), was very visible on social media. Specifically, the founder and Executive Director of this organization (second author S.R.C.W.) was effectively utilizing social media platforms to provide education about important SRH issues, publicizing efforts to change legislation and services for SRH in the region, and had made a request for those interested in various related fields to provide more expertise and support of these efforts. Thus, the authors of this paper started a dialogue about collaborating on ongoing projects.

At this time, the organization was engaged in piloting the Sister2Sister (S2S) Virtual Safe Space Program as a digital platform to address the significant gaps existing in SRH resources and service delivery in Saint Lucia (and the wider Caribbean), particularly for marginalized young women who identified as victims of abuse/violence, LGBTQ+, as engaging in transactional sexual activities, or belonging to other vulnerable groups. S2S was jointly funded by the Caribbean Vulnerable Communities Coalition (CVC) and the Organisation of Eastern Caribbean States (OECS), under the Global Fund's Safe Space and Service Access Grant for Marginalized Youth in the OECS. The pilot initiative, delivered over the span of 9 months, provided an integrated educational program that consisted of 14 virtual psychosocial support group sessions covering a range of pertinent SRH and associated mental health topics. These safe space virtual chats

were moderated by trained experts in these content areas (such as authors S.R.C.W. and A.A.), who would also provide helpful external resources during the virtual support sessions, archived on HERStoire website for later reference by attendees.

The program primarily targeted young women aged 16–24 years old in Saint Lucia, who possess limited access to SRH and related mental health services. Importantly, this intervention utilized and bolstered existing mental health infrastructure by partnering with existing organizations such as PROSAF, a registered support service provider for survivors of abuse and trauma in St. Lucia. Relevant funding agencies, local and regional body stakeholders, as well as the beneficiaries of the program considered the pilot to be highly successful in meeting both the SRH and associated mental health needs of young women, by providing those who accessed the virtual safe space with credible and sound SRH related information, resources and referral systems, as well as confidential and responsive psychosocial support. Consequently, the OECS has deemed this pilot program to be a Best Practice for the region, and the HERStoire Collective has since received commitments from local and regional partnerships to expand the reach of the program to several other Caribbean nations, via integrated mobile technology innovation.

Project Implementation

Content Determination

Given HERStoire's success with the S2S program and with working with other providers/advocates such as PROSAF and governmental bodies in the region (including the Bureau of Health Education at the Ministry of Health and Wellness in St. Lucia), we decided to leverage these connections to assess specific mental health training needs across a range of stakeholders involved in mental health support in the region. Leaders of these groups noted the need for more training around trauma-related issues, and further highlighted the utility of providing practical tips for supporting trauma survivors in crisis. In addition, PROSAF was forthcoming about a high rate of burnout in those providing support for survivors in various capacities, and thus requested that the team ensure provision of training in self-care.

An important feature of effective collaborative public health initiatives is the inclusion of community partners (such as these advocacy groups) as equal contributors to the knowledge exchange (Campbell et al., 2004). As a result, HERStoire (specifically, author S.R.C.W., as a seasoned public health educator) and the speakers (authors A.A., a licensed psychologist, and T.M.P., an attending psychiatrist) devised a 1-day workshop program that took in this advisement to determine the final topics: psychoeducation on types of trauma and typical posttrauma reactions, informational session on evidence-based PTSD treatments (specifically, Prolonged Exposure, PE; Foa et al., 2007), hands-on skills training for short-term strategies to handle immediate trauma crisis (e.g., breathing retraining, distress tolerance skills), and a final session dedicated to self-care practices with small group break-out discussions on ways to engage in regular self-care to reduce burnout. Provision of such an educational session to a range of stakeholders was deemed consistent with recommended advocacy work at the provider level, targeting the intervention intent and staff development domains (Hodges & Ferreira, 2013). Such a training also closely followed work highlighting the significant utility of educational interventions as an advocacy tool to effect meaningful change in community mental health settings (Ponce et al., 2019).

