Anxiety mediates the relationship between childhood adversity and perceived current life stress in a diverse sample of emerging adults

Cinthia S. Tao, Nayani Ramakrishnan, Matthew McPhee, Olivia Podolak Lewandowska and Suzanne Erb

Department of Psychology, University of Toronto Scarborough, Toronto, Canada; Department of Psychological Clinical Science, University of Toronto Scarborough, Toronto, Canada

ABSTRACT
Childhood adversity is associated with increased current life stress in adulthood and is often influenced by subjective appraisals related to anxiety. Anxiety is a multifaceted construct that includes variability in assumed presentation. The current study assessed the unique mediating effects of both trait and symptom-based anxiety on childhood adversity and current life stress. Undergraduate students enrolled in a large, urban, public university (N = 638, 89% non-Caucasian) completed the Childhood Trauma Questionnaire, State-Trait Anxiety Inventory, Beck Anxiety Inventory, and the Perceived Stress Scale. A parallel mediation demonstrated that both trait and symptom-based anxiety fully mediated the relationship between childhood adversity and perceived current life stress and that these effects are statistically different (b = .112, SE = .020, 95% CI [0.074, 0.153]). Thus, we demonstrated a unique mediating role of two different anxiety indices that varied in strength of their respective contributions to the model.

INTRODUCTION
Understanding the relationship between childhood adversity and current life stress has been an important focus of recent research (Betz et al., 2020; LoPilato et al., 2020; McLaughlin et al., 2017). Childhood adversity can be characterized according to five dimensions: physical abuse, emotional abuse, physical neglect, emotional neglect, and sexual abuse during childhood or adolescence (Bernstein & Fink, 1998). Exposure to adverse events in early life is thought to alter core dimensional aspects of affective and cognitive processes in the brain (Juster et al., 2010) and can produce lasting dysregulations in the physiological response to stress (Essex et al., 2011; Teicher et al., 2003). Negative outcomes following childhood adversity can manifest years after the initial exposure (Greenfield & Marks, 2010), including increased sensitivity to stress (Heim & Nemeroff, 2001) and decreased capacity to respond effectively to stressful events (Chrousos, 2009; Tyrka et al., 2012).

In response to daily life stress, individuals having experienced childhood adversity report relatively greater levels of psychological distress (Chu et al., 2013), increased sensitivity to and altered perceptions of stress (LoPilato et al., 2020; McLaughlin et al., 2010), heightened emotional reactivity to stress (Glaser et al., 2006; Heim & Nemeroff, 2001), and difficulties with emotion regulation more generally (Duffy et al., 2018; Hyman et al., 2007). As the intensity and frequency of these feelings persist and increase, it becomes more difficult to engage in daily activities and thus can undermine...
an individual’s quality of life. As such, individuals also report stronger negative associations between perceived current life stress and past-year major life events (Back et al., 2008; McLaughlin et al., 2010). Moreover, recent work from Betz et al. (2020) identified perceived lack of control in stressful situations as a learned outcome of childhood adversity that becomes generalized to other, less threatening situations and persists into adulthood. Thus, the perceptions of demands imposed by stressful events plays an important role in how an individual will respond, and it is crucial to understand how subjective appraisals of stressful life events are associated with childhood adversity (Cohen et al., 1995; Goldman et al., 2005).

Increased sensitivity to stress following childhood adversity may stem from enhanced threat anticipation (Teicher & Samson, 2016). Anxiety signals the presence of potential threat and anxious responses can be expressed through cognitive (e.g. restlessness, worry) and physiological (e.g. sweating, heart racing) manifestations (C. H. Spielberger & Rickman, 1990) that help reduce vulnerability to threat (Butler & Mathews, 1987). Thus, enhancements in threat anticipation resulting from childhood adversity may in turn heighten an individual’s likelihood to experience anxiety later in life. Indeed, childhood adversity confers vulnerability for developing later anxiety symptoms (Gorka et al., 2014; Herringga et al., 2013; Lähdepuro et al., 2019) and anxiety disorders (Heim & Nemeroff, 2001) in adulthood.

Furthermore, anxiety is associated with negatively biased appraisals of future events (Shepperd et al., 2005), and predicts increases in stress reactivity (Abelson et al., 2007; Powers et al., 2016). Although some situations are universally viewed as stressful, the assessment of other events can vary according to factors such as personality characteristics, available social support, and past experiences (Biondi & Picardi, 1999; Goldman et al., 2005). For example, individuals with high trait (i.e. dispositional) anxiety report heightened perceptions of negative outcomes as they anticipate greater levels of distress in the presence of a negative (i.e. threatening) stimulus or stressful event (Bishop, 2007; Gasper & Clore, 1998). Indeed, anxiety is thought to precede the expression of higher levels of perceived stress following stress exposure (Bardeen et al., 2013; Tanguy et al., 2018). In addition, perceived stress is distinct from the frequency of stressful life events per se, with the two factors being only weakly correlated (Cohen et al., 1983). Thus, it is possible that heightened anxiety in later life that is as a result of childhood adversity will serve to indirectly alter the relationship between early life experience and perceived current life stress. However, there is a paucity of research investigating this link between self-reported somatic and psychological indicators of anxiety and its influence on perceived current life stress.

