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## Examining How Adverse Childhood Experiences and the Underlying Processes of Trait and State Impulsivity Influence Suicidal Behavior

Julia K. Duran  
*Fort Hays State University, juliakduran@gmail.com*

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EXAMINING HOW ADVERSE CHILDHOOD EXPERIENCES AND  
THE UNDERLYING PROCESSES OF TRAIT AND STATE  
IMPULSIVITY INFLUENCE SUICIDAL BEHAVIOR

A Thesis Presented to the Graduate Faculty  
of Fort Hays State University in  
Partial Fulfillment of the Requirements for  
the Degree of Master of Science

by

Julia K. Duran  
B.S., Kansas State University

Date 4-28-21

Approved   
Major Professor

Approved   
Dean of the Graduate School

## ABSTRACT

Due to the effects of ACEs and impulsive behavior on mental and physical health, it is important to better understand the relationship between these two as well as how they both may influence choices, such as suicide. Numerous studies have identified impulsive behavior as a risk factor for suicide, however, recent research has identified several underlying independent processes that make up impulsivity. This study uses a broad assessment of trait and state impulsivity to gather a more discrete understanding of the underlying processes that contribute to impulsive behavior. The short version UPPS-P scale was used to measure negative urgency, lack of premeditation, lack of perseverance, sensation seeking, and positive urgency, and behavioral lab tasks were used to measure prepotent response inhibition, delay discounting, and distortions in elapsed time. Simple bivariate regressions revealed ACEs are a significant predictor of prepotent response inhibition, total S-UPPS-P scores, as well as the subscales of negative urgency, positive urgency, and sensation seeking. A hierarchical regression found total ACE scores, negative urgency, and distortions in elapsed time to be significant predictors of total suicidal behavior scores. Lastly, an ordinal logistic regression suggests a greater likelihood of going from suicidal ideation to planning, and from planning to attempting when ACEs, negative urgency, and lack of premeditation scores are greater. By identifying these specific dimensions of impulsivity as risk factors for suicidal behaviors, we can recognize individuals at greater risk of attempting, as well as target and mitigate the effects of these behaviors through interventions.

*Keywords:* Trait Impulsivity, State Impulsivity, ACEs, Suicidal Behaviors

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## INTRODUCTION

Suicide is currently one of the leading causes of death in the United States and world, yet the underlying processes that contribute to this behavior are not well understood. Suicide attempts can be damaging to individuals, especially if successful, and are catastrophic for loved ones and communities left behind. According to the National Institute of Mental Health (NIMH, 2020), suicide is the tenth leading cause of death overall in the US and was the second cause of death among individuals between 10-34 years of age making it a current major public health concern. Many risk factors as well as protective factors for suicidal behavior have been identified; however, the suicide rate continues to rise. While these statistics are concerning, suicide is preventable and with continuing research, we can work to identify factors that put individuals at a greater risk of attempting suicide. The use of the phrase “suicidal behavior” in this paper refers to suicidal ideation, plans, and attempts.

One of the most significant precursors to suicide are Adverse Childhood Experiences (ACEs), which are shown to have a strong relationship with risk of attempted suicide throughout the lifespan (Dube et al., 2001). ACEs are traumatic and stressful events that occur in childhood and include physical and verbal abuse, sexual abuse, physical and emotional neglect, loss of a parent, family discord and/or divorce, exposure to alcohol or drug abuse, mental illness in the home, and violence in the home or neighborhood. These experiences induce stress and trauma responses that influence children’s physical and psychological health and development. ACEs have also been linked to several harmful and unhealthy physical and mental outcomes in adolescence and adulthood (Centers for Disease Control and Prevention [CDC], 2020).

Along with ACEs, impulsive behavior has been listed as a risk factor for suicide, although findings have not been able to distinguish if elevated levels of impulsivity influence the

progression from ideation to attempting (Klonsky & May, 2015). Like ACEs, impulsive behavior can lead to maladaptive decision making which can affect mental and physical health throughout life. Impulsivity directly influences decisions made and, therefore, should be studied in relation to suicidal behaviors. The choice to attempt suicide may be influenced by poor cognitive abilities to reflect and consider consequences, as well as to avoid overwhelming negative emotions and physical sensations. A majority of studies examining the relationship between impulsive behavior and suicide treat impulsivity as a unitary construct by using only one overall score to represent impulsiveness, although it has been suggested that several independent processes contribute to impulsive behavior (Paulsen & Johnson, 1980). Additionally, the positive relationship between impulsive choice and suicide has primarily been established through self-report measures (Bender et al., 2011; Corruble et al., 1999; Cremniter et al., 1999). Self-report and behavioral laboratory measures of impulsive behavior show weak correlations suggesting they measure distinct forms of impulsivity. When looking at measures of impulsivity, self-report questionnaires assess stable, trait-like personality characteristics that contribute to impulsive behavior, whereas behavioral lab tasks focus on the measurement of rash actions during a specific situation or moment in time (state-like processes) (Cyders & Coskunpinar, 2011).

The precise influence of trait and state impulsiveness on suicidal behavior remains unclear. This study uses a broad assessment of self-report and behavioral measures of impulsivity to gather a more discrete understanding of the underlying processes that contribute to impulsive behavior. We seek to better understand how ACEs, suicidal behavior, and impulsivity are interconnected by first examining the relationships between reported ACEs and levels of trait and state impulsivity as well as how ACEs and multiple dimensions of trait and state impulsivity influence suicidal behavior.

## **Impulsive Choice**

Current research has shown individuals' levels of impulsive choice are determining factors in the decisions they make. The consequences of these decisions can have major influences on mental and physical health. Impulsivity is the most commonly included criterion in the *Diagnostic and Statistical Manual of Mental Disorders*, fifth edition (DSM–5; American Psychiatric Association, 2013) and has been shown to be related to a wide array of maladaptive behaviors and mental disorders such as Attention Deficit Hyperactivity Disorder (ADHD; Barkley et al., 2001), Substance Use Disorder (Bickel & Marsch, 2001), Borderline Personality Disorder (Stepp & Pilkonis, 2008), obesity (Fields et al., 2013), Bipolar Disorder (Swann et al., 2001), gambling (Reynolds, 2006), and Schizophrenia (Heerey et al., 2007). Impulsivity is also predictive of poor outcomes during and after substance abuse treatment (MacKillop & Kahler, 2009; Stanger et al., 2012). Therefore, understanding and mitigating the impact of impulsivity on decision-making is key to the treatment of mental and physical health.

Impulsive choice has been defined as behaviors without adequate thought, the tendency to act with less forethought than do most individuals of equal ability and knowledge, or a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions (International Society for Research on Impulsivity, n.d.; Moeller et al., 2001). Impulsive choice is multidimensional, meaning it has several different pathways and cognitive processes that contribute to its overall assessment (Paulsen & Johnson, 1980). However, there is no consistent, agreed upon understanding of the nature of the underlying characteristics of impulsive choice.

Many research studies use only one form of assessment to measure impulsive choice. The problem with this is that impulsivity encompasses several independent processes that cannot be

fully captured with only one form of assessment. Impulsive choice has been measured in research using self-report surveys, as well as behavioral lab tasks, but few studies have used both forms of assessment. Self-report measures assess stable, trait-like personality characteristics that contribute to impulsive behavior, whereas behavioral lab tasks focus on the measurement of rash actions during a specific situation or moment in time (state-like processes) (Cyders & Coskunpinar, 2011).

### ***Self-Report Measures***

Using the Five Factor Model of personality (FFM; McCrae & Costa, 1987), Whiteside and Lynam (2001) identified distinct facets of personality that have been commonly used to measure impulsivity, hoping to bring structure to the diverse and inconsistent research surrounding impulsive choice. Conducting a factor analysis of commonly used self-report impulsivity measures, the underlying constructs of impulsive choice were separated into negative urgency, lack of premeditation, lack of perseverance, and sensation seeking. These four factors explained 66% of the variance in seventeen commonly used impulsivity measures such as the Barratt Impulsiveness Scale (BIS-11), Revised NEO Personality Inventory (NEO-PI-R), I-7 Impulsiveness Questionnaire, Sensation Seeking Scale (SSS), etc. Thus, these four factors formed the Urgency, Premeditation (lack of), Perseverance (lack of), and Sensation Seeking (UPPS) Behavior Scale (Whiteside & Lynam, 2001). Cyders and Smith (2007) later added a fifth construct, positive urgency (UPPS-P; Lynam et al., 2006). These five subscales are intended to capture separate underlying pathways of the development and manifestation of impulsive behavior (Berg et al., 2015).

**Negative Urgency.** Negative urgency refers to acting rashly while experiencing negative affect. Individuals who are high in negative urgency may engage in impulsive behaviors to

alleviate negative emotions despite the long-term harmful consequences of these actions. Negative emotions, such as anger, anxiety, fear, and sadness, reduce self-control by impairing cognitive functions necessary for self-restraint (Curci et al., 2013; Cyders & Smith, 2008; Heatherton & Wagner, 2011; Schmeichel & Tang, 2015). Consequently, negative urgency is a strong predictor of problematic alcohol consumption (Coskunpinar et al., 2013), substance use (Magid & Colder, 2007), bulimia (Fischer et al., 2008), non-suicidal self-injury (NSSI; Yen et al., 2009), and has been linked to suicidal behavior (Anestis & Joiner, 2011; Klonsky & May, 2010).

Regarding suicide, the interpersonal-psychological theory of suicidal behavior (Joiner, 2005) proposes that in order to enact lethal self-inflicted violence individuals must exhibit elevated levels of perceived burdensomeness, thwarted belongingness, and the acquired capability for suicide. Anestis and Joiner (2011) found that the four-way interaction of negative urgency, perceived burdensomeness, thwarted belongingness, and the acquired capability for suicide predicted lifetime suicide attempts suggesting that those high in negative urgency are at an even greater risk for suicide. Additionally, Klonsky and May found that both suicide ideators only and suicide attempters were high in negative urgency (2010). Results suggest that persons presenting with elevated levels of negative urgency may be more likely to attempt suicide or engage in self-harming behaviors while experiencing extreme negative affect.

**Positive Urgency.** Impulsive responses due to experiencing strong emotions are not only limited to negative emotions. Positive urgency is the tendency to act rashly while experiencing extreme positive emotional states (Whiteside & Lynam, 2001). Intense positive emotions can cause individuals to become overly optimistic about possible outcomes of situations (Nygren et al., 1996; Wright & Bower, 1992). In addition, experiencing very intense positive and negative

emotions undermines rational decision making (Bechara, 2005; Dreisbach, 2006), interferes with people's views of their long-term goals, and may shift focus onto their short-term needs (Dreisbach & Goschke, 2004). This may cause those who are high in positive urgency to make decisions without considering the long-term consequences of those decisions. Although the emotions experienced are positive, disorders such as depression and anxiety have been linked to positive urgency (Carver et al., 2013), as well as alcohol and substance use (Cyders & Smith, 2008; Smith & Cyders, 2016). It has been found that negative urgency and positive urgency show similar correlation patterns with categories of psychopathology suggesting they may not be completely discrete dimensions (Berg et al., 2015). It may be that regardless of the emotion certain individuals experience strong affect and a deficit in emotional regulation leading to impulsive behavior. A relationship between positive urgency and suicidal behavior has not yet been established in the literature.

**Lack of Premeditation.** Lack of premeditation refers to behaving without regard to consequences leading to spur of the moment behaviors without thinking about the outcomes of those actions. Research has shown that high levels of lack of premeditation may be due to poor ability to reflect and consider consequences, as well as poor executive functioning, which is necessary for the cognitive control of behavior and monitoring behaviors that facilitate goal achievement (Phillippe et al., 2010; Ray et al., 2009). It is also suggested that lack of premeditation may stem from a high tolerance for negative consequences from maladaptive behaviors (Berg et al., 2015). Lack of premeditation has been shown to predict increased alcohol and substance use (Magid & Colder, 2007), aggression (Ray et al., 2009), and non-suicidal self-injury (Glenn & Klonsky, 2010). It was also found that lack of premeditation was significantly associated with suicide attempts (Yen et al., 2009). Researchers suggest this is due to lack of

premeditation being associated with other high-risk behaviors such as anger and aggression.

Klonsky and May (2010) found that those who attempted suicide showed poor premeditation, but not those with suicidal ideation only, suggesting lack of premeditation may be what distinguishes those who attempt suicide with those who exhibit suicide ideation only. It could be that when faced with extreme negative emotions individuals high in lack of premeditation contemplate suicide without fully considering all outcomes.

**Lack of Perseverance.** Lack of perseverance is the inability to stay focused on a task for an extended period of time. Individuals who are low in perseverance might struggle with completing projects and with working when distracting stimuli are present (Whiteside & Lynam, 2001). High levels of lack of perseverance may be related to a low sense of responsibility (Magid & Colder, 2007) or insufficient reinforcement from certain stimuli (Berg et al., 2015). Lack of perseverance is strongly linked to problematic alcohol use disorders (Dick et al., 2010), and was most strongly associated with ADHD when compared to the other dimensions of impulsivity; urgency, lack of premeditation, and sensation seeking (Lopez et al., 2015). This aligns with the predominantly inattentive subtype of ADHD and suggests that high scorers struggle to force themselves to stay focused on a required task, which affects their ability to complete a goal. A weak ability to persevere when pursuing a goal may increase the likelihood of engaging in maladaptive behaviors due to boredom occurring frequently and the inability to stay focused on the goal of stopping the maladaptive behavior.

