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Using a Novel Experimental Paradigm to Investigate Whether Individuals with Trauma Exposure are at an Increased Risk of Pleading Guilty Falsely

Jennifer M. Bartlett

Using a Novel Experimental Paradigm to Investigate Whether Individuals with Trauma Exposure are at an Increased Risk of Pleading Guilty Falsely

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JENNIFER M. BARTLETT

Montclair State University

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Dissertation Chair: Dr. Tina M. Zottoli

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of

Jennifer M. Bartlett

Candidate for the Degree:

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Certified by:

[redacted]

Dr. Scott Herness
Vice Provost for Research and
Dean of the Graduate School

8/16/22

Date:

Dissertation Committee:

[redacted]

Dr. Tina M. Zottoli
Dissertation Chair

[redacted]

Dr. Sarah Lowe

[redacted]

Dr. Tarika Daftary-Kapur

[redacted]

Dr. Jazmin Reyes Portillo

Abstract

Individuals with trauma histories are overrepresented in the criminal justice system. However, little is known about how trauma-exposed individuals engage with the legal process. Over 90% of U.S. criminal convictions are resolved by guilty plea and in recent years it has become clear that guilty pleas are a leading cause of wrongful conviction. This dissertation used a newly developed, computerized interactive environment to explore the impact of trauma history on the likelihood that an innocent person will plead guilty to a crime they did not commit. Individuals with trauma histories are more likely to be risk averse when facing potential losses, may have diminished sensitivity to rewards, and may overvalue outcomes that come sooner in time rather than later in time. Since the plea process pits the certain loss of a plea deal against the uncertain loss at trial and involves potential outcomes that can occur at different points in time, I hypothesized that those with trauma exposure might be at a higher risk to plead guilty when innocent relative to those without trauma exposure. While I did not find any significant effects of trauma exposure alone on plea decisions, these data suggest that those with more severe trauma symptoms may be more likely to falsely accept a plea deal and more willing to accept longer plea sentences (on average) relative to those with less severe symptoms. Implications for trauma-informed practice and policy are discussed.

Keywords: false guilty pleas, guilty plea decision making, trauma exposure

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Chapter 1: Introduction

The United States legal system was conceived as an adversarial trial system in which both the prosecutor and defense attorney publicly present their versions of an event, cross-examine each other's witnesses, and then have a neutral party (i.e., jury or a judge) render a decision on the facts of the case. As the number of cases became too burdensome for the system, the trial process was slowly replaced by the plea process in which defendants could privately settle their cases, usually in exchange for leniency (e.g., a reduction in sentence length) (Dervan, 2019; Fisher, 2003). Today, an estimated 95% of all criminal convictions are the result of a guilty plea (Devers, 2011). However, scholars have criticized the plea process, arguing that offers of leniency and the immediacy of the plea deal may compel defendants to plead guilty when innocent or when they may be better situated to pursue trial (Bibas, 2004; Gazal-Ayal & Tor, 2012). An additional criticism is that many of the procedural and constitutional protections afforded to defendants who go to trial have not been formally extended to those who plead guilty (Bibas, 2004; Redlich et al., 2017).

Some scholars have argued that plea bargaining has an "innocence problem," (Bordens, 1984; Edkins & Dervan, 2013) and the plea process itself is now considered a leading cause of wrongful conviction in the United States (Gazal-Ayal & Tor, 2012). Over the past 15 years, research on the potentially coercive nature of plea bargaining has emerged. Research in this area has identified case-, system-, and defendant-level characteristics associated with higher rates of plea acceptance (e.g., probability of conviction; Bartlett & Zottoli, 2020; pre-trial detention; Edkins & Dervan, 2018; Redlich et al., 2017; race, Edkins, 2011; Kutatladze, Andiloro, & Johnson, 2016; mental illness, Redlich et al., 2010) and scholars have begun to understand how these factors may combine in ways that undermine defendant autonomy.