In summary, experiences of childhood adversity have been associated with greater perceived current life stress (Betz et al., 2020; McLaughlin et al., 2010), and this relationship is often influenced by subjective appraisals (e.g. sensitivity to stress, threat anticipation; McLaughlin et al., 2010; Teicher & Samson, 2016) related to anxiety. Although these constructs are highly interrelated, to the best of our knowledge no work to date has investigated anxiety as a mediator in the relationship between childhood adversity and perceived current life stress. Thus, the primary objective of the current study was to determine whether anxiety mediates the relationship between childhood adversity and perceived current life stress in a sample of diverse young adults. The current study will assess these constructs in an ethnically diverse sample of emerging adults that is generally understudied (Syed & Mitchell, 2013). These individuals are thought to experience additional societal pressures during the transition from high school to university (Briggs et al., 2012). Thus, it was hypothesized that a history of childhood adversity would predict heightened anxiety which in turn would predict elevated levels of current life stress.

Anxiety is a complex, multi-faceted construct that includes variability in presentation (e.g. dispositional versus symptom-based measures; cognitive versus physical manifestations; Creamer et al., 1995; Dobson, 1985). To address this complexity, we used the State-Trait Anxiety Inventory (STAI) and the Beck Anxiety Inventory (BAI) as measures of trait and symptom-based characteristics of anxiety, respectively. Both questionnaires are widely used in both clinical and non-clinical samples, though the STAI has weaker discriminant validity between anxiety and depressive
symptoms (Julian, 2011; Kennedy et al., 2001). Given the considerable symptom overlap observed between anxiety and depression (Den Hollander-gijssman et al., 2012), the BAI was included as an index of both cognitive (e.g. worry) and physiological (e.g. heart racing, dizziness) anxiety symptoms distinct from depression (Julian, 2011; Kabacoff et al., 1997). However, the BAI does not assess other primary symptoms of anxiety, most notably worry and other cognitive aspects of anxiety (Julian, 2011). Thus, the inclusion of both measures in the model offers a convincing and nuanced examination of the role of anxiety as a mediator in the relationship between childhood adversity and perceived current life stress.

Methods

Participants

Participants (N= 649) aged 18–25 (M = 18.75, SD = 1.24) years old were recruited through the SONA portal, a subject pool comprised of first-year undergraduate students completing an introductory Psychology course at the University of Toronto Scarborough (UTSC). This campus is part of a large, urban Canadian university and is situated in one of the country’s most diverse communities (Ahmadi, 2018), thus providing a unique opportunity to assess a majority non-Caucasian sample of emerging adults. The inclusion criteria for age (18–25 years old) was determined using the distinct period defined by emerging adulthood (Arnett, 2000). Participants received course credit upon completion of the study and were excluded if it took less than 15 minutes to complete the study. All study procedures were approved by the University of Toronto Research Ethics Boards (REBs #34,834).

Procedure

Data from participants were collected from two study protocols. A subset of participants in this sample were included in a previous report (Ramakrishnan et al., 2019). In both study protocols, participants provided informed consent and completed the computerized questionnaires on either Inquisit 5 software (Millisecond) or Qualtrics. All questionnaires were administered in a randomized fashion. A demographics questionnaire assessing education, socioeconomic status, ethnicity, religious affiliation and status of physical and mental health was administered at the start of the session.

Measures

Childhood Trauma Questionnaire. Childhood adversity was measured using the Childhood Trauma Questionnaire (CTQ; Bernstein & Fink, 1998). The CTQ is a retrospective self-report instrument used to measure the severity of exposure to five subscales of childhood experiences using 25 items: physical abuse, emotional neglect, emotional abuse, physical neglect, and sexual abuse. Participants use a five-point Likert scale ranging from 1 (Never) to 5 (Very Often) to indicate the response that best describes their experiences (e.g. ‘My parents were too drunk or high to take care of the family’). Thus, scores can range from 25–125 and can be computed using subscales (ranging from 5–25) or as a total score (as in the current study), with higher scores corresponding to greater severity of adverse childhood experiences. The CTQ has demonstrated adequate internal consistency reliability ranging from a median of .66 to a median of .92 across diverse samples (Bernstein & Fink, 1998). Cronbach’s alpha for the current sample was α = .90.