**Sensation Seeking.** Last, sensation seeking is the tendency to enjoy exciting activities and being open to trying new experiences that may or may not be dangerous (Whiteside & Lynam, 2001). Sensation seeking behavior is often driven by positive reinforcement usually in the form of stimulation or arousal (Berg et al., 2015), but may also include a high threshold for



fear and perceived threat (Franken, et al., 1992), or low pain sensitivity (Anestis et al., 2011). Sensation seeking is associated with many maladaptive behaviors such as increased frequency of substance and alcohol use (Magid & Colder, 2007), non-suicidal self-injury (Glenn & Klonsky, 2010), suicidal behavior (Ortin et al., 2012; Witte et al., 2012), and depressive symptoms (Ortin et al., 2012). Individuals high in sensation seeking may engage in behaviors that are more impulsive to receive positive reinforcement, such as a high euphoria from a substance, and emotional relief, or stimulation from non-suicidal self-injury. Ortin and colleagues (2012) found sensation seeking to be linked to suicidal ideation and suicide attempts even after controlling for depression and substance use. Further suggesting a link between sensation seeking and suicide, Witte and colleagues found sensation seeking accounted for the relationship between gender and fearlessness about death (2012). Taken together, these findings suggest sensation seeking may be a risk factor for suicide attempts due to reduced fear associated with thoughts of death.

Negative and positive urgency, lack of premeditation, lack of perseverance, and sensation seeking may lead to actions that are socially unacceptable or inappropriate, such as acting violently when angry, struggling to stay focused on a task, or engaging in substance use. Additionally, negative urgency, lack of premeditation, and sensation seeking have been linked to suicidal behavior suggesting; these three facets of impulsivity may be important for understanding what contributes to the transition from suicidal ideation to attempt. By measuring these five dimensions of trait impulsivity, we can examine the distinct relationships between each factor in relation to ACEs and suicidal behavior.

As previously mentioned, self-report measures like the UPPS-P are believed to assess the separate underlying developmental pathways that contribute to trait impulsivity. Traits are considered inherent characteristic attributes that are consistent and stable overtime and may be

influenced by biological and environmental factors. Self-report measures can be most accurate measuring impulsive choice when the individuals have insight into their own feelings, thoughts, and behaviors, and can be administered quickly and inexpensively. However, the current debate is that people do not act consistently from one situation to the next and may be influenced by situational factors. Self-report surveys are limited in their ability to predict behavior in particular situations and fail to assess the underlying cognitive processes of impulsivity, which is why this study included both self-report and behavioral lab tasks to gather a more complete representation of impulsive behavior.

### ***Behavioral Lab Task Measures***

Behavioral tasks of impulsive choice are also believed to assess impulsive behavior but do not correlate strongly with self-report measures. Research suggests that behavioral tasks measure cognitive processes contributing to situational reactions (Cyders & Coskunpinar, 2011). Five different types of cognitive processes contribute to impulsive behavior: prepotent response inhibition, resistance to distractor interference, resistance to proactive interference, delay discounting, and distortions in elapsed time (Dougherty et al., 2002; Dougherty et al., 2005; Friedman & Miyake, 2004; Marsh et al., 2002). Each of these five cognitive processes is measured using a different behavioral task.

**Prepotent Response Inhibition.** Prepotent response inhibition refers to individuals being able to suppress dominant or automatic responses. Measurement also assesses the inability to inhibit already initiated responses (Friedman & Miyake, 2004). In tasks measuring prepotent response inhibition, individuals inhibit behavioral responses that have been made habitual through repeated execution. One example of this is the Stroop task, which presents color words (i.e., red, blue, and purple) in different ink colors from that of the word. Participants are then

required to name the color of the ink that the words are written in rather than reading the word itself. By doing this, participants are suppressing the learned and automatic response of reading the word itself (Stroop, 1935). Another task commonly used to assess prepotent response inhibition is the go/no-go paradigm. This requires participants to respond with a fast motor response (i.e., raising a hand) when a go-stimulus appears (i.e., green light), but then withhold that response when a no-go stimulus appears (i.e., red light). Responding to the go-stimulus is made prepotent by presenting it more frequently than the no-go stimuli (Lapping & Eriksen, 1966).

Individuals who show increased difficulties with prepotent response inhibition are unable to interrupt or stop a current response or may be unable to suppress an action that is no longer appropriate. Past research has found that adolescents engaging in non-suicidal self-injury with suicide attempts (Dougherty et al., 2009) as well as those diagnosed with disruptive behavior disorders (Dougherty et al., 2003) such as Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD) showed higher rates of response inhibition failures when compared to healthy controls. The diagnosis of these disorders includes the criteria of impulsive decision making which may explain the link found between disruptive behavior disorders and poor response inhibition. It may be that when engaging in rebellious or unacceptable actions adolescents struggle with withholding or stopping this behavior which has been made habitual through repeated practice. Similarly, measures of prepotent response inhibition may capture the inability of those experiencing suicidality to stop a dominant response such as self-inflicted violence made dominant through frequent occurrence, or to stop their attempt once it has already been initiated.

**Resistance to Distractor Interference.** Resistance to distractor interference is the ability to avoid interference from task irrelevant information from the external environment (Friedman & Miyake, 2004). Behavioral tasks that assess resistance to distractor interference also require participants to suppress giving their attention to a distractor stimulus while completing a task. One example is a shape-matching task in which participants indicate whether a white shape matches a green shape that is presented either alone or with a red distractor shape (DeSchepper & Treisman, 1996). Individuals who score low in resistance to distractor interference may struggle with focusing their attention on a target stimulus, and/or may fail to suppress the distracting information.

**Resistance to Proactive Interference.** Resistance to proactive interference is the ability to resist memory intrusions of no longer relevant information. Although resistance to distractor interference requires the distracting stimuli to be presented simultaneously with the target information, the interfering information in resistance to proactive interference is presented prior to the target information and was previously relevant to the task (Friedman & Miyake, 2004). One example is the cued recall task in which participants view either one or two lists of four words each and must retrieve the word on the most recent list that belongs to a cued category, ignoring any previous lists (Tolan & Tehan, 1999). Research suggests that individuals with poor resistance to proactive interference fail to use inhibitory processes or to control their attention (Anderson & Neely, 1996). It could be that suicidal individuals are unable to resist intrusions from distressing memories which may intensify their distress and contribute to the decision to end one's life.

**Delay Discounting.** Delay discounting refers to the degree to which a reward decreases in value as the time it takes to obtain that reward gets further away. Delay discounting is assessed

using reward-choice paradigms in which individuals are asked to choose between a smaller sooner reward and a larger later reward. In delay discounting tasks the smaller, sooner option is seen as the more impulsive choice, whereas the larger, later is the more self-controlled choice (Marsh et al., 2002). Therefore, people who have preferences for the smaller, sooner rewards are more often seen as being higher in impulsive choice because they show a constant need for immediate gratification.

The marshmallow study is an example of an impulsive choice study using a delay-discounting task, where children were told they could have one marshmallow now or wait and have two later (Mischel et al., 1989; Shoda et al., 1990). In a follow-up study, children who had more self-control and waited to receive the two marshmallows had lower BMI's later in life, higher SAT scores, were better able to deal with frustrations, and got along better with peers (Mischel, 2014). This shows impulsive choice can lead to poor life outcomes whereas its opposite, self-control, may lead to more positive life outcomes.

Research suggests that people's level of delay discounting is directly related to their current behavioral patterns or the choice individuals make in situations or in response to stimuli indicating it could be significant in understanding suicidal behavior. A preference for smaller sooner rewards over larger later has been linked to antisocial personality disorders (Petry, 2002), addictions (Bickel et al., 2007), pathological gambling (Petry & Madden, 2010), and drug abuse (Yi et al., 2010). Recently research has found low-lethality, unplanned suicide attempts to be associated with increased discounting of delayed rewards (Dombrovski et al., 2011; Dombrovski et al., 2012). Another study used a hypothetical delay discounting questionnaire (Monetary Choice Questionnaire; MCQ) when comparing groups of individuals with depression and found steeper delay discounting rates in suicidal ideation and post suicide attempt groups when

compared to a non-suicidal, non-depressed group. However, they did not find a difference between the suicidal ideation and suicide attempt group in choice impulsivity, depression level, severity and intensity of suicidal ideation, and psychological pain (Caceda et al., 2014). These findings demonstrate increased choice impulsivity may be present in severe suicidal ideation and attempting, however further research is needed in order to understand why some ideators go on to attempt while others do not.

**Distortions in Elapsed Time.** Finally, distortions in elapsed time refer to the inability to estimate the amount of time that has passed. Accuracy of time perception has been negatively correlated with behavioral and self-report measures of impulsivity (Barratt, 1985; Dougherty, et al., 2003; Lawrence & Stanford, 1999). Time perception may be disrupted in impulsive individuals suggesting they may misjudge the amount of time that has passed (Barratt & Patton, 1983). Individuals that are more impulsive may perceive that time passes slower, for instance that 5 minutes have passed when actually 4 minutes have passed (Gerbing et al., 1987). Similarly, individuals considering suicide may feel that they have been experiencing extreme distress for longer than they actually have. This overestimation of the amount of time passed may contribute to the impulsive decision to end one's own life.

These five cognitive processes contributing to impulsive behavior are believed to be more directly related to current behavioral patterns than trait measures and therefore may be better predictors of the choices individuals make from day to day (state impulsivity). The ability of these tasks to capture a measure of state impulsivity can be beneficial in understanding factors that contribute to the process of suicide by capturing behavioral snapshots of the choices made in situations or in response to stimuli and not just, what might be done. These tasks are also better

for controlling certain aspects, or confounds, of situations. Further, behavioral lab tasks do not have strong face validity and so are less susceptible to deception.

Previous research on impulsivity has primarily used only one form of assessment, with few studies using both self-report and lab task measures. Self-report and lab task measures have low correlation suggesting they measure different aspects related to impulsive responses (Cyders & Coskunpinar, 2011). Self-report measures assess trait impulsivity or individuals' stable personality characteristics over time whereas behavioral lab task measures assess state impulsivity, or how people may behave in a certain situation or under certain circumstances. To capture a broad assessment of impulsivity, the current study will use both a self-report survey assessing all five factors (i.e., negative urgency, lack of premeditation, lack of perseverance, sensation seeking, and positive urgency), as well as behavioral lab tasks measuring prepotent response inhibition, delay discounting, and distortions in elapsed time. Using multiple measures can provide a more accurate identification of levels of impulsivity, as well as allow us to explore discrete relationships between the separate dimensions of impulsive choice with ACEs and suicidal behavior.

### **Adverse Childhood Experiences**

ACEs are potentially traumatic and stressful life events that are experienced between the ages of 0 to 17 years. These events may vary in severity and chronicity within children's family or social environment. ACEs are commonly used to assess childhood maltreatment and dysfunctional environments. ACEs include physical and verbal abuse, sexual abuse, physical and emotional neglect, loss of a parent, family discord and/or divorce, exposure to alcohol or drug abuse, mental illness in the home, and violence in the home or neighborhood. These experiences induce stress and trauma responses that influence children's physical and psychological health

and development. ACEs have also been linked to several harmful and unhealthy physical and mental outcomes in adolescence and adulthood (CDC, 2020).