To date, little attention has been given to how trauma exposure might affect plea decisions. Defendants with trauma exposure are overrepresented in the legal system (Ardino, 2012; Donley et al., 2012; Taylor et al., 2020), with one systematic review and meta-analysis concluding that the lifetime prevalence estimates of PTSD ranged from 4% to 32% in male prisoners and from 16% to 58% in female prisoners (Baranyi et al., 2018) compared to 5-10% in U.S. community samples (Breslau, 2002; Kessler et al., 1995). Moreover, persons with trauma exposure and PTSD tend to approach decisions involving risk and uncertainty differently from persons without trauma exposure (e.g., Jia et al., 2020; May & Wisco, 2020; Ruderman et al., 2016). These differences might affect how they engage in the plea process. For example, compared to those without histories of trauma, persons with trauma histories are more likely to be risk averse when facing potential losses (e.g., Ruderman et al., 2016); may have diminished sensitivity to rewards (e.g., May & Wisco, 2020); and may be more sensitive to time-delays such that they may be more likely to overvalue rewards that come sooner in time rather than later in time (e.g., Acheson et al., 2019). Since the plea process pits the certain loss of a plea deal against the uncertain loss at trial and involves potential outcomes that can occur at different points in time, it is reasonable to expect that those with trauma histories might be at a higher risk to plead guilty when innocent relative to those without.

Chapter 2: Literature Review

During the trial process, defendants are protected by several constitutional and procedural rights, whereas plea negotiations occur outside the view of the public and many of the rights that are inherent in the trial process have not been extended to the plea process (Bartlett & Zottoli, 2021). Critics of the plea process argue that the practice may lead to demographic disparities in case outcomes (Berdejó, 2018), give prosecutors too much power in adjudicatory processes (Miller, McDonald & Cramer, 1978) and undermine defendant autonomy (e.g., Caldwell, 2011). In contrast, proponents of the practice argue that it helps reduce the burden on an oversaturated court system and is necessary given the current volume of cases in the United States. These positions are not necessarily mutually exclusive. A reasonable policy goal is to maintain a high rate of true guilty pleas, while maintaining defendant autonomy and minimizing the likelihood that innocent defendants will plead guilty falsely (Zottoli et al., 2019).

The choice faced by an individual defendant is often a choice between a certain loss (i.e., plea sentence) and an uncertain outcome of potentially worse severity (i.e., sentence if convicted at trial), and the outcomes often entail some measurable delay (i.e., length of sentence until release) (Bartlett & Zottoli, 2021). As a simplified example, imagine a defendant who is facing 10 years in prison for an assault charge. Based on the evidence against them and their attorney's advice, they estimate their probability of conviction at trial to be approximately 50% (at chance). Now imagine that the prosecutor offers the defendant 4 years in prison in exchange for a guilty plea. This defendant has to weigh accepting the certain outcome of 4 years until freedom against the 50/50 gamble of it at trial. If acquitted at trial they are immediately free; if not, they will go to prison for 10 years (i.e., 10 years until freedom). Predicting what a defendant does in this case, and whether guilty and innocent defendants approach these decisions differently, have become

important research questions. However, this research is still relatively new and models for predicting plea decisions are still being explored.

Guilty Plea Decision – Making: Theoretical Framework

Expected Utility Theory and Shadow of the Trial

Until recently, psychologists who studied guilty plea decisions relied on a model developed by criminologists in the 1970s. This model, known as Shadow of the Trial (SOT), is based on expected utility theory (EUT), which predicts that humans operate as rational actors and will choose the action that will result in the highest expected utility. As similarly described and in Bartlett & Zottoli (2021), SOT predicts that the subjective value of a plea offer will depend on its distance (i.e., discount) from the expected value of trial (i.e., long-run, average trial sentence). The expected value of trial equals the probability of conviction multiplied by the potential sentence if convicted at trial. So, SOT predicts that, on average, risk-neutral defendants will accept some offer lower than the expected value of trial, reject offers higher than the expected value of trial, and be indifferent to offers equal to the expected value of trial. As an example, consider a risk-neutral defendant facing a 1-year sentence at trial and a 50% chance of losing. The expected value of trial for the defendant is 6 months (i.e., 50% of 1 year). This risk-neutral defendant should reject any deal for a penalty greater than 6 months, accept some offer below 6 months, and be indifferent to an offer equal to 6 months. Since SOT relegates all individual- and case- level differences to noise, the model predicts the expected value of the plea sentence to be at or below expected value of trial (assuming on average, defendants are risk neutral and rational actors).