State-Trait Anxiety Inventory. The STAI (Spielberger et al., 1983) is a self-report measure of anxiety composed of two subscales to assess state and trait anxiety. The STAI is comprised of 40 items, with 20 items allocated to each of the state and trait anxiety components, with all items rated on a 4-point Likert scale. For the purposes of the current study only Trait anxiety was assessed. The Trait Anxiety Scale (STAI-Trait) assesses dispositional feelings of stress, worry, and discomfort that are experienced on a daily basis across typical situations by recalling the frequency of feelings ‘in general’ on items
such as ‘I worry too much over something that doesn’t really matter’ and ‘I feel inadequate’ (C. D. Spielberger & Sydeman, 1994). Responses range from 1 (Almost Never) to 4 (Almost Always). The scores are summed for each scale ranging from 20–80 with higher scores corresponding with greater anxiety. The STAI has good construct validity and excellent internal consistency (α = .86 to .95; Spielberger et al., 1983). Cronbach’s alpha for the current sample was α = .96.

**Beck Anxiety Inventory.** The Beck Anxiety Inventory (BAI; Beck et al., 1988) is a 21-item self-report questionnaire assessing physiological and cognitive symptoms of anxiety, such as nervousness and dizziness during the past month. Participants indicate the degree to which each item was present and bothered them on a 4-point scale ranging from 0 (Not at all) to 3 (Severely – It bothered me a lot). Thus, total scores range from 0 to 63 with higher scores being associated with higher levels of anxiety. The BAI has shown good internal consistency (α = .92), and concurrent validity with the STAI (r = .47 to .58; Julian, 2011). Cronbach’s alpha for the current sample was α = .92.

**Perceived Stress Scale.** The Perceived Stress Scale (PSS-10; Cohen et al., 1983) is a 10-item self-report measure used to assess levels of current life stress during the past month. Items are designed to measure how often participants find their lives unpredictable and uncontrollable and includes statements such as ‘how often have you felt that you were unable to control the important things in your life?’ Each item is scored on a 5-point Likert scale, ranging from 0 (Never) to 4 (Very Often). Items are summed to create a total score where higher scores indicate higher levels of perceived stress. The PSS-10 has demonstrated acceptable internal reliability (α = .84 to .86), Cohen et al., 1983). Cronbach’s alpha for the current sample was α = .87.

**Statistical analyses**

All statistical analyses were conducted in SPSS 24 (IBM Corp, 2016). For all measures, extreme univariate outliers were removed (i.e. listwise deletion) if z-scores were greater than 3 standard deviations above or below the mean in accordance with the literature (Tabachnick & Fidell, 2013). According to this criteria, extreme outliers were identified for the STAI-Trait (n = 1) and BAI (n = 6) measures and were not included in the statistical analyses (excluding these cases did not in fact affect the outcome of the analyses, given they represented less than 1% of the total sample). There were no observed outliers for the CTQ and the PSS-10 questionnaires. Descriptive statistics and correlations for measures assessing childhood adversity, anxiety, and perceived current life stress were computed for descriptive purposes.

A parallel mediation analysis was conducted using PROCESS macro for SPSS (Hayes, 2017) to determine whether the hypothesized model would reveal a unique mediating role of different indices of anxiety (i.e. STAI-Trait and BAI). In the proposed mediation, childhood adversity (CTQ) was indicated as the primary independent variable, current life stress (PSS-10) was indicated as the primary outcome, and anxiety (i.e. STAI-Trait and BAI) were included as the mediating variables (Figure 1). Prior to analyses, multivariate outliers were identified with Mahalanobis distance (p < .001) and removed (n = 4). Thus, our final sample consisted of 638 participants. Bias-corrected 95% bootstrap confidence intervals (CI) were estimated for indirect effects. Indirect mediation effects were interpreted as significant if the 95% bootstrap CI did not contain a value of 0.

**Results**

**Sample characteristics**

The majority of the sample identified their biological sex as female (74.6%). Participants were from diverse backgrounds: 11.0% European, 33.7% East or Southeast Asian, 32.8% South Asian, 7.4% Middle Eastern, 4.9% African, 1.6% Latin, Central or South American, 6.1% Caribbean, 0.5% Pacific
Islander, 0.2% Aboriginal, and 1.9% identified as other. This sample is representative of the ethnic diversity found on campus. Descriptive data and correlations for measures assessing childhood adversity, anxiety, and perceived current life stress are presented in Table 1.

**Mediation analyses**

The direct and indirect effects, as well as the unstandardized path coefficients for the mediation analysis, are presented in Figure 2. The CTQ significantly predicted both measures of anxiety across all models of direct effects. In addition, the STAI-Trait and BAI positively predicted scores on the PSS-10. That is, as childhood adversity increased so did anxiety, and increases in anxiety in turn predicted

---

**Table 1.** Descriptive statistics and bivariate correlations among primary study variables (n = 638).

|      | Mean | SD   | 1   | 2    | 3   | 4    |
|------|------|------|-----|------|-----|------|
| 1. CTQ | 38.03 | 11.76 | 1   |      |     |      |
| 2. STAI-Trait | 47.25 | 11.05 | 0.404** | 1   |     |      |
| 3. BAI  | 16.91 | 11.39 | 0.374** | 0.639** | 1   |      |
| 4. PSS-10 | 19.53 | 7.36  | 0.263** | 0.605** | 0.448** | 1    |

CTQ = Childhood Trauma Questionnaire; STAI = State-Trait Anxiety Inventory; BAI = Beck Anxiety Inventory; PSS-10 = Perceived Stress Scale. **p ≤ 0.01.

