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Measuring Contextual Factors Associated with Experiential Avoidance Using a Behavior Analogue Paradigm

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MEASURING CONTEXTUAL FACTORS ASSOCIATED WITH EXPERIENTIAL AVOIDANCE USING A BEHAVIOR ANALOGUE PARADIGM

by

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The purpose of the present study was to investigate the relationship between levels of state and trait experiential avoidance across two different contexts using behavior analogue methodology. Performance on the cold pressor task (threshold, tolerance, endurance, and intensity; Zettle et al., 2012) was compared to performance on a modified version of the Trier Social Stress Test (TSST; Kirschbaum et al., 1993) to obtain a behavioral measure of experiential avoidance that was standardized across these four behavioral indices. Data were collected from a convenience sample of undergraduate students (N = 133) from college classrooms on the campus of Western Michigan University. Participants completed the cold pressor task and TSST in a counterbalanced order. Trait and state-based measures of experiential avoidance, emotion dysregulation, positive and negative affect intensity, state and trait anxiety, interpersonal sensitivity, perceived pain tolerance, and fear of negative evaluations were measured at baseline along with average and maximum heart rate. State-based measures were completed again following each task and heart rate data were collected during five minutes of speech preparation as well as directly following the speech, arithmetic, and cold pressor task.

It was hypothesized that participants who reported higher levels of trait experiential avoidance would report decreased threshold, tolerance, and endurance as well as increased

intensity of physical and social discomfort across the two behavioral measures, providing evidence that experiential avoidance can be conceptualized as a functional response class. These hypotheses were partially confirmed as high trait experiential avoiders rated the cold pressor task, speech, and arithmetic task as more intense than low trait avoiders. Those higher in trait experiential avoidance also tolerated the speech significantly less longer than those reporting lower levels of trait experiential avoidance. Trait experiential avoidance was also a predictor of positive affect intensity following both the cold pressor task and TSST and of state experiential avoidance post-TSST. Based on the results of an experimental manipulation check, participants in this study experienced significant increases in state experiential avoidance and reductions in positive affect intensity following each task. State anxiety increased from baseline to post-TSST. Decreased endurance of each task was predictive of greater state experiential avoidance and reductions in positive affect within each task.

Fear of negative evaluations and lower arithmetic task endurance were the best predictors of state experiential avoidance following the TSST. Lower endurance levels were also the best predictor of state experiential avoidance following the cold pressor task, but contrary to hypotheses this did not hold for the TSST. It was also found that state anxiety and fear of negative evaluations were the strongest predictors of state anxiety following the TSST above and beyond self-report and behavioral measures of experiential avoidance. In contrast with hypotheses, performance on the cold pressor task was not a significant predictor of performance on the TSST. However, speech task endurance and state experiential avoidance were the strongest predictors of arithmetic task endurance. The results of this study support the notion that context is an important factor in understanding experiential avoidance and the strategies used to manage discomfort in the moment following physical and social discomfort are multifaceted.

Conceptualization of the function of experiential avoidance in different contexts as well as context-specific treatment implications are discussed.

TABLE OF CONTENTS

ACKNOWLEDGMENTS....................ii

LIST OF TABLES....................xi

INTRODUCTION....................1

Overview of the Present Study....................1

Self-Report Measures in Behavioral Sciences....................3

Experiential Avoidance....................5

Event or Construct?....................5

Transdiagnostic Models of Psychopathology and Experiential Avoidance....................10

Correlates of Experiential Avoidance....................13

Self-Report Measures of Experiential Avoidance....................15

Behavioral and Physiological Measures of Experiential Avoidance....................17

Emotional Imagery....................17

Physically Aversive Stimuli....................19

Feedback, Social Stress, and Avoidance....................21

Study Rationale and Hypotheses....................24

Cold Pressor Task Hypotheses....................24

Trier Social Stress Test Hypotheses....................27

Self-Report Hypotheses....................30

METHOD 32

Participants 32

Recruitment 32

Procedure 33

Scheduling and Informed Consent 33

Instrumentation 33

Heart Rate Measurement 33

Self- Report Measures 34

Acceptance and Action Questionnaire-II 34

Multidimensional Experiential Avoidance Questionnaire 35

State Measure of Experiential Avoidance 35

State Difficulties in Emotion Regulation Scale 36

State-Trait Anxiety Inventory 36

Positive and Negative Affect Schedule 37

Brief Fear of Negative Evaluation Scale 37

Brief Symptom Inventory 38

Social Desirability Scale-17 38

Analogue Measures 39

Cold Pressor Task 39

Trier Social Stress Test 41

Design......46

RESULTS......47

Pariticipants......47

Preliminary Analyses......48

Treatment of Missing Data......48

Normality, Linearity, and Homoscedasticity......49

Bivariate Correlations......52

Cold Pressor Task Hypotheses......53

Trier Social Stress Test Hypotheses......54

Self-Report Hypotheses......56

Trait Experiential Avoidance Measures......57

State Experiential Avoidance Measures......59

Experimental Manipulation Check......61

Paired Samples *t*-tests for Cold Pressor Task......61

Paired Samples *t*-tests for TSST......63

Regression Analyses......64

Cold Pressor Task Analyses......64

Trier Social Stress Test Analyses......67

Task Comparison Analyses......70

Hierarchical Linear Regression Analyses Comparing Task Performance......72

Table of Contents—Continued

DISCUSSION 74

Limitations and Future Directions 85

Conclusion 87

REFERENCES 114

APPENDICES

A. Human Subjects Institutional Review Board Full Approval Letter 132

B. Recruitment Slide 133

C. Recruitment Script 134

D. Study Handouts 136

E. Study Fliers 137

F. Informed Consent Document 138

G. Heart Rate Monitor Visual Instructions 142

H. Cold Pressor Task Experimenter Instructions 143

I. TSST Experimenter Instructions 145

J. Demographic Questionnaire 148

K. Figure Depicting the Cold Pressor Apparatus 150

L. Cold Pressor Visual Analogue Scale 152

M. TSST Judge Script 153

N. TSST Visual Analogue Scale 155

O. Debriefing Questionnaire 156

Table of Contents—Continued

P. Referral List 157

LIST OF TABLES

1. Skewness and Kurtosis Values for Baseline Measures 88

2. Skewness and Kurtosis Values for Pre, Mid, and Post TSST Measures 89

3. Skewness and Kurtosis Values for Cold Pressor Task 90

4. Means, Standard Deviations, Minimum and Maximum Scores, and Internal Consistencies for Baseline Measures 91

5. Means, Standard Deviations, Minimum and Maximum Scores, and Internal Consistencies for Pre, Mid, and Post TSST Measures 92

6. Means, Standard Deviations, Minimum and Maximum Scores, and Internal Consistencies for Mid and Post Cold Pressor Task Measures 93

7. Correlations Between Study Variables Measured at Baseline 94

8. Inter-Correlations Between Study Variables Measured During and Post Cold Pressor Task and Variables Measured at Baseline 97

9. Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline...100

10. Correlations Between TSST and Cold Pressor Task Variables and State-Based Measures 106

11. Summary of Hierarchical Regression Predicting State Experiential Avoidance Post Cold Pressor Task 110

12. Summary of Hierarchical Regression Predicting Positive Affect Intensity Post Cold Pressor Task...110

13. Summary of Hierarchical Regression Predicting State Experiential Avoidance Post TSST 111

14. Summary of Hierarchical Regression Predicting Positive Affect Intensity Post TSST 111

15. Summary of Hierarchical Regression Predicting State Anxiety Post TSST 112

16. Summary of Hierarchical Regression Predicting Cold Pressor Task Endurance from TSST Variables 112

17. Summary of Hierarchical Regression Predicting Arithmetic Endurance from Speech Variables 113

INTRODUCTION

Overview of the Present Study

Experiential avoidance is conceptualized as an unwillingness to experience aversive private events such as thoughts, feelings, and memories, accompanied by efforts to escape or avoid contact with these events (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). The avoidance of unwanted private events is thought to play a critical role in the development and maintenance of human suffering. Indeed, experiential avoidance is associated with numerous harmful mental health outcomes including posttraumatic stress disorder (Marx & Sloan, 2005; Thompson & Waltz, 2010), problematic alcohol consumption (Dvorak, Arens, Kuvass, Williams, & Kilwein, 2013), cannabis abuse, (Bordieri, Tull, McDermott, & Gratz, 2014) and depression and anxiety (Cribb, Moulds, & Carter, 2006; Newman & Llera, 2011; Kashdan et al., 2014). Problem behaviors also tend to co-occur (Regier et al., 1990), and experiential avoidance appears to explain the co-variation in several harmful behaviors including drug/alcohol use, disordered eating behavior/excessive exercise, internet overuse, deliberate self-harm, as well as aggression (Kingston, Clarke, & Remington, 2010). Experiential avoidance has been studied and found elevated among individuals who engage in hoarding behavior (de la Cruz et al., 2013), emotional eating (Litwin, Goldbacher, Cardaciotto, & Gambrel, 2017), and who report chronic pain (Esteve, Ramírez-Maestre, & López-Martínez, 2012). It may aid in maintaining panic attacks through agoraphobic behaviors (White, Brown, Somers, & Barlow, 2006), and is correlated with maladaptive worry and perfectionism (Santanello & Garnder, 2007). There is also beginning evidence of a longitudinal relationship between experiential avoidance and emotional disorders

(Spinhoven, Drost, de Rooij, van Hemert, & Penninx, 2014). While the form of these behaviors and problems differ, experiential avoidance may be the common functional pathway that maintains mental health concerns that are wide-reaching and problematic.

The study of factors, such as experiential avoidance, that develop and maintain human suffering is important to assess for, prevent, and treat mental illness. However, a major limitation of the current experiential avoidance literature is the overreliance on self-report assessment instruments with questionable psychometric properties (Bond et al., 2011; Wolgast, 2014). The measurement of experiential avoidance through self-report screening tools also does not provide a clear overview of the contextual factors that may be involved. Given these limitations, in the ways in which experiential avoidance presents in a laboratory setting could shed further light on these factors. One conceptualization of experiential avoidance is that the behaviors belong to a common functional class and this appears supported across two behavior analogue contexts of physical pain/discomfort (Zettle et al., 2012). However, less is understood regarding the extent to which experiential avoidance may be a functional response class across contexts of physical and social or emotional discomfort.

Considering links across context is important as many of the experiential avoidance self-report questionnaires were designed to measure avoidance of emotional discomfort with little attention paid to factors that make avoidance more likely. Studying a potential relationship between different contextual factors could provide more evidence for the functional response class hypothesis or help to determine the multifaceted nature of experiential avoidance. The purpose of the present study was to investigate the relationship between behavioral measures of experiential avoidance across two different contexts. The aims were to better understand whether avoidance of physical pain and discomfort is related to the avoidance of uncomfortable social and emotional private experiences. A convenience sample of university students were recruited to participate in two behavior analogue tasks measuring physical and emotional/social discomfort in a laboratory context.

Self-Report Measures in Behavioral Sciences

Self-report inventories are common in psychological and behavioral sciences and the purpose of these measures is often to assess private behavior. The term "private events" was first introduced by B. F. Skinner in radical behaviorism. Skinner argued private events are characterized by limited accessibility to outside observers, making them difficult to study scientifically. The measurement of private events may indeed be particularly challenging as the technologies used to assess events within the skin are limited. Despite these limitations, Skinner believed studying private events adds important information to the analysis of behavior and should therefore be included as objects of study.

> The problem of privacy may…eventually be solved by technical advances. But we are still faced with events which occur at the private level and which are important to the organism without instrumental amplification. How the organism reacts to these events will remain an important question, even though the events may someday be made accessible to everyone. (Skinner, 1953; p. 282).

While self-report measures are common in modern psychological research, using these instruments too prevalently has limitations. Response biases occur when participants respond to survey questions based on their desire to be perceived favorably. Participants may also respond based on the way items are worded rather than what is being measured which could bias survey results. Another limitation is recall bias, which can occur in survey research when participants are asked to self-report on their past behavior and thus may be inaccurate in reporting what they remember (Gorin & Stone, 2001). To correct for recall biases, Experience Sampling and Ecological Momentary Assessment have been used to measure research participants' private events as they occur in naturalistic settings (Stone & Shiffman, 2002) and may give a better sense of how one responds to contextual factors in the moment. Still other measures, such as personality assessments, often have embedded validity scales which are designed to assess one's test taking approach (i.e., overreporting or minimizing symptoms) (Millon, Millon, & Grossman, 1994; Butcher, Graham, Ben-Porath, Tellegen, Dahlstrom, & Kaemmer, 2001; Ben-Porath, & Tellegen, 2008; Morey, 2007). However, most self-report measures used in psychological research are face-valid, do not capture reporting styles, and may introduce error into the findings.

Another key limitation of using self-report measures is their psychometric properties (i.e., validity and reliability) which may vary and even be poor or inconsistent across studies. The Acceptance and Action Questionnaire (AAQ; Hayes et al., 2004) was originally developed as a self-report measure of experiential avoidance/psychological flexibility. The AAQ-II was developed and validated based on problems with the internal consistency of the original AAQ, but continued questions regarding discriminant validity from neuroticism remained (Wolgast, 2014; Rochefort, Baldwin, & Chmielewski, 2017) and led to the development of newer measures with superior reliability, validity, and measurement of specific avoidance strategies (Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011; Gámez, Chmielewski, Kotov, & Watson, 2014).

While this is an improvement, these self-report measures still lack contextual information and conclusions drawn from their use are highly inferential. Participants in experiential avoidance research must be aware to some extent that they engage in avoidance and to understand how this affects their functioning. Some forms of experiential avoidance, such as distraction and thought suppression may be especially covert (Chawla & Ostafin, 2007), making them even more difficult to study. Rumination, the tendency to obsessively consider the possible causes/consequences of negative emotions, may be a covert form of experiential avoidance that seems to maintain depressive symptoms (Cribb, Moulds, & Carter, 2006; Moulds, Kandris, Starr, & Wong, 2007; Giorgio et al., 2010). Another covert strategy, dissociation, is common in survivors of trauma and may maintain PTSD symptoms through experiential avoidance (Thompson & Waltz, 2010). However, given the covert nature of emotion/cognitive regulation strategies, they may be associated with a lack of awareness of one's emotional experiences (Tull & Roemer, 2007). Thus, asking research participants to self-report on the extent to which they engage in these strategies may require a sophisticated reporting style, awareness of emotional states, and willingness to disclose. Participants who are chronic avoiders may also opt out of participating in research due to fears their participation will result in psychological distress. The measurement of experiential avoidance through self-report presents methodological, statistical, and assessment limitations that could be better addressed through study at multiple levels (i.e., behavioral, physiological).

Experiential Avoidance

Event or Construct?

In classical test theory, it is proposed that a latent, underlying true score exists in measuring psychological constructs. Performance on a psychological testing measure is used to statistically approximate this hidden true score which is never fully attained as all scores contain an error term. Because true scores cannot be truly detected, observed scores are used and these are defined as the enduring product of true scores with measurement error (Algian & Penfield, 2009). Classical test theory is the underlying framework used in the construction of many self-reports measures along with the more contemporary Item Response Theory (IRT). IRT is a statistical approach like classical test theory which is also based on the idea of latent variables

(Kean & Reilly, 2014). The development of self-report instruments in psychology research has therefore been based primarily on the assumption that researchers are measuring unobservable, higher-order constructs or traits.

Experiential avoidance is currently conceptualized from the framework of classical test theory based on its measurement through self-report tools as scholars attempt to approximate the true score using statistical methods. Investigators frequently write about experiential avoidance as though it is a latent trait or hypothetical construct which seems problematic as many behaviors that serve this function are readily observable. Still, because experiential avoidance is based on one's relationship with their private events, the measurement of "willingness" becomes difficult to define and study. In the ACT literature, unwillingness is conceptualized as a *behavioral* unwillingness (Boulanger, Pistorello, & Hayes, 2010; Chawla & Ostafin, 2007). In this sense, one's relationship with their private events can technically be defined and observed based on their behavior (i.e., substance abuse, subtle behavioral avoidance) with no need to observe or study the frequency or intensity of these private experiences and make conclusions beyond the data which occur in space and time (Skinner, 1953). As experiential avoidance is often conceptualized as a mediating variable (Kingston, Clark, & Remington, 2010; Panayiotou et al., 2015; Castilho et al., 2017) in the development and maintenance of psychopathology, many researchers have modeled it statistically as an intervening variable (Reddy, Pickett, & Orcutt, 2006; Merwin, Rosenthal, & Coffey, 2009; Shi, Zhang, Zhang, Fu, & Wang, 2016). However, Skinner believed that the goals of behavioral science, prediction and influence of behavior, could occur without referring to hypothetical constructs, which he considered explanatory fictions overcomplicating the analysis of behavior. To study and conclude about experiential avoidance as a hypothetical construct may therefore introduce explanatory fictions into the analysis without clear behavioral referents and lead researchers to draw non-parsimonious conclusions about the prediction and influence of behavior.

One of the problems with conceptualizing experiential avoidance as a hypothetical construct rather than an observable, measurable event is potential confusion regarding that which can be classified as event and as a construct. While there is some evidence for a temporal relationship between experiential avoidance and emotional disorders (Spinhoven, Drost, de Rooij, van Hemert, & Penninx, 2014), most of the experiential avoidance research is based on cross-sectional designs. Although experiential avoidance is thought to be one of the main mechanisms in the development and maintenance of psychopathology, temporal precedence for these relationships is just beginning. Smith (2007) wrote that failing to distinguish between events, constructs, and intervening variables may lead to misunderstanding the terms which appears to be a significant problem in the literature. Furthermore, psychological events that are strongly grounded in science still may be considered constructs because they are not observable, and their measurement is also based on constructions (Fryling and Hayes, 2006). The origin of the term hypothetical construct was first used to describe the “unobservable, existential, and inferred” (p. 25), while intervening variables were based on the empirical influence of observable variables (Lovasz & Slaney, 2013). These terms have sometimes been used interchangeably and MacCorquodale and Meehl (1948) recognized this as a problem long ago, arguing for a distinction between the terms. They proposed the term hypothetical construct should be reserved for discussion of unobservable processes, while intervening variable is more appropriate when referring to “constructs that abstract the empirical relationships” (p. 106).

From the classical test theory perspective, experiential avoidance is often considered a hypothetical construct rather than an observable, measurable event or intervening variable.

Although researchers refer to the events that may be a form of experiential avoidance (i.e., drug/alcohol use), these events are far removed, and the writers describe a hypothetical construct rather than a psychological event. For example: “Experiential avoidance was modeled as a *latent* variable with three observed manifest indicators…” (Orcutt, Pickett, & Pope, 2005; p. 1014); “…investigate whether experiential avoidance is already subsumed within the more traditional coping models of whether it is a separate *construct*…” (Karekla & Panayiotou, 2011; p. 164); and “the *construct* of experiential avoidance” (Chapman, Dixon-Gordan, & Walters, 2011; p. 37). Conceptualizing experiential avoidance as a construct could, as MacCorquodale and Meehl put it, further increase confusion about what is being studied. It also seems somewhat antithetical as much of the experiential avoidance research is based on its links with observable events that were measured using empirical methods. However, as Fryling and Hayes pointed out, many of the scientific methods used to measure intervening variables are based on construction themselves which complicates the analysis. Further clarity in theory and diversity in measurement (i.e., using multiple levels of analysis) may improve the ways experiential avoidance is assessed and understood.

Given the limitations in self-report measures, solely measuring experiential avoidance via self-report may also introduce limitations to the conceptual analysis. It is perhaps more important to conceptualize experiential avoidance as an intervening variable or psychological event rather than as a hypothetical construct, especially when the goals of the behavior analytic community are to understand the relationship between behavior and the context in which it operates (Biglan & Hayes, 1996; Gifford & Hayes, 1999). Not all forms of experiential avoidance are directly observed (i.e., they occur at a covert level); however, many forms are (Kingston, Clarke, & Remington, 2010). Specifically, researchers and clinicians who think of experiential avoidance as a construct may fail to recognize observable forms of experiential avoidance if they do not fit within the narrow definition included in the self-report measure. As the operational definition is broad, experiential avoidance will be idiographic to learning history and environmental context. Topography may differ across individuals based on these factors, but function to escape or avoid aversive private events very similarly.

If the term experiential avoidance can be used to describe a class of behaviors rather than an unseen entity, it may be more useful to measure experiential avoidance according to this conceptualization. Zettle and colleagues (2012) wrote: “From a contextualistic perspective, it seems much more useful to think and speak of experiential avoidance as a functional response class that may account for comorbidity among topographically diverse forms of psychopathology, rather than as a hypothetical construct.” (p. 433). Similarly, Kashdan, Barrios, Forsyth, and Steger (2006) proposed that experiential avoidance can be considered a generalized psychological vulnerability, meaning pervasive use of experiential avoidance could increase a variety of psychological difficulties. Specifically, they found that experiential avoidance statistically mediated the relationship between maladaptive coping, emotional response styles, and uncontrollability with distress related to anxiety. They also found that experiential avoidance mediated the effect of emotion regulation strategies (suppression and reappraisal) on participants’ negative and positive life experiences, which resulted in reduced positive affect. When emotion regulation strategies are used pervasively and inflexibly as experiential avoidance, they may be a core diathesis in the maintenance of negative affect and may increase vulnerability to anxiety-related pathology.

Boulanger, Hayes, and Pistorello (2010) argue that experiential avoidance has added value beyond being conceptualized as an emotion regulation strategy. Given the empirical relationship between experiential avoidance and many psychological problems as well as diminished quality of life, they contend that experiential avoidance is a transdiagnostic, functional process associated with factors rooted in one's context. From this perspective, it appears conceptualizing experiential avoidance as an event, defined as a functional class of behaviors, will have more utility in research and clinical practice than conceptualizing experiential avoidance as a latent trait or hypothetical construct. Understanding experiential avoidance as a class of observable, malleable behaviors may lend itself to improved methods for identifying contextual cues linked with avoidance behavior.

Transdiagnostic Models of Psychopathology and Experiential Avoidance

A transdiagnostic model is a conceptual model used to explain comorbidity of psychological disorders based on factors common across conditions (Krueger & Eaton, 2015). While the form of suffering (e.g., anxiety/alcohol use) is different, the transdiagnostic process (i.e., experiential avoidance) may contribute to both. In the traditional Diagnostic and Statistical Manual (DSM) and International Statistical Classification of Diseases and Related Health Problems (ICD) nosology, psychopathology is defined categorically, and differential diagnosis is emphasized. Individuals must be experiencing a given number of symptoms to meet diagnostic criteria for a given psychological disorder. However, this approach could be problematic as various clusters of symptoms can be arranged to arrive at a diagnosis and thus the forms can vary greatly (Biskin & Paris, 2012). Assessment and treatment have also frequently been based on topography with little attention paid to function and transdiagnostic processes. The prevailing model for empirically supported treatments (ESTs) was developed based on DSM diagnoses and often lacked clear guidelines on the treatment of comorbid pathology (Westen, Novotny, & Thompson-Brenner, 2004). Attending to form over function may also lead to the problem of reification (i.e., circular reasoning, person does X *because* they are depressed, and person X is depressed because they do X) which may prevent understanding the basic function the behavior serves regardless of how it appears.

Transdiagnostic models of psychopathology are becoming increasingly popular to address common criticisms of the categorical approach such as sub-threshold symptoms which are often linked with distress and may benefit from ESTs despite the absence of a DSM diagnosis (Karsten et al., 2011). Comorbidity is the norm and not the exception, thus when an individual meets diagnostic criteria for one psychological disorder, they are increasingly likely to meet criteria for another disorder (Kessler, 2005). Furthermore, given differences in severity of diagnosis, a dimensional approach to classifying psychopathology may be more appropriate rather than diagnosing and treating based on distinct categories.

ACT was designed to lessen experiential avoidance and promote psychological flexibility including mindfulness and acceptance of one's emotional experiences in the present moment (Hayes et al., 2006). Because ACT was not developed with a targeted DSM diagnosis and rather with a goal to promote willingness and committed action toward a variety of valued domains, ACT is regarded as a trandiagnostic treatment package (McEvoy, Nathan, & Norton, 2009). Accordingly, experiential avoidance is more prevalently being described as a transdiagnostic process in the literature (Boulanger, Hayes, & Pistorello, 2010; Kashdan, Breen, Afram, & Terhar, 2010; Aldao & Nolen-Hoeksema, 2010). Similarly, the Unified Protocol (UP) for transdiagnostic treatment of emotional disorders (Barlow et al., 2010) was created to idiographically treat common difficulties according to function as opposed to topography. The authors of the UP encourage treatment of emotion-driven behaviors, which are conceptualized according to reinforcing/punishing consequences. Given the shift toward transdiagnostic processes in the literature, clinicians using existing form-based treatment models (i.e., Prolonged Exposure/Cognitive Processing Therapy) could benefit from conceptualizing based on the function of these processes rather than whether they fit with the diagnosis. Classifying experiential avoidance from a dimensional perspective may result in improvements in overall quality of life rather than aiming solely for symptom reduction.

In the Process Model of Emotion Regulation (Werner & Gross, 2010), antecedent and response focused emotion regulation strategies are distinguished. Emotion regulation strategies that are considered antecedent-focused are those aimed to modify the emotion during its onset (i.e., attentional deployment, reappraisal), while response-focused emotion regulation involves tempering the responses linked with emotion. In this model, experiential avoidance may be best understood as a response-focused emotion regulation strategy. Over time, continued use of experiential avoidance may result in continued psychological distress and dysfunction as well as loss of contact with personally meaningful activities (Karekla & Panyiotou, 2011).

Experiential avoidance is a process, not a diagnosis, and the transdiagnostic conceptualization is dimensional rather than categorical (Kring & Sloan, 2009; Mansell, Harvey, Watkins, & Shafran, 2009). To classify experiential avoidance as a functional response class aligns more accurately with this perspective as there is strong evidence experiential avoidance maintains pathology regardless of form (e.g., Kashdan, Barrios, Forsyth, & Steger, 2006; Berman, Wheaton, McGrath, & Abramowitz, 2010; Fledderus, Bohlmeijer, & Pieterse, 2010). Thus, as experiential avoidance can be defined by function and refers (at least partially) to observable events, a transdiagnostic conceptualization appears warranted.

Correlates of Experiential Avoidance

As experiential avoidance has been considered a transdiagnostic risk factor in the etiology and maintenance of psychopathology, researchers have investigated its links to many forms of human suffering. For example, one contemporary way to conceptualize the maintenance of PTSD symptoms has been through the framework of experiential avoidance. There is a well-established cross-sectional relationship between experiential avoidance and related constructs such as peritraumatic dissociation, which appear to be robust predictors of PTSD symptoms in convenience samples (Marx & Sloan, 2005; Thompson & Waltz, 2010), outcomes related to PTSD such as problematic alcohol consumption (Dvorak, Arens, Kuvaas, Williams, & Kilwein, 2013; Meyer, Morissette, Kimbrel, Kruse, & Gulliver, 2013) and associated outcomes such as cannabis dependence (Bordieri, Tull, McDermott, & Gratz, 2014). Several longitudinal studies also link experiential avoidance to PTSD symptoms (Shenk, Putnam, Rausch, Peugh, & Noll, 2014; Orcutt, Bonanno, Hannan, & Miron, 2014). Thus, experiential avoidance may be a critical factor in the maintenance of PTSD.