For the most part, SOT has been sufficient for predicting long-run, average plea sentences (Bushway & Redlich, 2012), but there is substantial variability in the plea discounts

accepted by defendants that cannot be explained or predicted by the model (Bushway & Redlich, 2012; Smith, 1986). In recent years, especially as the problem of false guilty pleas has garnered more attention, researchers have shifted their attention to identifying and understanding these case-, defendant-, and system-level factors that affect plea outcomes. As noted earlier and in Bartlett and Zottoli (2021), this research has brought to light previously obscured policies and procedures (e.g., discovery practices; Turner & Redlich, 2016) and has identified a host of system-level (e.g., plea discount, Schneider & Zottoli, 2019; pre-trial detention, Edkins & Dervan, 2018; probability of conviction, Bartlett & Zottoli, 2021; Peterson et al., 2020) and defendant-level (e.g., juvenile status, Helm & Reyna, 2017; factual innocence, Tor et al., 2010) variables that influence guilty plea decision-making, including factors that might lead a defendant to feel coerced, potentially increasing the likelihood of guilty pleas for even innocent defendants. These data have prompted researchers to look beyond SOT for an explanation. Drawing on established theory from the fields of cognitive psychology and behavioral economics—such as Prospect Theory (Kahneman & Tversky, 1979) and Temporal Discounting Theory (Ainslie, 1975) –researchers have already begun to account for some of the case-level variance that SOT cannot explain.

Prospect Theory

According to Prospect Theory (Kahneman & Tversky, 1979), people tend to make different decisions when outcomes are framed as losses compared to when they are framed as gains, and they tend to overweight low probabilities and underweight high probabilities. Contrasting with Expected Utility-based models like SOT, which assumes that the function relating outcome magnitude and outcome probability is linear, Prospect Theory predicts that the rate of risk-seeking/risk averse behavior will shift with changes in outcome probability,

particularly at the tail ends of the probability range. Specifically, when decisions are framed as losses (as most, though not all, plea decisions are likely to be), Prospect Theory expects humans to be generally risk-seeking (trying to avoid any loss) at moderate to high outcome probabilities, and to be disproportionately so as the likelihood of loss gets increasingly high. However, at the very low end of the probability spectrum, risk-averse behavior arises (trying to preserve the smallest loss possible).

Prospect theory has been used to understand deviations from expected value of trial in the plea context. Recently, Bartlett and Zottoli (2021) showed that non-detained defendants facing potential incarceration (i.e., loss frame) required 'better deals' relative to the expected value of trial when probability of conviction was high and were willing to accept 'worse deals' relative to the expected value of trial when probability of conviction was low; that is, as predicted by Prospect Theory, the participants were more risk averse when probability of conviction was low. Specifically, in a series of three between-subject designs, Bartlett and Zottoli (2021) manipulated probability of conviction and potential trial sentence and measured longest acceptable plea offer (if any) that mock-guilty participants would be willing to accept. Across all three studies, participants *who accepted plea deals* wanted increasingly better plea deals (relative to the expected value of trial) as conviction probability increased and were willing to accept worse deals (relative to the expected value of trial) as conviction probability decreased. At the lowest probability range (0.05), individuals were willing to accept deals that were four times longer than what SOT would predict for the condition. In contrast, at the highest probability of conviction (0.9) the deviation from SOT was only about 40% of the expected value of trial[1].

[1] See Petersen et al., 2020 for a similar pattern of results among mock defendants and Bushway et al., 2014 also demonstrated similar results among a sample of defense attorneys.