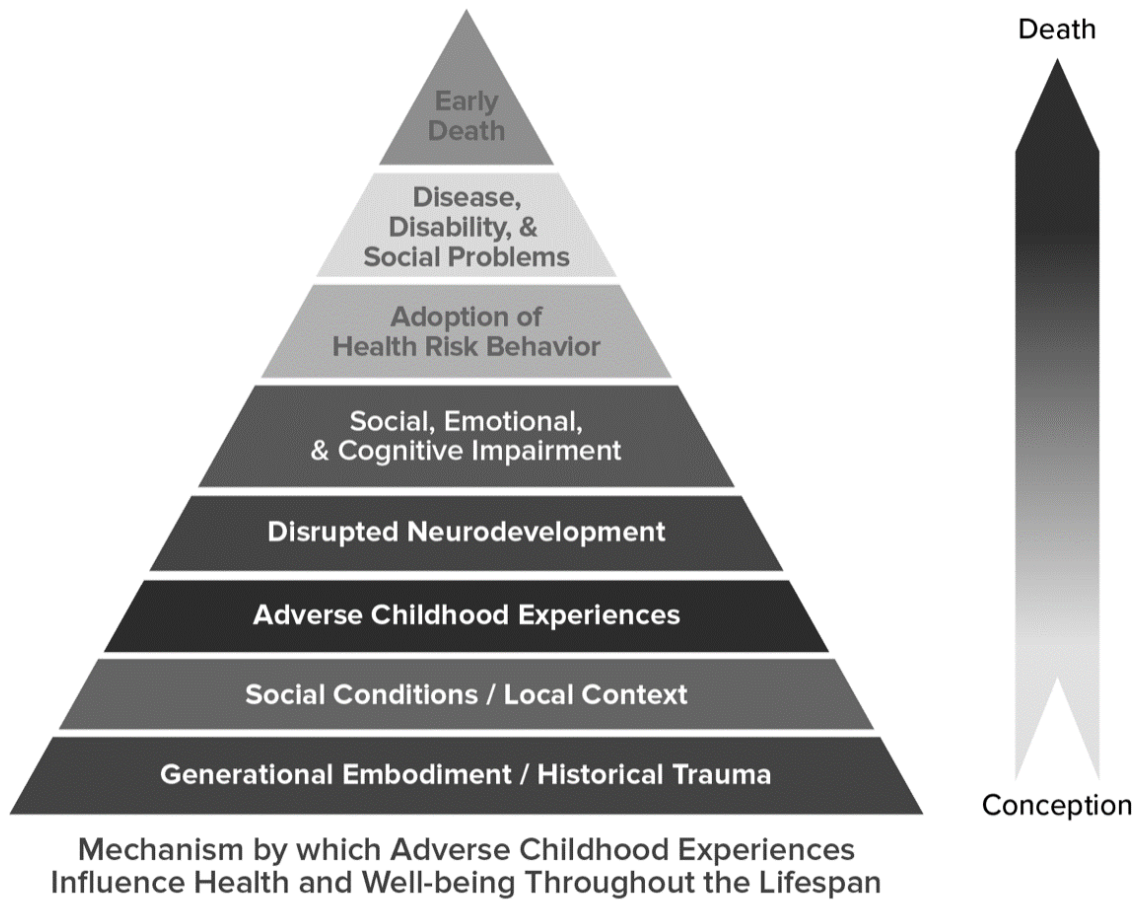
The CDC has listed ACEs as a public health issue and has reported that 1.9 million cases of heart disease and 21 million cases of depression could have been potentially avoided by preventing ACEs. Additionally, ACEs cost families, communities, and society hundreds of billions of dollars each year, suggesting ACEs should be addressed and mitigated as soon as possible to decrease risk factors. It is important to note that ACEs are preventable by teaching and creating safe, stable, and nurturing relationships and environments (CDC, 2020).

The ACE pyramid (see figure 1) shows how ACEs strongly influence health and well-being throughout life, so that as the number of ACEs increases well-being throughout life is diminished and risk factors for disease are increased. ACEs disrupt healthy neurodevelopment, cause social, emotional, and cognitive impairment, and increase the likelihood of health risk behaviors such as disease, disability, and death (CDC, 2020).



**Figure 1**

*ACE Pyramid*



*Note.* Figure taken from Centers for Disease Control and Prevention, CDC-Kraiser ACE Study.

### ***Health Consequences***

About 61% of adults have experienced at least one ACE, while 1 in 6 reported four or more ACEs (CDC, 2020). The high prevalence of ACEs shows how widespread childhood trauma is and that it does not solely occur because of poverty. Higher numbers of ACEs have been linked to increased health risks and diseases such as heart disease (Dong et. al., 2004), high blood pressure (Su et al., 2015), chronic lung disease (Anda, Brown, Dube et al., 2008), liver disease (Dong et al., 2003), cancer (Ports et. al., 2019), and early death. Enduring six or more

ACEs has been shown to decrease life expectancy by an average of 20 years (Brown et al., 2009). Due to the lack of nurturing relationships, the inability to trust adults in one's life, and the lack of support, individuals who report more ACEs are more likely to engage in risky health behaviors and struggle to perform well in educational and occupational settings. Higher ACE scores have been linked to smoking (Anda et al., 1999), alcohol use (Strine et al., 2012), drug abuse (Anda, Brown, Felitti, et al., 2008; Stein et al., 2017), obesity (Williamson et al., 2002), mental illness (Chapman et al., 2007), depression (Chapman et al., 2004; Remigio-Baker et al., 2014), risky sexual behavior (Hillis et al., 2001), offending (Baglivio et al., 2014; Baglivio et al., 2015), adolescent pregnancy (Hillis et al., 2004), and homelessness (Herman et al., 1997).

For some people, risky behaviors and poor health may be how they cope with ACEs. One longitudinal study involving obese individuals who lost more than 100 pounds found that those who regained the weight were significantly more likely to have a history of major childhood emotional trauma, when compared to those who maintained the weight loss (Felitti & Williams, 1998). The patients who regained the weight reported feeling "protected" by their obesity due to being noticed less and therefore safe from further harm (Felitti et al., 2010).

When looking at life opportunities such as education, employment, and earnings later in life, Metzler and colleagues (2017) found that individuals with four or more ACEs were 2.34 times as likely not to graduate from high school, 2.3 times as likely to be unemployed, and 1.6 times as likely to live in a household reporting poverty compared to those with no ACEs. Researchers point out that these life factors are dependent on one another, such that higher education leads to greater employment opportunities, which then leads to higher income. Education can be beneficial in developing critical thinking skills, communication skills, self-discipline, and productivity, as well as developing personal growth by establishing a sense of

accomplishment (University of the People, 2020). When children have inadequate and/or a lack of education and a poor home life, they are not able to develop the skills needed to achieve in other areas of life, inhibiting them from reaching their full potential. These consequences of poverty not only effect the individual but will also affect their family across generations, as it has been shown that children of parents who are undereducated, underemployed, and/or living in poverty are at greater risk for the same outcomes (Tyler & Lofstrom, 2009).

It is important to consider that adverse experiences rarely occur in isolation meaning that for individuals who have experienced a single ACE, the likelihood of exposure to an additional ACE ranged from 65-93% (Felitti et al., 1998). Similarly, women who have been victims of trauma and abuse are more likely to continue to be victims throughout their lives and relationships. Women who have experienced five or more ACEs are 8.32 times more likely than women who have experienced zero ACEs to be victims of sexual violence (Ports et al., 2016). The number of violent experiences increases the risk of victimization among women by 60% and perpetration by men increases by about 70% (Whitfield et al., 2003).

Furthermore, research has shown ACEs negatively affect the regions of the brain that are associated with emotional and behavioral self-regulation (i.e., corticolimbic system), suggesting they can be directly predictive of suicidal behavior. The risk of a suicide attempt was two to three times higher for individuals with any ACE, regardless of the ACE category. Dube and colleagues (2001) suggest that approximately two thirds (67%) of suicide, attempts are attributable to abusive or traumatic childhood events. Data shows a strong association between ACEs and suicide attempts in childhood and adolescence. Researchers suggest this association is due to the proximity of the ACE and the suicide attempt in time, as well as youth having a limited capacity to cope with more immediate stressors such as physical, sexual, or emotional

abuse. This same study found that for every one increase in the ACE score risk of suicide attempts increases by about 60%. An ACE score of at least 7 increased the likelihood of children or adolescents attempting suicide by 51-fold and adults attempting suicide by 30-fold.

When looking at adults the relationship between ACEs and suicide attempts shows how ACEs have a long-term impact on the risk for suicide attempts throughout the lifespan (Dube et al., 2001). Life outcomes are dependent on factors such as the age of the experience, the type of maltreatment or stress, the frequency duration, severity of the maltreatment, and the relationship between the victim and the perpetrator (CDC, 2020). These findings suggest that ACEs play a large role in mental and physical health outcomes, but ACEs are rarely ever assessed in primary care settings. Regularly administering ACE assessments could allow for early intervention and prevention of these health consequences.

### ***Changes in Development***

Suffering adverse events not only has subsequent risk factors but also causes damage and improper development of children's brains. Developmental changes can begin in utero when mothers are exposed to teratogens, which are any environmental substance or agent that negatively impact the fetus. Examples of tetragons include a lack of prenatal care, nutrition deficiencies, exposure to repeated stressful environments like domestic violence, substance use, and illness or disease (Lumen Boundless Psychology, n.d). In any of these situations, fetuses begin to develop differently than they would if in a healthy environment. Following birth, the first four years of life are an extremely crucial time for brain development given that by age four children's brains are 90% developed. Children's brains build and strengthen neuronal connections through repeated stimuli and experiences from their environment. However, if

children do not receive proper stimulation, neuronal connections can weaken and fade (Perry, 2005).

Development can be hindered further from chronic exposure to stress caused by ACEs. Stress is the body's method of reacting to actual or anticipated threats, challenges, or physical or psychological barriers that disrupt homeostasis (Muthukumar & Nachiappan, 2013). Stimuli that alter organisms' environment are responded to by multiple systems in the body; the two most major being the autonomic nervous system (ANS) and the hypothalamic- pituitary adrenal axis (HPA; Ulrich-Lai & Herman, 2009). Experiencing multiple, chronic, stressful, and traumatic events may over stimulate the ANS (Pervanidou & Chrousos, 2007), which is responsible for control of non-conscious bodily functions, such as breathing, heartbeat, blood pressure, and digestive processes.

Additionally, research has shown that areas like the HPA, which regulate the body's reaction to stress, are dysregulated as the body adapts to stress caused by ACEs leading to physical and behavioral changes (Trickett et al., 2010). Physical symptoms may include things like chest pain, headaches, fatigue, muscle tension, pain, and sleep problems. Behavioral changes can also occur and may include overeating or undereating, angry outbursts, drug or alcohol misuse, and social withdrawal. Along with these, mood can be affected causing anxiety, restlessness, lack of motivation or focus, feeling overwhelmed, irritability or anger, and sadness or depression (Mayo Clinic, 2019). Research has found abnormalities and hyperactivity of the HPA in victims of suicide and found that biological stress responses in this region might increase the risk for suicide, suggesting that teaching individuals how to manage stress can be beneficial in reducing risk for suicide (Mann, 2003).

Moreover, the amygdala has been found to be overly active in those who experience ACEs and is involved in processing emotions and fear learning (Williams, 2019). This structure links the areas of the cortex that are responsible for higher functioning with hypothalamic and brainstem systems that control lower metabolic responses such as touch, pain sensitivity, and respiration. This helps individuals to determine whether a stimulus is threatening and triggers emotional and physical responses. Children who have suffered chronic abuse and stressful events may overestimate external threat due to having a lower threshold for activation of their “fight or flight” response. These children may be more prone to living in a state of arousal and fear and may struggle to trust others, as well as tolerate everyday stressors at home, school, or in the community (Perry, 2005)

Along with these findings, research has detected that maltreatment may cause reduced volume in the hippocampus, which is associated with learning and memory, as well as the corpus callosum, which is responsible for interhemispheric communication, arousal, emotion, and higher cognitive abilities (Williams, 2019). Research has found reduced volume in corpus callosum regions to be associated with self-reported impulsivity in suicidal patients with Bipolar Disorder (Matsuo et al., 2010; Nery-Fernandes et al., 2012). It could be that reduced volume in the corpus callosum caused by ACEs leads to higher levels of trait impulsivity and suicidality. Additionally, because the hippocampus and corpus callosum are involved in higher-level abilities children with deficits in these regions may show decreases in cognitive ability and struggle with learning.

Along with these two brain structures, there was reduced volume in the cerebellum, which coordinates motor behavior and executive functioning (Williams, 2019). Participants with lesions in deep cerebellar nuclei showed difficulty initiating stop processes on a Stop Signal Task

(Burnamonti et al., 2014). These findings support the connection between the cerebellum and prepotent response inhibition suggesting the effects of ACEs on the cerebellum may lead to increased difficulties interrupting or stopping a current response or lead to the inability to suppress an action that is no longer appropriate.

Furthermore, the prefrontal cortex was found to be smaller in some individuals who were severely neglected (Williams, 2019). This area of the brain is responsible for higher order brain functions, such as planning, reasoning, emotional regulation, and judgement. Recent studies have found the prefrontal cortex to be associated with behavioral and cognitive inhibition, impulsive behavior, and suicidal behavior (Mann, 2003). When looking at volitional acts, Ingvar (1994) suggests that the prefrontal cortex is involved in imagined volitional acts, including representations of future events. Defects in this region of the brain may result in poor decision-making and impulsive behavior, which could cause some individuals to be at increased risk for suicidal attempts. Based on Ingvar's findings, individuals with abnormalities in the prefrontal cortex may have a decreased ability to imagine future events when compared to the current overwhelming psychological distress and negative emotions they may be experiencing (Ingvar, 1994).

It has also been found that neglect early in life can cause decreased electrical activity, decreased metabolism, and fewer connections between important brain regions (see Figure 2). Physical abuse can also cause direct damage to the brain structure causing severe issues (Williams, 2019). Children with acute ACEs are ill prepared for learning in classroom, social, and emotional contexts due to repetitive fear and stress response activation, which reduces higher order cognitive skills. These consequences can impact individuals throughout their lifespan therefore it is important that awareness of these physiological changes be known when working

with individuals who have experienced ACEs, so that the proper education, treatment, and care can be given. Treatments include teaching individuals the skills they are lacking in, such as how to handle stress, resolve conflicts, and manage their emotions and behaviors (CDC, 2019).

## Figure 2

### *Neurological Effects of Extreme Neglect*



*Note.* Figure taken from Bruce Perry, 2005 that compares a healthy three-year old's developing brain with a three-year old suffering from severe sensory-deprivation neglect. The researcher points out that the brain of the child experiencing extreme neglect is significantly smaller and has abnormal development of the cortex.