Similarly, experiential avoidance is thought to be an important risk factor in the development of social anxiety. It has been proposed that the safety behaviors in social anxiety are a form of experiential avoidance which function to reduce social anxiety and anxiety-related thoughts in the short-term (Mahaffey, Wheaton, Fabricant, Berman, & Abramowitz, 2012). In one study, Kashdan and colleagues (2014) found experiential avoidance was temporally related to an increase in social anxiety symptoms during an experimental condition in which participants were asked to self-disclose to a stranger. In another study, the MEAQ subscale behavioral avoidance was associated with both social anxiety symptoms and cannabis use in community sample (N = 103) of cannabis using adults (Buckner, Zvolensky, Farris, & Hogan, 2014). This is further evidence for the transdiagnostic nature of experiential avoidance. In another study, Afram and Kashdan (2015) investigated the role of experiential avoidance in social anxiety among romantic partner dyads (*N* = 51 couples) through inducing anxiety in a social rejection task in which the partners were led to believe the other partner was listing excessive negative characteristics about them. They found a relationship between experiential avoidance, rejection sensitivity, and social anxiety which could mean experiential avoidance may be used in the moment to manage fear of negative evaluation.

Experiential avoidance is associated with interpersonal problems (Gerhart, Baker, Hoerger, & Ronan, 2014), recency and lifetime frequency of self-harm (Nielsen, Sayal, & Townsend, 2016), and may interact with rumination to predict depressive symptoms (Cribb, Moulds, & Carter, 2006). It is a predictor of generalized anxiety disorder symptom severity (Newman & Llera, 2011), obsessive compulsive disorder (Abramowitz, Lackey & Wheaton, 2009), paranoid delusions (Udachina, Varese, Myin-Germeys, & Bentall, 2014), and somatic difficulties (Costa & Pinto-Gouveia, 2013). While many of these studies are cross-sectional, there is beginning longitudinal data for the relationship between experiential avoidance, as measured by the AAQ, and emotional disorders including anxiety and depression (Spinhoven et al., 2014). Participants (*N* = 2,316) were administered diagnostic interviews which were evaluated along with AAQ scores at two-year intervals over a six-year period. There was temporal stability in experiential avoidance overtime, and experiential avoidance predicted changes in distress and fear-related disorders. It also mediated the longitudinal relationship of fear disorders and distress disorders. Based on these results, experiential avoidance has an important impact on comorbid emotional disorders.

Self-Report Measures of Experiential Avoidance

The AAQ-II is a 7-item self-report measure of experiential avoidance and it is currently the most widely used measure. Following the development of the AAQ-II, several similar self-report measures of experiential avoidance have been published. Examples of specific measures include the AAQ-Stigma (AAQ-S; Levin, Luoma, Lillis, Hayes, & Vilardaga, 2014), the AAQ-Weight (AAQ-W; Lillis & Hayes, 2008), and the AAQ-Substance Abuse (AAQ-SA; Luoma, Drake, Hayes, & Kohlenberg, 2011). The AAQ-II has also been validated in multiple languages (e.g., Meunier et al., 2014; Karekla & Michaelides, 2017). As mentioned earlier, the AAQ-II has inconsistent psychometric properties which may be a central limitation to some of the research in this area. To better understand the discriminant validity of the AAQ-II, Wolgast (2014) examined the factor structure using exploratory factor analysis to evaluate the item pool and developed items to assess distress and acceptance/non-acceptance. In this study, the AAQ-II item pool was linked more strongly with items measuring distress comparing to items designed to measure acceptance/nonacceptance. Wolgast concluded that the AAQ-II appears to be more a measure of psychological distress than emotional acceptance/nonacceptance. Thus, using the AAQ-II as the sole measure of experiential avoidance may lead to uncertain conclusions about the relationship between the variables of interest and treatment outcomes.

The Multidimensional Experiential Avoidance Questionnaire (MEAQ; Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011) and a briefer version of this measure, the Brief Experiential Avoidance Questionnaire (BEAQ; Gámez, Chmielewski, Kotov, & Watson, 2014) were designed to measure experiential avoidance and address the problems related to the psychometric properties of the AAQ (i.e., internal consistency concerns; original $\alpha = .70$; Hayes et al., 2004). While the authors acknowledge the improvement in internal consistency ($\alpha = .88$), they raise concern that the AAQ-II items tap content more strongly related to distress than experiential avoidance. As the AAQ was originally developed as a measure of experiential avoidance and the AAQ-II study authors describe it as a measure of psychological flexibility, Gámez and colleagues believe a more behaviorally specific measure is needed. The MEAQ and BEAQ authors developed measure items based more closely on the operational definition of experiential avoidance and include mention of specific avoidance strategies. Gámez and colleagues believe experiential avoidance is distinct from neuroticism or negative emotionality. From a contextual perspective, experiential avoidance is the relationship one holds with their distress rather than the contents of their emotions. Therefore, measuring specific avoidance strategies rather than one's stance about emotion is important.

In several studies, measurement differences have been noted between the AAQ-II and MEAQ (Lewis & Naugle, 2017; Rochefort, Baldwin, Chmielewski, 2017). The MEAQ appears to be a better predictor of a likely PTSD diagnosis and seems to better discriminate genuine psychopathology. Rochefort and colleagues examined the construct validity of the AAQ-II and MEAQ in an online sample (*N* = 1,052) and convenience sample (*N* = 364). In their research, the AAQ-II had suboptimal convergent and divergent validity with measures of neuroticism and negative affect. The MEAQ, however, had strong convergent and divergent validity in the expected directions. The items of the AAQ-II also loaded more strongly onto factors related to mindfulness or formed distinct factors. Given the questions related to the construct and divergent validity of the AAQ-II, measuring experiential avoidance at the self-report level could be improved using the MEAQ or BEAQ.

Behavioral and Physiological Measures of Experiential Avoidance

Emotional Imagery

Although experiential avoidance is most often measured using self-report measures, some researchers have used additional methods outside of self-report. Most of these measures involve use of emotional imagery, physiological measures, and pain induction tasks where participants are dichotomized based on AAQ or AAQ-II scores (high vs. low levels). In one study, Sloan (2004) evaluated the relationship between self-reported physiological emotional reactivity in response to pleasant, unpleasant, and neutral emotionally evocative stimuli as well as experiential avoidance. Participants (N = 62) were sorted into high and low experiential avoidance groups based on AAQ scores. Overall, participants in the high experiential avoidance group endorsed stronger emotional experiences related to unpleasant and pleasant stimuli than those in the low group. At the physiological level, participants who endorsed higher levels of experiential avoidance demonstrated lower heart rate reactivity in response to unpleasant stimuli in comparison to those in the low experiential avoidance group. Sloan suggests the decreased heart rate could mean the high avoidant participants engaged in more efforts to regulate their emotions during the unpleasant films. In a similar study, participants who reported higher levels of experiential avoidance (AAQ scores) reported stronger negative affect intensity, discomfort, and electrodermal responses when exposed to an emotionally evocative film (Salters-Pedneault, Gentes, & Roemer (2007). There may be key individual differences in physiological and emotional responsivity to aversive films. Those who engage in higher levels of experiential avoidance by trait may be more likely to experience difficulties in daily life settings when exposed to distressing stimuli.

To further examine the role of experiential avoidance in response to aversive imagery, Cochrane, Barnes-Holmes, Stewart, and Luciano (2007) compared participants high (*n* = 15) and low (*n* = 14) in experiential avoidance (AAQ scores). Participants in their study completed a matching task in which they elected whether to view aversive imagery. Avoiding the aversive imagery (i.e., through selection of the neutral imagery) was punished through providing negative feedback. Participants in the high experiential avoidance group showed a larger latency to produce a correct choice resulting in an aversive (as opposed to neutral) image and reported stronger anxiety symptoms but rated aversive images as less unpleasant and emotionally arousing than the low avoidance group. In another study, participants were divided into three groups (high, mid, and low avoidance; *n* = 6 per group). Participants in this study completed the same matching task as well as event-related potentials (ERPs), brain responses to sensory information as measured through electroencephalography (EEG) technology. These participants attended more strongly to the content of the viewed images and discriminated between neutral and aversive imagery. Greater activity in the left hemisphere was specifically noted in the high experiential avoidance group. Cochrane and colleagues suggest that, as left hemisphere dominance is observed in language, those in the high experiential avoidance group utilized verbal strategies in attempts to regulate emotions.

López and colleagues (2010) assigned high and low experientially avoidant participants (based on AAQ-II scores) to watch a neutral film, complete a mood-related questionnaire, a working-memory task (pressing the space bar when recalling information about the film). They were then asked to self-report how well they could concentrate when the distraction was introduced as well as how strongly they attended to the interference. In the next trial, participants were exposed to a film with distressing content. Those in the high avoidance group rated both films more negatively than those in the low avoidance group and by contrast reported more frequent intrusive thoughts. The high avoidant group did not improve on the working memory task while the low avoidant group did. Overuse of experiential avoidance during this task may have resulted in an increase the frequency of intrusive thoughts and impaired working memory. There is some evidence that cognitive load, as measured by a task that requires recalling a long number sequence, seems to interfere with perspective taking (Knowles, 2014). Perhaps those who actively engage in more covert forms of experiential avoidance (i.e., rumination, distraction, or suppression) use more of their cognitive resources toward avoidance, missing direct learning opportunities in the environment.

Physically Aversive Stimuli

Karekla, Forsyth, and Kelly (2004) investigated the role of experiential avoidance in panic symptoms in a sample of undergraduate students high (n = 27) and low (n = 27) in experiential avoidance. Participants completed a task in which they inhaled twelve 20-second breaths of carbon dioxide enriched air to simulate panic symptoms. Participants in the high experiential avoidance group reported stronger panic symptoms and more intense fear, panic, and uncontrollability in comparison to the low experiential avoidance group. Experiential avoidance thus may serve as a particular vulnerability for anxiety-related pathology. In a similar experiment, Feldner, Zvolensky, Eifert, and Spira (2003) exposed participants (N = 48) to twenty percent carbon dioxide-enriched air to simulate anxiety symptoms. As in the previous study, participants were split into groups according to high and low avoidance. In each group, the researchers instructed half of the participants to engage in suppression of their emotional state induced by the carbon dioxide-enriched air, while the other half received instructions to notice their emotional response. Participants in the high avoidance group reported more significant anxiety and affective distress but did not report higher levels of physiological arousal. Those assigned to the high avoidance group endorsed more significant anxiety symptoms compared to the low avoidance group when instructed to engage in suppression compared to those in the observation group, suggesting suppression exacerbated symptoms.

As in the above studies, participants in another study were split into two groups as a function of high and low levels of experiential avoidance (Zettle, Peterson, Hocker, & Provines (2007). In this experiment, participants in both groups were asked to complete a challenging perceptual-motor task while also undergoing the effects of a task simulating the symptoms of alcohol consumption. Those in the high experiential avoidance group rated the alcohol consumption symptoms as more aversive than those in the low experiential avoidance group and performed more poorly on the challenging motor task. Zettle and colleagues (2012) assigned participants to two groups based on high and low levels of self-reported experiential avoidance to complete a series of analogue measures of experiential avoidance. They hypothesized that participants reporting higher levels of experiential avoidance (AAQ scores) would make more errors when sorting colored straws while wearing goggles that simulate intoxication. They also predicted that participants higher in experiential avoidance would remove their hand more quickly from ice water during a cold pressor task. Their findings were in the expected directions and Zettle and colleagues suggest this is evidence that experiential avoidance is a functional response class. Given this information, participants who self-report higher experiential avoidance may also experience similar difficulties on a ranger of other distress inducing laboratory tasks. More information regarding behavioral measures of experiential avoidance in other contexts may continue to refine this conceptualization.

Feedback, Social Stress, and Avoidance

The avoidance of negative outcomes seems to carry important survival value in some contexts. Avoidance of threatening conditions induces positive emotions (Kim, Shimojo, & O'Doherty, 2006; Delgado, Jou, LeDoux, & Phelps, 2009) and results in replication of that behavior in similar future occasions as it serves a negative reinforcement function (Murty, LaBar, Hamilton, & Adcock, 2011). Avoidance (i.e., experiential avoidance) is linked with the maintenance of anxiety disorders and other pathology as discussed above (e.g., Craske et al., 2009). Avoidant individuals also seem to attend more strongly to possible undesirable social consequences within an experimental context (McAuliffe, 2004). Specifically, highly avoidant individuals may regard negative social consequences as particularly punishing and thus be motivated to act in ways that escape or avoid the presentation of aversive social consequences. Mangiapanello and Hemmes (2015) conceptualized feedback and functional relations associated with feedback delivery from a behavior analytic perspective, contending that feedback functions as many operant conditioning procedures do, to reinforce and punish behavior. Negative feedback in particular, may carry punishing properties and is accompanied by the risk of punishing entire functional classes of behavior (Darrow, Dalto, & Follette, 2012). Yet interpersonal feedback in particular seems to have important social functions. For instance, seeking interpersonal feedback can shape social contingencies that make social interactions more reinforcing for the individuals who partake in them.

Negative interpersonal feedback delivery has been a subject of scientific inquiry. Individuals who endorse symptoms related to social anxiety and depression appear to be increasingly vulnerable to the effects of such feedback. In one study, self-worth appeared more strongly linked with receiving negative interpersonal feedback in a sample of depressed individuals (Park & Crocker, 2008). In addition, trait perfectionism and perfectionistic self-presentations are associated with social anxiety, depressive symptoms, reports of negative social feedback and rumination related to life events such that negative social feedback and interpersonal rumination mediate the relationship between perfectionism and distress (Nepon, Flett, Hewitt, & Molnar, 2011). Feedback and avoidance of feedback has also been studied as it relates to experiences of physical pain. Feedback regarding failure versus feedback related to success was associated with a stronger report of physical pain and lower pain tolerance among participants who completed the cold pressor task (van den Hout, Vlaeyen, Peters, Engelhard, & van den Hout, 2000). There also appears to be a link between emotional exhaustion and depletion of emotion regulation strategies among individuals reporting perceived abusive interactions in workplace settings, which may increase motivation to avoid social interactions (Chi & Liang, 2013; Whitman, Halbesleben, & Holmes, 2014). Avoidance of feedback has also been studied in relation to computer-based tasks in which participants were observed to engage more strongly in avoidance behavior related to aversive feedback delivered by a computer (Moustafa, Sheynin, Myers, & Boraud, 2015). However, the effects of negative feedback in relation to this task were mitigated if information regarding the incorrect response was provided.

The Trier Social Stress Test (TSST; Kirschbaum, Pirke, & Hellhammer, 1993) is a social stress analogue task that includes participation in several conditions. In the TSST, research participants are asked to give a speech and complete a mental arithmetic task before a panel of judges. Heart rate is typically measured while participants prepare to give the speech, as well as during the TSST, and afterward. Performance on the TSST is linked with increased heart rate, cortisol levels, and stress (von Dawans, Kirschbaum, & Heinrichs 2011). Participants who complete the TSST appear to engage in more cognitive avoidance strategies (Debeer et al., 2012). Stress induced during the TSST may also increase emotional avoidance (Roelofs, Elzinga, & Rotteveel, 2005) and participants higher in experiential avoidance show an elevated baseline heart rate before completing the TSST (Brown, 2018) which could mean trait avoiders are more quickly physiologically distressed. However, more research on the relationship between state and trait experiential avoidance related to the TSST could provide further evidence for how experiential avoidance functions in social contexts. While laboratory conditions are generally contrived, measuring individual differences in tasks of physical and social discomfort could lead to better conclusions about how experiential avoidance presents in naturalistic settings.

Study Rationale and Hypotheses

Based on the notion that experiential avoidance can be conceptualized as a functional response class, it was hypothesized that experiential avoidance would be related across two different analogue tasks. While there is evidence that experiential avoidance is related across tasks of physiological discomfort, the relationship between physical and social/emotionally uncomfortable contexts is less understood. A behavior analogue paradigm was used to investigate the relationship between state and trait experiential avoidance associated with performance on the cold pressor task and TSST among a convenience sample of undergraduate students. Those higher in levels of trait experiential avoidance would, conceptually, be more likely to report higher levels of state experiential avoidance across contexts regardless of the form of discomfort if experiential avoidance is a functional response class.

A set of empirically informed hypotheses were developed to make predictions regarding participants' performance on the cold pressor task and TSST as well as on self-report measures of experiential avoidance, and state-based measures including emotion dysregulation, anxiety, negative and positive affect, and fear of negative evaluations. It was hypothesized that the TSST and cold pressor conditions would evoke discomfort across these state-based measures and increase motivation to reduce negative emotion/physical discomfort by engaging in experiential avoidance in the moment.

Cold Pressor Task Hypotheses

Hypothesis One: It was anticipated that participants endorsing higher levels of self-reported **state** and **trait** experiential avoidance [as measured by the state measure of experiential avoidance (SMEA), and trait-based measures: AAQ-II and MEAQ] would demonstrate lower threshold ratings as measured by their performance on the cold pressor task than participants self-reporting low levels of state and trait experiential avoidance. **Threshold** on the cold pressor task was measured by the length of time participants immersed their hand in icy water until first reporting they were experiencing pain by saying "painful."

H1a) It was predicted that lower threshold on the cold pressor task would be negatively correlated with state and trait experiential avoidance as measured by the AAQ-II, MEAQ and SMEA at baseline and post cold pressor. Specifically, it was expected that lower threshold would be inversely correlated with higher perceived pain tolerance and average and maximum heart rate. It was hypothesized that lower threshold would be most strongly related to SMEA scores post cold pressor.

H1b) It was anticipated that lower threshold on the cold pressor would be negatively associated with higher intensity on the cold pressor task. It was also predicted that participants who reported higher trait experiential avoidance would report decreased cold pressor threshold and increased cold pressor intensity.

Hypothesis Two: It was hypothesized that participants self-reporting higher levels of **state** and **trait** experiential avoidance would have lower tolerance levels, as measured by the cold pressor task, than participants self-reporting lower levels of experiential avoidance. **Tolerance** on the cold pressor task was measured by the amount of time participants elected for their hand to remain immersed in icy water.

H2a) It was assumed that lower tolerance on the cold pressor task would be negatively correlated with SMEA, AAQ-II and MEAQ scores. Further, it was expected that lower tolerance would be negatively correlated with higher perceived pain tolerance and average and maximum heart rate. It was hypothesized that lower tolerance would be more strongly correlated with state experiential avoidance post cold pressor than the other variables.

H2b) It was anticipated that participants reporting higher levels of trait experiential avoidance would show decreased tolerance of the cold pressor task.

Hypothesis Three: It was hypothesized that participants indicating higher levels of **state** and **trait** experiential avoidance would evidence lower levels of endurance, as measured by the cold pressor task, than participants self-reporting lower levels of state and trait experiential avoidance. **Endurance** on the cold pressor task was measured by subtracting threshold from tolerance to assess how long participants immersed their hand in icy water after reporting pain.

H3a) It was hypothesized that lower endurance on the cold pressor would be negatively correlated with state experiential avoidance, measured by SMEA scores at baseline and post cold pressor, and trait experiential avoidance measured by the AAQ-II and MEAQ. It was anticipated that higher endurance would be positively correlated with higher perceived pain tolerance and inversely correlated with average and maximum heart rate. It was further hypothesized that lower endurance would be most strongly correlated with state experiential avoidance post cold pressor.

H3b) It was proposed that lower endurance on the cold pressor would predict higher levels of state experiential avoidance post cold pressor as measured by the SMEA. It was hypothesized that lower cold pressor endurance would predict state experiential avoidance post cold pressor above and beyond perceived pain tolerance, trait experiential avoidance, and heart rate measures.

Hypothesis Four: It was hypothesized that participants who self-reported higher levels of **state** and **trait** experiential avoidance would rate the intensity of their experience with the cold pressor task more strongly than participants self-reporting lower levels of state and trait experiential avoidance. **Intensity** on the cold pressor task was measured through asking participants to rate the intensity of their pain on a visual analogue scale.

H4a) It was hypothesized that higher intensity levels on the cold pressor task would be positively correlated with state experiential avoidance measured by the SMEA at baseline and post cold pressor and trait experiential avoidance measured by the AAQ-II and MEAQ. It was also predicted that higher intensity levels would be the most strongly correlated with state experiential avoidance post cold pressor.

H4b) It was expected that participants reporting higher levels of trait experiential avoidance would report increased intensity on the cold pressor task.

Trier Social Stress Test Hypotheses

Hypothesis Five: It was hypothesized that participants reporting higher levels of **state** and **trait** experiential avoidance, as measured by the SMEA at baseline and post TSST, trait experiential avoidance: AAQ-II, and MEAQ, in addition to reporting lower threshold on the cold pressor task, would also indicate lower **threshold** ratings on the TSST as measured by a forced threshold rating (i.e., indicating when they first experience emotional discomfort during the speech and arithmetic through pressing the lap button on the study cell phone) than participants lower in state and trait experiential avoidance.

H5a) It was hypothesized that lower threshold on the TSST would be negatively correlated with state and trait experiential avoidance as measured by the SMEA at baseline and post TSST and trait experiential avoidance measured by the AAQ-II and MEAQ at baseline. It was predicted that lower threshold would be inversely correlated with higher interpersonal sensitivity, fear of negative evaluations, and average and maximum heart rate before and during the TSST. It was hypothesized that lower threshold would be most strongly associated with state experiential avoidance post TSST.

H5b) It was predicted that lower threshold on the TSST would be negatively associated with higher intensity on the TSST for both the speech and arithmetic tasks.

Hypothesis Six: It was hypothesized that participants reporting higher levels of **state** and **trait** experiential avoidance measured by the SMEA at baseline and post TSST, AAQ-II, and MEAQ, beyond having lower tolerance on the cold pressor task, would evidence lower <u>**tolerance**</u> on the TSST as measured by the duration of time participants elected to give a speech and how long participants elected to solve arithmetic problems.

H6a) It was anticipated that lower tolerance on the TSST would be negatively correlated with state and trait experiential avoidance, interpersonal sensitivity, fear of negative evaluations, and heart rate measures before and during the TSST. It was hypothesized that lower tolerance would be most strongly correlated with state experiential avoidance post TSST.

H6b) It was assumed that participants reporting higher levels of trait experiential avoidance would show decreased tolerance of the TSST speech and arithmetic tasks.

Hypothesis Seven: It was hypothesized that participants reporting higher levels of **state** and **trait** experiential avoidance, in addition to performing with lower levels of endurance on the cold pressor task, would demonstrate lower levels of <u>**endurance**</u> on the TSST. This was measured by subtracting threshold from tolerance to obtain a measure of how long participants continued to give a speech and complete the arithmetic task after self-reporting emotional discomfort.

H7a) It was anticipated that lower endurance on the TSST would be negatively correlated with state experiential avoidance, measured by SMEA scores at baseline and post TSST, and trait experiential avoidance measured by the AAQ-II and MEAQ. It was proposed that higher endurance would be positively correlated with higher perceived interpersonal sensitivity and fear of negative evaluations as well as inversely correlated with average and maximum heart rate. It was further hypothesized that lower endurance would be most strongly correlated with state experiential avoidance post TSST.

H7b) It was hypothesized that lower endurance on the TSST speech and arithmetic tasks would predict higher levels of state experiential avoidance post TSST as measured by the SMEA. It was expected that lower cold pressor endurance would predict state experiential avoidance post TSST above and beyond interpersonal sensitivity, trait experiential avoidance, and heart rate measures.

H7c) It was presumed that lower endurance on the TSST speech and arithmetic tasks would predict lower endurance on the cold pressor task above and beyond trait experiential avoidance, state experiential avoidance post TSST, and heart rate measures during the speech and arithmetic tasks.

H7d) It was expected that lower endurance on the TSST speech task would predict lower endurance on the arithmetic task above and beyond trait experiential avoidance, state experiential avoidance post TSST, and heart rate measures during the speech.

Hypothesis Eight: It was hypothesized that participants who reported higher levels of **state** and **trait** experiential avoidance would report greater intensity of physiological pain during the cold pressor task and would also report greater levels of emotional pain during the **<u>intensity</u>**

rating portion of the TSST as measured by placing a vertical line on a visual analogue scale following the speech and arithmetic tasks.

H8a) It was predicted that greater intensity on the TSST would be positively correlated with state experiential avoidance measured by the SMEA at baseline and post TSST and trait experiential avoidance measured by the AAQ-II and MEAQ. It was hypothesized that higher intensity levels would be the most strongly correlated with state experiential avoidance post TSST.

H8b) It was expected that participants reporting higher levels of trait experiential avoidance would report increased intensity of the TSST speech and arithmetic tasks.

Self-Report Hypotheses

Hypothesis Nine: It was hypothesized that trait anxiety, negative affect intensity, positive affect intensity, state emotion dysregulation, and fear of negative evaluations would be associated with higher levels of **state** and **trait** experiential avoidance as measured by the SMEA at baseline and post cold pressor and TSST and AAQ-II and MEAQ.

H9a) It was expected that there would be positive correlations between state experiential avoidance, trait experiential avoidance, and the cold pressor and TSST intensity, and trait anxiety, state anxiety, negative affect intensity, state emotion dysregulation, and fear of negative evaluations. It was predicated that these variables would be positively correlated with positive affect intensity. It was hypothesized that there would be negative correlations between state experiential avoidance, trait experiential avoidance, and the cold pressor and TSST threshold, tolerance, and endurance and trait anxiety, state anxiety, negative affect intensity, state emotion dysregulation, and fear of negative evaluations. Finally, it was hypothesized that these variables would be positively correlated with positive affect intensity.

H9b) It was hypothesized that there would be a statistically significant change between state anxiety (increase), negative (increase) and positive affect intensity (decrease), emotion dysregulation (increase), fear of negatives evaluations (increase), state experiential avoidance (increase), and heart rate measures (increase) between baseline and post tasks as well as pre-tasks for heart rate measured during speech preparation. Cold pressor and TSST speech and arithmetic endurance were expected to predict these variables above and beyond perceived pain tolerance, interpersonal sensitivity, and heart rate variables.

METHOD

Participants

To calculate the total sample pool of participants required to reach a medium effect size, G*Power 3.0 software (Faul, Erdfelder, Lang, & Buchner, 2007) was used to conduct an a priori statistical power analysis based on eight continuous predictor variables in regression equations. Based on the results of this a prior analysis, a total sample of 160 participants was required.