Recruitment

The first scheduled workshop (held in March, 2019) was advertised a month before the workshop via an emailed flyer to the leadership of various relevant associations/organizations (e.g., medical nurses, psychiatric providers, school counselors, advocacy groups, and governmental health educators in Saint Lucia; for more detailed information on methods, see Asnaani et al., 2020). Despite some 100 requests to attend within the first 2 weeks of recruitment, we could only offer 45 participants a spot to attend due to funding constraints, but we prioritized attendance from a maximal range of stakeholders representing some 19 different organizations/associations on the island. We then offered a second workshop in February 2020 to those who had not been given an opportunity to attend the first one, and were able to increase our capacity to 60 in-person attendees. Furthermore, to expand the reach of this training and mobilize other partners in the broader region, we were able to offer this second workshop as concurrent remote training (via the online platform Zoom) to an additional 12 participants who identified as advocacy group leaders, clinical researchers, therapists, and medical associ-ation leaders from 6 other countries (Saint Vincent, Grenada, Antigua, Jamaica, Barbados, and Trinidad). The HERStoire Collective was instrumental in tapping into its professional regional network to broaden the reach of this second workshop.

Funding

It is important here to briefly mention the role of funding, given its relevance to establishing and maintaining partnerships with advocacy groups, particularly in low-resourced settings or non-federally-funded research areas. This first workshop was partially funded by a local corporate financial institution and hotel venue willing to donate space and technical equipment to us, and all remaining costs were covered by the first author's general research funds so that there was absolutely no cost to attendees of the workshop, along with meals for the day free of charge. However, this limited funding in the first workshop, given the no-cost model for attendees, greatly hindered our ability to accept the majority of interested providers.

The HERStoire Collective was vocal in sharing the success of this first workshop and strongly advocated for a second workshop to be part of a regionally funded project provided by the Equality and Justice Alliance (EJA), in order to obtain financial support to provide this training to those who had been wait-listed for the first training, among others. EJA is a coalition project across several human rights organizations based in the United Kingdom that is dedicated to supporting civil societies and legislative reform that ensure more expansive antidiscrimination laws (specifically towards women and LGBTQ+ individuals) in specific Commonwealth countries. To this end, this coalition launched a funded initiative across multiple countries in the Caribbean region in the spring of 2019 to specifically encourage the development of a unified advocacy strategy across the region to support national-level activities that could inform legislative reform efforts, with mental health reform recognized as one of the three key areas in need of improvement in this region. Our team prepared a joint proposal to apply for this seed funding (another advocacy action recommendation; Ponce et al., 2019), for which we received the funds to hold the second workshop. Importantly, to better meet the objectives of this seed grant and the funding body (EJA), we added some pre- and postworkshop questions to assess change in stigma towards women and LGBTQ+ individuals, and incorporated a brief

formal presentation with testimonials by two invited LGBTQ+ activists from a local advocacy group (United and Strong), who provided education on key terms and issues surrounding mental health for this community, which proved to be a very powerful addition to the original content.

Outcomes

All participants completed pre- and postworkshop questionnaires generated by our team assessing changes in knowledge about trauma and effective treatments for PTSD, stigma towards survivors, and self-care knowledge/practice. Of the 95 individuals who attended both workshops, 93 of these individuals provided informed consent for these data to be examined, and the analytic approach and specific results of the first workshop have been discussed in detail elsewhere (Asnaani et al., 2020). Briefly here, the data revealed that participants from both workshops found the trainings to be overwhelmingly helpful in adding to their knowledge on effective and evidence-based treatments for trauma. In addition, participants reported significantly improved understanding around definitions of trauma, and lower stigma towards trauma survivors, all of which were promising indicators of the utility of such a training endeavor in this global context. Participants also found the self-care module particularly helpful in addressing burnout.

Advocacy-Related Deliverables

An important aspect of broadening the impact of training and research public health efforts in such global settings is to have concrete and well-defined deliverables to provide to the community, providers, and legislators/policymakers looking to make a change in their service/approach (e.g., Valdez et al., 2019). As a result, there were several key deliverables, some previously defined and some that emerged as potentially useful. For instance, during the first workshop with so many different stakeholders in the room, it was clear from group discussions that there were many more resources available to trauma survivors and their providers than each individual group/organization was aware of. Thus, one deliverable that was not initially conceived in the first workshop, but came about organically, was the creation of a group-think resource guide of local mental health treatment and support services provided by each of the stake-holder groups, which our team collated and distributed to all attendees.