Values represent unstandardized regression coefficients; ** p ≤ 0.001, *p < 0.05. Bolded values are statistically significant.
increases in perceived stress. Moreover, the total effect of the CTQ on PSS-10 was significant, \( b = .164, SE = .026, 95\% CI [.113, .216] \), such that participants who endorsed high levels of childhood adversity exhibited more current life stress. Consistent with our hypothesis, the analyses demonstrated that childhood adversity (CTQ) indirectly influenced current life stress (PSS-10) as a function of its relationship with both measures of anxiety (i.e. STAI-Trait \( b = .136, SE = .016, 95\% CI [.106, .170] \)), and BAI \( b = .024, SE = .011, 95\% CI [.004, .046] \); Figure 2). Of note, a pairwise comparison of the specific indirect effects revealed that the effects are statistically different \( b = .112, SE = .020, 95\% CI [.074, .153] \). More specifically, both indirect effects being the same sign (i.e. positive) allows us to conclude a larger indirect effect of STAI-Trait compared to the BAI (Hayes, 2013). The direct effect of CTQ on PSS-10 was no longer statistically significant when the mediators were included in the model, thus demonstrating a full mediation in the relationship between CTQ and PSS-10 (Figure 2).

**Discussion**

The goal of this study was to examine two indices of anxiety as unique mediators of the relationship between childhood adversity and perceived current life stress. Consistent with past work (e.g. Betz et al., 2020; Mundy et al., 2015), we showed independent and direct positive relationships between childhood adversity and both perceived life stress and anxiety symptoms. In addition, and in keeping with our primary hypotheses, we report for the first time a mediating role of two separate indices of anxiety on the relationship between childhood adversity and perceived life stress. Indeed, in assessing different facets of anxiety (i.e. trait and symptom-based), our major finding was that both anxiety measures fully mediated the relationship in a representative undergraduate sample.

Moreover, of the two anxiety measures we assessed, the STAI-Trait contributed significantly more than the BAI to the overall indirect effect. This may reflect the fact that the trait measure represents dispositional tendencies to perceive events as being stressful (Spielberger, 1966). Indeed, individuals with high levels of dispositional (trait) anxiety tend to perceive current threat in a manner leading to distress (Gasper & Clore, 1998). From this it may follow that the potent effects of childhood adversity on internalizing behaviours such as anxiety (Timmermans et al., 2010) then lead to global enhancements in threat anticipation.

The BAI also significantly mediated the relationship between childhood adversity and perceived life stress, though to a lesser degree than the STAI. This could be attributed to the fact that the BAI was developed to differentiate between anxiety and depressive disorders and prior work has demonstrated that these symptoms may not be apparent in a normative sample (Creamer et al., 1995). More notably, despite a strong correlation between measures of anxiety in the current study, the BAI has often been administered in clinical samples and thus possibly contributed less to the indirect effect due to the clinical nature of the questionnaire (Piotrowski, 1999). We justified the inclusion of both anxiety measures in the current study due to the overlap between anxiety and depression symptoms (Janiri et al., 2020) and the weaker discriminant validity of the STAI (Julian, 2011). In addition, a recent study comparing non-clinical and depressive groups were found to exhibit similar levels of stress not attributable to trait anxiety alone, as both groups did not differ on this measure (Konstantopoulou et al., 2020). Moreover, our results are consistent with past research that has demonstrated high convergent validity between the measures administered in our study (Julian, 2011).

The present study has several limitations to consider. First is the use of retrospective data in a cross-sectional study design, meaning that causal inferences cannot be made. That said, a mediation analysis was appropriate in the current context given that we were using stable predispositions (i.e. childhood adversity and anxiety) to predict state or transient perceptions of current life stress. Moreover, the temporal coincidence of the variables, that is, trait anxiety as primary and current life stress as secondary, further justified the mediation analysis (Fairchild & McDaniel, 2017; Zvolensky et al., 2002). Although the objectives of our study justified the design, clarifying the causal links between these variables using a longitudinal design is an important
focus for future research. Secondly, the present study relied on the use of retrospective, self-report questionnaires. This form of measurement has the advantage of offering participants greater privacy, is considered to be less invasive than face-to-face interviews (Bernstein et al., 2003), and is generally reliable in the context of our study variables. However, it is acknowledged that self-reports of childhood adversity may lead to biased reporting (e.g. due to inaccurate memories and social desirability factors; Betz et al., 2020; McDonald, 2008) that may, in turn, affect the precision with which relationships between anxiety and current life stress can be determined.