Temporal Discounting Theory

Temporal discounting theory, sometimes referred to as Delayed Discounting, posits that humans tend to prefer rewards that come sooner in time over rewards that are more distant in time (Ainslie, 1975), and that rewards lose subjective value the further away they are in time (Ainslie & Haslam, 1992; Thaler 1981). For a future reward to maintain its subjective value, its magnitude must increase relative to its distance away in time. In the first experiment to separate the effects of plea discount from potential trial sentence, Schneider and Zottoli (2019) found that, given the same discount, guilty and innocent mock-defendants accepted plea offers more frequently when the potential trial sentence (PTS) was 5 years than when it was 25 years. This was contrary to prior thinking on the effects of potential trial sentence, but the authors speculated that participants needed larger discounts as PTS became larger, because given the same size discount, the reward (i.e., freedom) shifted further into the future and therefore lost subjective value. As an example, consider two defendants: Defendant A is facing 10 years, Defendant B is facing 5 years, and each receive a 50% plea discount, such that Defendant A is offered a plea deal of 5 years and Defendant B is offered a plea deal of 2.5 years. Defendant B's deal may be more desirable because freedom (the reward) is only 2.5 years away as opposed to 5 years away. Regardless that each defendant is receiving the same discount, the reward is more salient when it is closer in time.

Such an explanation is also reasonable for the Bartlett & Zottoli (2021) data: Consider a defendant who is facing a 10-year potential trial sentence. If they were facing a 90% probability of being convicted at trial, their expected value of trial would be equal to nine years, whereas, if they were facing a 5% probability of being convicted at trial, their expected value of trial would be six months. Assuming the same discount is given to each defendant, the distance to freedom

(relative to Expected Value) will be shorter for someone facing a lower conviction probability than a person facing a higher conviction probability. Therefore, delayed discounting may be an alternative, and potentially even stronger, explanation for the deviations from SOT obtained by Bartlett & Zottoli (2021)[2].

Guilty Plea Decision – Making: Individual Differences

Risk-aversion and future discounting have been shown to vary with certain individual difference variables such as race and age. For example, age has been robustly correlated with risk-seeking behaviors (e.g., Burnett et al., 2010; Paulsen et al., 2012), and the rates at which people discount future outcomes can be affected by personality characteristics (Myerson et al., 2017; Yeh et al., 2021), intellectual ability (Shamosh, 2008) and age (Green & Myerson, 1999; Green et al., 1996; Steinberg et al., 1999). Many of the individual difference variables (e.g., race, mental illness, age) that affect how individuals approach decisions under risk are also relevant to plea decision making; indeed, understanding how defendants from different groups may be differentially affected by justice system processes may serve to alleviate systematic bias and disparate outcomes. To date, several individual difference variables have been shown to moderate plea decisions, including race and ethnicity (Bartlett & Zottoli, 2021; Kutatladze, Andiloro, & Johnson, 2016), age (Redlich & Shteynberg, 2016), factual innocence (Tor et al., 2010), gender (Zimmerman & Hunter, 2017) and the presence of severe mental illness (Redlich et al., 2010).

[2] Fuzzy Trace Theory (FTT; Reyna, 1995) also provides a strong framework for understanding plea decisions (Helm & Reyna, 2017). Recent work by Zottoli and colleagues (2022) has successfully explained much of the existing research on the effects of potential trial sentences and probability of conviction through an FTT framework. For space considerations and since, to my knowledge, there is no explicit work on trauma and decision-making in the FTT literature, this work is not reviewed here.

In the Bartlett and Zottoli (2021) data discussed above, participants identifying as Hispanic or African American were more likely to accept plea offers and to agree to longer (worse) plea sentences than those who did not identify as Hispanic or African American, and this was true across multiple experiments suggesting it may reflect a group difference in risk-aversion. This is concerning given that there is research to suggest that compared to White defendants, members of those minority groups are at an increased risk to be offered plea sentences that are longer and include incarceration. For example, in a study that examined the impacts of race on plea offers and the types of plea offers being made in New York City, Kutateladze and colleagues (2014) found that black defendants and Latino defendants received sentences that included jail/prison time more often than other racial groups. Moreover, black defendants were less likely to receive a charge reduction as part of their plea offer; although these differences were associated with upstream factors such as the type of defense counsel (i.e., public versus private) which suggested the need to assess for quality legal representation among minority groups (Kutateladze et al., 2014). Additionally, Edkins (2011) surveyed defense attorneys across the United States and found that defense attorneys would recommend settling for a higher plea sentence for clients that were members of minority groups relative to their White clients. Taken together, the experimental, archival and survey data suggest that there are not only differences in how members of minority groups perceive the value of plea offers, but also that the kind of offers they receive may be different from those offered to their White counterparts.