Another major deliverable from these trainings was the provision of widely used (in the U.S., at least) psychometrically sound self-report questionnaires for PTSD in adults (namely, the Posttraumatic Diagnostic Scale for DSM-5; Foa et al., 2016) and children (namely, the Child PTSD Symptom Scale for DSM-5; Foa et al., 2018), to equip providers with better ways to assess for PTSD in those they supported. In addition, slide copies, handouts for skills taught and self-care, and some publicly available psychoeducation handouts were provided to all attendees for use as needed with their clients (or for themselves).

Finally, a major deliverable from the second workshop in particular, given its primary funding by the EJA and their mandate to advocate for mental health reform in the region, was the presentation of the preliminary results of the second workshop by second author S.R.C.W. within days of it occurring to a regional body plenary session held in the first week of March, 2020. During this session, it was made clear that to address existing intersectionality in vulnerable populations such as women, girls, and members of the LGBTQ+ community, it would be beneficial to capitalize on the involvement and organic creation of working groups in the mental health realm with members representing the diverse mental health needs of key populations. It was strongly suggested by the regional public health advocates and legal representatives attending this plenary session that intra- and inter-country working groups be established in order to yield significant improvements in mental health legislation. Specifically, this would entail having advocates in these workgroups use the results from this project, and others that were concurrently occurring across the region over the course of the 1-year EJA initiative, to inform strategies that advance mental health legislation at local and regional levels. These strategies include identification of key mental health training targets, stakeholder groups to partner with in each country, availability and accessibility of currently offered services, and ongoing situations where the rights of those seeking mental health services are threatened. These workgroups' efforts in synthesizing these data and engaging in ongoing dialogue on mental health are intended to result in the ability to provide stronger, documented, and evidence-supported arguments for these teams to present to governing bodies to advocate for significant (and tangible) improvements in mental health legislation.

Challenges to Advocacy-Partnered Work

As the process described above for this advocacy partnership demonstrates, there is a potential for greater impact of our work as clinical trainers and researchers as a result of systematic partnership with advocates and engagement in social justice activities. That said, this work is certainly not without its significant challenges. By sharing these here, it is our hope that they serve as considerations (and not deterrents) to colleagues engaging in similar work.

Limited Funding

As mentioned already, inadequate funding from legislative bodies continues to be a major challenge to doing such work. While obtaining research funds from federal or private foundations is itself no easy undertaking, looking for financial support for mental health efforts related to policy or legislation change can feel like an even taller order. It was because our team could fund the first workshop with some combination of corporate sponsorship and general research funds (greatly limiting the number of attendees as a result) that we had enough data to justify inclusion in the funding initiative offered by the EJA, allowing us to hold a second workshop. Indeed, with each passing success and impact on policy/legislation, the likelihood of additional funding increases. However, to initially build this momentum, it requires monetary infusion from somewhere outside of traditional outlets. Even in the second workshop, additional corporate sponsorship and engagement with local vendors to increase awareness and on-the-ground support were key, but this endeavor can feel foreign to those of us based in the U.S., where such corporate sponsorship is not always the norm for our work as psychologists.

Credibility and Media Exposure

Another obstacle faced during this project was creating buy-in from leaders of various health care systems in the region, several of whom were reticent to engage with a researcher who actually originates from the region (as first author A.A. does). That is, we surprisingly learned that there is actually more inherent trust and belief of credibility in foreigners wishing to provide support to the region. In addition, this

spilled over into the media exposure for this event (another feature we do not typically prioritize when doing community-based work stateside, but that is important in such settings: building awareness through TV and print media about such trainings to support advocacy efforts). Specifically, the trainers were purposely presented as "International doctors" by some media outlets and then proudly hailed as "Saint Lucians returning home" by others, creating interesting, sometimes opposing, optics around the expertise of the speakers.