Finally, future studies might explore related variables such as emotional reactivity and negative affect in this mediation model. Anxiety predicts increases in emotional reactivity in response to stress (Powers et al., 2016), and is in fact often characterized by the presence of negative affective states (Joormann & Vanderlind, 2014). Of relevance, Hengesch et al. (2018) found that past experiences of childhood adversity led to alterations in acute stress reactivity, as expressed through increases in subjective negative affect and state anxiety. Past work has also shown that negative affect positively correlates with cortisol levels that, in turn, predict higher levels of perceived stress from current life events (Van Eck et al., 1996). Thus, an examination of the potential contribution of negative affect and/or emotional reactivity in the mediation of the relationship between childhood adversity and perceived current life stress by anxiety may be warranted.

In conclusion, the present study reports clearly establishes anxiety as a mediator in the relationship between childhood adversity and perceived current life stress in a sample of emerging adults. By assessing both trait and symptom-based characteristics of anxiety, we were able to demonstrate differences in the strength of their respective contributions to the model. More notably, the current study contributes to prior work that has largely focused on utilizing predominantly Caucasian samples. In establishing a relationship between these constructs in a diverse sample of emerging adults, we allow for generalizability and appropriate representation that reflects undergraduate student populations. Although the relationship between childhood adversity and perceived current life stress is complex, our findings contribute to a better understanding of the specific characteristics of anxiety that can explain its role in mediating the relationship between childhood adversity and current life stress.

**Disclosure statement**

No potential conflict of interest was reported by the author(s).

**Data accessibility**

Data will be made available upon request.

**Funding**

Funding for this study was provided by NSERC (#72050521). NSERC had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

**ORCID**

Nayani Ramakrishnan [http://orcid.org/0000-0003-4941-3239](http://orcid.org/0000-0003-4941-3239)

**References**

Abelson, J. L., Khan, S., Liberzon, I., & Young, E. A. (2007). HPA axis activity in patients with panic disorder: Review and synthesis of four studies. *Depression and Anxiety*, 24(1), 66–76. [https://doi.org/10.1002/da.20220](https://doi.org/10.1002/da.20220)
Ahmadi, D. (2018). Is diversity our strength? An analysis of the facts and fancies of diversity in Toronto. City, Culture and Society, 13, 64–72. https://doi.org/10.1016/j.ccs.2017.11.002

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. American Psychologist, 55(5), 469. https://doi.org/10.1037/0003-066X.55.5.469

Back, S. E., Brady, K. T., Waldrop, A. E., Yeatts, S. D., McRae, A. L., & Spratt, E. (2008). Early life trauma and sensitivity to current stressors in individuals with and without cocaine dependence. The American Journal of Drug and Alcohol Abuse, 34(4), 389–396. https://doi.org/10.1080/00952990802122614

Bardeen, J. R., Fergus, T. A., & Orcutt, H. K. (2013). Experiential avoidance as a moderator of the relationship between anxiety sensitivity and perceived stress. Behavior Therapy, 44(3), 459–469. https://doi.org/10.1016/j.beth.2013.04.001

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. Journal of Consulting and Clinical Psychology, 56(6), 893–897. https://doi.org/10.1037/0022-006X.56.6.893

Bernstein, D. P., Stein, J. A., Newcomb, M. D., Walker, E., Boggs, D., Ablaivita, T., Stokes, J., Handelsman, L., Medrano, M., Desmond, D., & Zule, W. (2003). Development and validation of a brief screening version of the childhood trauma questionnaire. Child Abuse & Neglect, 27(2), 169–190. https://doi.org/10.1016/S0145-2134(02)00541-0

Bernstein, D. P. F. L., & Fink, L. (1998). Childhood trauma questionnaire: A retrospective self-report manual. Harcourt Brace & Company.

Betz, L. T., Penzel, N., Rosen, M., & Kambeitz, J. (2020). Relationships between childhood trauma and perceived stress in the general population: A network perspective. Psychological Medicine, 1–11. https://doi.org/10.1017/S003329172000135X

Biondi, M., & Picardi, A. (1999). Psychological stress and neuroendocrine function in humans: The last two decades of research. Psychotherapy and Psychosomatics, 68(3), 114–150. https://doi.org/10.1159/000012323

Bishop, S. J. (2007). Neurocognitive mechanisms of anxiety: An integrative account. Trends in Cognitive Sciences, 11(7), 307–316. https://doi.org/10.1016/j.tics.2007.05.008

Briggs, A. R. J., Clark, J., & Hall, I. (2012). Building bridges: Understanding student transition to university. Quality in Higher Education, 18(1), 3–21. https://doi.org/10.1080/13583322.2011.614468

Butler, G., & Mathews, A. (1987). Anticipatory anxiety and risk perception. Cognitive Therapy and Research, 11(5), 551–565. https://doi.org/10.1007/BF01183858

Chrousos, G. P. (2009). Stress and disorders of the stress system. Nature Reviews Endocrinology, 5(7), 374. https://doi.org/10.1038/nrendo.2009.106

Chu, D. A., Williams, L. M., Harris, A. W., Bryant, R. A., & Gatt, J. M. (2013). Early life trauma predicts self-reported levels of depressive and anxiety symptoms in nonclinical community adults: Relative contributions of early life stressor types and adult trauma exposure. Journal of Psychiatric Research, 47(1), 23–32. https://doi.org/10.1016/j.jpsychires.2012.08.006

Cohen, S., Kessler, R. C., & Underwood, L. G. (1995). Strategies for measuring stress in studies of psychiatric and physical disorders. In S. Cohen, R. C. Kessler, & L. G. Underwood (Eds.), Measuring stress: A guide for health and social scientists (pp. 3–28). Oxford University Press.