Age and gender have also been associated with plea decisions. For example, researchers have found that adolescent participants were twice as likely to plead guilty when innocent relative to adults when presented with a hypothetical plea scenario and were less likely to weigh

long-term consequences when making plea decisions (Redlich & Shteynberg, 2016), and across field and experimental studies, adolescents as a group have been found to understand and appreciate less about the plea process than adults (Grisso et al., 2003;; Viljoen et al., 2005; Zottoli & Daftary-Kapur, 2019). Likewise, female defendants may be more inclined than their male counterparts to plead guilty (e.g., Redlich & Summers, 2012). This phenomenon might be partly explained by unique pressures on women to plead guilty (e.g., childcare and family responsibilities) (Jones, 2011), though the effect has also been found in lab experiments (e.g., Zimmerman & Hunter, 2018).

Of most relevance to the current investigation, both factual innocence (Bordens, 1984; Gregory et al., 1978; Redlich & Shteynberg, 2016; Schneider & Zottoli, 2019; Tor et al., 2010) and mental illness (Redlich et al., 2010) have also been identified as defendant-level characteristics that impact plea decisions. Given that my research question centers on whether persons with trauma histories and trauma symptoms are at an increased risk to plead guilty when innocent, the findings from the research on these variables will be discussed in detail in the following sections.

Innocence

Overall, factually innocent individuals are not inclined to falsely implicate themselves. Instead, research suggests that those who are innocent are more likely to resist accepting a plea deal and believe that their innocence will be transparent in the context of a trial. This tendency has been coined the “Innocence Effect” and can lead an innocent defendant to overestimate their odds of winning at trial (Gazal-Ayal & Tor, 2012). Despite an innocent defendant’s natural resistance to taking a plea deal, research has showed that given the right conditions, an innocent defendant can be compelled to plead guilty. In fact, according to the National Registry of

Exonerations, about 25% (N = 792) of the 3,178 U.S. exonerations documented since 1989, involved defendants that pleaded guilty (National Registry of Exonerations, n.d.)

The national registry data likely underestimate the true percentage of guilty pleas that are false, given that avenues for post-conviction relief are typically limited for those who plead guilty (e.g., those who accept a plea offer often waive their rights to appeal). Field data from a study that sampled youths and adults in New York City found that false plea rates were as high as 27% for the youth sample and as high as 19% for the adult sample (Zottoli et al., 2016). Similarly, in a sample of 193 adolescent male offenders who were convicted of felonies, 18.1% admitted to having entered a plea of guilty to their current, or a prior offense, despite being innocent (Malloy et al., 2014). Evidence from these field studies pointed to pressure from attorneys (Malloy, et al., 2014) and large sentence differentials (Zottoli et al., 2016) as potential contributors to self-reported false guilty pleas. Likewise, archival data has supported that high sentence differentials may be compelling enough to lead an innocent defendant to plead guilty; as an example, in an study that examined 466 exoneration cases between 1989 and 2011, Gazal-Ayal and Tor (2012) found that innocent defendants were willing to accept plea deals when probability of conviction at trial was high, when their sentence was substantially discounted, when faced with the death penalty, or if the defendant had confessed prior to plea negotiations (see also Kassin, Drizin, Grisso, Gudjonsson, Leo, & Redlich, 2010).

In laboratory studies that have included both guilty and innocent participants, people tended to plead guilty more often when offers included very high sentence differentials (Kim, 2014; Schneider & Zottoli, 2019; Ulmer & Bradley 2006), there was (or they perceived that there was) a substantial amount of evidence against them (Kassin et al., 2010), they were told (in a vignette) that they would be held on pre-trial detention (Edkins & Dervan, 2018), and/or they

had a high probability of conviction (Tor et al., 2010; Bartlett & Zottoli, 2021). Nevertheless, for somewhat obvious reasons it is difficult to study false guilty pleas in the laboratory –namely it is difficult to mimic the emotional pressures of the real-world plea negotiation, wherein one's liberty is at risk.