Technical Limitations and Resources

While the second workshop expanded the reach of the material to providers in the region via the Zoom remote platform, there were certainly associated challenges with this addition. For instance, there was no ethernet wired connection in the hotel venue where the workshop was being held, and internet connectivity was quite inconsistent as a result, with frequent disconnections and loss of sound/video feeds. In addition, while the utilization of webinar-style trainings is quite commonplace and growing in popularity elsewhere in the world (Cummings, 2011; Matza et al., 2015), this is a modality that individuals are still learning to adopt more readily in the Caribbean region. That said, the participants who did join on remotely were very actively engaged in discussions about the topics with the online moderator for the entire duration of the workshop.

Other Cultural Nuances and Lessons

Finally, several other cultural nuances to doing such work in this specific region included conforming to the preferred mode of communication (i.e., use of the mobile application WhatsApp, and not email, as a primary mode of communication with most contacts on the ground), only providing information that is relevant to each sponsoring or partnering body (versus giving the whole picture of the project), and understanding the value of important elements such as free training and free provision of fully catered meals (another feature taken for granted in countries such as the U.S., where providers often self-pay).

Future Directions

This paper presented a detailed account of the logistics, implementation, challenges, and benefits of engaging in a research-advocacy partnership, with trauma-related training in a global context

as an example of how such a partnership can work well. However, this project is still ongoing, and as it continues to grow, it is important to continually assess the impact of such a partnership. Thus, future directions are framed more readily as questions around how to effectively continue engaging in this fairly unchartered territory.

First, given the significant current controversy in our own training programs as psychologists and clinical researchers on how (and whether) to integrate advocacy and social justice issues into our profession (Ali & Sichel, 2019), what are some of the changes we need to systematically make across our traditional training models to encourage our current trainees to more widely engage in such efforts? Surveys of clinical psychology doctoral candidates increasingly highlight a desire for greater integration of diversity-focused issues across the clinical and research training curriculum (Gregus et al., 2019), with growing guidance that we should explicitly include direct instruction on working with advocates and other stakeholders to build such competencies (Chu et al., 2012).

Second, many global researchers and implementation experts have recognized that simply rolling out mass training in EBPs in low-resource settings is not going to suffice in terms of appreciably reducing health disparities globally. That is, if the overall legislation, policy, and services infrastructure do not support such training efforts, they are more likely to fail (Yorke et al., 2016). As a result, the onus is both on those of us who assess efficacy and effectiveness of EBPs, and for those of us who push for the dissemination and implementation of EBPs, to make the engagement with local or national legislative or policy-making bodies a major objective of what we aim to do (Hodges & Ferreira, 2013; Horne et al., 2019). Working with advocates to reach those top-down decision makers is an effective and sometimes less intimidating way to reach such a goal. Indeed, this project closely partnered with the Ministry of Health and Wellness in St. Lucia, with the hope that continued partnership with such leadership (who oversee the larger health care system in the country) could be an effective way to take such a top-down approach.

This point is clearly related to the ultimate consideration as we move forward, which is to ask ourselves, "Is it even our responsibility as psychologists and as clinical researchers to engage in such social justice activities and advocacy efforts to broaden the impact of our work to popula-

tions in need?" It should come as no surprise that the answer is a resounding "Yes!" For too long, our field has relegated such efforts to those few who are "the ones who like to get involved in social justice issues in the community" and "are known for doing minority population work" while the rest of us get to sit on the mainstream side of things, testing, innovating and, to put it bluntly—having our work miss the mark of actually making an impact where it counts and where it is needed.

Every single one of us dedicated to evidence-based practices should be thinking about maximizing our impact in the mental health realm by mobilizing our efforts with these broader societal issues in mind (Chu et al., 2012). Otherwise, to use a popular CBT metaphor, we are simply putting a band-aid over a gushing wound of mental health disparities, considerably unequal human rights, and a limited bottom-up approach to dissemination that has already been failing and will continue to do so. Some of our greatest strengths as mental health researchers and practitioners have been the ability to be flexible, thoughtful, and effective in our improvement of psychological science. Making the commitment to integrate this dimension of advocacy-partnered work would be wonderfully in line with these ideals and has the potential to appreciably broaden the impact of what we do.