These changes in brain development may explain certain behavioral patterns that individuals who experience ACEs exhibit, such as impulsive and suicidal behaviors. ACEs show a strong association with suicide due to the physical and psychological stress associated with each experience, as well as their impact on brain regions like the prefrontal cortex. In this study, we hope to support past literature by finding a strong relationship between ACEs and suicidal behavior, further demonstrating the importance of preventing ACEs.

Additionally, previous work has suggested impulsive behavior is one possible outcome of having been exposed to ACEs (Beers & Bellis, 2002; Haaris Sheikh et al., 2018). The effects of chronic and severe ACEs on numerous regions of the brain cause frequent fear responses based on primitive instincts rather than higher order functioning such as thought, memory, and



voluntary action. Responses triggered by threat and based on survival warrant less forethought and may instead include immediate reactions based on emotions (Perry, 2005). This pattern of responding may continue throughout adolescence and adulthood and may explain the connection between ACEs and more impulsive behavior. Given the impact of impulsive behavior on life outcomes, further examination of the relationship between ACEs and the underlying processes of impulsive behavior is crucial. This study seeks to answer how ACEs influence levels of trait and state impulsivity. It is expected that participants with higher ACE assessment scores will also report higher levels of trait impulsivity (negative urgency, positive urgency, lack of perseverance, lack of premeditation, and sensation seeking) and higher levels of state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time).

### **Suicide and Impulsivity**

Suicide is defined as death caused by self-directed injurious behavior with intent to die as a result of the behavior whereas suicidal ideation refers to thinking about, considering, or planning suicide. According to the National Institute of Mental Health (NIMH), suicide is the second leading cause of death for people 10-34 years of age, the fourth leading cause of death among people 35-54 years of age, and the eighth leading cause of death among people 55-64 years of age (Centers for Disease Control and Prevention [CDC], 2020). In 2018, there were more than two and a half as many suicides (48,344) than there were homicides (18,830) showing suicide is a frequent, continual occurrence in many societies with permanent and devastating effects. Data from 2018 also shows 9.8 million adults reported having serious thoughts of committing suicide, 2.8 million adults made suicide plans, and 1.3 million adults attempted suicide. In a 20-year span from 1999 to 2018, the total suicide rates in the United States increased by 35% (NIMH, 2020). These findings show suicidal behavior is on the rise and may

be further exacerbated by the COVID-19 outbreak which at one point left 20.5 million Americans unemployed (Kochhar, 2020), and instructed the public to stay in their homes and avoid group interactions. Recognizing persons who are most at risk for suicide can be difficult making preventative measures hard to develop. To date some effective suicide prevention strategies, include decreasing access to lethal means, creating safety plans, providing support services, and increasing accessibility of suicide prevention hotlines. By continuing to develop appropriate treatments and conduct research to further understanding, the occurrence of suicidal ideation, attempts, and fatalities could be reduced.

In recent years, research on suicidal behaviors has increased allowing the identification of predictors and risk factors for suicide. Suicide can affect anyone, but some groups are at an increased risk of attempting, such as personnel in military, construction, art, entertainment, media, and design fields. Additionally, the highest suicide rates occur in non-Hispanic American Indian/Alaska Natives and non-Hispanic White populations (NIMH, 2020). Having a family member attempt suicide or die by suicide is a significant risk factor for suicidal behavior, as is a history of suicide attempts (Guldin et al., 2015). A significant relationship has also been found between risk of suicidal behavior and younger age, being female, having fewer years of formal education and before being married (Nock et al., 2008). While females are more likely to exhibit suicidal behavior, the suicide rate among males is 3.7 times higher than that of females showing males are more likely to be successful in their completion of suicide (NIMH, 2020). Along with this, virtually all mental disorders, particularly depressive disorders are major risk factors for suicidal behavior. When looking specifically at individuals who made suicide attempts, more than half reported having a prior mental disorder. This risk substantially increases when multiple disorders are present. These researchers point out that the type of disorder, as well as the

magnitude of the disorder, make a difference in suicidal progression, showing that there is not one single underlying common pathway for those with mental disorders that leads to attempting suicide (Nock et al., 2009). Among individuals with suicidal ideation, it has been found that those with substance use disorders and impulse control disorders have the highest risk of attempting (Nock et al., 2008).

Equally important, research indicates the frequency and persistency of suicidal ideation have been linked to future suicidal behavior suggesting further research is needed to understand factors associated with suicide ideation as well (Miranda et al., 2014). Another study found earlier age-of-onset of suicidal ideation to be significantly associated with greater risk of suicide plan and attempt. This study also found that within the first year that suicidal ideation begins the chances that the individual goes from ideation to attempts is extremely elevated. Among individuals with suicidal ideation, those who have a plan are at a significantly higher risk of attempting suicide. What may be overlooked is that individuals in their first year after onset of suicidal ideation are at a risk level just as high as those with a plan (Nock et al., 2008). Suicidal ideation is a common appearance at emergency rooms and psychiatric clinics in which individuals may be screened for more intensive care such as an inpatient facility. It is important that those who perform the screen can adequately identify which individuals with suicidal ideation are at risk for attempting suicide.

Although many risk factors for suicidal behavior have been identified, it has been argued that using current risk factors gives only a slight advantage of predicting suicidal thoughts and behaviors (Franklin, 2016). Researchers still have little understanding of how and why people transition from thinking about suicide to attempting suicide. Recent research has focused on understanding the steps leading to suicide attempts, including the time it takes for individuals to

follow through with attempting after their first thought of suicide. One study found that nearly half of those who died by suicide reported 10 minutes or less between the first thought of suicide and their attempt (Deisenhammer, et. al., 2009). A similar study found that 60% (18 of 30) of its participants reported deciding to attempt suicide within five minutes and no one deciding to attempt suicide more than three days prior (Millner et al., 2017). These findings suggest that for some the choice to attempt suicide may be based on rash action with little to no forethought of the consequences or outcome of attempting. These seemingly more impulsive attempts may be influenced by factors such as stressful life events leading to emotional distress (Nock et al., 2009). Some studies have concluded that individuals with suicidal ideation and previous suicide attempts have been shown to be high in impulsive choice, which may help to explain why some suicide attempts are made impulsively with little to no planning (Bender et al., 2011; Brodsky et al., 2001; Corruble et al., 1999; Cremniter et al., 1999; McGirr et al., 2008). These studies however used only self-report measures to assess impulsiveness showing more research is needed on the relationship between suicidal behavior and the underlying cognitive processes of state impulsivity.

Suicidal thoughts and behaviors may cause a situation in which people opt for the more immediate choice of relieving pain and suffering while also avoiding future pain and suffering. This scenario is like those presented in delay discounting tasks in which individuals choose between a smaller outcome that is sooner in time or a larger outcome that is further away in time. For certain individuals, the more impulsive choice may entail attempting suicide because the alternative, their future, has decreased in importance due to it seeming further away in time when compared to the current overwhelming psychological distress and negative emotions they may be experiencing. Delay discounting is reported to measure the choice individuals may make in

situations or in response to stimuli, which may help to better understand decision making and situational factors surrounding suicide.

Additional similarities with other state measures of impulsivity entail the ability to capture the situational factors that contribute to one thinking about or attempting suicide. Individuals high in prepotent response inhibition may be unable to stop a dominant response such as self-inflicted violence made dominant through frequent occurrence, or to stop their attempt once it has already been initiated. Individuals with poor resistance to proactive interference may be unable to resist intrusions from distressing memories which may then intensify their distress and contribute to the decision to end one's life. Moreover, certain tasks may be able to capture poor time perception in suicidal individuals. Poor time perception may contribute to the impulsive decision to end one's own life due to them overestimating the amount of time that they have been experiencing extreme distress. Therefore, it seems appropriate to use behavioral lab tasks to measure individuals' state-like impulsive choice when assessing the relationship between suicidal behaviors and impulsivity because of the situational factors surrounding suicide attempts that these tasks may capture.

This study seeks to examine the how the underlying pathways of trait impulsivity (negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking) influence suicidal behavior. We hypothesize that for participants who show higher levels of trait impulsivity (negative urgency, lack of premeditation, and sensation seeking) the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater. Additionally, we will examine the relationship between state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time) and suicidal behavior. We hypothesize that for participants who show higher levels of state impulsivity (delay discounting, prepotent

response inhibition, and distortions in elapsed time) the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.

Lastly, current research has shown that asking about suicide and related behaviors does not induce suicidal ideation and related behaviors. Thirteen papers examined whether asking about suicide induces suicidal ideation for adolescents and adults, with none of the 13 studies finding statistically significant increases in suicidal ideation. In fact, the authors suggested acknowledging and talking about suicide may even reduce suicidal ideation (Dazzi, et al., 2014). These findings suggest that asking individuals about suicidal thoughts and behaviors does not cause harm to participants and can be used to effectively learn more about suicidal ideation, attempts, and death by suicide. By studying suicidal thoughts and behaviors we hope to potentially reduce the occurrence of suicidal ideation, attempts, and fatalities and well as the devastating effects on loved ones and communities left behind.

### **Impulsivity, ACEs, and Suicidal Behavior**

The current study will examine how ACEs influence the underlying discrete processes of trait and state impulsivity, as well as how ACEs and the specific processes of trait and state impulsivity together influence suicidal behavior. As previously mentioned, ACEs have been shown to be directly predictive of suicidal behavior because of their impact on regions of the brain that are associated with emotional regulation (Dube et al., 2001). Additionally, ACEs have been shown to be linked to mental disorders, as well as many major physical illnesses and fewer years of education, which are each risk factors for suicide on their own. In combination, the numerous negative outcomes that can occur simultaneously as a result of ACEs may explain why ACEs are such strong predictors of suicidal behavior. Not only does the impact of ACEs on numerous brain regions influence suicidal behavior but can also lead to impulsive behavior in

more ways than one. ACEs may impact the regions of the brain associated with volitional acts (Ingvar, 1994), self-regulation, emotions (Williams, 2019), and response inhibition (Burnamonti et al., 2014) causing maladaptive decision making. The effects of severe and chronic ACEs may also cause individuals to act out of fear responses based on primitive instincts rather than higher order thinking, which may explain more impulsive behavior with little forethought of the consequences. The literature has shown a relationship between ACEs and negative urgency (Shin et al., 2018), however the relationship between ACEs and state impulsivity has yet to be explored in research. Due to effects of ACEs and impulsive behavior on mental and physical health, it is important to better understand the relationship between these two as well as how they both may influence choices, such as suicide. The choice to attempt suicide may be a rash decision made with little consideration of the long-term consequences carried out to relieve extreme negative distress.

The combination of trait and state impulsivity measures that will be used in this study have not yet been used in research and may yield important findings. It is anticipated that from this study we can better understand the discrete factors that influence the pathway to suicide to potentially reduce the occurrence of suicidal ideation, attempts, and fatalities, as well as the devastating effects on loved ones and communities left behind. Together, these findings suggest that chronic and severe exposure to ACEs may alter self-control leading to high levels of impulsivity, which could cause increased risk for suicide attempts. The following general hypotheses will be tested in this study. For specific hypotheses and corresponding data analyses see Appendix A.

H1: Participants exposed to a greater number of ACEs will show higher levels of total trait impulsivity as well as on each of the subscales (negative urgency, positive urgency, lack of

premeditation, lack of perseverance, and sensation seeking) and will show higher levels of state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time).

H2: Total suicide behavior scores could be predicted from ACEs, trait impulsivity (negative urgency, lack of premeditation, and sensation seeking), and state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time).

H3: For participants who were exposed to a greater number of ACEs and for those who show higher levels of trait impulsivity (negative urgency, lack of premeditation, and sensation seeking) and state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time) the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.

## METHODS

### **Participants and Procedure**

The current study recruited 311 participants. The age of participants ranged from 19-64 years old with the average being 35 years of age ( $SD = 9.74$ ). Frequencies and percentiles for the remainder of the demographic information can be found in Table 1 and 2.

Due to the recent events of COVID-19, participants were inquired about whether their overall stress increased, decreased, or remained the same during the ongoing pandemic (see Table 2).

Participants were recruited through Amazon's Mechanical Turk (MTurk). No restrictions or exclusions were placed on participants, aside from participants needing to be 18-65 years old. The online survey consisted of three different behavioral lab tasks and three self-report questionnaires. Informed consent was obtained from participants in the first page of the online survey. The first part of the online survey was administered through Qualtrics. This included the



consent form, demographic information, and the ACE questionnaire. Demographic information included age, gender, race/ethnicity, education level, and socioeconomic status. The behavioral lab tasks and two of the questionnaires (Suicide Behaviors Questionnaire-Revised [SBQ-R] & short version UPPS-P [S-UPPS-P]) were obtained through Inquisit Web by Millisecond. The online survey was presented in the same order for all participants and consisted of the demographic information, the ACE questionnaire, the stop signal task, the prospective time estimation task, the delay-discounting task, the SBQ-R, and the S-UPPS-P. Based on the approved research protocols by the University Review Board (IRB), participants who completed the survey received a debriefing form disclosing the purpose of the study, as well as suicide hotline information. In total, the time it took to complete the online survey was about 24 minutes.