Recruitment

The study received full approval by the WMU Human Subjects Institutional Review Board (HSIRB; Appendix A). The student investigator and project managers contacted instructors within the departments of psychology, sociology, communication, anthropology, gender and women studies, the specialty program in alcohol and drug use, holistic health care, global and international studies, the music department, and within the honors college to recruit undergraduate students to participate. Instructors who agreed to participate in the recruitment process showed a recruitment slide advertising the study (Appendix B) or had a research assistant visit their classroom to read a description of the study from a recruitment script (Appendix C). The script contained information stating that the investigators were examining physical and psychological reactions to two stressful tasks that involve physical and social discomfort. Research assistants who visited the classrooms passed out handouts regarding the study with contact information for the student and principal investigator (Appendix D). Interested participants contacted the investigators through the study email address available on the handouts or through telephone in the Trauma Research Laboratory by calling the phone number provided on the handout or through study fliers (Appendix E).

Procedure

Scheduling and Informed Consent

The student investigator and project managers scheduled sessions for potential participants to participate in the study. The informed consent document (Appendix F) was read fully with each participant, the contents were then reviewed, and the informed consent document was signed by both the participant and the primary research assistant who was referred to as the "experimenter" in this study. Several potential participants (n = 2) shared they did not wish to complete a public speaking task and therefore they did not participate in the study or sign the consent document.

Instrumentation

Heart Rate Measurement

After signing the informed consent document, participants were given visual (Appendix G) and verbal instructions describing how to attach the heart rate monitor. Heart rate was monitored using an elastic strap and chest transmitter that transmits heart rate to a wrist watch device worn on the participant's right hand. All heart rate monitors and watches were sanitized before and after use. Participants attached the devices and research assistants confirmed the device was working before setting a timer for ten minutes and started the heart rate watch to take baseline heart rate data. During the baseline heart rate measurement, participants remained seated and completed the packet of self-report questionnaires while their heart rate was being measured. At the end of ten minutes, the research assistant stopped the watch and recorded each participant's average and maximum heart rate on the experimenter datasheet checklist for whichever task was conducted first (Appendix H and I).

Self-Report Measures

An investigator designed demographic questionnaire (Appendix J) was used to measure age, gender, ethnicity, relationship status, educational status, annual household income, and handedness to control for in the cold pressor condition. Participants were also asked to rate their perceived level of pain tolerance on a scale from 1 = *poor*; 2 = *fair*; 3 = *moderate*; 4 = *good* and to report whether they had the following disqualifying medical conditions: Raynaud's disease, schizophrenia, urticaria (hives), stroke, history of abnormal screening EKG, history of heart disease, history of stroke, currently using a pacemaker, and untreated high blood pressure. These were considered exclusionary criteria to prevent adverse reactions and to control for conditions that could affect one's responses to pain. Two participants reported one of these conditions and thus did not continue with completing the study.

Acceptance and Action Questionnaire-II (*AAQ-II*; Bond, Hayes, Baer, Carpenter, Guenole, Orcutt, Waltz, & Zettle, 2011). The AAQ-II is a 7-item self-report measure of experiential avoidance/psychological inflexibility. The items are rated on a 7-point Likert-type scale with a range of 1 = *never true* to 7 = *always true,* with higher scores reflecting greater levels of experiential avoidance/psychological inflexibility. The authors of the AAQ-II reported good internal consistency ($\alpha = .84$) and good test-retest reliability at .81 and .79 for twelve and three months, respectively. The AAQ-II served as a self-report measure of trait experiential avoidance in the present study and was administered at baseline only. Internal consistency of the AAQ-II was excellent ($\alpha = .90$).

Multidimensional Experiential Avoidance Questionnaire (*MEAQ;* Gámez, Chmielewski, Kotov, Ruggero, & Watson, 2011). The MEAQ is a 62-item self-report measure of experiential avoidance that contains six dimensions: behavioral avoidance, distraction and suppression, repression and denial, procrastination, distress aversion, and distress endurance. It was developed based on problems related to the AAQ-II's internal consistency and discriminant validity from neuroticism and negative emotionality. The MEAQ assesses greater content coverage than the AAQ-II through the six dimensions and the items were developed to more explicitly measure experiential avoidance according to its operational definition. Respondents complete items on a Likert-type scale that ranges from 1 = *strongly agree* to 6 = *strongly disagree.* Higher scores on the measure correspond to higher levels of experiential avoidance. The MEAQ has evidenced good internal consistency as well as excellent convergent validity with other measures of avoidance and measures of stress avoidance, alexithymia, social avoidance, and suppression and possesses excellent discriminative validity. The MEAQ was used as a self-report measure of trait experiential avoidance in the present study and was administered at baseline only. Internal consistency of the MEAQ was excellent in the present study ($\alpha = .91$).

State Measure of Experiential Avoidance (*SMEA*; Kashdan et al., 2014). The SMEA is a brief 4-item measure of state-based experiential avoidance. Items are rated on a Likert-type scale ranging from 1 = *very slightly or not at all* to 5 = *extremely.* It was originally designed as an experience sampling state measure and is positively correlated with the AAQ-II ($r = .75$). The SMEA was given at baseline and post cold pressor and TSST to evaluate potential changes in state levels of experiential avoidance across the cold pressor and TSST. Internal consistency of the SMEA was good at baseline (α = .80) and in each condition (α = .86 cold pressor; α = .81 TSST).

State Difficulties in Emotion Regulation Scale (*S-DERS*; Lavender, Tull, DiLillo, Messman-Moore, & Gratz, 2017). The S-DERS is a 30-item self-report measure of state emotion regulation encompassing four subscales: nonacceptance of emotional responses, difficulties modulating emotional and behavioral responses in the moment, limited awareness of current emotions, and limited clarity about current emotions. Respondents rate items on a 5-point Likert-type scale ranging from 1 = *not at all* to 5 = *completely*. The S-DERS is associated with measures of trait emotion dysregulation and related constructs including experiential avoidance, affect intensity and reactivity, and mindfulness. It has excellent internal consistency, construct validity, and predictive validity of the total scale and adequate levels of predictive and construct validity (Lavender et al., 2017). The S-DERS was used as a measure of state emotion dysregulation in the present study. Participants completed this measure at baseline and post cold pressor and TSST. Internal consistency was good at baseline (α = .80) and acceptable post cold pressor (α = .72) and TSST (α = .79).

State-Trait Anxiety Inventory (*STAI*; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1977). The STAI is a 40-item self-report instrument assessing state and trait symptoms of anxiety. Items are responded to on a four-point Likert-type scale ranging from 1 = *Almost Never* to 4 = *Almost Always*. Higher scores are reflective of greater anxiety. Twenty of the 40 items correspond to state anxiety, while the other 20 items assess trait anxiety. The study authors report internal consistency coefficients to range from .86 to .95, with test-retest reliability values to range between .65 and .75 over a two-month duration (Spielberger et al., 1983). The authors of the STAI also report good construct and concurrent validity (Spielberger, 1989). Participants completed the STAI at baseline as a measure of state and trait anxiety and filled out the state version of the measure once following the cold pressor and once following the TSST. Internal consistency of trait anxiety was excellent (α = .91) and state anxiety internal consistency at baseline was considered good (α = .88). State anxiety internal consistency was good post cold pressor (α = .81) and excellent post TSST (α = .92).

Positive and Negative Affect Schedule (*PANAS*; Watson, Clark, & Tellegen, 1988). The PANAS is a self-report measure of positive and negative affect with two 10-item mood scales. Participants respond to items on the PANAS to indicate the extent to which they have experienced a given emotion within the specified time duration, using a 5-point Likert-type scale ranging from 1 = *very slightly or not at all* to 5 = *extremely*. Reliability coefficient estimates were .86 to .90 for the Positive Affect Scale and .84 to .87 for the Negative Affect Scale (Watson, Clark, & Tellegan, 1988). The PANAS items were developed using a principal components analysis of a mood checklist created by Zevon and Tellegen (1982) which they assert measures the affective lexicon in a broad way. The PANAS was administered to assess positive and negative affective experiences at baseline and following each condition. Internal consistency of negative affect intensity was considered good at baseline, post cold pressor, and TSST (α = .87; α = .87; α = .88, respectively). Positive affect internal consistency was good at baseline (α = .88) and excellent post cold pressor (α = .91) and TSST (α = .90).

Brief Fear of Negative Evaluation Scale (*BFNES;* Rodebaugh et al., 2004). The BFNES is a 12-item self-report measure of the tendency to fear negative evaluation. Respondents rate items on a scale ranging from 1 = *not at all characteristic of me* to 5 = *extremely characteristic of me.* The BFNES converges with measures of social anxiety and depression and diverges from measures of agoraphobic avoidance. It also has excellent inter-item reliability (α =

.97) and test-retest reliability over a period of two weeks (*r* = .94). The BFNES was used to evaluate the relationship between negative evaluation fears and experiential avoidance. It was administered at baseline and post TSST, showing acceptable internal consistency (α = .73; α = .79, respectively).

Brief Symptom Inventory (*BSI*; Derogatis, 1982). The BSI is a 53-item self-report measure designed to assess psychological distress and symptoms related to psychiatric disorders. Respondents indicate their degree of experienced distress on a 5-point Likert type scale ranging from 0 = *not at all* to 4 = *extremely*. Higher scores indicate greater distress levels. The BSI assesses the following domains: somatization (α = .80), obsessive/compulsive thinking (α = .83), interpersonal sensitivity (α = .74), depression (α = .85), anxiety (α = .81), hostility (α = .78), phobic anxiety (α = .77), paranoid ideation (α = .77), and psychoticism (α = .71). These domains may be calculated as subscales and the BSI can also be scored using a General Severity Index (summing ratings), Positive Symptom Total (frequency of symptoms reported), and Positive Symptom Distress Index (measure of intensity of distress). The measure has good internal consistency (α's = .75-.96) and good test-retest reliability (.68-.91). The BSI also has convergent validity with the Symptom Checklist-90-Revised (*r* = .92-.99). The interpersonal sensitivity subscale of the BSI was used as a trait predictor of responses to the social stress task in the present study. Internal consistency for this subscale was considered acceptable (α = .70).

Social Desirability Scale-17 (*SDS-17*; Stöber, 2001). The SDS-17 is a 17-item self-report measure of social desirability of responses in research, or the tendency to misrepresent one's beliefs to earn the approval of others. Items on the SDS-17 are responded to according to endorsing items as true or false. The SDS-17 has acceptable to good convergent validity with other self-report measures of social desirability (e.g., Eysenck Personality Questionnaire-Life

Scale, Sets of Four Scale, Marlowe-Crowne Scale) with correlations ranging between $r = .52$ and $r = .85$. The measure also appears sensitive to instructions that evoke social desirability and is associated with related constructs including impression management. The SDS-17 has good discriminant validity from neuroticism, extraversion, psychoticism, and openness to experience (as evidenced by non-significant correlations) and some significant associations with agreeableness and conscientiousness. The SDS-17 was given at baseline to evaluate social desirability of responding in the present study. However, internal consistency was poor ($\alpha = .53$) and therefore it was not used in any inferential analyses beyond the correlational analyses.

Analogue Measures

To control for the potential of one condition to impact another, tasks were counterbalanced across all sessions, alternating between completing the physical discomfort condition and the social discomfort condition first.

Cold Pressor Task

Convection is a process that occurs when movement inside fluid causes the temperature of the fluid to increase and for heat to transfer more quickly. The cold pressor apparatus was designed to prevent the process of convection from occurring as rapidly using a motorized pump to regulate the flow of water through tubing connecting two insulted buckets of ice water (Appendix K). To counterbalance, the cold pressor task was administered in an alternating order across participants either after they completed the baseline self-report measures and baseline heart rate monitoring or after the TSST data were collected. The cold pressor task in this study involved first immersing one's left hand in a chest of water regulated at 68 degrees Fahrenheit for two minutes. Before completing this portion, participants were given the following instructions: *"When I say go, please place your left hand into the ice water at least up to your* *wrist. I will tell you when to stop."* Research assistants then started the heart rate wrist watch to collect cold pressor heart rate average and maximum data and timed the task for two minutes. After two minutes, participants were told to "stop" and removed their hand from the 68-degree ice chest. Next, they were given the following instructions:

> Please place your left hand into the icy water at least up to your wrist. Please say "painful" when the cold sensation first becomes painful to you and try to hold your hand in the water as long as possible. Although we would like you to try to hold your hand in the water as long as possible, the decision of when to remove it is entirely up to you (Zettle et al., 2012; p. 437).

The backup research assistant then turned on the motorized pump and the participant placed their left hand in the cold pressor apparatus regulated at 40-degrees Fahrenheit. The timer was set for five minutes and heart rate data continued to be collected by the experimenter using the heart rate watch. Four behavioral indices of experiential avoidance were measured using the criteria outlined by Zettle and colleagues (2012). In that paper, threshold was operationalized as the following: "the length of (hand) immersion in the icy water until each participant reported pain" (p. 436); tolerance as: "the total amount of time each participant's hand remained in the icy water" (p. 436); endurance as "subtracting the threshold from the tolerance measure to reflect how long each participant kept his or her hand immersed in the water after indicating it was painful" (p. 436); and intensity as: "asking participants immediately after they had removed their hand from the water to rate the intensity of experienced pain during the task by placing a vertical mark along a 100-mm visual analogue scale (where 0 mm = *no pain* and 100 mm = *worst possible pain*)" (p. 436). These criteria were collected from each participant during the cold pressor portion of the study and were recorded on the cold pressor datasheet. If participants did not report pain at all, their threshold was recorded as zero. As soon as they removed their hand from the water, the wrist watch was stopped, and average and maximum heart rate data were recorded. At the end of the cold pressor task, a visual analogue scale drawn to scale from 0 – 100 mm (Appendix L) was given to participants to measure intensity with the following instructions:

> Please place a vertical mark along this scale to indicate the total physical pain you experienced during this experiment. Place marks closer to 0 mm to indicate less pain and closer to 100mm to indicate more pain.

When participants completed the intensity rating, they were given the packet of state-based measures (SMEA, S-DERS, PANAS, STAI – state) to complete regarding their experience in the cold pressor task. All participants were offered the option for a ten-minute break following whichever task was administered first.

Trier Social Stress Test

The TSST (Kirschbaum et al., 1993) was modified from its original format to approximate the four behavioral indices of experiential avoidance measured during the cold pressor task. The TSST involved mentally preparing for and delivering a speech regarding why they (participant) believed they were a good candidate for their ideal job. Participants were given 10 minutes to prepare for the speech. Following the speech portion of the task, participants completed a challenging mental arithmetic task intended to induce distress. The arithmetic task involved mentally subtracting the number 13 from 1,022, being given feedback when a mistake was made, and asked to start over from 1,022 each time there was an error in performing the arithmetic. Both the speech and arithmetic portion of the TSST were evaluated by two confederate judges (research assistants) who wore white lab coats. Judges were instructed to keep a flat, neutral affect and wrote contrived feedback on a clipboard throughout the duration of the speech and arithmetic task. A copy of the judge script can be found in Appendix M. While the TSST and cold pressor task were administered in a counterbalanced order, the speech task always preceded the arithmetic task, a limitation that will be noted in the discussion section. The following instructions were read to participants regarding the TSST:

> This is the speech portion of the task. You are to mentally prepare a speech describing why you would be a good candidate for your ideal job. You should aim to talk as long as you can. Your speech will be videotaped and reviewed by a panel of judges trained in public speaking. You have 10 minutes to prepare and your time begins now."

The experimenter then set their personal timer for 10 minutes and began recording heart rate data while the participant prepared for their presentation. After pressing the "start" button on the wrist watch, the experimenter left the room. If participants asked for writing utensils or paper to prepare for the speech, this request was denied, and they were instructed to do the best they could to prepare mentally. After 10 minutes elapsed, the experimenter re-entered the room, stopped the wrist watch and recorded the average and maximum heart rate data. Participants were given a cell phone with a digital timer and were instructed to click the lap button to record where in the speech they first experienced emotional discomfort. The experimenter read the following instructions to participants:

> We are interested in learning more about the discomfort you experience during this task and how that relates to your heart rate. It is important that you are honest. Please click the button when you first notice you are experiencing discomfort during the speech. The judges are not aware of this portion of the experiment. They believe you will have instructions in front of you to remind you about your speech task. When or if you click the button will not affect how they rate your speech. This discomfort rating is known only to myself and those running the experiment. If you do not experience discomfort during the speech, do not click the button.

Pressing the lap button was used as a measure of threshold (the first-time participants experienced discomfort) during the speech and arithmetic tasks. A video camera was set up on a tripod, which was used as a prop in the present study to increase the social stress of the TSST. The experimenter left the room and returned with two judges wearing white lab coats. The judge who had a speaking role always pretended to turn on the prop video camera. Both judges sat in chairs across the room from the participant. One of the confederate judges delivered the following instructions to the participants while keeping a flat, neutral affect:

> This is the speech portion of the task. You are to deliver a speech describing why you would be a good candidate for your ideal job. I will be tending to the monitor, so please direct your attention toward the video camera. Although we would like you to try to give a speech for as long as possible, the decision of when to stop is entirely up to you. You may elect to stop the speech at any time. If you choose to do this, please say, 'finished.' Your time begins now.

After these instructions were read, the experimenter immediately started the timer on the cell phone to record when participants first experienced emotional discomfort during the speech and started the heart rate wrist monitor to begin recording average and maximum heart rate during the speech. While the TSST typically involves asking participants to speak for a period of five to ten minutes, this portion was modified to obtain a standardized measure of tolerance (how long participants were willing to give the speech). If the participant spoke for a full five minutes, one of the judges stopped the speech by telling the participant that their allotted time for the speech was up. If the participant stopped speaking for a period of 20 seconds or longer, one of the judges gave the following prompt:

> "Are you finished? You still have time remaining and may continue if you are not finished."

When participants reported they were finished speaking, the experimenter temporarily excused the judges from the room. The experimenter stopped the wrist watch and recorded average and maximum heart rate data for the speech on the TSST datasheet. A visual analogue scale regarding the intensity of the task, drawn to scale from 0 – 100 mm, (Appendix N) was administered. They also answered a yes or no question unique to the TSST tasks: "Sometimes people want to leave a situation, but do not leave because they would feel stigmatized or uncomfortable. If you could have left this situation, would you have left?” on the intensity recording scale after the speech and after the arithmetic tasks. Participants were then given the following instructions by the experimenter:

> During the next portion of this task, please also click the button when you first notice you are experiencing discomfort. The judges are not aware of this portion of the experiment. When or if you click the button will not affect how they rate your abilities. This discomfort rating is known only to myself and those running the experiment. If you do not experience discomfort during the task, do not click the button.

The experimenter then left the room and re-entered with the confederate judges. One confederate judge always held the speaking role and delivered the following instructions:

> During the final 5-minute math portion of this task, you’ll be asked to sequentially subtract the number 13 from 1,022. You will verbally report your answers aloud and be asked to start over from 1,022 if a mistake is made. Although we would like you to try to continue for as long as possible, the choice to stop is entirely up to you. You may elect to stop the task at any time. If you choose to do this, please say, ‘finished.’ Your time begins now.

The experimenter then started both the cell phone timer to obtain the arithmetic threshold as well as a digital timer for five minutes. Judges took note of arithmetical errors and the speaking judge provided the following prompt when an error was made:

“That’s incorrect, please start over from 1,022.”

During the arithmetic task, participants also pressed the cell phone lap button to record when they first experienced emotional discomfort during the arithmetic task. If they did not report discomfort, their threshold rating was recorded as zero as it was in the speech task and cold pressor task. After the participants indicated they were finished with the task or after five minutes had elapsed, the speaking judge ostensibly turned off the video camera and the judges were dismissed from the room by the experimenter. The experimenter recorded each participant’s average and maximum heart rate as well as their threshold on the TSST datasheet. Intensity of the arithmetic task was next evaluated and consistent with the speech task, they were asked if they would have left this situation if they could have. Participants then completed the post-TSST packet of state-based measures (SMEA, S-DERS, PANAS, and STAI-state). Participants were debriefed at the end of the last task. When the TSST was administered last, debriefing occurred post-TSST, and when the cold pressor task was completed last, debriefing occurred post-cold pressor. The following instructions were read as part of the debriefing process:

> Thank you for your participation today. Your task performance was not actually recorded and no analysis of your performance was completed. This task is in no way reflective of your aptitude or ability. We hope that this task was not too stress inducing, but please take a referral slip should you feel the need to seek psychological services regarding any of what your participation required today. For the purposes of preserving the research question, we would like to remind you to please refrain from informing others about what your participation today entailed.

Participants were then given a two-item questionnaire (Appendix O) asking if their participation in the experiment produced lasting distress and if they felt the need to seek mental health services and if they wanted to talk with the investigators or a graduate-level research therapist about their distress. No participants indicated they needed to talk with someone during this experiment, but the investigators were available by phone or in person to conduct crisis intervention and de-escalation if needed. Participants were given a list of referrals to community agencies for psychological services in the event they felt the need to seek mental health services (Appendix P). At the end of the study, participants were provided with an extra credit slip with the study title and amount of time they participated to provide to their instructor should they offer extra credit for participating in psychological research.

Design

A repeated measures design was used to investigate the relationship between baseline and post cold pressor and TSST state-based measures. Cross-sectional analyses were also conducted to evaluate the relationship between trait-based measures and state-based measures.

RESULTS

The present study was designed to investigate the relationship between two behavior analogue measures of experiential avoidance across contexts that involved physiological and emotional discomfort. Performance on the cold pressor task was compared to performance on the TSST. State and trait experiential avoidance, emotion dysregulation, positive and negative affect, state and trait anxiety, interpersonal sensitivity, fear of negative evaluations, and social desirability were measured at baseline. State-based measures were administered again following the cold pressor task and TSST. Physiological measures (heart rate average and heart rate maximum) were assessed at baseline and post cold pressor and TSST performance. Four indices were used to conceptualize experiential avoidance on the cold pressor task and TSST including threshold, tolerance, endurance, and intensity (see Zettle et al., 2012). A sample of undergraduate students (*N* = 133) were recruited from the campus of Western Michigan University (WMU) to participate in the present study. While an a priori power analysis yielded a sample size of 160 participants based on eight continuous predictor variables, due to logistical issues with recruitment, this sample was not reached. This will be further discussed in the limitations section.

Participants

The mean age reported was 20 (*SD* = 4.31) and participants ranged in age from 18-51. Sixty-six percent of participants identified as female (*n* = 88); 32% male (*n* = 43); and 1.5% identified as transgender (*n* = 2). Fifty-four percent of the sample described themselves as European American or White (*n* = 70) followed by twenty-four percent identifying as African

American or Black (*n* = 31), seven percent Asian or Asian American (*n* = 9), six percent mixed heritage (*n* = 7), five percent Chicano/a/Latino/a/Hispanic (*n* = 6), two percent as other (*n* = 3), and two percent identifying as Middle Eastern or Arab American descent (*n* = 4). The average household income reported by participants was < $10,000 (*SD* = 1.90), with 88% indicating their highest education completed was "some college" (*n* = 117). Eighty-eight percent of the sample also described their relationship status as single, never married, not living with partner (*n* = 116). Eighty-eight percent of participants reported they were right handed (*n* = 117) with 11% left handed (*n* = 15) and .8% (*n* = 1) ambidextrous. Most of the sample 42% (*n* = 56) rated their pain tolerance as "moderate" while 34% described their pain tolerance as "good" (*n* = 45), 18.8% rated their pain tolerance as "fair" (*n* = 25), and 5% (*n* = 7) described their pain tolerance as "poor."

Preliminary Analyses

Treatment of Missing Data

All analyses were conducted using Statistical Packaging for the Social Sciences (SPSS) version 20. The database was first evaluated for missing data and patterns that would constitute data missing in a non-random pattern. To test these assumptions, Little's Missing Completely at Random (MCAR) test was conducted ($\chi 2$ = 4952.98; *df* = 16422; *p* = 1.00), yielding non-significant results. According to Tabachnick and Fidell (2007), finding a non-significant effect indicates data are missing in a random pattern. Thus, data in the present study were considered MCAR and the expectation maximization algorithm was used to replace missing data values. Expectation maximization was selected over other approaches to missing data (i.e., multiple imputations, maximum likelihood estimation) as it estimates maximum likelihood model parameters and is preferred for cases of missing data.

Normality, Linearity, and Homoscedasticity

To test the assumption of normality, skewness and kurtosis values were computed and the distributions for all study variables were evaluated. A visual analysis of the histograms and Q-Q plots for all study variable total scores was also completed to test the assumption of linearity. Data generally fell on straight lines or was corrected by a log 10 transformation and subsequently met the assumption of linearity which will be described in more detail below. Residual plots were also evaluated and there was no evidence that the assumption of homoscedasticity was violated. Skewness and kurtosis are terms used to describe distribution normality, with skewness characterizing symmetry of the distribution and kurtosis referring to the degree of outlying cases in the distribution. The criterion for evaluating skewness and kurtosis as outlined by Mertler and Vannatta (2005) and Lei and Lomax (2005) were used to assess for potential violation of the normality assumption. If the absolute value for skewness and kurtosis falls between -1 and +1, data are considered normally distributed with values closer to zero being considered ideal. According to Lei and Lomax, if values fall between -1 and -2.3 and +1 and +2.3, the distribution is considered to have moderate non-normality. If values are greater than -2.3 and +2.3, the violation of normality is considered severe.

Study variables assessed at baseline were reviewed first followed by study variables measured prior to, mid, and following the TSST, and variables assessed during and after the cold pressor task. The skewness and kurtosis values for these variables are presented in tables 1, 2, and 3 respectively. The interpersonal sensitivity subscale of the BSI which was used as a trait predictor of study task performance had a kurtosis value that fell outside of the normal limits was noted (kurtosis value = -1.10; *SE* = .43). However, in evaluating the histogram, while there was some evidence of kurtosis, it did not appear to jeopardize the assumption of normality and as skewness was considered normal no transformation was completed. The state-based measure of emotion dysregulation administered at baseline, the S-DERS, was moderately positively skewed and this was confirmed through visual analysis of the histogram and Q-Q plot. As such, a log 10 transformation was computed which resulted in a new skewness value of .87 (*SE* = .21) and a kurtosis value of .99. Visual inspection of the histogram matched these values and the data appeared more normally distributed. Negative affect intensity as measured by the negative affect scale of the PANAS at baseline had a moderate positive skew (skewness = 1.26; *SE* = .21) and kurtosis value (kurtosis = 1.70; *SE* = .43) which was noted on the histogram and Q-Q plot. A log 10 transformation was thus computed and improved these values (skewness value = .43; *SE* = .21; kurtosis value = -.15; *SE* = .43).