References

Alessi, E. (2016). Resilience in sexual and gender minority forced migrants: A qualitative exploration. *Traumatology, 22*(3), 203–213. https://doi.org/10.1037/trm0000077

Ali, A., & Sichel, C. E. (2019). Radicalizing advocacy in service settings: Using structural competency to address tensions between social action and psychological practice. *Psychological Services*. https://doi.org/10.1037/ser0000382

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Arlington, VA: American Psychiatric Association.

Asnaani, A., Charley White, S. R., Majeed, I., & Phillip, T. M. (2020). Trauma education and stigma reduction in global settings: An evaluation of the impact of a one-day trauma psychoeducation workshop with community stakeholders in the Caribbean nation of Saint Lucia. *International Journal of Environmental Research and Public Health, 17*(7), 2255.

Asnaani, A., Richey, J. A., Dimaite, R., Hinton, D. E., & Hofmann, S. G. (2010).

A cross-ethnic comparison of lifetime prevalence rates of anxiety disorders. *Journal of Nervous and Mental Disease, 198*(8), 551–555. https://doi.org/10.1097/NMD.0b013e3181ea169f

Benjet, C., Bromet, E., Karam, E. G., Kessler, R. C., McLaughlin, K. A., Ruscio, A. M., Shahly, V., Stein, D. J., Petukhova, M., Hill, E., Alonso, J., Atwoli, L., Bunting, B., Bruffaerts, R., Caldas-de-Almeida, J. M., de Girolamo, G., Florescu, S., Gureje, O., Huang, Y., … Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide: results from the World Mental Health Survey Consortium. *Psychological Medicine, 46*(2), 327–343. https://doi.org/10.1017/S0033291715001981

Caldas de Almeida, J. M., & Horvitz-Lennon, M. (2010). Mental health care reforms in Latin America: An overview of mental health care reforms in Latin America and the Caribbean. *Psychiatric Services, 61*(3), 218–221. https://doi.org/10.1176/ps.2010.61.3.218

Campbell, C., Cornish, F., & Mclean, C. (2004). Social capital, participation and the perpetuation of health inequalities: Obstacles to African-Caribbean participation in 'partnerships' to improve mental health. *Ethnicity & Health, 9*(3), 305–327. https://doi.org/10.1080/1355785042000250120

Chu, J. P., Emmons, L., Wong, J., Goldblum, P., Reiser, R., Barrera, A. Z., & Byrd-Olmstead, J. (2012). Public psychology: A competency model for professional psychologists in community mental health. *Professional Psychology: Research and Practice, 43*(1), 39–49. https://doi.org/10.1037/a0026319

Cummings, J. A. (2011). Technology in the practice of School Psychology: The future is past tense. In M. A. Bray & T. J. Kehle (Eds.), *The Oxford Handbook of School Psychology* (pp. 831–859). The Oxford University Press.

Desai, M. U., Bellamy, C., Guy, K., Costa, M., O'Connell, M. J., & Davidson, L. (2019). "If you want to know about the book, ask the author": Enhancing community engagement through participatory research in clinical mental health settings. *Behavioral Medicine, 45*(2), 177–187. https://doi.org/10.1080/08964289.2019.1587589

Dudley-Grant, R. (2016). Innovations in clinical psychology with Caribbean peoples. In J. L. Roopnarine & D. Chadee (Eds.), *Caribbean Psychology: Indigenous Contributions to a Global Discipline* (pp. 357–386). American Psychological Association. https://doi.org/10.1037/14753-015

Foa, E. B., Asnaani, A., Zang, Y., Capaldi, S., & Yeh, R. (2018). Psychometrics of the Child PTSD Symptom Scale for DSM-5 for trauma-exposed children and adolescents. *Journal of Clinical Child and Adolescent Psychology, 47*(1), 38–46. https://doi.org/10.1080/15374416.2017.1350962

Foa, E. B., Hembree, E., & Rothbaum, B. (2007). *Prolonged Exposure Therapy for PTSD: Therapist Guide*. Oxford University Press.