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. Journal of Health and Social Behavior, 24(4), 385–396. https://doi.org/10.1177/002213358302400406

Creamer, M., Foran, J., & Bell, R. (1995). The Beck Anxiety Inventory in a non-clinical sample. Behaviour Research and Therapy, 33(4), 477–485. https://doi.org/10.1016/0005-7967(94)90082-U

Den Hollander-gijsman, M. E., Wardenaar, K. J., De Beurs, E., Van der Wee, N. J., Mooijaart, A., Van Buuren, S., & Zitman, F. G. (2012). Distinguishing symptom dimensions of depression and anxiety: An integrative approach. Journal of Affective Disorders, 136(3), 693–701. https://doi.org/10.1016/j.jad.2011.10.005

Dobson, K. S. (1985). The relationship between anxiety and depression. Clinical Psychology Review, 5(4), 307–324. https://doi.org/10.1016/0272-7358(85)90010-8

Duffy, K. A., McLaughlin, K. A., & Green, P. A. (2018). Early life adversity and health-risk behaviors: Proposed psychological and neural mechanisms. Annals of the New York Academy of Sciences, 1428(1), 151. https://doi.org/10.1111/nyas.13928

Essex, M. J., Shirkcliff, E. A., Burk, L. R., Ruttle, P. L., Klein, M. H., Slattery, M. J., Kalin, N. H., & Armstrong, J. M. (2011). Influence of early life stress on later hypothalamic–pituitary–adrenal axis functioning and its covariation with mental health outcomes: A study of the allostatic process from childhood into adolescence. Development and Psychopathology, 23(4), 1039–1058. https://doi.org/10.1017/S0954579411000484

Fairchild, A. J., & McDaniel, H. L. (2017). Best (but oft-forgotten) practices: Mediation analysis. The American Journal of Clinical Nutrition, 105(6), 1259–1271. http://doi.org/10.3945/ajcn.117.152546

Gasper, K., & Clore, G. L. (1998). The persistent use of negative affect by anxious individuals to estimate risk. Journal of Personality and Social Psychology, 74(5), 1350. https://doi.org/10.1037/0022-3514.74.5.1350

Glaser, J. P., Van Os, J., Portegijs, P. J., & Myin-Germeys, I. (2006). Childhood trauma and emotional reactivity to daily life stress in adult frequent attenders of general practitioners. Journal of Psychosomatic Research, 61(2), 229–236. https://doi.org/10.1016/j.jpsychores.2006.04.014

Goldman, N., Gle, D. A., Seplaki, C., Liu, I. W., & Weinstein, M. (2005). Perceived stress and physiological dysregulation in older adults. Stress, 8(2), 95–105. https://doi.org/10.1080/10253890500141905
Gorka, A. X., Hanson, J. L., Radtke, S. R., & Hariri, A. R. (2014). Reduced hippocampal and medial prefrontal gray matter mediate the association between reported childhood maltreatment and trait anxiety in adulthood and predict sensitivity to future life stress. *Biological of Mood & Anxiety Disorders*, 4(1), 1–10. https://doi.org/10.1186/2045-5380-4-12

Greenfield, E. A., & Marks, N. F. (2010). Identifying experiences of physical and psychological violence in childhood that jeopardize mental health in adulthood. *Child Abuse & Neglect*, 34(3), 161–171. https://doi.org/10.1016/j.chiabu.2009.08.012

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-base approach*. Guilford Press, New York, USA.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). The Guilford Press.

Heim, C., & Nemeroff, C. B. (2001). The role of childhood trauma in the neurobiology of mood and anxiety disorders: Preclinical and clinical studies. *Biological Psychiatry*, 49(12), 1023–1039. https://doi.org/10.1016/S0006-3223(01)01157-X

Hengesch, X., Elwensoep, M. M., Schaia, V. K., Larra, M. F., Finke, J. B., Zhang, X., Bachmann, P., Turner, J. D., Vögele, C., Muller, C. P., & Schächinger, H. (2018). Blunted endocrine response to a combined physical-cognitive stressor in adults with early life adversity. *Child Abuse & Neglect*, 85, 137–144. https://doi.org/10.1016/j.chiabu.2018.04.002