## **Measures**

### ***Adverse Childhood Experiences***

The ACE-Q (Felitti, Anda, et al., 1998) is a ten-item questionnaire that asks participants about prior exposure (during the first 18 years of life) to psychological, physical, and sexual abuse as well as neglect, household dysfunction such as domestic violence, substance use or mental illness in the home, incarceration of a family member, and parent divorce. Participants recorded their responses by clicking Yes or No on the record form indicating whether or not they were exposed to a category. To score this questionnaire, the categories in which the respondent indicated they had indeed been exposed are summed. The minimum score possible was a 0 (showing no exposure to any ACEs) and the maximum score possible was a 10 (showing exposure to all ACEs). This questionnaire took about 2 minutes to complete. Reliability for the ACE measure was assessed using Cronbach's alpha. Results indicate good reliability ( $\alpha = .84$ ). See Appendix C for full assessment form.

### ***Impulsivity***

Trait impulsivity will be measured using the short version Urgency, Premeditation (lack of), Perseverance (lack of), Sensation seeking, Positive Urgency Impulsive Behavior Scale (S-UPPS-P; Cyders et al., 2014). This measure includes five subscales that assessed positive urgency (e.g., “I tend to act without thinking when I am really excited.”), negative urgency (e.g., “Sometimes when I feel bad, I can’t seem to stop what I am doing even though it is making me feel worse.”), lack of premeditation (e.g., “I like to stop and think things over before I do them.”), lack of perseverance (e.g., “I finish what I start.”), and sensation seeking (e.g., “I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.”). This version has 20 items total, with four items for each subscale. Items were responded to on a 4-point Likert scale (1= Agree Strongly, 2= Agree Some, 3= Disagree Some, 4= Disagree strongly) with higher overall scores indicating higher levels of trait impulsivity. This measure took around 9 minutes to complete. Cronbach’s alpha coefficient for the five S-UPPS-P subscales were: negative urgency, .78; positive urgency, .85, lack of premeditation, .85, lack of perseverance, .79, and sensation seeking, .74 (Cyders et al., 2014; Lynam, 2013). Reliability for the S-UPPS-P measure was assessed using Cronbach’s alpha. Results indicate good reliability ( $\alpha = .84$ ). See Appendix F for full assessment form.

Prepotent response inhibition was measured using the Stop Signal task (SST; Verbruggen et al., 2019). This is a reaction time task that provided an estimation of the covert stop signal reaction time (SSRT) in milliseconds calculated using the integration method (Verbruggen et al., 2019). The SSRT is an estimate of the amount of time it takes to stop the execution of a response that might already be underway but needs to be stopped. SSRT is calculated by subtracting the start time of the stop process (when participants see a stop signal) from the estimated finishing time of the stop process. Higher SSRT indicated a poor inhibition ability. In this task an arrow

appeared on the screen and pointed to either the left or right. Participants were instructed to push a response key if the arrow pointed left and a different key if the arrow pointed right unless the stop signal (a beep noise) was played. When the stop signal was played participants were instructed not to press the response key. The SST included one practice block with 32 trials and three test blocks with 72 trials each. The SST was originally created by Logan et al (1994; 1997) and shows moderate reliability with a Pearson correlation of  $r=.65$ . This task took around 9 minutes to complete. See Appendix D for links to behavioral lab tasks.

Delay discounting was measured using the 5-trial Adjusting Delay Discounting task (Koffarnus & Bickel, 2014). This task contains five questions and was used to estimate delay discounting rates of monetary rewards. Participants chose between a smaller amount of money (\$5) now or a larger amount (\$10) in the future. The delay for the larger amount varied based on previous choices while the monetary amounts were held constant. This task took about one minute to complete and directly estimated the Effective Delay 50% (ED50), which is a value that is inverse of the discount rate. The ED50 is then directly translated into the absolute k-value (inverse of ED50, also known as discount rate). The higher the discount rate the less a participant was willing to wait for the delayed larger reward and the more the immediate reward was preferred. Higher discounting rates equate to making more smaller sooner choices and is seen as more impulsive behavior. This task was chosen over other delay discounting tasks due to its short administration time. Typical discounting tasks can be time consuming and tedious, especially when combined with numerous other tasks like in this study. When comparing this short version to an adjusting amount discounting task discount rates were highly correlated,  $r = .67$  (Koffarnus & Bickel, 2014). See Appendix D for links to behavioral lab tasks.

Distortions in elapsed time was measured using the Prospective Time Estimation Task (Whitman et al., 2007). This task involved a single trial in which participants saw a green dot on the screen for a certain amount of time. A red circle then appeared with an alarm sound that was turned off by pressing the spacebar. Participants were to estimate in seconds the duration that the green stimuli was on the screen by indicating on a slider from 0-3 minutes. Participant's estimations were recorded in seconds. Higher positive amounts indicated greater overestimation of elapsed time. This task took approximately 1 minute to complete. See Appendix D for links to behavioral lab tasks.

### ***Suicidal Behavior***

The Suicide Behaviors Questionnaire-Revised (SBQ-R; Osman et al., 2001) is a four item self-report questionnaire that was used to identify participants risk for suicide. Item one assessed lifetime suicide ideation and/or suicide attempt ("Have you ever thought about or attempted to kill yourself?"). Responses range from 1 - 4 points and allow the separation of participants into groups (1 point = non-suicidal subgroup, 2 points = suicide risk ideation subgroup, 3 points = suicide plan subgroup, and 4 points = suicide attempt subgroup). Item two assessed the frequency of suicidal ideation over the past twelve months ("How often have you thought about killing yourself in the past year?"), with scores ranging from 1 point (Never) to 5 points (Very often [5 or more times]). Item three assessed the threat of suicide attempt ("Have you ever told someone that you were going to commit suicide, or that you might do it?"), with scores ranging from 1-3 points (1 point = "Yes at one time, but really did not want to die" or "Yes at one time, and really wanted to die", 2 points = "Yes, more than once, but did not want to do it", 3 points = "Yes more than once, and really wanted to do it"). Item four evaluates the likelihood of suicidal behavior in the future ("How likely is it that you will attempt suicide someday?") with answers

ranging from 0 points (Never) to 6 points (Very likely). This questionnaire took about 2 minutes to complete and total scores ranged from 3-18, with higher scores indicating higher risk of suicide. A receiver operating characteristic (ROC) analysis of data collected from an adult population revealed the sensitivity of the SBQ-R to be 93% and the specificity to be 95%. The area under the curve (AUC) ranged from .89-1.00, which falls into the very good range (Osman et al., 2001). Reliability for the SBQ-R measure was assessed using Cronbach's alpha. Results indicate good reliability ( $\alpha = .86$ ). See Appendix E for full assessment form.

## RESULTS

Data were screened using the explore function of SPSS. For scores that were found to be missing, the mean was used in their place. Examination of the boxplots indicated an outlier for lack of premeditation. This was removed, which transformed the skewness and kurtosis to be within acceptable range (-1 to 1). The discount rate  $k$  also showed not normally distributed data and so a log transformation was performed which resulted in acceptable range for skewness and kurtosis. The SBQ-R total score's kurtosis was within acceptable range, but skewness was 1.2, however this was kept as is. A log transformation did not improve the distribution of SBQ-R scores and outliers were not deleted because high suicidal behavior scores were of interest. Examination of histograms indicated that the distribution shape for the other variables of interest may be normally distributed; however, skewness and kurtosis scores were examined to further assess these distributions. Skewness and kurtosis scores were within the acceptable range for all other variables. Table 1 and 2 show demographic information from the sample.

**Table 1***Frequency and Percentages of Gender, and Education (N=311)*

	<i>Frequency</i>	<i>Percent</i>
<b>Gender</b>		
Female	156	50.2
Male	153	49.2
Non-Binary	1	.3
Transgender	1	.3
<b>Education</b>		
Some high school	3	1.0
High school diploma or equivalent	19	6.1
Some college	29	9.3
Associates degree	17	5.5
Vocational training	6	1.9
Bachelor's degree	149	47.9
Master's degree	84	27.0
Doctorate degree	4	1.2

**Table 2**

*Frequency and Percentages of Race/Ethnicity, Social Class, and Change in Stress Level Due to Covid-19 (N=311)*

	<i>Frequency</i>	<i>Percent</i>
<b>Race/Ethnicity</b>		
African American	27	8.7
Asian	117	37.6
Hispanic/Latino	26	8.4
White/Caucasian	125	40.2
Prefer not to answer	5	1.6
Other	11	3.4
<b>Social Class</b>		
Lower class	88	28.3
Working class	91	29.3
Average middle class	101	32.5
Upper middle class	26	8.4
Upper class	5	1.6
<b>Covid Stress</b>		
Increase	195	62.7
Decrease	42	13.5
Remain the same	74	23.8

## Hypothesis One

Bivariate regressions were run to test the hypothesis that there will be a strong positive relationship between ACE scores and levels of trait impulsivity in which participants exposed to a greater number of ACEs will show higher scores on overall trait impulsivity and on the following subscales: negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking.

A bivariate regression was performed to evaluate how well total S-UPPS-P impulsive behavior scores could be predicted from total ACE scores. A scatterplot indicated that the relation between X and Y was positive and reasonably linear. The correlation between ACEs and total S-UPPS-P scores was statistically significant,  $r(309) = .26, p < .001$ . The regression equation for predicting impulsive behavior from ACEs was found to be  $Y' = 41.836 + .812 * X$ . The  $R^2$  for this equation was .07; about 7% of the variance in total S-UPPS-P scores was predicted from ACEs. These results suggest a weak relationship between the variables of interest. Overall, higher ACE scores tend to be associated with an increase in total S-UPPS-P scores. The 95% CI for the slope to predict impulsivity from ACEs ranged from .48 to 1.15; thus, for every 1-point increase in ACE score the predicted level of trait impulsivity measured using the S-UPPS-P total score increased by about .48 to 1.15 points.

Bivariate regressions were performed to evaluate how well the specific dimensions of trait impulsivity (negative urgency, positive urgency, lack of perseverance, lack of premeditation, and sensation seeking) measured using the S-UPPS-P scale, could be predicted from ACEs. A scatterplot indicated that the relation between X and Y was positive and reasonably linear for sensation seeking, negative, and positive urgency. The correlation between negative urgency and ACEs was statistically significant,  $r(309) = .23, p < .001$ . The regression



equation for predicting negative urgency from ACE scores was found to be  $Y' = 9.667 + .238 * X$ . The  $R^2$  for this equation was .05; about 5% of the variance in negative urgency was predicted from ACEs. These results suggest a weak relationship between the variables of interest. Overall, higher ACE scores tend to be associated with higher negative urgency scores. The 95% CI for the slope to predict negative urgency from ACEs ranged from .12 to .35; thus, for every 1-point increase in ACE score the predicted negative urgency score increased by about .12 to .35 points.

The correlation between positive urgency and ACEs was also statistically significant,  $r(309) = .30, p < .001$ . The regression equation for predicting positive urgency from ACEs was found to be  $Y' = 8.429 + .342 * X$ . The  $R^2$  for this equation was .09; about 9% of the variance in positive urgency was predicted from ACEs. These results suggest a weak relationship between the variables of interest. Overall, higher ACE scores tend to be associated with higher positive urgency scores. The 95% CI for the slope to predict positive urgency from ACEs ranged from .22 to .46; thus, for every 1-point increase in ACE score, the predicted positive urgency score increased by about .22 to .46 points.

The correlation between sensation seeking and ACEs was statistically significant,  $r(309) = .15, p < .01$ . The regression equation for predicting sensation seeking from ACEs was found to be  $Y' = 10.170 + .155 * X$ . The  $R^2$  for this equation was .02; about 2% of the variance in sensation seeking was predicted from ACEs. These results suggest a weak relationship between the variables of interest. Overall, higher ACE scores tend to be associated with higher sensation seeking scores. The 95% CI for the slope to predict sensation seeking from ACEs ranged from .04 to .27; thus, for every 1-point increase in ACE score, the predicted sensation seeking score increased by about .04 to .27 points.

A bivariate regression was performed to test the hypothesis that there will be a strong positive relationship between ACE scores and stop signal reaction times (SSRT) in which participants exposed to a greater number of ACEs will have longer stop signal reaction times on the Stop Signal Task measuring prepotent response inhibition. A scatterplot indicated that the relation between X and Y was positive and reasonably linear. The correlation between ACEs and prepotent response inhibition was statistically significant,  $r(309) = .19, p < .001$ . The regression equation for predicting prepotent response inhibition from ACEs was found to be  $Y' = 1439653.573 + 40821130.21 * X$ . The  $R^2$  for this equation was .03; about 3% of the variance in prepotent response inhibition was predicted from ACEs. These results suggest a weak relationship between the variables of interest. Overall, higher ACE scores tend to be associated with longer SSRT's which indicates poorer prepotent response inhibition. The 95% CI for the slope to predict prepotent response inhibition from ACEs ranged from 9.54 to 37.68; thus, for every 1-point increase in ACE scores, the predicted prepotent response inhibition measured using the SSRT increased by about 10 to 38 milliseconds.