Foa, E. B., McLean, C. P., Zang, Y., Zhong, J., Powers, M. B., Kauffman, B. Y., Rauch, S., Porter, K., & Knowles, K. (2016). Psychometric properties of the Posttraumatic Diagnostic Scale for DSM-5 (PDS-5). *Psychological Assessment, 28*(10), 1166–1171. https://doi.org/10.1037/pas0000258

Francis, K., Molodynski, A., & Emmanuel, G. (2018). Mental health care in Saint Lucia. *BJPsych International, 15*(1), 14–16. https://doi.org/10.1192/bji.2017.12

Government of Saint Lucia. (2005). Criminal Code. In *Laws of Saint Lucia* (pp. 94–95).

Gregus, S. J., Stevens, K. T., Seivert, N. P., Tucker, R. P., & Callahan, J. L. (2019). Student perceptions of multicultural training and program climate in Clinical Psychology Doctoral Programs. *Training and Education in Professional Psychology*. https://doi.org/10.1037/tep0000289

Hickling, F., & Gibson, R. (2005). The history of Caribbean Psychiatry. In F. W. Hickling & E. Sorel (Eds.), *Images of Psychiatry: the Caribbean*. Kingston, Jamaica: University of the West Indies.

Himle, J. A., Baser, R. E., Taylor, R. J., Campbell, R. D., & Jackson, J. S. (2009). Anxiety disorders among African Americans, blacks of Caribbean descent, and non-Hispanic whites in the United States. *Journal of Anxiety Disorders, 23*(5), 578–590. https://doi.org/10.1016/j.janxdis.2009.01.002

Hodges, S., & Ferreira, K. (2013). A Multilevel Framework for Local Policy Development and Implementation. In A. Culp (Ed.), *Child and family advocacy: Bridging the gaps between research, practice, and policy* (pp. 205–215). Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-7456-2_14

Horne, S. G., Maroney, M. R., Nel, J. A., Chaparro, R. A., & Manalastas, E. J. (2019). Emergence of a transnational LGBTI psychology: Commonalities and challenges in advocacy and activism. *American Psychologist, 74*(8), 967–986. https://doi.org/10.1037/amp0000561

Human Rights Watch. (2018a). *"I have to leave to be me": Discriminatory laws against LGBT people in the Eastern Caribbean*. https://www.hrw.org/report/2018/03/21/i-have-leave-be-me/discriminatory-laws-against-lgbt-people-eastern-caribbean

Human Rights Watch. (2018b). *Eastern Caribbean: LGBT people face bias, violence*. https://www.hrw.org/news/2018/03/21/eastern-caribbean-lgbt-people-face-bias-violence

Jackman, M. (2017). Protecting the fabric of society? Heterosexual views on the usefulness of the anti-gay laws in Barbados, Guyana and Trinidad and Tobago. *Culture, Health and Sexuality, 19*(1), 91–106. https://doi.org/10.1080/13691058.2016.1207806

Jarero, I., Artigas, L., Uribe, S., & Miranda, A. (2014). EMDR therapy humanitarian trauma recovery interventions in Latin America and the Caribbean. *Journal of EMDR Practice and Research, 8*(4), 260–268. https://doi.org/10.1891/1933-3196.8.4.260

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research, 21*(3), 169–184. https://doi.org/10.1002/mpr.1359

Kirmayer, L. J., & Pedersen, D. (2014). Toward a new architecture for global mental health. *Transcultural Psychiatry, 51*(6), 759–776.

Matza, A. R., Sloan, C. A., & Kauth, M. R. (2015). Quality LGBT health education: A review of key reports and webinars. *Clinical Psychology: Science and Practice, 22*(2), 127–144. https://doi.org/10.1111/cpsp.12096

Pan American Health Organization, & CARICOM Secretariat. (2006). *Report of the Caribbean Commission on Health and Development. Caribbean Commission on Health and Development*. Ian Randel Publishers.