Herringer, R. J., Birn, R. M., Ruttle, P. L., Burghy, C. A., Stodola, D. E., Davidson, R. J., & Essex, M. J. (2013). Childhood maltreatment is associated with altered fear circuitry and increased internalizing symptoms by late adolescence. *Proceedings of the National Academy of Sciences*, 110(47), 19119–19124. https://doi.org/10.1073/pnas.1310766110

Hyman, S. M., Paliwal, P., & Sinha, R. (2007). Childhood maltreatment, perceived stress, and stress-related coping in recently abstinent cocaine dependent adults. *Psychology of Addictive Behaviors*, 21(2), 233. https://doi.org/10.1037/0893-164X.21.2.233

IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

Janiri, D., Moser, D. A., Doucet, G. E., Luber, M. J., Rason, A., Lee, W. H., Murrough, J. W., Sani, G., Eickhoff, S. B., & Frangou, S. (2020). Shared neural phenotypes for mood and anxiety disorders: A meta-analysis of 226 task-related functional imaging studies. *JAMA Psychiatry*, 77(2), 172–179. https://doi.org/10.1001/jamapsychiatry.2019.3351

Joormann, J., & Vander Lind, W. M. (2014). Emotion regulation in depression: The role of biased cognition and reduced cognitive control. *Clinical Psychological Science*, 2(4), 402–421. https://doi.org/10.1177/2167702614536163

Julian, L. J. (2011). Measures of anxiety. *Arthritis Care & Research*, 63(S1), S467–472. https://doi.org/10.1002/acr.20561

Juster, R. P., McEwen, B. S., & Lupien, S. J. (2010). Allostatic load biomarkers of chronic stress and impact on health and cognition. *Neuroscience & Biobehavioral Reviews*, 35(1), 2–16. https://doi.org/10.1016/j.neubiorev.2009.10.002

Kabacoff, R. I., Segal, D. L., Hersen, M., & Van Hasselt, V. B. (1997). Psychometric properties and diagnostic utility of the Beck Anxiety Inventory and the state-trait anxiety inventory with older adult psychiatric outpatients. *Journal of Anxiety Disorders*, 11(1), 33–47. https://doi.org/10.1016/S0887-6185(96)00033-3

Kennedy, B. L., Schwab, J. J., Morris, R. L., & Beldia, G. (2001). Assessment of state and trait anxiety in subjects with anxiety and depressive disorders. *Psychiatric Quarterly*, 72(3), 263–276. https://doi.org/10.1016/s1052-0200(07)

Konstantopoulou, G., Iliou, T., Karavalogliou, K., Iconomou, G., Assimakopoulos, K., & Alexopoulos, P. (2020). Associations between (sub) clinical stress- and anxiety symptoms in mentally healthy individuals and in major depression: A cross-sectional clinical study. *BMC Psychiatry*, 20(1), 428. http://doi.org/10.1186/s12888-020-02836-1

Lähdepuro, A., Savolainen, K., Lahti-Pulkkinen, M., Eriksson, J. G., Lahti, J., Tuovinen, S., Kajantie, E., Pesonen, A. K., Heinonen, K., & Räikkönen, K. (2019). The impact of early life stress on anxiety symptoms in late adulthood. *Scientific Reports*, 9(1), 1–13. https://doi.org/10.1038/s41598-019-40698-0

LoPilato, A. M., Addington, J., Bearden, C. E., Cadenhead, K. S., Cannon, T. D., Comblatt, B. A., Mathalon, D. H., McGlashan, T. H., Perkins, D. O., Tsuang, M. T., Woods, S. W., & Walker, E. F. (2020). Stress perception following childhood adversity: Unique associations with adversity type and sex. *Development and Psychopathology*, 32(1), 343–356. https://doi.org/10.1017/s0954579419000130

McDonald, J. D. (2008). Measuring personality constructs: The advantages and disadvantages of self-reports, informant reports and behavioural assessments. *Enquire*, 1(1), 1–19. https://www.nottingham.ac.uk/sociology/documents/enquire-volume-1-issue-1-dodoric-mcdonald.pdf

McLaughlin, K. A., Conron, K. J., Koenen, K. C., & Gilman, S. E. (2010). Childhood adversity, adult stressful life events, and risk of past-year psychiatric disorder: A test of the stress sensitization hypothesis in a population-based sample of adults. *Psychological Medicine*, 40(10), 1647–1658. https://doi.org/10.1017/s0033291709992121

McLaughlin, K. A., Koenen, K. C., Bromet, E. J., Karam, E. G., Liu, H., Petukhova, M., Ruscio, A. M., Sampson, N. A., Stein, D. J., Aguilar-Gaxiola, S., Alonso, J., Borges, G., Demytennaere, K., Dinolova, R. V., Ferry, F., Florescu, S., De Girolamo, G., Gureje, O., Kawakami, N., Lee, S., & Kessler, R. C. (2017). Childhood adversities and post-traumatic stress disorder: Evidence for stress sensitisation in the world mental health surveys. *The British Journal of Psychiatry: The Journal of Mental Science*, 211(5), 280–288. https://doi.org/10.1192/bjp.bp.116.197640