## **Hypothesis Two**

It was hypothesized that suicidal behaviors could be predicted from ACEs, negative urgency, sensation seeking, lack of premeditation, prepotent response inhibition, delay discounting, and distortions in elapsed time. A hierarchical regression analysis was used to test this hypothesis. The data were screened to test the assumptions of a multiple regression including the assumption of multicollinearity. Results suggest that all assumptions were met; collinearity diagnostics for tolerance and VIF indicated that multicollinearity was not an issue when assessing the predictor variables. Variables that could explain suicidal behaviors were entered into four steps. Total SBQ-R scores were entered as the dependent variable. Total ACE scores

were entered into the first block, the S-UPPS-P subscales of negative urgency, sensation seeking, and lack of premeditation were entered into the second block, the SSRT as a measure of prepotent response inhibition, and the log transformed discount rate  $k$  as a measure of one's delay discounting were entered into the third block, and the S-UPPS-P subscales of positive urgency and lack of perseverance, as well as time estimates as a measure of one's distortions in elapsed time, were entered into the fourth block. Overall, the full model was significant  $F(9, 300) = 14.73, p < .001; R = .55; \text{Adjusted } R^2 = .31$ . Together trait and state impulsivity along with ACEs accounted for nearly 31% of the variance in total SBQ-R scores. Table 3 and 4 show the amount of variance in total suicide behavior scores accounted for by each of the four models.

**Table 3**

*Model 1 & 2 for Hierarchical Regression Analysis for Variables Predicting Suicidal Behaviors (N=300)*

	Model 1			Model 2		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
ACE	.64	.06	.51***	.60	.06	.48***
Negative Urgency				.21	.07	.17**
Premeditation				.09	.08	.06
Sensation Seeking				-.13	.07	-.10
$R^2$		.26			.29	
F for change in $R^2$		106.59***			4.24**	

\*\* $p < .01$ , \*\*\* $p < .001$ .

**Table 4***Model 3 & 4 for Hierarchical Regression Analysis for Variables Predicting Suicidal**Behaviors (N=300)*

	Model 3			Model 4		
	<i>B</i>	<i>SE B</i>	$\beta$	<i>B</i>	<i>SE B</i>	$\beta$
ACE	.59	.06	.47***	.60	.06	.47***
Negative Urgency	.22	.07	.18***	.25	.08	.21**
Premeditation	.10	.08	.06	.11	.11	.06
Sensation Seeking	-.12	.07	-.10	-.09	.08	-.08
Discount Rate	-.08	.05	-.08	-.08	.05	-.07
Response Inhibition	.00	.00	.03	7.25 <sup>E-6</sup>	.00	.01
Time Estimation				.01	.01	.11*
Positive Urgency				-.06	.09	-.06
Perseverance				.02	.11	.01
R <sup>2</sup>		.29			.31	
F for change in R <sup>2</sup>		1.36			1.91	

\**p*<.05, \*\**p*<.01, \*\*\**p*<.001.**Hypothesis Three**

An ordinal logistic regression analysis was conducted to investigate the relationship between ACE scores, three facets of trait impulsivity (negative urgency, lack of premeditation, and sensation seeking), and three cognitive processes of state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time) in relation to suicide ideation, plan, and attempts (non-suicidal subgroup, suicide risk ideation subgroup, suicide plan subgroup,

suicide attempt subgroup). See table 5 for the frequency and percentages of the SBQ-R subgroups. The predictor variables were tested to verify there was no violation of the assumption of no multicollinearity.

In this analysis, we see a significant improvement in the fit of the final model over the null model  $\chi^2(9)=100.22, p<.001$ . Both the Pearson chi-square test  $\chi^2(900) = 957.84, p=.09$  and the deviance test  $\chi^2(900)= 590.44, p= 1.00$  were not significant. This suggests good model fit. The results of the test of parallel lines indicate non-significance, suggesting the assumption of proportional odds is satisfied.

ACE scores is a significant predictor of suicidal ideation, plan, and attempt. The ordered log-odds (Estimate) = .37, SE = .05, Wald = 63.97,  $p<.001$ . The estimated odds ratio favored a positive relationship  $EXP(\text{Estimate}) = 1.45, 95\% \text{ CI } (1.32, 1.60)$  for every one unit increase of ACE scores. The odds ratio indicates that the odds of being in a higher category on suicidal ideation, plan, and attempt increases by a factor of 1.45 for every one unit increase in total ACE scores.

The predictor variables negative urgency, positive urgency, lack of premeditation, and sensation seeking were found to contribute to the model. For negative urgency the ordered log-odds (Estimate) = .19, SE = .05, Wald = 13.15,  $p<.001$ . The estimated odds ratio favored a positive relationship  $EXP(\text{Estimate}) = 1.21, 95\% \text{ CI } (1.09, 1.35)$  for every one unit increase of negative urgency scores. The odds ratio indicates that the odds of being in a higher category on suicidal ideation, plan, and attempt increases by a factor of 1.21 for every one unit increase in negative urgency scores.

For positive urgency the ordered log-odds (Estimate) = -.15, SE = .06, Wald = 5.66,  $p<.05$ . The estimated odds ratio favored a negative relationship  $EXP(\text{Estimate}) = .87, 95\% \text{ CI}$

(.77, .97) for every one unit increase of positive urgency scores. The odds ratio indicates that the odds of being in a lower category on suicidal ideation, plan, and attempt, increases by a factor of .87 for every one unit increase on positive urgency.

For lack of premeditation the ordered log-odds (Estimate) = .15, SE = .07, Wald = 4.18,  $p < .05$ . The estimated odds ratio favored a positive relationship  $EXP(\text{Estimate}) = 1.16$ , 95% CI (1.01, 1.33) for every one unit increase of lack of premeditation scores. The odds ratio indicates that the odds of being in a higher category on suicidal ideation, plan, and attempt increases by a factor of 1.16 for every one unit increase in lack of premeditation scores.

For sensation seeking scores the ordered log-odds (Estimate) = -.11, SE = .05, Wald = 3.79,  $p < .05$ . The estimated odds ratio favored a negative relationship  $EXP(\text{Estimate}) = .90$ , 95% CI (.81, 1.00) for every one unit increase of sensation seeking scores. The odds ratio indicates that the odds of being in a lower category on suicidal ideation, plan, and attempt, increases by a factor of .90 for every one unit increase on sensation seeking.

Lastly, a Spearman's rho correlation was conducted to examine the relationship between the change in stress level due to Covid-19 and total SBQ-R scores. The analysis revealed a statistically significant relationship between the two variables  $r_s(311) = .22$ ,  $p < .001$ . The effect size of this relationship is weak. Squaring the correlation coefficient indicated that 4.84% of the variance in total SBQ-R scores was explained by Covid-19 stress.

**Table 5***Frequency and Percentages of SBQ-R subgroups used in Ordinal Logistic Regression**(N=304)*

	<i>N</i>	<i>Percent</i>
Non-suicidal subgroup	164	53.9
Suicide risk ideation subgroup	59	19.4
Suicide plan subgroup	65	21.4
Suicide attempt subgroup	16	5.3

**Table 6***Summary for Ordinal Logistic Regression Analysis for Variables Predicting Suicide Ideation,**Plan, and Attempts (N=304)*

	<i>B</i>	<i>SE</i>	<i>Wald</i>	<i>Exp (B)</i>	<i>Sig,</i>
ACE	.37	.05	63.97	1.45	.00
Negative Urgency	.19	.05	13.15	1.21	.00
Premeditation	.15	.07	4.18	1.16	.04
Perseverance	-.04	.07	.24	.96	.63
Sensation Seeking	-.11	.05	3.79	.90	.05
Positive Urgency	-.15	.06	5.66	.87	.02
Discount Rate	-.07	.04	3.27	.94	.07
Time Estimation	.00	.00	.46	1.00	.49
Response Inhibition	-8.78 <sup>E-6</sup>	.00	.06	1.00	.81

## DISCUSSION

Previous findings have suggested impulsive behavior as a possible outcome of having been exposed to ACEs (Beers & Bellis, 2002; Haaris Sheikh et al., 2018). A relationship between ACEs and negative urgency has been established in the literature (Shin et al., 2018), however no other relationships between ACEs and the other four facets of trait impulsivity have been found. Furthermore, the relationship between ACEs and state impulsivity has yet to be explored. In order to build off previous literature, the hypothesis that the three dimensions of state impulsivity, total trait impulsivity scores, and the five specific subscales of trait impulsivity could be predicted from ACE scores were tested. The results of the statistical analyses partially support the hypotheses, as ACE scores were found to be a significant predictor of total S-UPPS-P scores, negative urgency, positive urgency, sensation seeking, and prepotent response inhibition. These results suggest that individuals who have experienced high numbers of ACEs may be more likely to exhibit more impulsive behavior. Specifically, they may be more likely to enjoy exciting activities and be open to trying new experiences that may or may not be dangerous, as well as act rashly while experiencing extreme negative and positive emotions. Additionally, they may lack prepotent response inhibition and struggle to suppress dominant or automatic responses, as well as struggle to inhibit already initiated responses. As mentioned previously ACEs have been shown to result in reduced volume in the cerebellum, which coordinates motor behavior and executive functioning (Williams, 2019). A recent study found that participants with lesions in deep cerebellar nuclei showed difficulty initiating stop processes on a Stop Signal Task (Burnamonti et al., 2014). The findings support the connection, suggesting the effects of ACEs on the cerebellum may lead to increased difficulties interrupting or stopping a current response or lead to the inability to suppress an action that is no longer appropriate. All



in all, having been exposed to ACEs impacts regions of the brain that are associated with volitional acts (Ingvar, 1994), self-regulation, emotions (Williams, 2019), and response inhibition (Burnamonti et al., 2014), which may explain the findings that an increase in ACEs results in increased impulsive behavior. The effects of severe and chronic ACEs may also cause individuals to act out of fear responses based on primitive instincts rather than higher order thinking, which may explain more impulsive behavior with little forethought of the consequences. ACEs were not found to be a significant predictor of increased delay discounting, distortions in elapsed time, lack of premeditation, and lack of perseverance.

Next, it was hypothesized that suicidal behaviors could be predicted from ACEs, negative urgency, sensation seeking, lack of premeditation, prepotent response inhibition, delay discounting, and distortions in elapsed time. The results of the hierarchical regression supported the hypothesis in that together trait and state impulsivity along with ACEs significantly accounted for nearly 31% of the variance in total suicidal behavior scores. When looking at each predictor, ACEs, negative urgency, and distortions in elapsed time were significant predictors of total suicidal behavior scores. These results align with several previous findings that ACEs have a strong relationship with suicidal behaviors due to their impact on regions of the brain that are associated with emotional regulation (Dube et al., 2001). Additionally, ACEs have been shown to be linked to many negative outcomes (i.e., mental and physical illness) which are risk factors for suicide on their own. A relationship between negative urgency and suicidal behaviors has also already been established in the research literature (Shin et al., 2018). These results suggest that those who act rashly while experiencing negative emotions may be more likely to exhibit suicidal behaviors. This could be from a lack of emotional control which then results in thinking about or performing rash actions that could be taken to reduce the discomfort associated with

negative emotions. Next, the analysis revealed a relationship between distortions in elapsed time and suicidal behaviors which has not been established previously in the literature. It may be that individuals considering suicide feel that they have been experiencing extreme distress for longer than they actually have. This overestimation of the amount of time passed may contribute to the impulsive decision to end one's own life.

In contrast, delay discounting, lack of premeditation, sensation seeking, and prepotent response inhibition were not found to be predictive of suicidal behaviors. Although lack of premeditation and sensation seeking were not predictive of total suicide scores, they did influence the likelihood that individuals go from ideation to planning and from planning to attempting. It may be that while lack of premeditation does not influence overall suicidal behaviors (i.e., telling someone they were going to commit suicide, and how often they have thought about killing themselves), it more specifically contributes to the likelihood that individuals go from ideation to planning and then to attempting because of a lack of consideration of consequences. Like lack of premeditation, sensation was not found to be related to total suicide scores, but high scores did decrease the likelihood that someone goes from ideation to planning and planning to attempting. High levels of sensation seeking may not be related to suicidal behaviors because individuals may be more likely to engage in behaviors that provide positive reinforcement, such as a high euphoria from a substance, and emotional relief, or stimulation from non-suicidal self-injury. They may use these behaviors to cope which may help them to feel better and reduce the chances of them going on to plan or attempt suicide. Similarly, while delay discounting was not found to be a significant predictor of total suicide scores, nor was it associated with a greater likelihood of having lifetime suicidal ideation, plan, and/or attempt, it was just short of being a significant predictor of the latter ( $p = .07$ ). This

suggests that delay discounting would also be more likely to be associated with the transition to attempting suicide rather than total suicide behavior scores. Like these other variables prepotent response inhibition may not relate to overall suicidal behaviors like telling friends, and thinking about killing themselves, because it has to do with suppressing responses and inhibiting already initiated responses. These findings suggest some underlying processes of impulsive behavior may instead contribute to the progression of suicidal planning and attempting rather than suicidal behaviors in general.

Furthermore, statistical analysis supported the hypothesis that for participants exposed to a greater number of ACEs, the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater. This finding aligns with several previous findings that ACEs are strongly predictive of suicidal behavior due to their numerous effects on the brain and body.