The other variables that fell out of the above-mentioned range for normality of skewness and kurtosis included speech threshold, arithmetic threshold, tolerance, endurance, and arithmetic heart rate maximum. While a log 10 transformation was computed for the threshold variable during the speech portion of the TSST, this did not correct for or improve the normality of the distribution. As the skewness observed was moderate (skewness value = 1.20; *SE* = .93; kurtosis value = .93; *SE* = .43), no transformation was completed. In addition, outlying cases were not deleted as participants who completed the study evidenced notable variability in terms of threshold and tolerance scores and this information was considered valuable. This was also the case for arithmetic threshold, tolerance, and endurance. Log10 analyses were pursued for arithmetic heart rate maximum (skewness value = .67; *SE* = .21; kurtosis value = 1.54; *SE* = .43) and helped to normalize the distribution (new skewness value = .15; *SE* = .21; kurtosis value = .65; *SE* = .43). Average heart rate during the arithmetic task also had a kurtosis value that fell out of the range of normality (kurtosis value = 5.50; *SE* = .43) and a log 10 transformation helped to normalize the distribution (new kurtosis value = .16; *SE* = .43).

Next, the distributions for study variables assessed during and after the cold pressor task were evaluated. As with the TSST experiential avoidance indices, the cold pressor tolerance, endurance, and intensity were not transformed as the numeric values were close to the absolute value of +1 for kurtosis and log transformations did not correct for normality. No outlying cases were deleted given the variability also noted in cold pressor task performance. A log 10 transformation was conducted for the state emotion dysregulation, as measured by the S-DERS post cold pressor task (skewness value = 1.20; *SE* = .21; kurtosis value = -1.03; *SE* = .43) which improved the normality of the distribution (new skewness value = .64; *SE* = .21; kurtosis value = .83; *SE* = .43). Log 10 transformations also improved normality for negative affect measured by the PANAS post cold pressor based on moderate positive skew (skewness value = 1.23; *SE* = .21; kurtosis value = 1.49) which improved the normality of the distribution (new skewness value = .53; *SE* = .21; kurtosis value = -.48). Finally, a log transformation was conducted based on moderate inflation of kurtosis on the positive affect scale measured by the PANAS following the cold pressor task (kurtosis value = 1.49; *SE* = .21) but did not improve the normality of the distribution and as the kurtosis value was considered moderate, no further transformations were pursued as the residuals were normal thus rendering regression analysis appropriate. While transformations did improve the distributions for some variables, because the analyses were similar when run transformed vs. non-transformed and because the true variability were considered valuable especially for the heart rate data, all inferential statistics were conducted using the non-transformed values.

Means, standard deviations, and internal consistency coefficients were also calculated for each scale assessed at baseline, prior to, mid, and post TSST tasks, and during and after the cold pressor task. These results can be found in tables 4, 5 and 6. On average, participants first reported pain during the cold pressor task after 31 seconds, keeping their hands in the water for an average duration of 154 seconds and an average of 123 seconds after they reported physical pain. The average intensity rating of the cold pressor task was 49 on a scale from 0 – 100 and average heart rate during the cold pressor task was 82 beats per minute (BPM) with a maximum heart rate of 100 BPM. The relative change from baseline for average heart rate was a one-point decrease (83 BPM) and a four-point decrease for maximum heart rate (96 BPM). During the speech task, participants first reported emotional discomfort after an average of 37 seconds, speaking for an average of 128 seconds. They spoke for an average of 99 seconds after first indicating emotional discomfort during the speech (measured by pressing the cell phone lap button) and on average rated the intensity of the speech as 51 on a scale from 0 – 100. Average heart rate during speech preparation was 83 BPM, with a maximum heart rate average during speech preparation at 101 BPM. During the speech task, average heart rate was 93 BPM and maximum heart rate average was 105 BPM. Participants, on average, reported the emotional discomfort during the arithmetic task after 45 seconds, and continued the arithmetic task for an average of 234 seconds. They tended to complete the arithmetic task for about 199 seconds after first reporting emotional discomfort by pressing the lap button and rated the arithmetic task with an average intensity of 54 on a scale from 0 – 100.

Bivariate Correlations

Bivariate correlations were used to investigate study hypotheses and to determine the direction and degree of the relationship between the variables of interest. Due to the large number of study variables examined, Bonferroni corrections were used to correct for potential multiplicity (the statistical problem of multiple comparisons). The relationships between all variables measured at baseline are presented in Table 7. Inter-correlations between the variables assessed during the cold pressor task and at baseline are available in Table 8. Table 9 displays the inter-correlations between study variables measured pre, mid, and post TSST and variables measured at baseline. Correlations between the cold pressor task and TSST state-based measures are presented in Table 10.

Cold Pressor Task Hypotheses

Pearson's product moment correlation analyses were computed to evaluate the relationships between the variables of interest. Partial support was found for hypothesis (1a) as cold pressor threshold was negatively associated with state experiential avoidance as measured by the SMEA administered post cold pressor task ($r = .25$, $p < .01$). No relationship emerged between trait experiential avoidance and cold pressor threshold as measured by MEAQ and AAQ-II scores nor with cold pressor threshold and state experiential avoidance at baseline as measured using the SMEA. Contrary to hypothesis (1a), cold pressor threshold was also not associated with average or maximum heart rate or with perceived pain tolerance. Hypothesis (1b) was fully supported as cold pressor threshold was negatively correlated with cold pressor intensity ($r = -.30$, $p < .01$). Hypothesis (2a) was also partially supported as a negative association between cold pressor tolerance and state experiential avoidance as measured by the SMEA administered post cold pressor ($r = -.44$, $p < .01$) and at baseline ($r = -.18$, $p < .05$) was noted. Consistent with hypothesis (1a), no support was found for a relationship between trait experiential avoidance and cold pressor tolerance as measured by the MEAQ and AAQ-II. While tolerance was not associated with cold pressor average and maximum heart rate, it was positively correlated with perceived pain tolerance ($r = .24$ $p < .01$) in the expected direction.

Next, the correlational hypotheses were evaluated regarding endurance and intensity on the cold pressor. Cold pressor endurance, as measured by summing the total of subtracted cold pressor threshold from cold pressor tolerance, was negatively associated with state experiential avoidance per the SMEA ($r = -.30$, $p < .01$) and perceived pain tolerance ($r = .20$, $p < .01$). However, cold pressor endurance was not significantly linked with trait experiential avoidance or state experiential avoidance at baseline nor heart rate average or maximum during the cold pressor. These findings partially confirm hypothesis (3a). Cold pressor intensity was positively correlated with state experiential avoidance post cold pressor task measured by the SMEA ($r = .51$, $p < .01$). Consistent with the other behavioral indices of experiential avoidance measured during the cold pressor task, cold pressor intensity was not significantly correlated with trait experiential avoidance or state experiential avoidance at baseline. The intensity variable was negatively correlated with perceived pain tolerance ($r = -.18$, $p < .05$), but was not associated with average or maximum heart rate during the cold pressor task. Thus, hypothesis (4a) was also partially confirmed.

Trier Social Stress Test Hypotheses

No significant correlations were noted between state and trait experiential avoidance and speech threshold at any of the timepoints. In addition, no statistically significant correlations were found between arithmetic threshold and state or trait experiential avoidance at any time point. Interpersonal sensitivity was slightly positively associated with speech threshold ($r = .20$, $p < .01$), but not with arithmetic threshold. Speech and arithmetic threshold also were not significantly correlated with average or maximum heart rate nor with fear of negative evaluations at any time point. Thus, small support was noted for hypothesis (5a). It was also hypothesized that an inverse relationship would be found between TSST tolerance and intensity variables for both tasks. However, hypothesis (5b) was not supported as no relationship was found between these variables although there was a strong relationship between speech and arithmetic intensity ($r = .61$, $p < .01$). While state experiential avoidance assessed post speech was not significantly associated with speech tolerance, some support was found for hypothesis (6a) as speech tolerance was slightly negatively correlated with MEAQ scores ($r = -.27$, $p < .01$), AAQ-II scores ($r = -.21$, $p < .05$), and SMEA scores assessed at baseline ($r = -.22$, $p < .05$). Speech tolerance was also slightly negatively associated with average heart rate during speech preparation ($r = -.20$, $p < .01$). Arithmetic tolerance was moderately negatively associated with state experiential avoidance measured post arithmetic ($r = -.32$, $p < .01$). However, contrary to initial hypotheses, arithmetic tolerance was not significantly linked with trait experiential avoidance or state experiential avoidance at baseline. Arithmetic tolerance had a small positive correlation with both average heart rate ($r = .19$, $p < .05$) and maximum heart rate ($r = .18$, $p < .05$) at baseline. Regarding hypothesis (7a), speech endurance was not linked with state experiential avoidance post speech but was slightly negatively associated with MEAQ scores ($r = -.22$, $p < .05$). Arithmetic endurance was slightly negatively correlated with state experiential avoidance measured by the SMEA post arithmetic task ($r = -.29$, $p < .01$), but was not associated with trait or state experiential avoidance assessed at baseline. Speech endurance also had a small negative correlation with average heart rate at baseline ($r = -.19$, $p < .05$). Next, hypothesis (8a) was tested using the TSST speech and arithmetic intensity variables. As hypothesized, speech intensity was strongly positively correlated with state experiential avoidance post speech measured by the SMEA ($r = .52$, $p < .01$). Further consistent with hypotheses, intensity of the speech had a small positive relation with trait experiential avoidance measured by the MEAQ ($r = .27$, $p < .01$), a moderate positive relationship with AAQ-II scores ($r = .33$, $p < .01$), and a moderate positive relationship with state experiential avoidance at baseline ($r = .32$, $p < .01$). Speech intensity was also slightly negatively linked with average heart rate at baseline ($r = -.26$, $p < .01$) and strongly positively correlated with average heart rate during the speech preparation ($r = .52$, $p < .01$) as well as maximum heart rate during the speech preparation ($r = .20$, $p < .01$) which was a small positive correlation. Arithmetic intensity was strongly related to state experiential avoidance measured by the SMEA following the arithmetic task ($r = .60$, $p < .01$). While arithmetic intensity was not correlated with MEAQ scores, it was significantly moderately correlated with AAQ-II scores ($r = .31$, $p < .01$) as well as slightly positively correlated with SMEA scores at baseline ($r = .29$, $p < .01$). Arithmetic intensity was slightly positively correlated with average heart rate during the arithmetic task ($r = .26$, $p < .01$) as well as with average heart rate during the speech preparation ($r = .24$, $p < .01$). Thus, hypothesis (8a) was mainly confirmed and in the expected directions.

Self-Report Hypotheses

Per hypothesis nine, the bivariate correlations were evaluated between trait anxiety, negative affect intensity, state emotion dysregulation, and far of negative evaluations with state and trait experiential avoidance as well as the behavioral indices in each task. It was initially hypothesized that trait anxiety, negative affect intensity, and state emotion dysregulation would be negatively correlated with threshold, tolerance, and endurance indices on each task and that intensity would be positively correlated with these measures. It was further hypothesized that fear of negative evaluations would be positively correlated with intensity indices on each task and that threshold, tolerance, endurance and intensity would be negatively associated with these variables. Other expected directions included positive correlations between trait experiential avoidance and state-based measures at baseline with intensity as well as negative correlations between these variables and threshold, tolerance, and endurance indices on each task. For ease of comparison, state-based measure correlations are discussed post cold pressor task and TSST only, however, relationships with state-based measures at baseline are still available in the correlation matrices.

Trait Experiential Avoidance Measures

Consistent with hypotheses, moderate positive correlations were found between total MEAQ and AAQ-II scores ($r = .41$, $p < .01$). While MEAQ scores were moderately positively associated with SMEA scores at baseline ($r = .40$, $p < .01$), and slight positive correlations were found for state experiential avoidance post TSST ($r = .18$, $p < .05$). Contrary to hypotheses, no relationship was noted between MEAQ scores and SMEA scores post cold pressor. MEAQ scores were not significantly related to trait anxiety; however, significant small correlations between MEAQ scores and state anxiety post cold pressor ($r = .18$, $p < .05$) and state anxiety post TSST ($r = .27$, $p < .01$) were noted. Consistent with hypotheses, MEAQ scores were also slightly positively associated with negative affect intensity post cold pressor ($r = .21$, $p < .01$) and TSST ($r = .24$, $p < .01$) as well as with state emotion dysregulation following the cold pressor ($r = .25$, $p < .01$) and TSST ($r = .22$, $p < .01$). There was no relationship between MEAQ scores and fear of negative evaluations post TSST. However, positive affect intensity post TSST ($r = -.28$, $p < .01$) and post cold pressor ($r = -.27$, $p < .01$) were slightly negatively correlated with MEAQ scores in the expected directions. In contrast with initial hypotheses, no relationship emerged between cold pressor and TSST speech/arithmetic threshold and MEAQ scores, nor between cold pressor and arithmetic tolerance and MEAQ scores. A moderate negative correlation between speech tolerance and MEAQ scores ($r = -.27$, $p < .01$) was found which is consistent with hypothesis (9a) and in the anticipated direction. Although cold pressor endurance and arithmetic endurance did not have a significant relationship with MEAQ scores, speech endurance did ($r = -.22$, $p < .01$) have a small negative correlation. Finally, no relationships were noted between cold pressor/speech/arithmetic intensity and MEAQ scores.

AAQ-II scores were strongly positively correlated with trait anxiety ($r = .70$, $p < .01$) and moderately positively with state anxiety post cold pressor task ($r = .44$, $p < .01$) and post TSST ($r = .46$, $p < .46$). AAQ-II scores were also strongly positively associated with negative affect intensity post cold pressor ($r = .60$, $p < .01$) and post TSST ($r = .50$, $p < .01$). A strong positive correlation between AAQ-II scores and state emotion dysregulation post cold pressor ($r = .55$, $p < .01$) and moderate positive correlation post TSST ($r = .41$, $p < .01$) was also noted. AAQ-II scores had a small positive correlation with fear of negative evaluations ($r = .21$, $p < .05$). As hypothesized, a negative moderate inverse relationship between AAQ-II scores and positive affect post cold pressor ($r = -.37$, $p < .01$) and post TSST ($r = -.40$, $p < .01$) was found. However, inconsistent with hypotheses, AAQ-II scores were not significantly correlated with cold pressor, speech, or arithmetic threshold. While a relationship between AAQ-II scores and cold pressor and arithmetic tolerance did not emerge, there was a significant small relationship between AAQ-II scores and speech tolerance ($r = -.21$, $p < .01$) which was in the anticipated direction. Contrary to hypotheses, there was no relationship between AAQ-II scores and cold pressor, speech, or arithmetic endurance. However, moderate positive correlations were noted between AAQ-II scores and speech intensity ($r = .33$, $p < .01$) as well as arithmetic intensity ($r = .31$, $p < .01$), although there was no relationship between AAQ-II scores and cold pressor intensity. No relationship was found between state experiential avoidance post cold pressor and AAQ-II scores, however, a small significant positive correlation was evidenced between state experiential avoidance post TSST and AAQ-II scores ($r = .25$, $p < .01$).

State Experiential Avoidance Measures

Trait anxiety was slightly positively correlated with state experiential avoidance post cold pressor ($r = .21$, $p < .05$), moderately positively correlated with state anxiety post cold pressor ($r = .40$, $p < .01$), and slightly positively correlated with state anxiety post TSST ($r = .22$, $p < .01$). Contrary to initial hypotheses, there was no relationship between negative affect intensity post cold pressor and state experiential avoidance post cold pressor. However, a moderate association was evidenced between negative affect intensity post TSST and state experiential avoidance post cold pressor ($r = .33$, $p < .01$). Emotion dysregulation post cold pressor was not associated with state experiential avoidance post cold pressor, but emotion dysregulation post TSST was ($r = .17$, $p < .05$). There was no relationship between fear of negative evaluations and state experiential avoidance post cold pressor which was surprising. Consistent with hypotheses and in the expected directions, there was a significant small negative relationship between positive affect intensity post cold pressor ($r = -.22$, $p < .01$), a small positive correlation with positive affect post TSST ($r = -.22$, $p < .01$), and a small positive relationship with state experiential avoidance post cold pressor. Cold pressor threshold was slightly inversely associated with state experiential avoidance post cold pressor ($r = -.25$, $p < .01$), but was not correlated with speech and arithmetic threshold. Cold pressor tolerance was moderately negatively related to state experiential avoidance post cold pressor ($r = -.40$, $p < .01$), and with arithmetic tolerance ($r = -.32$, $p < .01$), but was not associated with speech tolerance. While cold pressor endurance did have a moderate negative relationship with state experiential avoidance post cold pressor ($r = -.30$, $p < .01$), speech and arithmetic endurance did not have such a relationship with state experiential avoidance on the cold pressor task. Cold pressor intensity was strongly correlated with state experiential avoidance post cold pressor ($r = .51$, $p < .01$), and was also slightly associated with speech intensity ($r = .24$, $p < .01$), and arithmetic intensity ($r = .22$, $p < .01$). Finally, a small positive correlation was noted between state experiential avoidance post TSST and post cold pressor ($r = .24$, $p < .01$).

Next, the relationships between these study variables and state experiential avoidance post TSST were examined. Trait anxiety had a small negative correlation with state experiential avoidance post TSST ($r = -.28$, $p < .01$). Strong positive correlations were found between state anxiety post cold pressor ($r = .56$, $p < .01$), state anxiety post TSST ($r = .66$, $p < .01$), and state experiential avoidance post TSST which was consistent with hypotheses. Similarly, a small significant positive relationship was noted between both negative affect intensity post-cold pressor ($r = .24$, $p < .01$), a strong relationship with negative affect intensity post TSST ($r = .52$, $p < .01$), and state experiential avoidance post TSST ($r = .33$, $p < .01$). Although there was no relationship between state emotion dysregulation post cold pressor and state experiential avoidance post TSST, there was a moderate relationship between state emotion dysregulation post TSST and state experiential avoidance post TSST ($r = .47$, $p < .01$). Fear of negative evaluations post TSST was associated with state experiential avoidance following the TSST ($r = .34$, $p < .01$), while small negative correlations were found between positive affect intensity post cold pressor ($r = -.29$, $p < .01$), positive affect intensity post TSST ($r = -.23$, $p < .01$), and state experiential avoidance post TSST. Contrary to hypotheses, no relationships were found between cold pressor threshold, speech threshold, arithmetic threshold, cold pressor tolerance, speech tolerance, cold pressor endurance, and speech endurance with state experiential avoidance post TSST. However, a moderate negative link between arithmetic tolerance and state experiential avoidance post cold pressor did emerge (*r* = -.32, *p* < .01) as did a small negative link between arithmetic endurance and state experiential avoidance post TSST (*r* = -.29, *p* < .01). Similarly, while there was no relationship between cold pressor intensity and state experiential avoidance post TSST, strong relationships were found between speech intensity (*r* = .52, *p* < .01), arithmetic intensity (*r* = .60, *p* < .01), and state experiential avoidance post TSST. Hypothesis (9a) was thus partially confirmed based on these noted relationships.

Experimental Manipulation Check

Paired Samples *t*-tests for Cold Pressor Task

To investigate hypothesis (9b), that introduction of the cold pressor task would result in higher levels of state experiential avoidance, emotion dysregulation, negative affect intensity, state anxiety, average heart rate, maximum heart rate, and lower levels of positive affect intensity, a series of paired samples *t*-tests were conducted to compare mean changes pre and post cold pressor task. This analytic strategy has been used as a standard for estimating these effects in mood induction task research (Lavender et al., 2017).

The cold pressor task appeared to significantly induce higher levels of state experiential avoidance (SMEA T1: *M* = 7.7 ± 3.4; SMEA T2: *M* = 8.8 ± 4.1; *t* (132) = -2.7, *p* < .01). However, this mean difference is a smaller change than might be anticipated if the cold pressor task is an effective analogue measure of both stimuli related to both physiological and emotional discomfort. Average heart rate during the cold pressor task did not change significantly from baseline. However, maximum heart rate did change significantly from baseline (maximum heart rate T1: *M* = 96.5 ± 13.1; maximum heart rate T2: *M* = 100.4 ± 18.9; $t_{(132)} = -2.5$, $p < .01$). Of the total sample, forty-eight participants kept their non-dominant hand in the ice water for the full duration of time. Based on previous literature, heart rate may decrease during the cold pressor task which could be partially explained by the mammalian dive reflex (i.e., breathing slows over time when mammals are immersed in cold water).

To test this notion, a paired samples *t*-test was conducted on this subtest of the sample who completed the full duration of the cold pressor task. While not significant, perhaps due to lack of statistical power given the relatively small subset of the dataset being analyzed, mean heart rate did slightly decrease (average heart rate for completers T1: $M = 82.7$; average heart rate for completers T2: $M = 81.2$). Based on the results of prior studies, heart rate during the cold pressor task initially increases with a decrease occurring for individuals who complete the task for several minutes. Thus, a paired samples *t*-test for maximum heart rate was also conducted for cold pressor task completers, showing that cold pressor task completers' ($n = 48$) maximum heart rate also increased (maximum heart rate completers T1: $M = 95.9 \pm 13.5$; maximum heart rate completers T2: $M = 99.4 \pm 12.7$; $t_{(47)} = -2.0$, $p < .05$). Contrary to hypotheses, state emotion dysregulation significantly decreased post cold pressor task (S-DERS T1: $M = 63.10 \pm 12.9$; S-DERS T2: $M = 58.96 \pm 10.1$; $t_{(132)} = 5.1$, $p < .001$). Participants completing the cold pressor task therefore reported decreased emotion dysregulation following completion of the cold pressor task. Similarly, a decrease in negative affect intensity was also noted following the cold pressor (PANAS-Negative T1: $M = 19.5 \pm 6.6$; PANAS-Negative T2: $M = 16.6 \pm 6.2$; $t_{(132)} = 6.7$, $p < .001$). Positive affect also slightly decreased following the cold pressor (PANAS-Positive T1: $M = 35.6 \pm 7.8$; PANAS-Positive T2: $M = 33.9 \pm 9.0$; $t_{(132)} = 3.6$, $p < .001$), while state anxiety had no statistically meaningful increase or decrease between baseline and post cold pressor. These results provide partial support for hypothesis (9b).

Paired Samples *t*-tests for TSST

To conduct a manipulation check for the TSST, paired samples *t*-tests were next calculated for relevant speech and arithmetic variables. No statistically significant changes were noted for mean differences between average heart rate at baseline and average heart rate during speech preparation, although an increase in maximum heart rate during speech preparation was noted (Max HR T1: $M = 96.5 \pm 13.1$; Max HR speech prep T2: $M = 101.7 \pm 15.8$; $t_{(132)} = -4.7$, $p < .001$). A significant change was also observed between average heart rate at baseline and average heart rate during the speech (average HR T1: $M = 82 \pm 15.5$; average HR T2: $M = 93.3 \pm 14.6$; $t_{(132)} = -7.5$, $p < .001$) and between maximum heart rate at baseline and maximum heart rate during the speech (average HR T1: $M = 96.5 \pm 13.1$; average HR speech T2: $M = 105.6 \pm 15.8$; $t_{(132)} = -7.3$, $p < .001$). Change between average heart rate at baseline and average heart rate during the arithmetic task was statistically significant (average HR T1: $M = 82 \pm 15.6$; average HR arithmetic T2: $M = 86.6 \pm 14.1$; $t_{(132)} = -3.2$, $p < .01$). No significant changes from baseline average heart rate and maximum arithmetic task heart rate were recorded. State experiential avoidance significantly increased from baseline to post TSST (SMEA T1: $M = 7.7 \pm 3.4$; SMEA T2: $M = 11.3 \pm 4.2$; $t_{(132)} = -9.7$, $p < .001$) with a larger mean difference than on the cold pressor task comparisons. Contrary to hypotheses, fear of negative evaluations, state emotion dysregulation, and negative affect intensity did not change between baseline and post TSST. The state emotion dysregulation and negative affect intensity findings are consistent with cold pressor task findings for these variables. However, positive affect intensity did significantly decrease between baseline and post TSST (PANAS-Positive T1: $M = 35.6 \pm 7.8$; PANAS-Positive TSST T2: $M = 32.1 \pm 9.3$; $t_{(132)} = 6.1$, $p < .001$), which is also consistent with the cold pressor task findings. Finally, state anxiety increased between baseline measurement and post

TSST as expected (STAI-state T1: $M = 38.6 \pm 10.9$; STAI-state TSST T2: $M = 47.1 \pm 12.9$; $t_{(132)} = -9.7$, $p < .001$) which is discrepant from the cold pressor task findings.

Regression Analyses

Hierarchical multiple linear regression analyses were used to estimate the predictive value of the variables of interest to behavioral measures of experiential avoidance across each task. Separate regression equations were computed for each index across each task. Results of the cold pressor task analyses are discussed first.

Cold Pressor Task Analyses

Chi-square analyses revealed no significant effect of handedness on completion or non-completion of the cold pressor task. Therefore, no effect of handedness was assumed in the analyses. To investigate the notion proposed that participants higher in trait experiential avoidance would report lower cold pressor threshold and higher intensity, independent samples *t*-tests were first conducted. No significant relationship was found between levels of trait experiential avoidance on predicting lower cold pressor threshold or higher cold pressor intensity and thus hypothesis (1b) was not supported based on these analyses. Similarly, there was no significant difference in means between low and high levels of trait experiential avoidance and cold pressor tolerance and therefore hypothesis (2b) was also not supported.

Given significant mean changes in state experiential avoidance, positive affect, and maximum heart rate pre and post cold pressor, these variables were pursued as predictors in the regression analyses. Regression analyses were used to predict state-based experiential avoidance and positive affect intensity following the cold pressor. While threshold, tolerance, and intensity were also considered important predictors, they were not included in the same regression equations as they have significant shared variance with endurance. Thus, they may introduce multicollinearity into the regression equations, taking away meaningful independent contributions. As the primary aims were to investigate the hypothesis that there is a temporal relationship between when one first reports pain and removing their hand from the cold pressor apparatus, endurance was considered the most important behavioral predictor of experiential avoidance.

The order of study variables selected as predictors in the regression models were based on hypothesized distal and proximal relationships to the criterion variables. Perceived pain tolerance was conceptualized as a distal predictor of state experiential avoidance as this was rated at baseline and individual differences in pain tolerance are likely shaped through exposure to a range of factors throughout one's history independent of this study. Pain tolerance was entered in the model first. To create a standardized trait experiential avoidance variable, AAQ-II and MEAQ scores were transformed into *z*-scores. As trait experiential avoidance was also conceptualized as a predictor of state-experiential avoidance, the composite *z*-score variable of trait experiential avoidance was also entered in step one. In step two, cold pressor maximum heart rate was entered as it was considered more proximal to state experiential avoidance. Cold pressor endurance was entered in the final step as the hypothesized behavioral measure was thought to be the most crucial to the prediction of state-based experiential avoidance.