Phillip, D. K., & Williams, T. S. (2013). Bullermen and Zamis: The LGB West Indian's Perspective. *Journal of LGBT Issues in Counseling, 7*(2), 143–153. https://doi.org/10.1080/15538605.2013.785416

Phillip, T. M. (2017). Telemental health in Latin America and the Caribbean. In *Telemental Health in Resource-Limited Global Settings* (pp. 181–192). Oxford University Press. http://dx.doi.org/10.1093/med/9780190622725.001.0001

Pilgrim, N. A., & Blum, R. W. (2012). Protective and risk factors associated with adolescent sexual and reproductive health in the English-speaking Caribbean: A literature review. *Journal of Adolescent Health, 50*(1), 5–23. https://doi.org/10.1016/j.jadohealth.2011.03.004

Ponce, A. N., Carr, E. R., Miller, R., Olezeski, C. L., & Silva, M. A. (2019). Psychologists as educators: Creating change in community mental health. *Professional Psychology: Research and Practice, 50*(6), 427–433. https://doi.org/10.1037/pro0000253

Razzouk, D., Gallo, C., Olifson, S., Zorzetto, R., Fiestas, F., Poletti, G., Mazzotti, G., Levav, I., & Mari, J. J. (2008). Challenges to reduce the "10/90 gap": Mental health research in Latin American and Caribbean countries. *Acta Psychiatrica Scandinavica, 118*(6), 490–498. https://doi.org/10.1111/j.1600-0447.2008.01242.x

Sabri, B., Stockman, J. K., Bertrand, D. R., Campbell, D. W., Callwood, G. B., & Campbell, J. C. (2013). Victimization experiences, substance misuse, and mental health problems in relation to risk for lethality among African American and African Caribbean women. *Journal of Interpersonal Violence, 28*(16), 3223–3241. https://doi.org/10.1177/0886260513496902

Sharan, P., Gallo, C., Gureje, O., Lamberte, E., Mari, J. J., Mazzotti, G., Patel, V., Swartz, L., Olifson, S., Levav, I., De Francisco, A., & Saxena, S. (2009). Mental health research priorities in low- and middle-income countries of Africa, Asia, Latin America and the Caribbean. *British Journal of Psychiatry, 195*(4), 354–363. https://doi.org/10.1192/bjp.bp.108.050187

Sharpe, J., & Shafe, S. (2015). Mental health in the Caribbean. In J. L. Roopnarine & D. Chadee (Eds.), *Caribbean psychology: Indigenous contributions to a global discipline* (pp. 305–325). American Psychological Association. https://doi.org/10.1037/14753-013

St. Lucia News Online. (2019). *Regional Rights Group Urge Gov'ts to Denounce Violence on the Basis of Sexual Orientation.*

United Nations Development Programme. (2012). *Caribbean Human Development Report 2012.*

Valdez, C. R., Rodgers, C. R. R., Gudiño, O. G., Isaac, P., Cort, N. A., Casas, M., & Butler, A. M. (2019). Translating research to support practitioners in addressing disparities in child and adolescent mental health and services in the United States. *Cultural Diversity and Ethnic Minority Psychology, 25*(1), 126–135. https://doi.org/10.1037/cdp0000257

World Health Organization. (2009). *WHO-AIMS Report on Mental Health Systems in Saint Lucia.*

World Health Organization. (2011). *WHO-AIMS Report on Mental Health Systems in the Caribbean.*

Yorke, C. B., Voisin, D. R., Berringer, K. R., & Alexander, L. S. (2016). Cultural factors influencing mental health help-seeking attitudes among Black English-Speaking Caribbean immigrants in the United States and Britain. *Social Work in Mental Health 14*(2), 174–194. https://doi.org/10.1080/15332985.2014.943832

. . .

Correspondence to Anu Asnaani, Ph.D., Department of Psychology, University of Utah, 380 S. 1530 E BEH S 502, Salt Lake City, UT 84112; anu.asnaani@psych.utah.edu