Next, it was hypothesized that for participants who are higher in their levels of negative urgency, lack of premeditation, and sensation seeking, the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater. This hypothesis was partially supported in that individuals who exhibit higher levels of negative urgency and lack of premeditation are at an increased likelihood of going from suicidal ideation to planning and from planning to attempting. Both negative urgency and lack of premeditation have previously been found to be associated with suicidal behaviors in the research literature. It could be that when faced with extreme negative emotions individuals high in lack of premeditation contemplate suicide without fully considering all outcomes. Similarly, individuals high in negative urgency may struggle to cope with negative emotions and may quickly turn to thinking of suicide as an escape. This could be because negative emotions, such as anger, anxiety, fear, and sadness, reduce self-control by impairing cognitive functions necessary for self-restraint (Curci et al., 2013; Cyders & Smith,

2008; Heatherton & Wagner, 2011; Schmeichel & Tang, 2015). Experiencing very intense negative emotions undermines rational decision making (Bechara, 2005; Dreisbach, 2006), interferes with views of long-term goals, and may shift focus onto short-term needs (Dreisbach & Goschke, 2004) which in the event of an emotional crisis could result in relieving uncomfortable and painful feelings through taking one's life.

In contrast to our hypotheses, higher levels of positive urgency and sensation seeking were associated with a lower likelihood of having lifetime suicidal ideation, plan, and/or attempt. These results are novel and could be because positive urgency has to do with positive emotional states, which are not usually experienced during suicidal crises. Also, like mentioned previously it could be that individuals high in sensation seeking may be more likely to use other activities such as alcohol, substances, or non-suicidal self-injury to cope which may help them to feel better and reduce the chances of them going on to plan or attempt suicide. Additionally, sensation seeking involves enjoying exciting activities which, like positive urgency, involves more positive emotional states that are not usually experienced during suicidal crises.

The hypotheses that an increase in delay discounting, prepotent response inhibition, and distortions in elapsed time would be associated with an increase in the likelihood of having lifetime suicidal ideation, plan, and/or attempt were not supported. These findings suggest that the transition from ideation to planning and then to attempting suicide may be more influenced by individuals' impulsive personality traits rather than these cognitive processes that contribute to situational reactions.

Lastly, results from a Spearman rho correlation suggest that an increase in stress due to Covid-19 was related to higher total suicidal behavior scores. The suicide rate continues to rise and may be further exacerbated by the current ongoing coronavirus disease pandemic. Public

health interventions put in place to reduce the spread of the virus have caused occupational and economic stress, social isolation, decreased access to community support, and barriers to mental health treatment all of which could increase suicide risk (Reger et al., 2020).

Similarly, adverse childhood experiences have the potential to worsen during the COVID-19 pandemic. Rates of child abuse and neglect, as well as domestic violence that children may witness, are expected to rise as children are at home with parents. The Children's Bureau reports that 77.5% of child abuse and neglect is perpetrated by the parents (U.S. Department of Health & Human Services, 2020). Reports of child maltreatment have also declined significantly due to school closures. Children do not have contact with educational staff, neighbors, family, and friends who make up a large proportion of child maltreatment reporters (Jonson-Reid et al., 2020). Due to these recent changes, now more than ever it is important to find ways to reduce the occurrence of ACEs which are associated with an increased risk of impulsive and suicidal behavior.

### **Limitations**

The research conducted involves limitations that need to be taken into consideration. First, many of the relationships found between the separate dimensions of impulsivity and ACEs were weak indicating a small change in impulsive behavior based on ACE scores. Secondly, there are limitations of both self-report surveys and behavioral lab tasks. Self-report surveys are limited in their ability to predict behavior in particular situations and fail to assess the underlying cognitive processes of impulsivity. It has also been argued that self-report surveys assess test taking styles rather than the intended construct and may be inaccurate if participants have low reading levels or poor insight (Cyders & Coskunpinar, 2011). Some weaknesses of behavioral lab tasks are they only assess a snapshot of behavior, they are limited

in their generalizability to real life situations and impulsive action, and they often measure multiple concurrent process at the same time, like impulsivity, memory, attention, and concentration (Cyders & Coskunpinar 2011). Behavioral lab tasks may also lack the emotion, stress, or temptation that is believed to be involved in impulsive behavior (Wingrove & Bond, 1997).

Additionally, this study did not include a measure for resistance to proactive interference, which may also show a relationship with ACEs and suicidal behaviors. A measure for resistance to proactive interference was originally intended to be included in this study but was removed prior to data collection due to its length and poor reliability. Individuals with poor resistance to proactive interference may be unable to resist intrusions from distressing memories which may then intensify their distress and contribute to the decision to end one's life. Furthermore, there was a large number of participants who did not complete the whole survey. We believe this is because using the software Inquisit Web required participants to download the Inquisit app. Subjects may be weary of downloading unknown software onto their computers. Only responses from participants who completed the whole survey were used, however because this survey was done remotely this brings into question the reliability of participants responses. Also, although using Mturk provided a randomly assigned sample that is more diverse than those reported in academic journals and college campuses, it still did not serve as an accurate representation of the general population.

### **Conclusions and Implications**

Impulsive behavior has been established as a risk factor for suicidal behavior, however it has been found that there are several underlying processes that make up impulsive behavior. This research identified specific underlying processes of both trait and state impulsivity that are

significant predictors of suicidal behavior. ACEs, negative urgency, lack of premeditation, and distortions in elapsed time are significant predictors of suicidal behaviors. These results not only expand on previous research findings, but also introduce novel relationships. By identifying the specific dimensions of impulsive behavior that contribute to suicide we can increase awareness of these risk factors, identify individuals at greater risk of attempting, and work to provide interventions that may reduce impulsivity, which in turn may contribute to a reduction in suicidal behaviors.

Also identified was that greater exposure to ACEs was a predictor of increased sensation seeking, negative urgency, positive urgency, and prepotent response inhibition. By identify the effects of ACEs on behavior, mental health professionals can once again target and mitigate the effects through inventions that focus on reducing these specific dimensions of impulsive behavior. It is also important to continue to reduce the occurrence of ACEs as their short- and long-term effects can be devastating.

Future research may benefit from further exploring the relationships between these variables as some of our findings were new and could benefit from being reproduced in the research literature. Additionally, research on interventions focused on reducing impulsive behavior could be beneficial as it has been found to be associated with many maladaptive behaviors and clinical disorders. Current and future research is especially significant due to the effects of the current ongoing Covid-19 pandemic that is likely to result in increased ACEs which in turn will result in increased impulsive and suicidal behaviors.

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APPENDICES

**Appendix A**

Hypotheses and Corresponding Analyses

<b>Hypothesis</b>	<b>Analysis</b>
<p>H1: There will be a strong positive relationship between ACE scores and levels of trait impulsivity in which participants exposed to a greater number of ACEs will show higher scores of total trait impulsivity as well as on the following subscales: negative urgency, positive urgency, lack of premeditation, lack of perseverance, and sensation seeking.</p>	<p><u>Simple Bivariate Regressions</u>            ACE scores * Negative urgency            ACE scores * Positive urgency            ACE scores * Lack of perseverance            ACE scores * Lack of premeditation            ACE scores * Sensation seeking            ACE scores * S-UPPS-P total scores</p>
<p>H1: There will be a strong positive relationship between ACE scores and stop signal reaction times in which participants exposed to a greater number of ACEs will have longer stop signal reaction times on the Stop Signal Task measuring prepotent response inhibition.</p>	<p><u>Simple Bivariate Regression</u>            ACE scores * Stop signal reaction times</p>
<p>H1: There will be a strong positive relationship between ACE scores and discount rates in which participants exposed to a greater number of ACEs will show higher discount rates (choose more smaller sooner choices) on the delay discounting task.</p>	<p><u>Simple Bivariate Regression</u>            ACE Scores* Discount rates</p>
<p>H1: There will be a strong positive relationship between ACE scores and time estimation in which participants exposed to a greater number of ACEs will have larger overestimations of the amount of time passed on a time estimation task.</p>	<p><u>Simple Bivariate Regression</u>            ACE Scores * Time estimation</p>

<p>H2: Total suicide behavior scores could be predicted from ACEs, trait impulsivity (negative urgency, lack of premeditation, and sensation seeking), and state impulsivity (delay discounting, prepotent response inhibition, and distortions in elapsed time).</p>	<p><u>Hierarchical Regression</u>  ACE scores, negative urgency, positive urgency, lack of perseverance, lack of premeditation, sensation seeking, discount rates, time estimation, stop signal reaction times * SBQ-R total score</p>
<p>H3: For participants who were exposed to a greater number of ACEs, the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.</p>	<p><u>Ordinal Logistic Regression</u>  ACE scores, negative urgency, positive urgency, lack of perseverance, lack of premeditation, sensation seeking, discount rates, time estimation, stop signal reaction times * non-suicidal subgroup, suicide risk ideation subgroup, suicide plan subgroup, and suicide attempt subgroup</p>
<p>H3: For participants who are higher in their levels of negative urgency, lack of premeditation, and sensation seeking, the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.</p>	
<p>H3: For participants who show higher discount rates (choose more smaller sooner choices) on a delay discounting task the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.</p>	
<p>H3: For participants who exhibit larger overestimations of the amount of time passed on a time estimation task the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.</p>	
<p>H3: For participants who have longer stop signal reaction times on the Stop Signal Task measuring prepotent response inhibition the likelihood of having lifetime suicidal ideation, plan, and/or attempt will be greater.</p>	

## Appendix B

### Demographic Questions

1. What is your age? \_\_\_\_\_
2. What is your gender identity?
  - a. Male
  - b. Female
  - c. Intersex
  - d. Non-binary/third gender
  - e. Transgender
  - f. Agender
  - g. Prefer not to say.
  - h. A gender not listed.
3. What is the highest level of education you have completed?
  - a. Primary school (K – 8<sup>th</sup> grade)
  - b. Some high school
  - c. High school diploma or equivalent
  - d. Vocational training
  - e. Some college
  - f. Associate's degree (e.g. AA, AE, AFA, AS, ASN)
  - g. Bachelor's degree (e.g. BA, BBA, BDA, BS)
  - h. Master's degree (e.g. MA, MBA, MFA, MS, MSW)
  - i. Specialist degree (e.g. EdS)
  - j. Applied or professional doctorate degree (e.g. MD, DDC, DO, DDS, JD, PharmD)
  - k. Doctorate degree (e.g. EdD, PhD)
4. What is your race/ethnicity?
  - a. American Indian/Alaskan Native
  - b. Asian
  - c. African American
  - d. Hispanic/Latino
  - e. Middle Eastern/North African
  - f. Native Hawaiian/Other Pacific Islander
  - g. White/Caucasian
  - h. Other, please specify: \_\_\_\_\_
  - i. Prefer not to answer
5. Which social class group do you identify with based on your individual annual income?
  - a. Lower class (less than \$25,000)
  - b. Working class (\$25,000 - \$49,999)
  - c. Average middle class (\$50,000 – \$114,999)
  - d. Upper middle class (\$115,000 – \$249,999)
  - e. Upper class (\$250,000 or more)



6. Did your overall stress increase, decrease, or remain the same during the ongoing pandemic?
  - a. Increase
  - b. Decrease
  - c. Remain the same.

## Appendix C

### *Adverse Childhood Experiences Questionnaire*

#### **While you were growing up during your first 18 years of life:**

1. Did a parent or other adult in the household **often...**  
Swear at you, insult you, put you down, or humiliate you?  
**or**  
Act in a way that made you afraid that you might be physically hurt?  
Yes No If yes enter 1
2. Did a parent or other adult in the household **often...**  
Push, grab, slap, or throw something at you?  
**or**  
Ever hit you so hard that you had marks or were injured?  
Yes No If yes enter 1
3. Did an adult or person at least 5 years older than you **ever...**  
Touch or fondle you or have you touch their body in a sexual way?  
**or**  
Try to or actually have oral, anal, or vaginal sex with you?  
Yes No If yes enter 1
4. Did you **often** feel that...  
No one in your family loved you or thought you were important or special?  
**or**  
Your family didn't look out for each other, feel close to each other, or support each other?  
Yes No If yes enter 1
5. Did you **often** feel that...  
You didn't have enough to eat, had to wear dirty clothes, and had no one to protect you?  
**or**  
Your parents were too drunk or high to take care of you or take you to the doctor if you needed it?  
Yes No If yes enter 1
6. Were your parents **ever** separated or divorced?  
Yes No If yes enter 1
7. Was your mother or stepmother:  
**Often** pushed, grabbed, slapped, or had something thrown at her?  
**or**  
**Sometimes or often** kicked, bitten, hit with a fist, or hit with something hard?  
**or**  
**Ever** repeatedly hit over at least a few minutes or threatened with a gun or knife?  
Yes No If yes enter 1

8. Did you live with anyone who was a problem drinker or alcoholic or who used street drugs?

Yes No

If yes enter 1

9. Was a household member depressed or mentally ill or did a household member attempt suicide?

Yes No

If yes enter 1

10. Did a household member go to prison?

Yes No

If yes enter 1

## Appendix D

### *Behavioral Lab Tasks Measuring State Impulsivity*

**Instructions for IRB committee: By following the link you will be taken to millisecond test library. You can select RUN DEMO. Follow the instructions to download the free Inquisit app (click download the app installer), then click Start. Once you click start you will NOT be able to exit the demo until you have finished.**

*Stop Signal Task 2019 – English* (Following the link will show you several stop signal tasks. Make sure you go to the one named Stop Signal Task 2019- English by Verbruggen et al., 2019)

Duration: 9 minutes

<https://www.millisecond.com/download/library/stopsignaltask/>

*Prospective Time Estimation Task – English* (Following the link will show you several time estimation tasks. Make sure to go to the one named Prospective Time Estimation Task – English by Whitman et al., 2007)

Duration: 1.5 minutes

<https://www.millisecond.com/download/library/timeestimation/>

*5-Trial Adjusting Delay Discounting task* by Koffarnus, Warren, and Bickel (2014)

Duration: 1 minute

<https://www.millisecond.com/download/library/delaydiscountingtask/minutediscountingtask/>

## Appendix E

### *Suicide Behaviors Questionnaire-Revised (SBQ-R)*

Instructions: Please check the number beside the statement or phrase that best applies to you.