While threshold, tolerance, and intensity were also considered important predictors, they were not included in the regression equations as they have significant shared variance with endurance. Thus, they may introduce multicollinearity into the regression equations, taking away meaningful independent contributions. In step one, participants' perceptions of their pain tolerance and trait experiential avoidance contributed significantly to the total model, $R^2 = .06$, F $(2, 130) = 4.45$, $p = .01$, accounting for 6% of the variation in post-cold pressor state experiential avoidance. Contrary to initial hypotheses, only perceived pain tolerance made a unique contribution to the model (β = -.19, t = -2.41, p < .05). In step two, maximum heart rate during the cold pressor was also not a significant predictor of state experiential avoidance above and beyond perceived pain tolerance and trait experiential avoidance, explaining only an additional 1% of the variance in post-cold pressor state experiential avoidance. In the final step, the addition of cold pressor endurance explained 13% of the total variance in state experiential avoidance post cold pressor, which was an additional 5% above and beyond the other predictors, R^2 Δ = .05, F (1, 128) = 7.86, p = .006. Cold pressor endurance made a unique contribution to the model (β = -.24, t = -2.8, p < .001). Thus, participants who perceived their pain tolerance as higher tended to endure the cold pressor task for longer after they indicated it was first painful. However, the best predictor of engaging in higher levels of state experiential avoidance in the moment to manage discomfort was removing one's hand from the ice water more quickly after first reporting pain. These findings are presented in Table 13.

Because emotion dysregulation and negative affect intensity decreased post cold pressor rather than increase as predicted, no regression equations were pursued to evaluate the best predictors of these variables. Given the meaningful change in reduction of positive affect intensity pre to post cold pressor, this regression equation was conducted next with positive affect intensity as the criterion variable. First, perceived pain tolerance and composite trait experiential avoidance were entered in the model at step one. Next, maximum heart rate was entered at step two, and finally cold pressor endurance was added in step three. At step one, perceived pain tolerance and trait experiential avoidance accounted for a total of 19% of the variance in positive affect intensity post cold pressor, R^2 = .19, F (2, 130) = 14.89, p = .001. Perceived pain tolerance made a unique contribution to the model (β = .18, t = 2.30, p < .05) as did trait experiential avoidance (β = -2.71, t = -4.88, $p < .001$). Maximum heart rate explained an additional 3% of the variance at step two, R^2 Δ = .03, F (1, 129) = 4.38, p = .04 and made a unique contribution to the model (β = -.17, t = -2.09, $p < .05$). Contrary to hypotheses, cold pressor endurance was not a significant predictor of changes in positive affect intensity, accounting for only .1% of the additional variance above and beyond the other predictors and thus it did not make a unique contribution. The strongest predictor of positive affect intensity following the cold pressor was trait experiential avoidance. Therefore, participants in this study who reported higher levels of trait experiential avoidance tended to report significant reductions in positive affect after removing their hand from the ice water. A summary of these findings is available in Table 14. Because no meaningful changes were found in state emotion dysregulation, negative affect intensity, or state anxiety from pre to post cold pressor, no regression analyses were completed for these variables.

Trier Social Stress Test Analyses

Meaningful pre- post changes were noted during the experimental manipulation check for speech preparation maximum heart rate, average heart rate during the speech and arithmetic tasks, and post-TSST state experiential avoidance, positive affect intensity, and state anxiety. However, as the heart rate variables were highly correlated and to standardize across cold pressor and TSST regression analyses, maximum heart rate for both the speech and arithmetic task were selected as the sole physiological predictor variables for the TSST regression analyses.

In the first regression model predicting state experiential avoidance post TSST, interpersonal sensitivity and the trait experiential avoidance composite variable were first introduced into the model. Interpersonal sensitivity was conceptualized as a distal risk factor for state experiential avoidance related to interpersonal contexts as it was hypothesized that individuals who are higher in interpersonal sensitivity would be more likely to report experiential avoidance in the moment in tasks that evoke social discomfort. In step two, maximum heart rate during the speech and arithmetic task were entered in the model as these were considered more proximal to state experiential avoidance. In the third step, speech endurance, arithmetic endurance, and state fear of negative evaluations were entered as predictors as these were considered the most critical predictors of state experiential avoidance in a social context. Interpersonal sensitivity and trait experiential avoidance explained 7% of the variance in state experiential avoidance post-TSST, $R^2 = .07$, F (2, 130) = 5.23, $p = .007$, with trait experiential avoidance making a unique contribution to the model ($\beta = .23$, $t = 2.40$, $p < .01$). At step two the total variance explained by maximum heart rate during the speech and arithmetic tasks was 15%, which was an additional 8% of the variance, $R^2 \Delta = .08$, F (3, 127) = 4.02, $p = .009$. However, neither variable made a significant unique contribution to the total model. In the final step, the addition of speech and arithmetic endurance as well as state fear of negative evaluations explained 22% of the total variance in state experiential avoidance post-TSST, which was an added 7% above and beyond the physiological variables entered in step two, $R^2 \Delta = .05$, F (2, 125) = 5.80, $p = .004$. State fear of negative evaluations made a unique contribution to the model ($\beta = .30$, $t = 3.25$, $p < .01$) as did endurance of the arithmetic task ($\beta = -.26$, $t = -3.10$, $p < .01$). The best predictors of state experiential avoidance post-TSST thus were how strongly participants feared negative evaluations in the moment as well as decreased endurance of the arithmetic task. Participants who chose to stop the arithmetic task more quickly after first reporting emotional discomfort also reported higher levels of experiential avoidance in the moment. A summary of this analysis can be found in Table 15.

Hierarchical regression analyses were also used to estimate the predictive power of experiential avoidance and TSST-related variables to positive affect intensity following the TSST. In the first step, interpersonal sensitivity and trait experiential avoidance explained 19% of the variance in positive affect intensity, $R^2 = .19$, F (2, 130) = 14.93, $p = .001$. Trait experiential avoidance uniquely contributed to the model ($\beta = -.35$, $t = -3.99$, $p < .001$). Maximum heart rate during the speech and maximum heart rate during the arithmetic task accounted for 19% of the total variance in positive affect intensity, which was only an additional .1% above and beyond interpersonal sensitivity and trait experiential avoidance, $R^2 \Delta = .01$, F (2, 128) = .58, $p = .55$. In the final block, speech endurance, arithmetic endurance, and state fear of negative evaluations accounted for 29% of the total variance in TSST positive affect intensity. The total variance explained by adding these predictors to the model was 9% above and beyond that explained in block two, $R^2 \Delta = .09$, F (3, 125) = 5.36, $p = .002$. In the final model, speech endurance was a unique contributor to predicting positive affect intensity ($\beta = .24$, $t = 2.93$, $p < .01$) as was state fear of negative evaluations ($\beta = -.29$, $t = -3.24$, $p < .01$). Participants who reported higher levels of trait experiential avoidance at baseline report decreased positive affect following their oral presentation and completing mental arithmetic. Participants who continued speaking longer after they first reported emotional discomfort had higher levels of positive affect following the tasks. Fear of negative evaluations predicted lower levels of positive affect intensity following these two stressful tasks. These results were in the expected directions, and while heart rate maximum did not emerge as a significant predictor, provide important information about experiential avoidance and emotion regulation in the moment. It appears that both one's fear of experiencing negative evaluations as well as their relationship with this private experience is an important predictor of their likelihood to engage in the face of distress. However, this only held during the speech task.

Regression analyses were next used to investigate the strongest predictors of state anxiety following the TSST. In the initial block, interpersonal sensitivity, trait experiential avoidance, and trait anxiety were entered as criterion variables, accounting for 39% of the total variance in state anxiety post-TSST, $R^2 = .39$, F (3, 129) = 26.89, $p = .001$. Interpersonal sensitivity made a unique contribution to the model ($\beta = .19$, $t = 2.40$, $p < .01$) along with trait anxiety ($\beta = .45$, $t = 4.72$, $p < .001$). At step two, only 1% additional variance was accounted for by adding maximum heart rate during the speech and arithmetic tasks, $R^2\ \Delta = .01$, F (2, 127) = .133, $p = .87$ and thus was not a significant predictor of state anxiety post-TSST. Introducing speech endurance, arithmetic endurance, and state fear of negative evaluations explained 6% additional variance above and beyond the other predictors, $R^2\ \Delta = .06$, F (3, 124) = 4.16, $p = .008$. The total variance explained by all predictors in the total model was 44%. State fear of negative evaluations made a unique contribution ($\beta = .27$, $t = 2.90$, $p < .01$) to predicting state anxiety post-TSST. In the final model, trait anxiety and state fear of negative evaluations were the only significant predictors of state anxiety with fear of negative evaluations emerging as the strongest predictor. Participants in the present study who reported higher trait anxiety at baseline experienced stronger state anxiety following the TSST. Endorsing greater fears of being negatively evaluated during the TSST was strongly predictive of anxiety in the moment and these relationships were not better accounted for by experiential avoidance.

Task Comparison Analyses

Cold pressor, speech, and arithmetic tolerance variables were transformed into dichotomously coded variables: completers vs. non-completers. Forty-eight participants kept their hand in the ice water for the full five minutes; twenty-one percent (n = 28) were female and fourteen percent (n = 19) were male. On the speech task, only eight participants spoke the entire five minutes; five percent (n = 6) were female and two percent (n = 2) identified as male. Eighty-three participants completed the arithmetic task for the full duration of time. Of those participants, forty percent identified as female (n = 53), twenty-one percent as male (n = 28), and two percent as transgender (n = 2). Moderate positive correlations were noted between cold pressor intensity and speech task intensity (r = .36, p < .01) and between cold pressor task intensity and arithmetic task intensity (r = .30, p < .01).

The trait experiential avoidance composite *z*-scores were next dichotomized into levels of experiential avoidance using a mean split with sixty-six percent of the sample (n = 62) in the high trait experiential avoidance group and forty-eight percent (n = 71) in the low experiential avoidance group. An independent samples *t*-test was used to compare cold pressor intensity across high trait experiential avoidance and low experiential avoidance groups. Levene's test of equality of variances revealed assumptions of homogeneity of variances were met. There was a significant difference in the scores for high trait experiential avoidance (M = 67; SD = 48) and low trait experiential avoidance (M = 44; SD = 32) conditions; $t_{(131)}$ = -3.16, p = .002. Participants reporting higher levels of trait experiential avoidance tended to rate the cold pressor task as more intense after completing. Independent samples *t*-tests were also conducted to compare speech task intensity and arithmetic task intensity by level of trait experiential avoidance. Homogeneity of variances assumptions were met for TSST task variables as well. Consistent with the cold pressor task findings, significant differences emerged in scores for high trait experiential avoidance (M = 63; SD = 45) and low trait experiential avoidance (M = 42; SD = 29) for the speech task, $t_{(131)}$ = -3.40, p = .001). These differences were also found when comparing means for arithmetic task intensity by level of experiential avoidance (high trait experiential avoidance *M* = 66; *SD* = 48; low trait experiential avoidance *M* = 44; *SD* = 32), $t_{(131)}$ = -3.17, *p* = .002. Across both tasks, participants higher in trait experiential avoidance reported stronger intensity of the task with the largest mean difference on the cold pressor task, suggesting participants found this task the most intense, followed by the arithmetic task, and speech task respectively.

This analytic approach was also used to compare means for cold pressor and TSST speech/arithmetic task tolerance. No significant differences were found for cold pressor tolerance, suggesting those high in trait experiential avoidance did not significantly differ from low avoiders in terms of total time their hand remained in the water. Higher trait avoiders tended to stop the speech sooner than low trait avoiders (high trait experiential avoidance *M* = 115; *SD* = 69; low trait experiential avoidance *M* = 140; *SD* = 79), $t_{(131)}$ = -1.90, *p* = .05. However, there were no significant mean differences detected in terms of arithmetic tolerance, which suggests there was no meaningful effect of trait experiential avoidance on determining how long one participated in the arithmetic task.

Hierarchical Linear Regression Analyses Comparing Task Performance

A series of regression analyses were used to evaluate the relationship between contexts that evoke physical and social discomfort. First, endurance of the cold pressor task was entered as the criterion variable in a hierarchical linear regression model. At step one, trait experiential avoidance was entered in the model as it was conceptualized as more of a distal or developmental factor that may increase the likelihood of difficulties enduring both physical and social discomfort. Contrary to hypotheses, trait experiential avoidance was not a significant predictor of cold pressor task endurance, R^2 = .01 *F* (1, 131) = .210, *p* = .65. In the next step, maximum heart rate during the speech and arithmetic tasks were input but did not significantly contribute to predicting cold pressor task endurance, $R^2\ \Delta = .03$, $F\ (2, 129) = 2.11$, $p = .13$. Introducing TSST-state experiential avoidance, speech endurance, and arithmetic endurance were also non-significant in the prediction of cold pressor endurance, $R^2\ \Delta = .01$, $F\ (3, 126) = .78$, $p = .51$. Participants' endurance of the cold pressor task was not predicted by trait experiential avoidance or TSST physiological and behavioral experiential avoidance variables. This refutes initial hypotheses and is evidence that experiential avoidance measured behaviorally may be more unique to context and learning history.

Next, the predictive value of speech task variables to endurance of the arithmetic task were evaluated. In the first step, trait experiential avoidance was entered in the model, explaining 1% of the variance in arithmetic endurance $R^2 = .01$, $F\ (1, 131) = 1.43$, $p = .23$ which was a non-significant finding. Maximum heart rate during the speech was also non-significant in step two, $R^2\ \Delta = .01$, $F\ (1, 130) = .011$, $p = .92$. When TSST state experiential avoidance and speech endurance were entered in step three, an additional 12% of the variance was explained, $R^2\ \Delta = .13$, $F\ (2, 128) = 8.91$, $p = .001$. The total variance explained by the model was 13%. Both state experiential avoidance and speech endurance made unique contributions to the prediction of arithmetic task endurance ($\beta = .22$, $t = 2.56$, $p < .01$; $\beta = -.27$, $t = -3.15$, $p < .001$, respectively). As both state experiential avoidance post TSST and speech endurance significantly predicted arithmetic task endurance, evidence of a relationship between both tasks was supported. For participants in this study, their experiential avoidance levels were linked across both legs of the social task experiment, but not across physical and social contexts.

DISCUSSION

The purpose of the present study was to better understand the relationship between state and trait experiential avoidance across contexts that involve physical and social/emotional discomfort. To investigate these relationships, an established physiological measure and existing social stress task were presented in a counterbalanced order to a convenience sample of university students. It was hypothesized that participants reporting higher levels of trait experiential avoidance would report physical and emotional discomfort more quickly under the two analogue conditions than participants lower in levels of trait experiential avoidance. Similarly, it was proposed that high trait avoidant participants would rate both tasks as more intense than low avoidant participants. While the role of discomfort was considered a key variable in understanding the likelihood of engaging in more experiential avoidance in the moment, one's relationship with their discomfort was conceptualized as the most critical variable. As such, endurance of physical and social discomfort *after* first reporting discomfort was investigated as a predictor of state experiential avoidance following the two stressful tasks and was found to be an important predictor.

Because one's learning history around willingness to tolerate pain and one's sensitivity to interpersonal discomfort may play an important role in experiential avoidance, these factors were controlled for in the regression equations. As trait experiential avoidance is influenced by more than solely contextual factors in the moment and the scope of the study was not to determine measurement differences, the decision to combine AAQ-II and MEAQ scores into composite *z*-scores was made and this variable was also estimated as a distal predictor of state experiential avoidance. Contributions of physiological measures and state fear of negative evaluations were also included in the models. As another aim of the study was to understand the impact of these stressful tasks on emotion, affect, and anxiety in the moment, meaningful differences across tasks for these outcomes were also investigated. Paired samples *t*-tests showed statistically significant effects of the cold pressor task on state experiential avoidance and reductions in positive affect intensity. Similarly, a meaningful effect was noted post TSST tasks such that state experiential avoidance and anxiety increased and positive affect intensity decreased and therefore these criterion variables were further investigated in regression models. Finally, to test the hypothesis that experiential avoidance is a functional response class, endurance of the cold pressor task and TSST speech and arithmetic tasks was also investigated. However, contrary to a priori hypotheses, performance on the two analogue tasks was not related which provides evidence that experiential avoidance is contextually-specific rather than related across the two contexts measured in the present study. Training experiential acceptance as an alternative to avoidance may thus be treated with more nuance and attention to the contextual factors one has a history of avoiding.

Cold pressor and arithmetic task endurance were the strongest predictors of state experiential avoidance following each task and contrary to hypotheses, speech task endurance was not significant in the model. The ways in which participants managed their private events during each task after reporting distress was thus a good analogue for predicting experiential avoidance in the moment and interestingly, trait experiential avoidance was only significant in the state experiential avoidance TSST model. These findings make sense when conceptualizing in terms of real-world comparisons of these analogue tasks to situations that are likely correlated with experiential avoidance. With the cold pressor task, state experiential avoidance may be less affected by one's pattern of trait experiential avoidance in the past as pain aversion is likely to be considered more widely aversive than social discomfort. It is probably also true that certain participants who have athletic training or prowess for tolerating physical discomfort may have found the cold pressor task less aversive or used more workable strategies to manage their physical discomfort during the task and these ideas are supported by the relationship noted between perceived pain tolerance and cold pressor threshold and endurance. With the TSST, however, a history of reinforcement/punishment associated with public speaking/arithmetic make the TSST findings more complicated and the significant contributions of interpersonal sensitivity to predicting TSST outcomes supports this notion as well.

Consistent with previous literature findings, trait experiential avoidance was a significant predictor of reductions in positive affect (Levin, Krafft, Pierce, & Potts, 2018), and in this study was the strongest predictor of this outcome variable independent of context. One interpretation of these regression equations is that trait experiential avoidance increases the propensity to engage in state experiential avoidance when faced with stressful/painful tasks and thus leads to a change in affective states. Specifically, it would be interesting to examine whether this change can be explained by covert experiential avoidance strategies such as distraction or thought suppression which conceptually might reduce contact with the present moment as well as contextual cues that are linked with positive affect. Given findings from the experimental manipulation check that negative affect intensity decreased during each task, it seems plausible that covert experiential avoidance strategies tend to blunt all affective states including both positive and negative. Small negative correlations between state lack of emotional clarity and positive affect intensity as well as a moderate positive correlation with negative affect intensity on the TSST were noted which could support the notion that experiential avoidance in the moment decreases one's ability to identify emotional/affective states in stressful contexts.

While state experiential avoidance also appears to be an important factor in momentary changes in affect, emotion, and problematic behavior (Kashdan et al., 2014; Hershenberg, Mavandadi, Shahrzad Wright, & Thase, 2017; Machell, Goodman, & Kashdan, 2015; Veilleux et al., 2018), this study is the first of its kind to evaluate behavioral measures as predictors of incremental change in experiential avoidance following exposure to stressful tasks. Based on the results of the present study, the strongest predictor of state experiential avoidance when physically uncomfortable is one's relationship with discomfort. As anticipated, there was a significant inverse relationship between cold pressor threshold and state experiential avoidance post cold pressor. Thus, participants who reported they were uncomfortable sooner in the task reported higher state experiential avoidance after completing and this is consistent with the Zettle study. Those who reported higher state experiential avoidance considered the task more intense and removed their hand sooner and they endured the physical discomfort less after reporting they were uncomfortable which is also a replication of the Zettle findings. One somewhat surprising finding was that participants high in trait experiential avoidance did not significantly differ from low avoidant participants in terms of how quickly or intensely they reported discomfort, nor did they differ in how long they tolerated discomfort. While this may be related to the use of a convenience sample, it could also reflect measurement variability is self-report instruments and thus explain why this particular Zettle finding did not replicate.

Elevated distress levels may be important in predicting experiential avoidance and there is evidence for a relationship between experiential avoidance and anxiety-related factors (Bardeen, Fergus, & Orcutt, 2013; Buckner, Zvolensky, Farris, & Hogan, 2014; Zvolensky et al., 2015), however, the direction and degree of this relationship is not easily inferred here. In the model predicting state anxiety post TSST, the strongest predictive factor was trait anxiety and, contrary to hypotheses, experiential avoidance measured both behaviorally as well as through self-report was non-significant. While higher levels of anxiety could motivate experiential avoidance, it seems that anxiety/distress itself is more related to trait factors in one's learning history including anxiety, interpersonal sensitivity, and fear of negative evaluations as these were significant in the model. Experiential avoidance may exacerbate one's experience of anxiety but may not be the essential factor in managing anxiety in the moment.

According to the way that experiential avoidance is conceptualized in the literature, however, a paradoxical relationship should occur in which distress levels increase post engaging in experiential avoidance (Williams & Lynn, 2010). As this was not the finding in the present study on the state anxiety variable post TSST, it seems likely that high avoiders' state anxiety may decrease in more of a delayed fashion and that in the moment experiential avoidance worked to temporarily reduce anxiety. However, as higher state anxiety following the TSST was also strongly associated with interpersonal sensitivity, trait anxiety, and fear of negative evaluations, it is perhaps more likely that these factors wash out the effects of experiential avoidance. In a convenience sample of undergraduates, the learning history around public speaking and even arithmetic is linked with a set of conditioned reinforcers including social praise and positive evaluations. Because a moderate level of anxiety is predictive of better task performance, it would make sense that participants with higher interpersonal sensitivity, trait anxiety, and fear of negative evaluations would also report increased anxiety in the moment and that these observations were independent of experiential avoidance. While anxiety itself may not be enough to explain leaving a task altogether, particularly if there is a likelihood of social stigmatization, it may lead to increased reliance on subtle behavioral avoidance strategies and covert strategies to make the moment more tolerable until escape is possible and more socially acceptable. However, because speech threshold and endurance were the lowest of the three tasks, the nature of the convenience sample may also partially explain why experiential avoidance did not contribute the TSST model predicting state anxiety and it would be interesting to replicate with a clinical sample.

To control for the possibility of the composite trait measures impacting the results, the analyses were run separately and grouped according to AAQ-II and MEAQ scores, but results remained insignificant and thus analyses were pursued using the composite scores. Higher perceived pain tolerance was positively correlated with higher cold pressor tolerance as expected, but average and maximum heart rate had no significant relationship with state experiential avoidance. While the evidence regarding the relationship between self-reported experiential avoidance and heart rate is somewhat inconsistent in the literature (Levin, Haeger, & Smith, 2016; Tull, Jakupcak, & Roemer, 2010), average heart rate may be higher for participants who engage in suppression and thus this would be interesting to study more explicitly during each task. Furthermore, the finding that trait experiential avoidance (high vs. low) grouping did not impact cold pressor tolerance or intensity is interesting as it is discrepant from the Zettle et al. (2012) study. It is possible that measurement differences can explain these differences as Zettle used the AAQ rather than AAQ-II or MEAQ and given the earlier issues with internal consistency of the AAQ it is possible these measure somewhat different constructs. However, a relative strength of this study above and beyond the Zettle study is a focus on the relationship between state and trait experiential avoidance rather than solely considering group differences based on trait experiential avoidance thus some of these findings are novel rather than an explicit replication.

Participants generally tolerated the speech less than the arithmetic task but endured the speech longer after reporting discomfort longer than they did on the arithmetic task which is an interesting finding. Similarly, a greater proportion of participants said they would leave the arithmetic task if given the opportunity than the speech task, although for both groups participants the majority stated they would not leave if they could/would not feel socially stigmatized. If more participants found the arithmetic task socially stigmatizing but also endured it for longer than the speech task, it would seem there may be other factors not directly controlled for in the experiment that could explain this phenomenon of enduring a task despite the experience of discomfort and desire to leave. It is also possible that unique demand characteristics of the study impacted endurance levels. Preparing for and delivering a speech regarding one's ideal job is a more abstract task than solving arithmetic and thus more response effort is involved which would decrease the likelihood of delivering the speech for an extended period, thus making the speech task more aversive and avoidance more salient. Learning history related to public speaking as well as mathematical skill could also impact this relationship. It is also possible that participants who felt more comfort with public speaking endured the speech longer given a stronger repertoire in public speaking skills.

The finding that participants tolerated the arithmetic task for longer than the speech task could also be explained by the obedience to authority phenomenon (Milgram, 1963). Specifically, more than half of the sample completed the arithmetic task while only eight participants fully completed the speech, yet the arithmetic task was rated as more intense. Each time a participant made a mistake on the arithmetic task, they were given the instructions, “That’s incorrect, please start over at 1,022” while the instructions on the speech task were less frequent and prompts were given only if participants did not speak for a period of 20 seconds or longer. In the absence of firm directions from researchers in white lab coats, it seems plausible participants may have chosen to stop sooner thus providing further support for the obedience to authority theory.

There may also be a dose-response relationship between endurance and intensity, with the longer one completes a stressful task resulting in increased intensity. Similarly, there may be differences in “cognitive load” across task. Because the instructions were given more frequently on the arithmetic task, due to obedience to authority participants may have opted to answer the arithmetic questions more quickly causing a delay in reporting their first experience of discomfort during the task. While the cold pressor task and TSST were counterbalanced across participants, speech and arithmetic tasks were not completed in a counterbalanced order. Therefore, an unintended learning effect of the speech task on the arithmetic task may have occurred. However, if significant habituation of anxiety levels occurred, it seems more likely that participants would also report reductions in the intensity of the arithmetic task having been exposed to the speech task. Given the variable levels of exposure and mean speaking time (M = 128 seconds) the likelihood of habituation explaining this relationship seems less plausible.

Covert experiential avoidance strategies such as distraction, suppression, and dissociation could also have been used to manage uncomfortable emotional experiences in the moment during the TSST. However, the relationship between these specific strategies and task performance are less understood as these were not explicitly measured in the moment. Perhaps these covert strategies were used to manage emotion during the arithmetic task which participants endured for a longer duration. While the form of their state experiential avoidance was less overt, if they were motivated to comply with the instructions of an authority figure, covert strategies may have been helpful in managing short-term social distress.

While it was hypothesized that endurance of the TSST tasks would predict endurance of the cold pressor task, this hypothesis was not supported in the present study. State experiential avoidance showed the most significant pre-post changes during the social analogue task. Thus, participants appeared more motivated to avoid social discomfort than physical discomfort at least per their self-report. On average, participants rated the cold pressor task as less intense than the speech and arithmetic and they also endured the cold pressor task for longer after reporting physical discomfort than they did on the TSST tasks. Their average tolerance was greater than on the speech task but less than on the arithmetic task. The most parsimonious conclusion is that tolerance of the cold pressor depends on one's learning history related to tolerating cold sensations rather than one's relationship with uncomfortable private events. Experiential avoidance related to physical discomfort may also look markedly different in a clinical sample such as those with a long history of chronic pain. Indeed, experiential avoidance is associated with chronic pain severity as well as quality of life interference (Esteve, Ramírez-Maestre, & López-Martínez, 2012; Karademas et al., 2017). Individuals with such a history conceptually have many more learning trials of avoiding physical pain and thus may engage in experiential avoidance more readily. This may also influence one's relationship with social/emotional discomfort through transformation of stimulus functions thus making experiential avoidance more likely across contexts for individuals with a strong history of physical pain avoidance.