Mundy, E. A., Weber, M., Rauch, S. L., Killgore, W. D., Simon, N. M., Pollack, M. H., & Rosso, I. M. (2015). Adult anxiety disorders in relation to trait anxiety and perceived stress in childhood. *Psychological Reports*, 117(2), 473–489. https://doi.org/10.2466/02.10.PRO.117c1726
Piotrowski, C. (1999). The status of the Beck Anxiety Inventory in contemporary research. *Psychological Reports, 85*(1), 261–262. https://doi.org/10.2466/pr0.1999.85.1.261

Powers, S. I., Laurent, H. K., Gunlicks-Stoessel, M., Balaban, S., & Bent, E. (2016). Depression and anxiety predict sex-specific cortisol responses to interpersonal stress. *Psychoneuroendocrinology, 69*, 172–179. https://doi.org/10.1016/j.psyneuen.2016.04.007

Ramakrishnan, N., McPhee, M., Sosnowski, A., Rajasingaam, V., & Erb, S. (2019). Positive urgency partially mediates the relationship between childhood adversity and problems associated with substance use in an undergraduate population. *Addictive Behaviors Reports, 10*, 100230. https://doi.org/10.1016/j.abrep.2019.100230

Shepperd, J. A., Grace, J., Cole, L. J., & Klein, C. (2005). Anxiety and outcome predictions. *Personality and Social Psychology Bulletin, 31*(2), 267–275. https://doi.org/10.1177/0146167204271322

Spielberger, C. D. (1966). Theory and research on anxiety. In C. D. Spielberger (Ed.), *Anxiety and behavior* (pp. 3–22). Academic Press.

Spielberger, C. D., & Sydeman, S. J. (1994). State-trait anxiety inventory and state-trait anger expression inventory. In M. E. Maruish (Ed.), *The use of psychological testing for treatment planning and outcome assessment* (pp. 292–321). Lawrence Erlbaum.

Spielberger, C. D., Gorsuch, R. L., Lushene, R., Vagg, P. R., & Jacobs, G. A. (1983). *Manual for the state-trait anxiety inventory*. Consulting Psychologists Press.

Spielberger, C. H., & Rickman, R. L. (1990). Assessment of state and trait anxiety. In N. Sartorius, V. M. Andreoli, G. Cassano, L. Eisenberg, & P. Kielholz (Eds.), *Anxiety: Psychobiological and clinical perspectives* (pp. 69–84). Hemisphere/Taylor & Francis.

Syed, M., & Mitchell, L. L. (2013). Race, ethnicity, and emerging adulthood: Retrospect and prospects. *Emerging Adulthood, 1*(2), 83–95. https://doi.org/10.1177/2167696813480503

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Tanguy, G., Sagui, E., Fabien, Z., Martin-Krumm, C., Canini, F., & Trousselard, M. (2018). Anxiety and psycho-physiological stress response to competitive sport exercise. *Frontiers in Psychology, 9*, 1469. https://doi.org/10.3389/fpsyg.2018.01469

Teicher, M. H., Andersen, S. L., Polcari, A., Anderson, C. M., Navalta, C. P., & Kim, D. M. (2003). The neurobiological consequences of early stress and childhood maltreatment. *Neuroscience & Biobehavioral Reviews, 27*(1–2), 33–44. https://doi.org/10.1016/S0149-7634(03)00007-1

Teicher, M. H., & Samson, J. A. (2016). Annual research review: Enduring neurobiological effects of childhood abuse and neglect. *Journal of Child Psychology and Psychiatry, 57*(3), 241–266. https://doi.org/10.1111/jcpp.12507

Timmermans, M., Van Lier, P. A., & Koot, H. M. (2010). The role of stressful events in the development of behavioural and emotional problems from early childhood to late adolescence. *Psychological Medicine, 40*(10), 1659–1668. https://doi.org/10.1017/S0033291709992091

Tyrka, A. R., Price, L. H., Marsit, C., Walters, O. C., Carpenter, L. L., & Uddin, M. (2012). Childhood adversity and epigenetic modulation of the leukocyte glucocorticoid receptor: Preliminary findings in healthy adults. *PloS One, 7*(1), e30148. https://doi.org/10.1371/journal.pone.0030148

Van Eck, M., Berkhof, H., Nicolson, N., & Solun, J. (1996). The effects of perceived stress, traits, mood states, and stressful daily events on salivary cortisol. *Psychosomatic Medicine, 58*(3), 447–458. https://doi.org/10.1097/00006842-199609000-00007

Zvolensky, M. J., Goodie, J. L., Ruggiero, K. J., Black, A. L., Larkin, K. T., & Taylor, B. K. (2002). Perceived stress and anxiety sensitivity in the prediction of anxiety-related responding: A multichallenge evaluation. *Anxiety, Stress & Coping, 15*(3), 211–229. https://doi.org/10.1080/1061580021000020699