**1. Have you ever thought about or attempted to kill yourself? (Check one only)**

- 1. Never
- 2. It was just a brief passing thought
- 3a. I have had a plan at least once to kill myself but did not try to do it
- 3b. I have had a plan at least once to kill myself and really wanted to die
- 4a. I have attempted to kill myself, but did not want to die
- 4b. I have attempted to kill myself, and really hoped to die

**2. How often have you thought about killing yourself in the past year? (Check one only)**

- 1. Never
- 2. Rarely (1 time)
- 3. Sometimes (2 times)
- 4. Often (3-4 times)
- 5. Very Often (5 or more times)

**3. Have you ever told someone that you were going to commit suicide, or that you might do it? (Check one only)**

- 1. No
- 2a. Yes, at one time, but did not really want to die
- 2b. Yes, at one time, and really wanted to die
- 3a. Yes, more than once, but did not want to do it
- 3b. Yes, more than once, and really wanted to do it

**4. How likely is it that you will attempt suicide someday? (Check one only)**

- 0. Never
- 1. No chance at all
- 2. Rather unlikely
- 3. Unlikely
- 4. Likely
- 5. Rather likely
- 6. Very likely

## Appendix F

### *Short Version Urgency, Premeditation (lack of), Perseverance (lack of), Sensation Seeking, Positive Urgency Behavior Scale (S-UPPS-P)*

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you Agree Strongly circle 1, if you Agree Somewhat circle 2, if you Disagree somewhat circle 3, and if you Disagree Strongly circle 4. Be sure to indicate your agreement or disagreement for every statement below.

- 1= Agree Strongly
- 2= Agree Some
- 3= Disagree Some
- 4= Disagree Strongly

1. I generally like to see things through to the end.
2. My thinking is usually careful and purposeful.
3. When I am in great mood, I tend to get into situations that could cause me problems.
4. Unfinished tasks really bother me.
5. I like to stop and think things over before I do them.
6. When I feel bad, I will often do things I later regret in order to make myself feel better now.
7. Once I get going on something I hate to stop.
8. Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.
9. I quite enjoy taking risks.
10. I tend to lose control when I am in a great mood.
11. I finish what I start.
12. I tend to value and follow a rational, "sensible" approach to things.
13. When I am upset, I often act without thinking.
14. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
15. When I feel rejected, I will often say things that I later regret.
16. I would like to learn to fly an airplane.
17. Others are shocked or worried about the things I do when I am feeling very excited.
18. I would enjoy the sensation of skiing very fast down a high mountain slope.
19. I usually think carefully before doing anything.
20. I tend to act without thinking when I am really excited.

## Appendix G

### Recruitment Script

Title of study: **Examining How Adverse Childhood Experiences and the Underlying Processes of Trait and State Impulsivity Influence Suicidal Behavior**

This study is conducted by Julia Duran and Dr. Janett Naylor-Tincknell of the Department of Psychology at Fort Hays State University, Hays, KS. This study is investigating the relationship between adverse childhood experiences, impulsive behavior, and suicidal thoughts and behaviors. This study will ask you to answer questions about yourself, including your experience with suicidal thoughts/behaviors and adverse childhood experiences. You will also be required to complete tasks that assess different aspects of impulsive behavior. This study should take approximately 24 minutes to complete. Please know that you are not obligated to participate. If you decide to participate, you will be able to skip any questions that make you uncomfortable. For participating in the entire study, you will be compensated \$0.50. If you chose to participate, please continue to read the informed consent.

Thank you!

Julia Duran  
Principal Investigator  
Department of Psychology  
jkduran@mail.fhsu.edu

Dr. Janett Naylor-Tincknell  
Co-Principal Investigator  
Department of Psychology  
600 Park St.  
Fort Hays State University  
Hays, KS 67601  
(785) 628-5857  
jmnaylor@fhsu.edu

## Appendix H

### Informed Consent Form

**TITLE OF STUDY:** Examining How Adverse Childhood Experiences and the Underlying Processes of Trait and State Impulsivity Influence Suicidal Behavior

#### **INTRODUCTION**

The Department of Psychology at Fort Hays State University supports the practice of protection for human subjects participating in research. **You are being asked to participate in a research study. It is your choice whether or not to participate.** The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with this unit, the services it may provide to you, or Fort Hays State University.

#### **PURPOSE OF THE STUDY**

The purpose of this study is to explore the relationship between adverse childhood experiences, impulsivity, and suicidal behaviors.

#### **PROCEDURES**

If you agree to take part in this study, you will be asked to complete an online survey/questionnaire. This survey/questionnaire will ask about adverse childhood experiences, and suicidal thoughts and behaviors. You will also be required to complete tasks that assess different aspects of impulsive behavior. **If you decide to participate in this research study, you will be asked to electronically sign this consent form. The length of time of your participation in this study is 24 minutes. Approximately 300 participants will be in this study.**

#### **RISKS**

We do not anticipate more than minimal risk with this study, and we do not expect you to experience more risk than what you might normally encounter in everyday life. However, if you feel distressed or uncomfortable by any of the questions you may choose not to answer and/or discontinue your participation. Participating in this study is completely voluntary and deciding to withdraw from the study will not impact your job status. If you feel uncomfortable while completing this study, please contact the researchers listed below.

#### **BENEFITS**

Participants may better understand how research is conducted. Participants may also gain insight on their adverse childhood experiences, impulsivity, and suicidal thoughts and behaviors. Participants may benefit in the form of increased self-awareness about their feelings, experiences, and characteristics. All participants will receive monetary compensation of .50 cents



for their participation. Benefits to society include an improved understanding of which factors influence suicidal behavior.

### **PAYMENT TO PARTICIPANTS**

You will be reimbursed .50 cents for your participation in this study.

### **PARTICIPANT CONFIDENTIALITY (HOW WILL PRIVACY BE PROTECTED)**

We will be taking the following steps to keep information about you confidential, and to prevent it from unauthorized disclosure: the principal investigator will be the only individual that has access to the original data in this study. Data will be stored on a storage device (password protected laptop) that only the principal investigator has access to. In addition, the principal investigator will only share such data with her faculty advisor, when necessary. Your name will not be associated in any publication or presentation with the information collected about you or with the research findings from this study.

### **OTHER IMPORTANT ITEMS YOU SHOULD KNOW**

- **Withdrawal from the study:** You may choose to stop your participation in this study at any time. Your decision to stop your participation will have no effect on the quality of job status.
- **Funding:** Outside funding is provided by the Graduate Association for Students in Psychology (GASP).
- **Alternative options:** You do not have to be in this study if you do not want to. If you agree to be in the study, but later change your mind, you may drop out at any time by exiting out of the internet window. There are no penalties or consequences of any kind if you decide that you do not want to participate.

### **REFUSAL TO SIGN CONSENT AND AUTHORIZATION**

You are not required to sign this Consent and Authorization form and you may refuse to do so without any penalty. However, if you refuse to sign electronically, you cannot participate in this study.

### **CANCELLING THIS CONSENT AND AUTHORIZATION**

You may withdraw your consent to participate in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about you, in writing, at any time, by sending your written request to: Dr. Janett Naylor-Tincknell, Department of Psychology, 600 Park St. Hays, KS 67601.

If you cancel permission to use your information, the researchers will stop collecting additional information about you. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

### **QUESTIONS ABOUT PARTICIPATION**

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.

We will not be following up with you after this study. If you feel upset after completing the study or find that some questions or aspects of the study triggered distress, talking with a qualified clinician may help. If you feel you would like assistance, please contact *your local mental health agency or the Substance Abuse and Mental Health Services Administration (SAMHSA) National Helpline at 1-800-662- HELP (4357) (English and Spanish) or the National Suicide Prevention Lifeline at 1-800-273-TALK (8255) or en espanol 1-888-628-9454 or the Crisis Text Line text “HELLO” to 741741.* In the case of an emergency please call 911.

**PARTICIPANT CERTIFICATION:**

I have read this Consent and Authorization form. If you have questions about this project or if you have a research-related problem, you may contact the researchers, *[Julia Duran and Dr. Janett Naylor-Tincknell)*. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 628-4349, write the Office of Scholarship and Sponsored Projects (OSSP), Fort Hays State University, 600 Park St., Hays, Kansas 67601, or email [irb@fhsu.edu](mailto:irb@fhsu.edu).

By clicking “I agree” below you are indicating that you are at least 18 years old, have read this consent form and agree to participate in this research study. You are free to skip any question that you choose. Please print a copy of this page for your records.

I Agree

I Do Not Agree

**RESEARCHER CONTACT INFORMATION:**

Julia Duran  
Principal Investigator  
Department of Psychology  
600 Park St.  
Fort Hays State University  
Hays, KS 67601  
(785) 236-0002  
[jkduran@mail.fhsu.edu](mailto:jkduran@mail.fhsu.edu)

Janett Naylor-Tincknell, Ph.D.  
Faculty Supervisor  
Department of Psychology  
600 Park St.  
Fort Hays State University  
Hays, KS 67601  
(785) 628-5857  
[jmnaylor@fhsu.edu](mailto:jmnaylor@fhsu.edu)

## Appendix I

### Debriefing Form

Thank you for participating in this study.

This study was focused on exploring the relationship between adverse childhood experiences, impulsivity, and suicidal thoughts and behaviors. This type of research is important in order to better understand what factors influence the pathway to suicide to potentially reduce the occurrence of suicidal ideation, attempts, and fatalities as well as the devastating effects on loved ones and communities left behind.

If the questions included in this study may have caused you psychological distress, please contact one of the national hotlines listed below or contact your local mental health agency. If you are unsure of the resources available near you, use this search engine (<https://findtreatment.samhsa.gov/locator>) to find resources using your zip code.

If you have any questions or concerns about this study, then please contact the principal investigator, Julia Duran ([jkduran@mail.fhsu.edu](mailto:jkduran@mail.fhsu.edu)) and Dr. Janett Naylor-Tincknell ([jmnaylor@fhsu.edu](mailto:jmnaylor@fhsu.edu)). If you have general questions about research, please contact the Office of Scholarship and Sponsored Projects (OSSP) Fort Hays State University, 600 Park St., Hays, Kansas 67601, call (785) 628-4349, or email [irb@fhsu.edu](mailto:irb@fhsu.edu).

#### **Hotlines:**

Substance Abuse and Mental Health Services Administration National Helpline (SAMHSA English and Spanish) – 1-800-662-HELP (4357)

National Suicide Prevention Lifeline – 1-800-273-TALK (8255) or in Spanish 1-888-628-9454

Crisis Text Line – text “HELLO” to 741741

Rape, Sexual Assault, Abuse, and Incest National Network (RAINN) – 1-800-656-HOPE (4673)

National Domestic Violence Hotline – 1-800-799-7233

In case of emergency please call 911.

## Appendix J

### IRB Exempt Letter



**FORT HAYS STATE  
UNIVERSITY**

*Forward thinking. World ready.*

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OFFICE OF SCHOLARSHIP AND SPONSORED PROJECTS

DATE: February 11, 2021

TO: Julia Duran

FROM: Fort Hays State University IRB

STUDY TITLE: [1715106-1] Examining How Adverse Childhood Experiences and the Underlying Processes of Trait and State Impulsivity Influence Suicidal Behavior

IRB REFERENCE #: 21-0077

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF EXEMPT STATUS

DECISION DATE: February 11, 2021

Thank you for your submission of New Project materials for this research study. The Fort Hays State University IRB Administrator has determined that this project is EXEMPT FROM IRB REVIEW according to federal regulations.

Please note that any changes to this study may result in a change in exempt status. Any changes must be submitted to the IRB for review prior to implementation. In the event of a change, please follow the Instructions for Revisions at <http://www.fhsu.edu/academic/gradschl/irb/>.

The IRB administrator should be notified of adverse events or circumstances that meet the definition of unanticipated problems involving risks to subjects. See <http://www.hhs.gov/ohrp/policy/AdvEvtGuid.htm>.

We will put a copy of this correspondence on file in our office. Exempt studies are not subject to continuing review.

If you have any questions, please contact Leslie Paige at [IRB@fhsu.edu](mailto:IRB@fhsu.edu). Please include your project title and reference number in all correspondence with this committee.

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Thesis: Examining How Adverse Childhood Experiences and the Underlying Processes of Trait and State Impulsivity Influence Suicidal Behavior.

Author: Julia K. Duran

Signature: Julia K. Duran

Date: 5/3/2021