Yet another interpretation is that social influence/persuasion more strongly impacted performance on the TSST tasks than the cold pressor thus explaining the non-significant regression equations when comparing performance on the two tasks. Instructions across the speech task and cold pressor task were better aligned, yet as participants tended to tolerate the arithmetic task longer than the other two tasks, it is interesting that their endurance was highest on the cold pressor task and seems to shed light that social task demands influenced participants' behavior during the TSST arithmetic task. Covert strategies may have also been used during this task to manage the discomfort in the moment and may be more successful in alleviating short-term physical pain vs. short-term emotional discomfort. In the Dialectical Behavior Therapy (DBT) distress tolerance module, TIP skills (Linehan, 2015; T = temperature; I = intense exercise; P = paced breathing/progressive muscle relaxation), are offered to manage intense emotions/distress before effective problem-solving can be done or to reduce vulnerability to emotion mind. To trigger the dive reflex, DBT clients/patients are asked to immerse their face in freezing cold water which results in slowed breathing and reductions in the intensity of emotions. Perhaps a similar phenomenon to the triggering of the dive reflex occurs during the cold pressor task which results in blunted affective states and decreased emotion dysregulation following the cold pressor. While there was still a significant pre-post change in cold pressor state experiential avoidance, the mean difference was less than on the TSST which could indicate the physical discomfort of the tasks reduces the intensity to act to reduce one's emotions in the moment.

While these tasks were used and modified to evoke physical and social distress, due to their contrived nature, important information may be missing. Conceptually, the decision to engage in experiential avoidance in more naturalistic settings is influenced by rule-governed behavior related to an individual's values. People are much more likely to spend more time giving a speech in a class because the quality (and often quantity) of the speech will result in a better grade (delayed, probabilistic outcome) and they may value being a good student, for example. In more clinical situations, endurance of an uncomfortable social situation is also likely influenced by rule-governance and values. For example, enduring an intense and chaotic interpersonal relationship for longer despite significant distress because one values that relationship. There is also evidence that tolerance of the cold pressor task increases as a function of values clarification exercises (Branstetter-Rost, Cushing, & Douleh, 2008) which supports the notion that rule-governed behavior can influence one's willingness to tolerate and endure distress.

From a treatment perspective, experiential acceptance which is considered a key mechanism of change in ACT is frequently taught through use of metaphor and experiential exercise. While there is a great deal of variability in the content of acceptance and defusion metaphors, and although ACT is a principle-based psychotherapy, ACT materials are generally written with less emphasis and instruction on facilitating acceptance of aversive stimuli in specific contexts. Indeed, several of the most common acceptance metaphors (i.e., imagining acceptance as struggling with a beach ball, try not to think of white bear, etc.) are discussed in ACT manuals with unwanted private events lumped into broad categories. It is probable that prominent ACT scholars and research psychologists presume a certain level of clinical skill when writing these materials and thus assume clinicians will tailor to their clients' own unique learning histories. However, there is no existing research before the present study to examine the relationship between experiential avoidance in different contexts and thus tailoring ACT principles, metaphors, and exercises may make more sense. Finally, while many versions of the AAQ/AAQ-II exist in relationship to different presenting problems and situations, it may be useful to add a small screener or clinical interview at the beginning of treatment to gather data about the most important contextual factors to target in treatment.

Limitations and Future Directions

It is worth mentioning that the state-base measures were not administered individually after the speech and arithmetic tasks, but rather given once after the entire TSST. While this was done to eliminate study demands, no individual differences could be inferred in state experiential avoidance, emotion dysregulation, positive and negative affect, and state anxiety across the speech and arithmetic tasks. It also seems possible that participants who do engage in higher amounts of experiential avoidance by trait would self-select out of the study given the very nature of experiential avoidance. This may be reflected in the non-significant differences found between high and low levels of trait experiential avoidance groups on cold pressor and TSST tolerance and intensity. Given the contrived nature of the study, the results are not likely a perfect analogue of experiential avoidance in the real world. Replication with a clinical sample might also be interesting, particularly with participants with somatoform and other mood/anxiety disorders.

Because performance on the TSST was not a significant predictor of performance on the cold pressor task endurance, one potential treatment implication would be to consider the unique role of context in experiential avoidance when conducting treatments that undermine avoidance such as ACT and exposure-based therapies. To further support the multifaceted nature of experiential avoidance, future researchers could replicate in a clinical sample through matching to pairs participants who have clinically elevated emotional disorders (i.e., depression, anxiety) and who report significant experiential avoidance with participants who meet diagnostic criteria for a somatoform disorder. It would be interesting to determine whether those with a long learning history of avoidance related to these specific contexts would tend to engage in greater experiential avoidance in a novel context (i.e., social -> physical, physical -> social). While the group design could be considered a strength of this study, it would also be helpful to conduct several single subject replications of this research to verify the findings. Similarly, comparing analogue tasks of physical and social discomfort and then conducting a brief acceptance-based intervention to determine the efficacy of acceptance in increasing tolerance of physical and social discomfort would be interesting as while there is some evidence that values clarification increasing cold pressor tolerance (Branstetter-Rost, Cushing, & Douleh, 2008), less is understood regarding whether acceptance can improve tolerance of social discomfort in a laboratory context. It would be interesting to also test whether acceptance trained in relation to one task (i.e., physical discomfort) then leads to acceptance of social discomfort without having to directly train acceptance of social discomfort or whether multiple exemplars need to be trained. Further understanding the impact of acceptance on unique contexts related to experiential avoidance could then lead to more information about how to treat specific classes of avoidance behavior specific to each context. For example, if conducting acceptance-based behavior therapy or exposure-based therapy, in creating a hierarchy of exposures, knowing whether targeting avoidance unique to physical discomfort, for example, is more effective initially than targeting avoidance of emotional discomfort would be useful information. For patients who are hesitant about approaching feared contexts, motivational interviewing strategies could be utilized to evoke change talk regarding approaching situations in these specific contexts. Finally, while ACT is a function-based treatment, learning more about contexts associated with experiential avoidance and adding to the available ACT resources and treatment protocols could be useful in helping clinicians who do not have strong backgrounds in thinking functionally about the relationship between behavior and environment.

Conclusion

The aims of the present study were to evaluate the relationship between state and trait experiential avoidance following exposure to two stressful tasks. It was hypothesized that state experiential avoidance would increase following exposure to the cold pressor task and TSST and this would be reflected in participants' lower threshold, tolerance, endurance, and higher intensity ratings. While these hypotheses were confirmed following each task, contrary to initial hypotheses, endurance on one task was not predictive of endurance on the other task. Although these measures are contrived, based on the results of this study, contextual information appears to be an important contributor to one's likelihood of engaging in experiential avoidance. Future researchers could evaluate performance on these tasks in a single subject design as one's unique learning history is likely a strong contributor to their experiential avoidance repertoire. It would also be interesting to investigate the role of social influence in performance on the cold pressor task. It seems plausible that obedience to authority or a conformity experiment with confederates could increase cold pressor tolerance and endurance as may have been the case during the TSST.

Table 1

Skewness and Kurtosis Values for Baseline Measures

Baseline Measures	Skewness	Kurtosis
AAQ-II	.65	.43
MEAQ	-.17	.20
SMEA	.92	.06
BSI – Interpersonal Sensitivity	-.40	-1.10
STAI – State Anxiety	.58	-.14
STAI – Trait Anxiety	.47	-.14
S-DERS	1.58* (.87)	4.13* (.99)
BFNES	.56	-.32
PANAS – Negative Affect	1.26* (.43)	1.70* (-.15)
PANAS – Positive Affect	-.57	.19
Heart Rate Average	.28	-.23
Heart Rate Maximum	.18	-.05

Table 2

Skewness and Kurtosis Values for Pre, Mid, and Post TSST Measures

TSST Measures	Skewness	Kurtosis
Heart Rate Average – Speech Prep	.32	.05
Heart Rate Maximum – Speech Prep	.35	.48
Threshold – Speech	1.20	.93
Tolerance – Speech	.88	-.19
Endurance – Speech	.96	.14
Intensity – Speech	-.061	-1.0
Heart Rate Average – Speech	.60	.52
Heart Rate Maximum – Speech	.77	1.0
Heart Rate Average – Arithmetic	-.95* (.12)	5.50* (.16)
Heart Rate Maximum – Arithmetic	.18	-.05
Threshold – Arithmetic	1.90	3.13
Tolerance – Arithmetic	-1.17	3.13
Endurance – Arithmetic	-.50	-1.33
Intensity – Arithmetic	-.17	1.0
Heart Rate Average – Arithmetic	.60	.52
Heart Rate Maximum – Arithmetic	.67* (.15)	1.54* (.65)
SMEA	-.11	-.84
BFNES	.34	-.61
S-DERS	.95	.67
State Anxiety	-.02	-.97
Positive Affect	-.25	-.76
Negative Affect	1.0	.94

Table 3

Skewness and Kurtosis Values for Cold Pressor Task

Cold Pressor Measures	Skewness	Kurtosis
Heart Rate Average – Cold Pressor	.65	.43
Heart Rate Maximum – Cold Pressor	-.17	.20
Threshold	.92	.06
Tolerance	-.40	-1.10
Endurance	.37	-1.67
Intensity	-.15	-1.07
SMEA	.44	-1.00
S-DERS	1.20* (.64)	-1.03* (.83)
PANAS – Negative Affect	1.23* (.53)	1.49* (-.48)
PANAS – Positive Affect	-.43	1.49
STAI – State Anxiety	.28	-.60

Table 4

Means, Standard Deviations, Minimum and Maximum Scores, and Internal Consistencies for Baseline Measures

Baseline Measures	Mean (*SD*)	Minimum-Maximum	α
AAQ-II	20(9)	7-43	.90
MEAQ	210(35)	101-299	.91
SMEA	8(3.4)	4-17	.80
BSI – Interpersonal Sensitivity	2(1.4)	0-4	.70
STAI – State Anxiety	38(11)	20-74	.88
STAI – Trait Anxiety	41(11)	20-72	.91
S-DERS	63(13)	45-123	.80
BFNES	36(10)	15-60	.73
PANAS – Negative Affect	19(6)	10-44	.87
PANAS – Positive Affect	35(7)	13-50	.88
Social Desirability	24(3)	18-31	.53
Heart Rate Average	83(12)	57-115	--
Heart Rate Maximum	96(14)	66-135	--

Table 5

Means, Standard Deviations, Minimum and Maximum Scores, and Internal Consistencies for Pre, Mid, and Post TSST Measures

TSST Measures	Mean (*SD*)	Minimum-Maximum	α
Average Heart Rate – Speech Prep	83(13)	51-118	--
Maximum Heart Rate – Speech Prep	101(15)	57-153	--
Threshold – Speech	37(42)	0-184	--
Tolerance – Speech	128(75)	0-300	--
Endurance – Speech	99(82)	0-300	--
Intensity – Speech	51(38)	0-300	--
Heart Rate Average – Speech	93(14)	65-141	--
Heart Rate Maximum – Speech	105(15)	71-164	--
Heart Rate Average – Arithmetic	87(14)	54-125	--
Heart Rate Maximum – Arithmetic	98(15)	62-151	--
Threshold – Arithmetic	45(66)	0-300	--
Tolerance – Arithmetic	234(99)	0-300	--
Endurance – Arithmetic	199(107)	0-300	--
Intensity – Arithmetic	54(31)	0-300	--
SMEA – TSST	11(4)	4-20	.81
BFNES – TSST	36(10)	12-60	.88
S-DERS – TSST	65(13)	39-105	.79
Negative Affect Intensity – TSST	19(7)	10-42	.88
Positive Affect Intensity – TSST	32(9)	12-50	.90
State Anxiety – TSST	48(13)	23-73	.92

Table 6

Means, Standard Deviations, Minimum and Maximum Scores, and Internal Consistencies for Mid and Post Cold Pressor Task Measures

Cold Pressor Measures	Mean (*SD*)	Minimum-Maximum	α
Average Heart Rate – Cold Pressor	82(13)	59-153	--
Maximum Heart Rate – Cold Pressor	100(19)	71-206	--
Threshold – Cold Pressor	31(47)	0-270	--
Tolerance – Cold Pressor	154(123)	0-300	--
Endurance – Cold Pressor	124(120)	0-300	--
Intensity – Cold Pressor	49(27)	0-176	--
SMEA – Cold Pressor	9(4)	4-18	.86
S-DERS – Cold Pressor	59(10)	42-91	.72
Negative Affect Intensity – Cold Pressor	16(6)	10-38	.87
Positive Affect Intensity – Cold Pressor	34(9)	13-50	.91
State Anxiety – Cold Pressor	38(11)	20-68	.81

Table 7

Correlations Between Study Variables Measured at Baseline

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Self-Rated Pain Tolerance	--													
2. MEAQ Total	-.04	--												
3. MEAQ – Behavioral Avoidance	-.09	.82**	--											
4. MEAQ – Distress Aversion	-.02	.82**	.70**	--										
5. MEAQ – Distress Endurance	.25**	.04	-.20*	-.16	--									
6. MEAQ – Distraction/Suppression	-.16	.72**	.53**	.56**	.20*	--								
7. MEAQ – Procrastination	-.25**	.54**	.42**	.32**	-.31**	.29**	--							
8. MEAQ – Repression/Denial	.08	.70**	.46**	.41**	-.09	.27**	.36**	--						
9. SMEA	.021	.40**	.46**	.36**	-.08	.20*	.11	.35**	--					
10. AAQ-II	-.01	.41**	.30**	.31**	-.20*	.19*	.36**	.46**	.36**	--				
11. S-DERS – Total	-.08	.28**	.16	.12	-.23**	.05	.36**	.48**	.41**	.61**	--			
12. S-DERS – Nonacceptance	-.07	.21*	.15	.13	-.17*	.14	.24**	.26**	.38**	.55**	.84**	--		
13. S-DERS – Modulate	-.04	.14	.07	.04	-.26**	.01	.32**	.30**	.32**	.48**	**.77****	.63**	--	

14. S-DERS – Lack of Awareness	.09	.28**	.01	.20*	-.14	.01	.17	.45**	.10	.20*	.17	-.10	-.16	--

Correlations Between Study Variables Measured at Baseline – Continued

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
15. S-DERS – Lack of Clarity	-.18*	.17	.17	.04	-.09	-.05	.23**	.40**	.20*	.26**	.61**	.30**	.44**	.21*
16. Negative Affect Intensity	-.05	.22*	.12	.20*	-.23**	.02	.27**	.32**	.41**	.62**	.55**	.52**	.50**	.052
17. Positive Affect Intensity	.09	-.32**	-.35**	1	.33**	-.09	-.35**	-.37**	-.29**	-.40**	-.41**	-.27**	-.30**	-.35**
18. Trait Anxiety	-.01	.32**	.30**	.28**	-.38**	.04	.37**	.45**	.44**	.70**	.60**	.50**	.48**	.27**
19. State Anxiety	-.07	.18*	.20*	.13	-.33**	.03	.26**	.28**	.42**	.48**	.53**	.48**	.48**	.15
20. Fear of Negative Evaluations	-.04	.21*	.21*	.06	-.05	.15	.26**	.27**	.22*	.45**	.42**	.36**	.32**	.12
21. Social Desirability	-.09	.03	.03	.01	-.06	.02	.21*	-.03	-.08	.20*	.07	.08	.09	-.02
22. Interpersonal Sensitivity	-.04	.17	.09	.09	-.13	.02	.28**	.22*	.26**	.50**	.44**	.34**	.39**	.07
23. Average Heart Rate	-.015	.13	.09	.20*	-.01	.20*	.05	-.06	-.06	.03	-.06	.03	.02	-.22*
24. Maximum Heart Rate	-.076	.08	.01	.12	.07	.22*	.02	-.07	-.06	-.05	-.11	-.07	-.03	-.12

Correlations Between Study Variables Measured at Baseline – Continued

Variable	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.
15. S-DERS – Lack of Clarity	--									
16. Negative Affect Intensity	.24**	--								
17. Positive Affect Intensity	-.25**	-.40**	--							
18. Trait Anxiety	.30**	.69**	-.60**	--						
19. State Anxiety	.25**	.50**	-.42**	.66**	--					
20. Fear of Negative Evaluations	.23**	.45**	-.32**	.60**	.36**	--				
21. Social Desirability	-.01	.27**	-.05	.17*	.03	.12	--			
22. Interpersonal Sensitivity	.22*	.44**	-.30**	.48**	.39**	.48**	.14	--		
23. Average Heart Rate	-.05	-.05	-.06	.01	.02	-.05	-.11	-.03	--	
24. Maximum Heart Rate	-.06	-.06	-.03	-.05	.01	-.02	-.14	-.07	.79**	--

Note. *N = 133*, * *p* < .05, ** *p* < 01.

Table 8

Inter-Correlations Between Study Variables Measured During and Post Cold Pressor Task and Variables Measured at Baseline

	Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1.	Average Heart Rate – Cold Pressor	--												
2.	Maximum Heart Rate – Cold Pressor	.70**	--											
3.	Threshold – Cold Pressor	.05	.01	--										
4.	Tolerance – Cold Pressor	-.09	-.09	.22*	--									
5.	Endurance – Cold Pressor	-.08	-.09	-.30**	.90**	--								
6.	Intensity – Cold Pressor	.02	.04	-.30**	-.47**	-.35**	--							
7.	SMEA – Cold Pressor	.12	.16	-.25**	-.40**	-.30**	.51**	--						
8.	SDERS – Cold Pressor	.08	-.09	-.07	-.12	-.08	.11	.17	--					
9.	SDERS – Nonacceptance – Cold Pressor	.03	-.07	-.07	-.12	-.06	.11	.24**	.82**	--				
10.	SDERS – Modulate – Cold Pressor	.20*	.04	-.08	-.14	-.08	.11	.15	.71**	.58**	--			
11.	SDERS – Lack of Awareness – Cold Pressor	-.08	-.20*	-.04	-.03	-.03	.04	-.13	.30**	.01	-.14	--		
12.	SDERS – Lack of Clarity – Cold Pressor	.09	.04	-.01	.16	-.12	-.03	.09	.64**	.35**	.48**	.16	--	
13.	Negative Affect Intensity – Cold Pressor	.07	-.07	-.20*	-.15	-.03	.16	.17	.58**	.54**	.45**	.16	.34**	--
14.	Positive Affect Intensity – Cold Pressor	-.14	-.22*	.14	.15	.08	-.27**	-.22*	-.25**	-.14	-.13	-.30**	-.22*	-.27**
15.	State Anxiety – Cold Pressor	-.08	-.05	-.15	-.27**	-.20*	.30**	.40**	.38**	.32**	.33**	.16	.26**	.56**

Inter-Correlations Between Study Variables Measured During and Post Cold Pressor Task and Variables Measured at Baseline – Continued

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
16. MEAQ Total – Baseline	.16	.07	-.08	-.14	-.11	.07	.13	.25**	.13	.13	.24**	.15	.21*
17. SMEA – Baseline	.21*	.01	-.08	-.18*	-.10	.14	.31**	.34**	.35**	.20*	.13	.12	.35**
18. AAQ-II – Baseline	.06	.01	-.09	-.06	.01	.01	.14	.55**	.52**	.35**	.21*	.34**	.60**
19. Self-Reported Pain Tolerance	-.11	-.20*	.13	.24**	.20*	-.18*	-.20*	.03	-.04	.01	.16	-.02	.03
20. S-DERS – Baseline	.03	-.05	-.17	-.09	-.01	.15	.22*	.71**	.60**	.53**	.17	.45**	.56**
21. State Anxiety – Baseline	.08	.04	-.07	-.15	-.08	.18*	.19*	.33**	.30**	.24**	.16	.11	.53**
22. Trait Anxiety – Baseline	.01	-.03	-.14	-.12	-.03	.19*	.21*	.01	.37**	.21*	.27**	.20*	.60**
23. Social Desirability	-.10	-.08	.04	.04	.01	-.13	.07	.02	.06	-.02	.02	-.07	.10
24. Average Heart Rate – Baseline	.33**	.35**	.16	.09	-.03	-.12	-.01	.06	-.10	-.05	-.16	-.15	-.17
25. Maximum Heart Rate – Baseline	.53**	.43**	.13	-.02	-.08	-.02	-.05	-.08	-.11	-.09	-.13	-.12	-.13

Inter-Correlations Between Study Variables Measured During and Post Cold Pressor Task and Variables Measured at Baseline – Continued

Variable	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.
16. MEAQ Total – Baseline	-.28**	.18*	--									
17. SMEA – Baseline	-.28**	.30**	X	--								
18. AAQ-II – Baseline	-.37**	.44**	X	X	--							
19. Self-Reported Pain Tolerance	.20*	-.12	X	X	X	--						
20. S-DERS – Baseline	-.37**	.56**	X	X	X	X	--					
21. State Anxiety – Baseline	-.39**	.53**	X	X	X	X	X	--				
22. Trait Anxiety – Baseline	-.57**	.60**	X	X	X	X	X	X	--			
23. Social Desirability	-.05	.10	X	X	X	X	X	X	X	--		
24. Average Heart Rate – Baseline	-.01	-.17	X	X	X	X	X	X	X	X	--	
25. Maximum Heart Rate – Baseline	-.03	-.13	X	X	X	X	X	X	X	X	X	--

Note. *N = 133, * p < .05, ** p < .01*. X = Correlations between trait-based measures not presented again as these are depicted in table seven.

Table 9

Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Average Heart Rate – Speech Prep	--													
2. Maximum Heart Rate – Speech Prep	.70**	--												
3. Average Heart Rate – Speech	.77**	.84**	--											
4. Maximum Heart Rate – Speech	.57**	.58**	.84**	--										
5. Average Heart Rate – Arithmetic	.76**	.53**	.72**	.58**	--									
6. Maximum Heart Rate – Arithmetic	.62**	.67**	.68**	.68**	.88**	--								
7. SMEA – TSST	.11	.11	.07	.10	.09	.06	--							
8. Threshold – Speech	-.06	-.17	-.11	-.07	-.02	-.05	.05	--						
9. Tolerance – Speech	-.20*	.08	-.10	.08	-.05	-.04	-.11	.08	--					
10. Endurance – Speech	-.07	-.08	.04	.07	-.02	-.04	-.09	-.43**	.82**	--				
11. Intensity – Speech	.52**	.20*	.13	-.06	.13	.11	.52**	-.01	-.43**	-.29**	--			
12. Threshold – Arithmetic	.13	.05	.07	.02	.09	.05	.05	.04	-.05	-.05	.18*	--		
13. Tolerance – Arithmetic	.01	.09	-.02	.08	-.06	.04	-.32**	-.07	.28**	.21*	-.31**	.11	--	
14. Endurance – Arithmetic	.03	-.01	.01	.02	-.01	-.03	-.29**	-.05	.21*	.24**	-.33**	-.50**	.74**	--

Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline – Continued

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
15. Intensity – Arithmetic	.24**	.02	.11	-.07	.26**	.04	.60**	.05	-.32**	-.18*	.46**	.03	-.49**	-.24**
16. S-DERS TSST – Total	.30**	.03	.03	-.06	.04	-.01	.47**	.01	-.19*	-.14	.35**	.04	-.06	-.05
17. S-DERS TSST – Nonacceptance	-.05	-.09	-.01	-.09	.02	-.02	.46**	.04	-.12	-.08	.30**	.06	-.04	-.06
18. S-DERS TSST – Modulate	.15	-.01	.10	-.01	.08	.02	.47**	.02	-.15	-.12	.31**	.04	-.07	-.05
19. S-DERS TSST – Lack of Awareness	-.11	-.17	-.17	-.17	-.15	-.16	-.14	-.06	-.17	-.10	.01	-.01	.07	.09
20. S-DERS TSST – Lack of Clarity	.09	.06	.09	.06	.07	.04	.18*	-.05	-.10	-.03	.20*	.01	-.22*	-.13
21. Negative Affect Intensity TSST	.04	-.10	.01	-.10	.05	-.04	.52**	.12	-.20*	-.19*	.29**	.03	-.09	-.04
22. Positive Affect Intensity TSST	-.15	.06	-.03	.06	-.09	-.05	-.23**	-.08	.30**	.28**	-.25**	.07	.13	.02
23. State Anxiety TSST	.02	-.13	-.09	-.13	-.03	-.09	.66**	.10	-.20*	-.22*	.45**	.06	-.16	-.15
24. Fear of Negative Evaluations – TSST	-.10	-.10	-.15	-.10	-.09	-.12	.34**	.06	.13	.07	.10	.11	.06	-.04
25. Would Leave – Speech	.09	.12	-.02	-.08	.05	.04	.27**	.01	-.29**	-.26**	.43**	-.04	-.12	-.07
26. Would Leave – Arithmetic	-.01	.06	.04	.05	-.01	.03	.41**	-.01	-.02	-.08	.02	-.03	-.28**	-.29**
27. MEAQ Total – Baseline	.12	.09	.04	-.08	.11	.09	.18*	-.02	-.27**	-.22*	.17	.08	-.08	-.10
28. SMEA – Baseline	.07	-.04	.01	-.11	.07	-.04	.38**	.11	-.22*	-.13	.27**	.02	-.15	-.04
29. AAQ-II – Baseline	.01	-.12	-.02	-.22	.01	-.12	.25**	.09	-.21*	-.11	.33**	.14	-.13	-.08
30. S-DERS – Baseline	.01	-.14	-.06	-.24**	.01	-.14	.17*	.15	-.16	-.09	.32**	.01	.02	.15
31. Self-Reported Pain Tolerance	-.03	-.07	.04	-.03	-.08	.03	-.01	.09	.05	-.06	-.13	.04	-.04	-.10

Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline – Continued

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
32. State Anxiety – Baseline	.02	-.04	-.06	-.10	.12	.01	.41**	.16	-.18*	-.15	.35**	-.06	-.07	.04
33. Trait Anxiety – Baseline	-.01	-.11	-.14	-.26**	.16	-.06	.28**	.23**	-.26**	-.25**	.36**	.05	-.11	-.05
34. Fear of Negative Evaluations – Baseline	-.09	-.03	-.13	-.08	-.09	-.11	.34**	.05	.13	.06	.07	.10	.07	-.02
35. Interpersonal Sensitivity – Baseline	-.01	-.04	-.10	-.16	.03	-.08	.18*	.20*	-.08	-.16	.13	.03	.05	.04
36. Negative Affect Intensity – Baseline	-.09	-.21*	-.15	-.29**	.16	-.29**	.35**	.20*	-.17	-.11	.34**	.05	-.09	-.01
37. Positive Affect Intensity – Baseline	-.09	.09	-.01	.12	-.21*	-.07	-.15	-.02	.29**	.16	-.30**	.10	.17*	-.01
38. Social Desirability – Baseline	-.20*	-.14	-.09	-.07	-.07	-.13	-.01	.11	.02	-.04	.05	-.06	.12	.14
39. Average Heart Rate – Baseline	.50**	.53**	.34**	.39**	-.30**	.36**	.15	-.21*	-.01	-.19*	-.26**	.09	.19*	-.04
40. Maximum Heart Rate – Baseline	.67**	.64**	.53**	.53**	-.11	.58**	.12	-.13	-.07	-.08	-.02	.19*	.18*	-.02

Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline – Continued

Variable	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.
15. Intensity – Arithmetic	--																
16. S-DERS TSST – Total	.29**	--															
17. S-DERS TSST – Nonacceptance	.30**	.87**	--														
18. S-DERS TSST – Modulate	.34**	.81**	.62**	--													
19. S-DERS TSST – Lack of Awareness	.02	.03	-.12	-.29**	--												
20. S-DERS TSST – Lack of Clarity	.18*	.50**	.26**	.39**	.27**	--											
21. Negative Affect Intensity TSST	.47**	.60**	.57**	.57**	-.05	.19*	--										
22. Positive Affect Intensity TSST	-.35**	-.28**	-.26**	-.20*	-.17	-.20*	-.39**	--									
23. State Anxiety TSST	.42**	.65**	.62**	.57**	.01	.24**	.70**	-.47**	--								
24. Fear of Negative Evaluations TSST	.09	.35**	.44**	.29**	-.02	.12	.41**	-.36**	.53**	--							
25. Would Leave Speech	.19*	.33**	.17*	.23*	.19*	.26**	.19*	.30**	.31**	.19*	--						
26. Would Leave Arithmetic	.27**	.15	.18*	.17	-.14	.05	.30**	-.14	.33**	.17*	.31**	--					
27. MEAQ Total – Baseline	.14	.22**	.12	.13	.17*	.18*	.24**	-.27**	.27**	.16	.30**	.16	--				
28. SMEA – Baseline	.29**	.40**	.33**	.31**	.10	.39**	.35**	-.24**	.36**	.35**	.24**	.40**	X	--			
29. AAQ-II – Baseline	.31**	.41**	.33**	.29**	.22*	.17*	.50**	-.40**	.46**	.38**	.21*	.09	X	X	--		
30. S-DERS – Baseline	.19*	.53**	.40**	.44**	.13	.38**	.46**	-.38**	.41**	.40**	.32**	.01	X	X	X	--	
31. Self-Reported Pain Tolerance	-.08	-.01	-.03	-.05	.15	-.07	.03	-.07	-.02	-.02	-.07	-.06	X	X	X	X	--

Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline – Continued

Variables	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
15. Intensity – Arithmetic	-.08	.32**	.28**	.05	.14	.36**	-.25**	.05	-.14	-.04
16. S-DERS TSST – Total	.29**	.50**	.17*	.42**	.43**	.55**	-.41**	.06	-.09	-.12
17. S-DERS TSST – Nonacceptance	.30**	.47**	.37**	.33**	.37**	.40**	-.17	.01	-.04	.03
18. S-DERS TSST – Modulate	.34**	.42**	-.04	.26**	.36**	.38**	-.09	-.04	-.03	.05
19. S-DERS TSST – Lack of Awareness	.02	.11	.19*	.05	.09	.02	-.31**	-.03	-.17*	-.16
20. S-DERS TSST – Lack of Clarity	.18*	.30**	.19*	.09	.12	.16	-.25**	-.06	-.12	-.09
21. Negative Affect Intensity TSST	.47**	.49**	.59**	.32**	.37**	.66**	-.24**	.12	-.07	-.01
22. Positive Affect Intensity TSST	-.35**	-.36**	-.55**	-.30**	-.30**	-.34**	.73**	-.05	-.06	-.07
23. State Anxiety TSST	.42**	.66**	.59**	.41**	.44**	.52**	-.37**	.56**	.01	.04
24. Fear of Negative Evaluations TSST	.09	.39**	.59**	.88**	.46**	.45**	-.31**	.13	.02	-.01
25. Would Leave Speech	.19*	.31**	.30**	.17	.19*	.16	-.21*	-.07	.05	-.06
26. Would Leave Arithmetic	.27**	.11	.06	.01	.14	-.19*	.02	-.06	.15	.01
27. MEAQ Total – Baseline	X	X	X	X	X	X	X	X	X	X
28. SMEA – Baseline	X	X	X	X	X	X	X	X	X	X
29. AAQ-II – Baseline	X	X	X	X	X	X	X	X	X	X
30. Self-Reported Pain Tolerance	X	X	X	X	X	X	X	X	X	X

Inter-Correlations Between Study Variables Measured Pre, Mid, and Post TSST and Variables Measured at Baseline – Continued

Variable	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.
32. S-DERS – Baseline	.61**	.53**	.40**	.44**	.13	.38**	-.38**	-.38**	.41**	.40**	.32**	.01	X	X	X
33. State Anxiety TSST – Baseline	.48**	.50**	.47**	.42**	.11	.30**	.49**	-.47**	.66**	.39**	.31**	.11	X	X	X
34. Trait Anxiety TSST – Baseline	.70**	.40**	.37**	.29**	.19*	.19*	.59**	-.55**	.59**	.59**	.30**	.06	X	X	X
35. Fear of Neg. Evaluations TSST – Baseline	.44**	.35**	.33**	.26**	.05	.09	.32**	-.30**	.40**	.88**	.17	.09	X	X	X
36. Interpersonal Sensitivity – Baseline	.49**	.46**	.37**	.36**	.09	.12	.37**	-.30**	.44**	.46**	.19*	.14	X	X	X
37. Negative Affect Intensity – Baseline	.61**	.43**	.40**	.38**	.01	.16	.52**	-.34**	.52**	.47**	.31**	.19*	X	X	X
38. Positive Affect Intensity – Baseline	-.41**	-.25**	-.17	-.09	-.31**	-.25**	-.24**	.72**	-.37**	-.31**	-.31**	-.02	X	X	X
39. Social Desirability – Baseline	.19*	-.02	.01	-.04	-.01	-.06	.11	-.05	.05	.13	.06	.07	X	X	X
40. Average Heart Rate – Baseline	-.04	-.07	-.04	-.03	-.17*	-.12	-.07	-.06	.01	.02	.05	.15	X	X	X
41. Maximum Heart Rate – Baseline	-.05	.01	.03	.05	-.16	-.09	-.02	-.07	.04	-.01	-.06	.01	X	X	X

Note. *N* = 133, * $p < .05$, * $p < .01$. X = Correlations between trait-based measures not presented again as these are depicted in table 7. Correlations 31 – 40 with 31 through 40 not displayed as they are trait-based measures with associations already depicted in table 7. Bold-face text used for trait-based measures.

Table 10

Correlations Between TSST and Cold Pressor Task Variables and State-Based Measures

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. SMEA - TSST	--													
2. Threshold – Speech	X	--												
3. Tolerance – Speech	X	X	--											
4. Endurance – Speech	X	X	X	--										
5. Intensity – Speech	X	X	X	X	--									
6. SMEA – Cold Pressor	.24**	.09	-.04	-.01	.24**	--								
7. Threshold – Cold Pressor	-.07	-.07	.05	.03	-.07	X	--							
8. Tolerance – Cold Pressor	.01	-.16	.17*	.12	-.20*	X	X	--						
9. Endurance – Cold Pressor	.04	-.09	.11	.14	-.07	X	X	X	--					
10. Intensity – Cold Pressor	.06	.09	-.20*	-.06	.36**	X	X	X	X	--				
11. Threshold – Arithmetic	X	X	X	X	X	-.01	.05	.02	.01	.01	--			
12. Tolerance – Arithmetic	X	X	X	X	X	-.09	.05	.16	.08	-.07	X	--		
13. Endurance – Arithmetic	X	X	X	X	X	-.03	-.03	.04	.05	.03	X	X	--	
14. Intensity – Arithmetic	X	X	X	X	X	.22*	-.01	-.36**	-.06	.31**	X	X	X	--
15. Would Leave Speech	.27**	X	X	X	X	.20*	-.11	-.06	-.01	.30**	X	X	X	X
16. Would Leave Arithmetic	.28**	X	X	X	X	.16	-.07	.01	.03	.06	X	X	X	X

Correlations Between TSST and Cold Pressor Task Variables and State-Based Measures

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
17. S-DERS TSST	X	X	X	X	X	.14	-.11	-.07	-.01	.20*	X	X	X	X
18. S-DERS Nonacceptance – TSST	X	X	X	X	X	.13	-.09	-.07	-.02	.16	X	X	X	X
19. S-DERS Modulate – TSST	X	X	X	X	X	.17	-.11	-.06	.01	.19*	X	X	X	X
20. S-DERS Lack of Awareness – TSST	X	X	X	X	X	-.05	-.05	-.05	-.04	.13	X	X	X	X
21. S-DERS Lack of Clarity – TSST	X	X	X	X	X	.26**	-.12	-.16	-.16	.12	X	X	X	X
22. S-DERS Cold Pressor	.11	.10	.11	-.01	.17*	X	X	X	X	X	.04	-.08	.04	.18*
23. S-DERS Nonacceptance – Cold Pressor	.18*	.11	.01	.09	.21*	X	X	X	X	X	.06	-.05	-.02	.24**
24. S-DERS Modulate – Cold Pressor	.05	.04	.03	.17	.19*	X	X	X	X	X	.04	-.10	.07	.29**
25. S-DERS Lack of Awareness – Cold Pressor	-.16	.09	-.25**	-.22*	.05	X	X	X	X	X	-.01	.05	.07	-.01
26. S-DERS Lack of Clarity – Cold Pressor	.17	.02	-.13	-.01	.16*	X	X	X	X	X	.01	-.24**	-.05	.12

*Note. N = 133, * p < .05, ** p < .01.* X = Correlations between TSST speech and arithmetic task inter-correlations and inter-correlations between cold pressor task variables not presented again as these are depicted in table 8 and 9.

Correlations Between TSST Speech and Cold Pressor Task Experiential Avoidance Variables and State-Based Measures – Continued

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
27. Negative Affect Intensity – TSST	X	X	X	X	X	.33**	-.20*	-.18*	-.04	.31**	X	X	X	X
28. Positive Affect Intensity – TSST	X	X	X	X	X	-.22*	.04	.18*	.14	-.31**	X	X	X	X
29. State Anxiety – TSST	X	X	X	X	X	.22*	-.06	-.01	.04	.22*	X	X	X	X
30. Fear of Negative Evaluations – TSST	X	X	X	X	X	.10	-.04	.14	.14	-.01	X	X	X	X
31. Negative Affect Intensity – Cold Pressor	.24**	.14	-.16	-.01	.39**	X	X	X	X	X	.03	-.13	.06	.42**
32. Positive Affect Intensity – Cold Pressor	-.29**	-.11	.34**	.27**	-.25**	X	X	X	X	X	-.01	.18*	.03	-.25**
33. State Anxiety – Cold Pressor	.56**	.11	-.13	-.09	.31**	X	X	X	X	X	-.09	-.11	-.03	.32**
34. Average Heart Rate – Speech Prep	X	X	X	X	X	.09	.08	-.10	-.09	.17	X	X	X	X
35. Maximum Heart Rate – Speech Prep	X	X	X	X	X	.07	.10	-.01	-.06	.07	X	X	X	X
36. Average Heart Rate – Speech	X	X	X	X	X	.06	.05	-.02	.01	.06	X	X	X	X
37. Maximum Heart Rate – Speech	X	X	X	X	X	-.01	.08	.10	.08	-.07	X	X	X	X
38. Average Heart Rate – Cold Pressor	.09	.01	-.10	.05	.14	X	X	X	X	X	.03	-.05	.07	.24**
39. Maximum Heart Rate – Cold Pressor	-.09	.11	.04	-.07	.01	X	X	X	X	X	-.07	.03	-.02	-.04

Correlations Between TSST Speech and Cold Pressor Task Experiential Avoidance Variables and State-Based Measures – Continued

Variable	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.
26. Negative Affect Intensity – TSST	X	X	X	X	X	X	X	.41**	.38**	.32**	.09	.21*
28. Positive Affect Intensity – TSST	X	X	X	X	X	X	X	-.23**	-.15	-.18*	-.17*	-.24**
29. State Anxiety – TSST	X	X	X	X	X	X	X	.28**	.26**	.17*	.12	.06
30. Fear of Negative Evaluations – TSST	X	X	X	X	X	X	X	.30**	.30**	.14	.02	.12
31. Negative Affect Intensity – Cold Pressor	.22*	.17*	.44**	.41**	.39**	.08	.25**	X	X	X	X	X
32. Positive Affect Intensity – Cold Pressor	-.23**	-.04	-.26**	-.18*	-.14	-.21*	-.24**	X	X	X	X	X
33. State Anxiety – Cold Pressor	.28**	.17	.40**	.36**	.32**	.17	.35**	X	X	X	X	X
34. Average Heart Rate – Speech Prep	X	X	X	X	X	X	X	.04	.01	.18*	-.10	.14
35. Maximum Heart Rate – Speech Prep	X	X	X	X	X	X	X	-.09	-.23**	-.05	-.15	.02
36. Average Heart Rate – Speech	X	X	X	X	X	X	X	-.17	-.04	.12	-.16	.17
37. Maximum Heart Rate – Speech	X	X	X	X	X	X	X	-.02	-.22*	-.08	-.22**	.01
38. Average Heart Rate – Cold Pressor	-.01	-.03	.07	.01	.17*	-.10	.17	X	X	X	X	X
39. Maximum Heart Rate – Cold Pressor	-.07	.03	-.03	.01	.02	-.18*	.02	X	X	X	X	X

Note. N = 133, * $p < .05$, ** $p < .01$. X = Correlations between TSST speech and arithmetic task inter-correlations and inter-correlations between cold pressor task variables not presented again as these are depicted in table 8 and 9.

Table 11

Summary of Hierarchical Regression Predicting State Experiential Avoidance Post Cold Pressor Task

Block	Variable	*B*	*SE B*	*β*	*t*	R^2	$R^2\Delta$	*F*
1)	Perceived Pain Tolerance	-.65	.41	-.13	-2.34**	.06		4.45**
	Trait Experiential Avoidance	.46	.27	.14	-1.57			
2)	Maximum Heart Rate – Cold Pressor	.02	.01	.09	1.71	.08	.01	1.54
3)	Endurance – Cold Pressor	-.01	.01	-.24	-2.81**	.13	.05	7.87**

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 12

Summary of Hierarchical Regression Predicting Positive Affect Intensity Post Cold Pressor Task

Block	Variable	*B*	*SE B*	*β*	*t*	R^2	$R^2\Delta$	*F*
1)	Perceived Pain Tolerance	.85	.85	.18	1.87	.19		14.89***
	Trait Experiential Avoidance	-2.67	.56		-4.86***			
2)	Maximum Heart Rate – Cold Pressor	-.08	.04	-.17	-2.07*	.21	.03	4.39*
3)	Endurance – Cold Pressor	.001	.01	.02	.30	.21	.01	.09

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 13

Summary of Hierarchical Regression Predicting State Experiential Avoidance Post TSST

Block	Variable	*B*	*SE B*	*β*	*t*	R^2	$R^2\Delta$	*F*
1)	Interpersonal Sensitivity	.39	.28	.12	1.37	.07		5.23**
	Trait Experiential Avoidance	.63	.30	.19	2.07*			
2)	Maximum Heart Rate – Speech	.02	.03	.08	.69	.09	.01	2.99**
	Maximum Heart Rate – Arithmetic	.01	.03	.03	.27			
3)	Endurance – Speech	8.55	.01	.01	.02	.16	.08	4.04***
	Endurance – Arithmetic	-.01	.01	-.28	-3.29***			
	Fear of Negative Evaluations	.12	.04	.29	3.16**			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 14

Summary of Hierarchical Regression Predicting Positive Affect Intensity Post TSST

Block	Variable	*B*	*SE B*	*β*	*t*	R^2	$R^2\Delta$	*F*
1)	Interpersonal Sensitivity	-.81	.61	-.12	-1.33	.19		14.93***
	Trait Experiential Avoidance	-2.43	.65	-.34	-3.74***			
2)	Maximum Heart Rate – Speech	.01	.06	.02	.19	.19	.01	7.71***
	Maximum Heart Rate – Arithmetic	-.05	.07	-.08	-.78			
3)	Endurance – Speech	.02	.01	.19	2.27*	.23	.04	6.14***
	Endurance – Arithmetic	-.01	.01	-.07	-.81			
	Fear of Negative Evaluations	-.27	.08	-.30	-3.39***			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 15

Summary of Hierarchical Regression Predicting State Anxiety Post TSST

Block	Variable	*B*	*SE B*	*Β*	*t*	R^2	$R^2\Delta$	*F*
1)	Interpersonal Sensitivity	1.97	.76	.21	2.57**	.38		26.88***
	Trait Experiential Avoidance	.60	.96	.06	.62			
	Trait Anxiety	.52	.11	.45	4.58***			
2)	Maximum Heart Rate – Speech	.04	.07	.04	.44	.39	.001	.13
	Maximum Heart Rate – Arithmetic	-.01	.08	-.001	-.09			
3)	Endurance – Speech	-.001	.02	-.01	-.25	.40	.01	1.94
	Endurance – Arithmetic	-.01	.01	.01	-1.83			
	Fear of Negative Evaluations	.35	.11	.28	2.95**			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 16

Summary of Hierarchical Regression Predicting Cold Pressor Task Endurance from TSST Variables

Block	Variable	*B*	*SE B*	*Β*	*t*	R^2	$R^2\Delta$	*F*
1)	Trait Experiential Avoidance	-.63	8.71	-.01	-.07	.01		.21
2)	Maximum Heart Rate – Speech	1.58	.92	.21	1.7	.03	.03	1.47
	Maximum Heart Rate – Arithmetic	-1.68	.98	-.21	-1.72			
3)	State Experiential Avoidance - TSST	2.17	2.70	.07	.80	.05	.02	1.13
	Endurance – Speech	.16	.13	.11	1.24			
	Endurance – Arithmetic	.04	.10	.03	.36			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 17

Summary of Hierarchical Regression Predicting Arithmetic Endurance from Speech Variables

Block	Variable	*B*	*SE B*	*Β*	*t*	R^2	$R^2\Delta$	*F*
1)	Trait Experiential Avoidance	.49	7.36	.01	.07	.01		1.43
2)	Maximum Heart Rate – Speech	.09	.57	.01	.16	.01	.001	.72
3)	State Experiential Avoidance - TSST	-6.95	2.21	-.27	-3.15**	.13	.12	4.86***
	Endurance – Speech	.28	.11	.21	2.56**			

Note. * $p < .05$, ** $p < .01$, *** $p < .001$.

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Appendix A

Human Subjects Institutional Review Board Full Approval Letter

WESTERN MICHIGAN UNIVERSITY

Institutional Review Board
FWA00007042
IRB00000254

Date: March 20, 2018

To: Amy Naugle, Principal Investigator
Meaghan Lewis, Student Investigator for dissertation

From: Daryle Gardner-Bonneau, Ph.D., Vice Chair
Daryle Gardner-Bonneau

Re: HSIRB Project Number 18-02-19

This letter will confirm that your research project titled "Investigating the Physical and Psychological Effects of Two Analog Tasks" has been **approved** under the **full** category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note: This research may **only** be conducted exactly in the form it was approved. You must seek specific board approval for any changes in this project (e.g., ***you must request a post approval change to enroll subjects beyond the number stated in your application under "Number of subjects you want to complete the study***)." Failure to obtain approval for changes will result in a protocol deviation. In addition, if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

Reapproval of the project is required if it extends beyond the termination date stated below.

The Board wishes you success in the pursuit of your research goals.

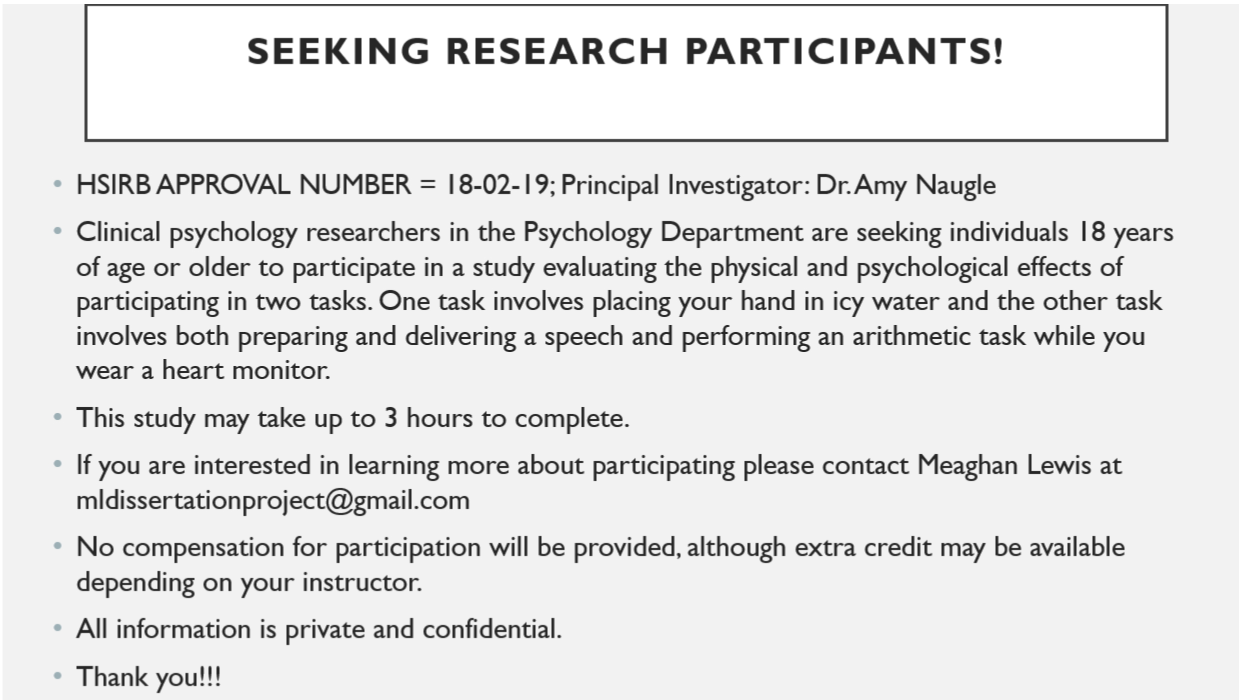
Approval Termination: **February 20, 2019**

Office of the Vice President for Research
Research Compliance Office
1903 W. Michigan Ave., Kalamazoo, MI 49008-5456
phone: (269) 387-8293 fax: (269) 387-8276
website: wmich.edu/research/compliance/hsirb

campus site: 251 W. Walwood Hall

Appendix B

Recruitment Slide



Appendix C

Recruitment Script

Hello, my name is _____________________, and I am here to invite you to participate in a research study that is being conducted in the psychology department. The title of this study is "Investigating the Physical and Psychological Effects of Two Analog Tasks."

This study is looking at people's participation on two tasks as well as their coping and emotion management skills in the moment. You may participate if you are 18-years-old or older and are currently enrolled in a psychology course at WMU.

If you choose to participate, you may email the investigators and they will schedule a time for you to meet with a research assistant. Part of your performance will involve completing questionnaires regarding your emotions, ways you manage emotions, and how you handle situations in which you are being evaluated. Another aspect of your participation will involve placing your hand in an ice chest filled with icy water to better understand how physical sensations affect coping strategies. You will be asked to rate the intensity of this experience and when it first becomes painful to you. You will also be asked to engage in a 10-minute dialogue with an unfamiliar person about a difficult situation you have experienced. After completing this conversation, you and the other participant will be asked to provide each other with feedback on this social interaction based on what went well from your perspective, what was neither positive nor negative, and what did not go well or felt uncomfortable. You will also be asked to complete a series of questionnaires regarding your emotions and be asked how the conversation went. The research assistant will then schedule you to come back for a follow-up session to hear your feedback from the other participant.

During the second session, you will meet with the research assistant to hear the audiotaped feedback the other participant provided regarding your 10-minute dialogue. While hearing this feedback, the research assistant will be checking in with you to ask if you feel any emotional discomfort and to rate the intensity of the feedback. Afterward, you will be asked to complete questionnaires regarding your emotions, how you manage your emotions, and how you handle evaluations. We will then provide you with more information on what we trying to find out in this study and provide you with a list of referral resources should any of the information have made you feel uncomfortable and you feel a need to seek services.

All of the information you provide during this study is completely confidential. Your responses will be assigned a code number and kept separately from any information you give us that includes personal identifiers such as your name or email address. Participation in this study is completely voluntary and you can stop at any time without any impact on your grade in this course or your relationship with Western Michigan University or the Psychology Department.

It may be possible to obtain extra credit points for participating in this study. Please check with your instructor on their policies regarding extra credit for participating in research. Your instructor may also have alternative methods for being awarded extra credit points if you decide not to participate in this study. Please ask your instructor. If you are interested in learning more about this study, please take a study handout. The handouts provide information for contacting the student investigator.

Thank you for your time and have a great day!

Appendix D

Study Handouts

Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485	Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485
Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485	Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485
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Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485	Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485
Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485	Physical and Psychological Effects of Two Tasks Study Please contact Meaghan Lewis at mldissertationresearch@gmail.com or by phone at (269) 387-4485

Appendix E

Study Fliers

Seeking Research Participants!

Clinical psychology researchers in the Psychology Department are seeking individuals 18 years of age or older to participate in a study evaluating the physical and psychological effects of participating in two tasks. One task involves placing your hand in icy water and the other task involves having a conversation with a stranger and providing and listening to feedback about that conversation.

If you are interested in learning more about participating please contact Meaghan Lewis at meaghan.m.lewis@wmich.edu

All information is private and confidential.

Thank you!

Meaghan.M.lewis@wmich.edu (269) 387-4485	Meaghan.M.Lewis@wmich.edu (269) 387-4485
Meaghan.M.Lewis@wmich.edu (269) 387-4485	Meaghan.M.Lewis@wmich.edu (269) 387-4485
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Meaghan.M.Lewis@wmich.edu (269) 387-4485	Meaghan.M.Lewis@wmich.edu (269) 387-4485

Appendix F

Informed Consent Document

Western Michigan University
Psychology Department

Principal Investigator: Amy Naugle, Ph.D.
Student Investigator: Meaghan Lewis, M.S.
Title of Study: *"Investigating the physical and psychological effects of two stressful tasks"*

You have been invited to participate in a research project titled "*Investigating the physical and psychological effects of two stressful tasks."* This project will serve as Meaghan Lewis's dissertation research project for the requirements of the degree of Doctor of Philosophy in clinical psychology. This consent document will explain the purpose of this research project and will go over all of the time commitments, the procedures used in the study, and the risks and benefits of participating in this research project. Please read this consent form carefully and completely and please ask any questions if you need more clarification.

What are we trying to find out in this study?

The purpose of the present study is to investigate the physical and psychological effects of two different tasks. We are interested in comparing your reaction to two different tasks and how these tasks affect you emotionally and physically.

Who can participate in this study?

You are eligible to participate if you are 18-years-old or older and are enrolled in a psychology course within the psychology department at Western Michigan University. Given the nature of the study, you are not eligible to participate if you have a neurological or psychiatric illness that could affect your responses to pain such as Raynaud's disease, schizophrenia, urticaria (hives), or stroke. You are also not eligible to participate if you have had an abnormal screening EKG, history of heart disease or stroke, or currently have a pacemaker or untreated high blood pressure.

Where will this study take place?

This study will take place in a private room located in the Trauma Research Laboratory in suite 2502 of Wood Hall on the campus of Western Michigan University.

What is the time commitment for participating in this study?

This study is comprised of one session. Depending on how quickly you complete the self-report measures and study tasks, it is estimated that this session could take up to 140-160 minutes to complete. You will be provided with a ten-minute break in between each task.

What will you be asked to do if you choose to participate in this study?

Should you choose to participate in the present study, your participation will include first completing some questionnaires regarding your demographic information, your emotions and how you handle them, how you handle evaluation, and any symptoms you may be experiencing. Next you will complete a task that involves placing your hand in an ice chest filled with icy water regulated by a thermometer at approximately 68 degrees Fahrenheit for one minute. After this, you will be asked to place your hand in an adjacent container filled with ice water regulated at 40 degrees Fahrenheit. It is your choice for how long to keep your hand in the water, but if you choose not to remove your hand, it will remain in the water for a period of five minutes.

You will also be asked to give a speech regarding why you are a good candidate for your ideal job. A panel of judges trained in public speaking will watch you deliver the speech and evaluate your speech. We will be asking you to provide us with an indication of when/if you first experience emotional discomfort through clicking a button on a computer screen. After you have finished giving the speech, we will be asking you to complete a second task that involves mental arithmetic. While we would like you to continue these tasks for as long as you can, the choice to stop is up to you. If, at the end of five minutes you are still giving the speech and doing the arithmetic task, the judges will stop your performance. After completing these tasks, you will be asked to complete additional questionnaires on your emotions and how you manage emotions. It is estimated that completion of this study will take approximately 140-160 minutes depending on how quickly or slowly you complete the measures.

What information is being measured during the study?

The first task, the cold pressor task, will measure your physical willingness to withstand uncomfortable physical sensations through measuring how long you are willing to keep your hand placed in icy water. The second task is designed to test the effects of public speaking and publicly completing mental arithmetic on variables including your emotions, how you manage emotions in the moment, and how you handle situations that involve being evaluated. You will be asked to talk about why you are a good candidate for your ideal job as if you are being interviewed. You will also be asked to indicate when you first experience discomfort on the cold pressor task and during the speech and arithmetic tasks. After each of these tasks, you will be asked to rate your discomfort on a visual scale. We will also be measuring your heart rate during each task to get a sense of how your heart rate may vary across tasks.

What are the risks of participating in this study and how will these risks be minimized?

Potential risks of participation include temporary physical pain or discomfort from placing your hand in the ice water. If, at any point, the physical discomfort of placing your hand in the icy water becomes too difficult for you, you may withdraw your hand at any point without penalty to yourself or your relationship with the psychology department at Western Michigan University. Another risk of participating includes experiencing potential distress related to public speaking and publicly completing an arithmetic task. There is also a risk you may experience distress related to completing the questionnaires. However, you may skip any questions you do not wish to answer. If you feel the need to seek professional mental health services, you will be provided with a list of local resources for psychological services. The student investigator is a Temporary

Limited License Psychologist with a master's degree in clinical psychology and the principal investigator is a Licensed Psychologist with a Ph.D. in clinical psychology. Should distress occur in the moment, either the student investigator or principal investigator will be available by phone or in person to address distress if it occurs in the moment. These tasks could potentially increase anxiety or panic symptoms. It is important for you to let us know if you become distressed to the point where you do not wish to continue. You may stop the task at any time and you may also choose to speak with the student investigator or a graduate level research therapist about your distress.

What are the benefits of participating in this study?

There are no direct benefits to you for participating in this study. However, there are potential benefits to the discipline. It is hoped that the information gathered may help improve our understandings of emotion management and feedback delivery. This information may also assist in developing more effective interventions to manage emotions.

Are there any costs associated with participating in this study?

Aside from your time participating, there are no known costs associated with participating in the present study.

Is there any compensation for participating in this study?

You may receive extra credit for participating in the present study. However, the decision to award extra credit points is ultimately up to your course instructor. Should you be interested in receiving extra credit, an extra credit slip will be provided to you at the end of the study by the research assistant and you will be responsible for providing your instructor with this slip. No other compensation will be offered.

Who will have access to the information collected during this study?

The answers you provide to the questionnaires and your performance on the cold pressor task, your heart rate data, and your data from the speech and arithmetic tasks will be kept confidential. No names will be linked to any of the data collected. All data will be kept in a locked filing cabinet in the Trauma Research laboratory with a code number attached to it to protect your identity. Your written data from completing the cold pressor task and questionnaires will be stored with your heart rate, speech, and arithmetic data in the locked filing cabinet and will also contain the same code number to link up your data. A master list with your name and contact information will be kept in a separate filing cabinet apart from your data should your instructor need to verify your participation for extra credit purposes and to share some additional purposes of this study with you at a later date. The results of this study may also be submitted for publication in scholarly journals as well as through presentations at research conferences. No names will be associated with the information. The results will be presented in a group format to make sure no individual responses are identified. Should you be interested in the results of this study, please let us know, we will send you a copy when the results are analyzed and interpreted.

What if you want to stop participating in this study?

You can choose to stop participating in the study at any time for any reason. You will not suffer any prejudice or penalty by your decision to stop your participation. You will experience NO consequences either academically or personally if you choose to withdraw from this study.
The investigator can also decide to stop your participation in the study without your consent.
Should you have any questions prior to or during the study, you can contact the primary investigator, Dr. Amy Naugle at (269) 387-4726 or amy.naugle@wmich.edu. You may also contact the Chair, Human Subjects Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298 if questions arise during the course of the study.
This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

I have read this informed consent document. The risks and benefits have been explained to me. I agree to take part in this study.

Please Print Your Name

______________________________ ______________________________

Participant's signature Date

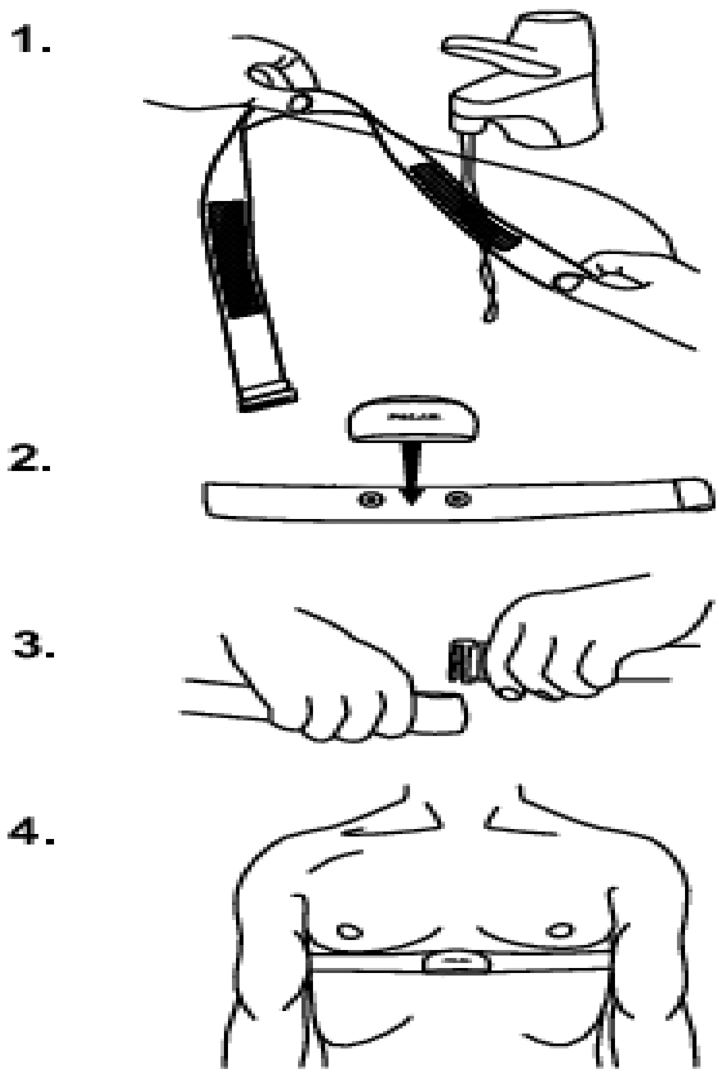
______________________________ __________

Signature of research staff obtaining consent Date

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board (HSIRB) as indicated by the stamped date and signature of the board chair in the upper right corner. Do not participate in this study if the stamped date is older than one year.

Appendix G

Heart Rate Monitor Visual Instructions



Appendix H

Cold Pressor Task Experimenter Instructions

Cold Pressor Task Experimenter Instructions					
Participant Number		**Today's Date**		**Experimenter Name**	
PRE- STRESS(BASELINE)					

Before the session: Wipe the heart rate transmitter and watch with alcohol pads. Grab your cell phone or timer and the participant's packet. The packet includes: Consent document, confidentiality form, measures packet one, measures packet for cold pressor task, measures packet for speech and arithmetic tasks, and the cold pressor visual analog task scale with the TSST visual analog scale, the debriefing script, debriefing questionnaire, and the referral list. Grab an extra credit slip form for the end. Make sure the "session in progress" sign is on the door. If rooms are unavailable, find a room across the hall. **For the TSST, you will also need a cell phone (or tablet) for the participant to self-report discomfort.**

- Review the ***consent form*** w/ participant. (Ensure they have a copy of the document to read while you read out loud).
- Answer any questions and obtain their signature.
- Go over the ***confidentiality form*** with the participant.
- Answer any questions and obtain their signature. Stress the importance of keeping what they do today confidential to protect the research question.
- Provide the participant with measures packet one.
- Check the medical exclusionary criterion on the demographic questionnaire to ensure they qualify.
- Pause to attach the heart rate monitor. Attach the connector to the strap and direct the participant to the restroom. Ask the participant to attach the heart rate transmitter to their chest by following the instructions in ***Figure 1.***
- When the participant returns, ensure that the equipment is working properly
  - Press OK and select "**Start**". Wait until heart rate is displayed. If the heartrate is displayed, stop the timing by pressing "**BACK**" twice.
- Provide the participant with measures packet one. Instruct them to complete the remaining measures, check over each item to ensure they have completed all of them. If the participant skipped an item(s), point it out to them and ask them if they are willing to provide an answer to that item(s).
- While they begin measures packet one, begin recording the participant's **baseline** session.
  - **Enter Start time here:** ______
  - Press OK and select **Start**. Wait until heart rate is displayed and then press OK to start the recording.
  - Set your personal timer for **10 minutes**
- When 10 minutes have elapsed, stop the heart monitor.
  - Stop by pressing "**BACK**" twice. **Stopped** should be displayed.
- Using the **"DOWN"** button, record the following data **f**rom this session.
  - **Duration of the session** _______
  - **Average Heart Rate** _______
  - **Maximum Heart Rate** _______
- Delete the data from this session.
  - Press "Back", Use the "Down" button to Select Data > Delete > All files > OK.
  - Delete all files? is displayed. Select Yes, All files deleted is displayed.
- Tell the participant, **"You will be participating in a study evaluating physical and psychological responses to two different tasks. Please try your best on the following set of tasks."**

COLD PRESSOR TASK

- Setup the cold pressor task beforehand according to the cold pressor task apparatus instruction sheet.
- Make sure container one (lone white bucket) is regulated at 68 degrees Fahrenheit +/- 5 degrees.
- Make sure container two (white bucket attached to apparatus) is regulated at 40 degrees Fahrenheit +/- 5 degrees.

- Begin recording the participant's heart rate for the cold pressor session. Press OK and select **Start**. Wait until heart rate is displayed and then press OK to start the recording.
    - **Enter Participant Cold Pressor Heartrate Start Time: ______**
- Read the cold pressor task instructions: **"When I say go, please place your left hand into the water at least up to your wrist. I will tell you when to stop."**
- Set timer for two minutes and say, **"Go!"**
- Once the participant has completed the two minute 68 degree Fahrenheit portion, provide the following instructions, **"When I say go, please place your left hand into the icy water at least up to your wrist. Please say "painful" when the cold sensation first becomes painful to you and try to hold your hand in the water as long as possible. Although we would like you to try to hold your hand in the water as long as possible, the decision of when to remove it is entirely up to you."**
- Turn on the pump.
- Say, **"Go!"**
- Set timer for five minutes.
    - **Time when first painful (threshold) _______**
    - **Time withdrew hand (tolerance) _______**
- Stop the cold pressor heart rate session by pressing "**BACK**" twice. **Stopped** should be displayed.
- Using the **"DOWN"** button, record the following data from this session.
    - **Duration of the session _______**
    - **Average Heart Rate ________**
    - **Maximum Heart Rate _______**
- Delete the data from this session.
    - Press "Back", Use the "Down" button to Select Data > Delete > All files > OK. Delete all files? is displayed. Select Yes, All files deleted is displayed.
- Administer cold pressor visual analogue task.
    - **Intensity rating _______**
- Administer cold pressor task measures packet.
- Calculate **endurance** by subtracting threshold from tolerance. Time should be in seconds.
    - **Endurance _______**
- *If* cold pressor task administered *first*, give a **ten minute break** before the TSST. *If* last, then de-brief and provide extra credit and referral slip.

POST- SESSION

- *If* cold pressor task is last, direct the participant to the restroom and ask them to remove the heart rate transmitter.
- *If* cold pressor task is last, read the debriefing script, give the debriefing two-item questionnaire, and provide a list of referrals. Give the participant th extra credit slip. Thank them for their participation.
- Write the participant's code number on the visual analog scales.
- Place all measures back in the participant's packet.
- Return all items to the file drawer.
- File consent form in the folder located in the filing cabinet.
- Lock the filing cabinet.
- Be sure to lock the lab and research rooms before leaving.

Appendix I

TSST Experimenter Instructions

TSST Experimenter Instructions					
Participant Number		**Today's Date**		**Experimenter Name**	
PRE- STRESS(BASELINE)					

Before the session: Wipe the heart rate transmitter and watch with alcohol pads. Grab your cell phone or timer and the participant's packet. The packet includes: Consent document, confidentiality form, measures packet one, measures packet for cold pressor task, measures packet for speech and arithmetic tasks, and the cold pressor visual analog task scale with the TSST visual analog scale, the debriefing script, debriefing questionnaire, and the referral list. Grab an extra credit slip form for the end. Make sure the "session in progress" sign is on the door. If rooms are unavailable, find a room across the hall. **For the TSST, you will also need a cell phone (or tablet) for the participant to self-report discomfort.**

- Review the ***consent form*** w/ participant. (Ensure they have a copy of the document to read while you read out loud).
- Answer any questions and obtain their signature.
- Go over the ***confidentiality form*** with the participant.
- Answer any questions and obtain their signature. Stress the importance of keeping what they do today confidential to protect the research question.
- Provide the participant with measures packet one.
- Check the medical exclusionary criterion on the demographic questionnaire to ensure they qualify.
- Pause to attach the heart rate monitor. Attach the connector to the strap and direct the participant to the restroom. Ask the participant to attach the heart rate transmitter to their chest by following the instructions in ***Figure 1.***
- When the participant returns, ensure that the equipment is working properly
  - Press OK and select "**Start"**. Wait until heart rate is displayed. If the heartrate is displayed, stop the timing by pressing "**BACK**" twice.
- Provide the participant with measures packet one. Instruct them to complete the remaining measures, check over each item to ensure they have completed all of them. If the participant skipped an item(s), point it out to them and ask them if they are willing to provide an answer to that item(s).
- While they begin measures packet one, begin recording the participant's **baseline** session.
  - **Enter Start time here: _______**
  - Press OK and select **Start**. Wait until heart rate is displayed and then press OK to start the recording.
  - Set your personal timer for **10 minutes**
- When 10 minutes have elapsed, stop the heart monitor.
  - Stop by pressing "**BACK**" twice. **Stopped** should be displayed.
- Using the **"DOWN"** button, record the following data **f**rom this session.
  - **Duration of the session ________**
  - **Average Heart Rate ________**
  - **Maximum Heart Rate ________**
- Delete the data from this session.
  - Press "Back", Use the "Down" button to Select Data > Delete > All files > OK.
  - Delete all files? is displayed. Select Yes, All files deleted is displayed.
- Tell the participant, **"You will be participating in a study evaluating physical and psychological responses to two different tasks. Please try your best on the following set of tasks."**

SPEECH PREP

- Give the following instructions: **"This is the speech portion of the task. You are to mentally prepare a speech describing why you would be a good candidate for your ideal job. You should aim to talk as long as you can. Your speech will be videotaped and reviewed by a panel of judges trained in public speaking. You have 10 minutes to prepare and your time begins now."**
- Begin recording the participant's heart rate session for speech prep. Press OK and select **Start**. Wait until heart rate is displayed and then press OK to start the recording.
  - **Enter Participant Heart Rate Speech Prep Start Time: _______**
- Set your personal timer for 10 minutes. Leave the room.
- Return to the room. Stop the heart rate speech prep session by pressing "**BACK**" twice. **Stopped** should be displayed.

- Using the **"DOWN"** button, record the following data from this session.
    - **Duration of the session ________**
    - **Average Heart Rate ________**
    - **Maximum Heart Rate ________**
- Delete the data from this session.
    - Press "Back", Use the "Down" button to Select Data > Delete > All files > OK. Delete all files? is displayed. Select Yes, All files deleted is displayed.
- Give the following instructions: **"We are interested in learning more about the discomfort you experience during this task and how that relates to your heart rate. It is important that you are honest. Please click the button when you first notice you are experiencing discomfort during the speech. The judges are not aware of this portion of the experiment. They believe you will have a device in front of you with instructions to remind you about your speech task instructions. When or if you click the button will not affect how they rate your speech. This discomfort rating is known only to myself and those running the experiment. If you do not experience discomfort during the speech, do not click the button."**
- Stress the importance of clicking the button when first uncomfortable and do a trial with the participant to ensure they understand the instructions.
- Escort the judges into the room.

SPEECH/ ARTHMETIC TASKS

- Introduce the judges, **"These are the judges who will be evaluating your speech performance today. They have received extensive high-quality training in public speaking evaluation through our lab and have proven skilled at evaluating non-verbal behavior and body language. They are also strong in their ability to evaluate how convincing and clear your speech is today."**
- **After the judge gives the speech instructions,** begin recording the participant's heart rate session for the speech. Press OK and select **Start**. Wait until heart rate is displayed and then press OK to start the recording.
    - **Enter Participant Heart Rate Session for Speech Start Time: _______**
- Set your personal timer for five minutes, Signal "Ok" to the judges. Stay in the room and standby to stop the watch when the participant finishes.
- Immediately stop the training session by pressing "**BACK**" twice. **Stopped** should be displayed.
- Using the **"DOWN"** button, record the following data from this session.
    - **Duration of the session ________**
    - **Average Heart Rate ________**
    - **Maximum Heart Rate ________**
- Delete the data from this session.
    - Press "Back", Use the "Down" button to Select Data > Delete > All files > OK. Delete all files? is displayed. Select Yes, All files deleted is displayed.
- To the judges, **"Please give us a brief moment alone so that I can administer the instructions for the next task."** Judges exit.
- Administer the TSST visual analogue scale.
- Give the following instructions, **"During the next portion of this task, please also click the button when you first notice you are experiencing discomfort. The judges are not aware of this portion of the experiment. When or if you click the button will not affect how they rate your abilities. This discomfort rating is known only to myself and those running the experiment. If you do not experience discomfort during the task, do not click the button."**
- Ensure the participant understands the instructions and do a trial click.
- Begin recording the participant's training session since it will take a minute to record and participants likely won't complete the arithmetic task long. Press OK and select **Start**. Wait until heart rate is displayed and then press OK to start the recording.
    - **Enter Participant Training Start Time: _______**
- Wait 30 seconds and invite the judges back into the room.
- **After the judges give the arithmetic instructions,** set your personal timer for 5 minutes, Signal "Ok" to the judges.
- Stand by to stop the heart rate monitor. When the participant says, "finished," immediately stop the arithmetic heart rate session by pressing "**BACK**" twice. **Stopped** should be displayed.
- Using the **"DOWN"** button, record the following data from this session.
    - **Duration of the session ________**
    - **Average Heart Rate ________**

  - **Maximum Heart Rate ________**
- Delete the data from this session.
  - Press “Back”, Use the “Down” button to Select Data > Delete > All files > OK. Delete all files? is displayed. Select Yes, All files deleted is displayed.
- Thank the judges and dismiss them from the room.
- Administer the TSST arithmetic visual analogue scale.
- Administer the speech and arithmetic measures packet.

POST- STRESS

- *If* TSST is last, direct the participant to the restroom and ask them to remove the heart rate transmitter.
- *If* TSST is last, read the debriefing script, give the debriefing two-item questionnaire, and provide a list of referrals. Give the participant th extra credit slip. Thank them for their participation.
- Write the participant’s code number on the visual analog scales.
- Place all measures back in the participant’s packet.
- Return all items to the file drawer.
- File consent form in the folder located in the filing cabinet.
- Lock the filing cabinet.
- Be sure to lock the lab and research rooms before leaving.

Appendix J

Demographic Questionnaire

1. Please indicate your handedness:

Check One:

- ☐ Right
- ☐ Left
- ☐ Ambidextrous

2. How old are you? ______Years

3. Gender
   - ☐ Female
   - ☐ Male
   - ☐ Transgender

4. Ethnicity
   - ☐ African-American/Black
   - ☐ Asian or Asian American
   - ☐ Chicano/a/Latino/a/Hispanic
   - ☐ European American or White
   - ☐ Pacific Islander or PI American
   - ☐ Middle Eastern or Arab American
   - ☐ Mixed Heritage
   - ☐ Other

5. Relationship status
   - ☐ Divorced, not remarried
   - ☐ Living with partner
   - ☐ Married
   - ☐ Married with children
   - ☐ Remarried
   - ☐ Single, never married, not living with partner

- ☐ Remarried
- ☐ Widowed
- ☐ Other

6. Annual household income (income for self – parent; income for family of origin – adult child)
   - ☐ <$10,000
   - ☐ $11,000-24,000
   - ☐ $25,000-49,000
   - ☐ $50,000-74,000
   - ☐ $75,000-99,000
   - ☐ $100,000-250,000
   - ☐ >$250,000

7. Educational status
   - ☐ Did not graduate high school
   - ☐ GED
   - ☐ Some college
   - ☐ Bachelor’s degree
   - ☐ Master’s degree
   - ☐ Doctorate or equivalent in my field

Appendix K

Figure Depicting the Cold Pressor Apparatus

Appendix L

Cold Pressor Visual Analogue Scale

Visual Analogue Scale

Please place a vertical mark along this scale to indicate the total physical pain you experienced during this experiment. Place marks closer to 0 mm to indicate less pain and closer to 100mm to indicate more pain.

0 mm |____| 100 mm

No pain Worst possible pain

Appendix M

TSST Judge Script

JUDGE INSTRUCTIONS FOR TSST
SPEECH PORTION: Judges' behavior during this time: Maintain minimal eye contact with participants and refrain from making emotional facial expressions.

1. After being introduced by the experimenter, deliver the following instructions:

"This is the speech portion of the task. You are to deliver a speech describing why you would be a good candidate for your ideal job. I will be tending to the monitor, so please direct your attention toward the video camera. Although we would like you to try to give a speech for as long as possible, the decision of when to stop is entirely up to you. You may elect to stop the speech at any time. If you choose to do this, please say, 'finished.' Your time begins now."

2. Turn on the video camera as if you are preparing to record.
3. When the experimenter signals "ok", set your timer for 5 minutes.
4. Write random notes on the clipboard.
5. If the participant stops speaking, they may remain silent for 20 seconds before prompting.
6. If the participant does not continue speaking, prompt them by saying, ***"You still have time remaining. Please continue if you are not yet finished."***
7. **RECORD THE TIME THE PARTICIPANT SAYS THEY ARE FINISHED.**

Time when finished (tolerance) _____________

ARITHMETIC PORTION: Judges' behavior during this time: Maintain minimal eye contact with participants and refrain from making emotional facial expressions.

1. After the experimenter has finished documenting the participant's data, say ***"During the final 5-minute math portion of this task, you'll be asked to sequentially subtract the number 13 from 1,022. You will verbally report your answers aloud and be asked to start over from 1,022 if a mistake is made. Although we would like you to try to continue for as long as possible, the choice to stop is entirely up to you. You may elect to stop the task at any time. If you choose to do this, please say, 'finished.' Your time begins now."***
2. When the experimenter signals "ok", set your timer for 5 minutes.
3. See attached sheet for the correct answers.
4. Follow along with the participant, if they make a mistake, say: ***"That's incorrect. Please start at 1,022.***
5. If the participant cannot recall their last number, say ***"Please start again at 1,022."***
6. When/if the participant says "finished," record the time they said "finished."
7. **Time said finished (tolerance) ______________**

8. If the participant does not say finished/completes the task the entire 5-minute period, stop the timer and tell them they have finished the task.

1009	580	151
996	567	138
983	554	125
970	541	112
957	528	99
944	515	86
931	502	73
918	489	60
905	476	47
892	463	34
879	450	21
866	437	8
853	424	
840	411	
827	398	
814	385	
801	372	
788	359	
775	346	
762	333	
749	320	
736	307	
723	294	
710	281	
697	268	
684	255	
671	242	
658	229	
645	216	
632	203	
619	190	
606	177	
593	164	

Appendix N

TSST Visual Analogue Scale

Visual Analogue Scale for TSST

Please place a vertical mark along this scale to indicate the total emotional discomfort you experienced during this experiment. Place marks closer to 0 mm to indicate less discomfort and closer to 100mm to indicate more discomfort.

0 mm |____| 100 mm

No discomfort Worst possible discomfort

Sometimes people want to leave a situation, but do not leave because they would feel stigmatized or uncomfortable. If you could have left this situation, would you have left?

Yes ___

No ___

Appendix O

Debriefing Questionnaire

1) Did your participation in today's experiment produce lasting distress to the point that you feel you need to seek mental health services?
2) Would you like to talk with the student investigator or a graduate-level research therapist about your distress right now?

Appendix P

Referral List

Referral List

Mental Health Agencies and Service Providers in the Kalamazoo Area

Child and Family Psychological Services—(269) 372-4140

Family & Children Services – (269) 344-0202

The Psychology Clinic at Western Michigan University – (269) 387-8302

Counseling and Psychological Services at Western Michigan University – (269) 387-5105

Douglass Community Association – (269) 343-6185

Kalamazoo Community Mental Health and Substance Abuse Services – (269) 373-6000

Borgess Outpatient Mental Health Services – (269) 226-5600

Catholic Family Services—(269) 381-9800

Adult and Family Counseling—(269) 323-9797

Emergency Resources

Gryphon Place – 2-1-1 (in Kalamazoo County) or (269) 381-4357

Kalamazoo Community Mental Health and Substance Abuse Services – (269) 373-6000

Bronson Methodist Hospital – (269) 341-6386 or 9-1-1

Borgess Hospital (269) 226-8000 or 9-1-1

National Suicide Prevention Hotline – 1-800-273-TALK