Most laboratory studies rely on vignette-based methodologies where participants are asked to imagine themselves in a hypothetical legal scenario (e.g., being caught with drugs) and are asked to make a decision to either pursue trial or accept a plea deal based on the information presented. Within these designs' researchers have manipulated a variety of psycholegal factors including, but not limited to, potential trial sentence (e.g., Bartlett & Zottoli, 2021; Schneider & Zottoli, 2019), guilt status (e.g., Edkins & Dervan, 2018; Tor et al., 2010; Zimmerman et al., 2018), pre-trial detention (Edkins & Dervan, 2018), collateral consequences (Edkins & Dervan, 2018) and probability of conviction (e.g., Bartlett & Zottoli, 2021; Peterson et al., 2020; Tor et al., 2010).

Critics have argued that vignette methodologies may underestimate plea rates because they cannot create the same emotional saliency for outcomes that defendants experience. To address these concerns, in recent years an alternative in-vivo deception paradigm was adapted from the confessions literature to study plea decisions (Edkins & Dervan, 2012). These designs, typically conducted with college students, ask the participant to complete a problem-solving type task in a controlled laboratory. Participants are randomly assigned to a control (innocent) condition and an experimental (guilty) condition in which they are placed in a situation that might lead them to violate a rule. In the guilty condition, participants are persuaded to cheat (in violation of instructions) by a student confederate; those who cheated were analyzed as factually guilty. Those in the innocent condition complete the task as instructed without temptation to

cheat. Therefore, participants in the study would be factually innocent or guilty of cheating depending on the condition that they were assigned and their actions. Then, regardless of their guilt status, the experimenter would return to the laboratory setting and accuse the participant of cheating on the basis of having an unusual pattern of incorrect answers in common with another participant. Options are then presented to the participants that simulate a plea bargaining, requiring the participant to weigh a real-life consequence and choose between two negative penalties of differing severity (e.g., having to choose between working in the lab for a designated period of time or face a possible charge of academic dishonesty; Wilford et al., 2020).

Although the designs are hardly directly comparable, traditional vignette research tends to produce lower false guilty plea rates than in-vivo deception methods. In studies that use vignette methodologies, innocent participants tended to falsely plead guilty around 20% of the time while guilty participants tended to plead guilty around 70-80% of the time (on average); however, certain conditions can cause the rates of false guilty pleas to fluctuate, such as the probability of conviction and the plea discount (see Bordens, 1984; Gregory et al., 1978; Redlich & Shteynberg, 2016; Schneider & Zottoli, 2019; Tor et al., 2010). In contrast, in vivo deception studies generally have yielded higher guilty plea rates than vignette studies, with an average plea rate of ~50% for innocent participants and 75-90% for guilty participants (Dervan & Edkins 2013; Wilford & Wells, 2017).

While in-vivo deception studies tend to have higher false guilty plea rates and the emotional pressure can be ratcheted up, traditional vignettes do allow researchers to manipulate some of the real-life consequences of the legal system (e.g., collateral consequences; pre-trial detainment). In contrast, with in-vivo deception studies, neither the adjudicative process nor the potential penalties are analogous to the real world. These lower stakes certainly raise important

questions as to whether *in-vivo* cheating paradigms inflate false plea rates. Cheating paradigms are also costly as they require higher participant compensation, are time consuming, and require large sample sizes to accommodate failures in successfully manipulating factual guilt. It is also difficult to maintain deception as more and more students participate from the same subject pool.

Thus, both deception studies and vignettes studies have their limitations, and, as a result, laboratory methods may not accurately capture real-world plea rates. To bridge the gap between in vivo and vignette methodologies, Wilford (2020) developed a novel computer simulation where individuals are able to design their own avatar and engage in an interactive scenario. In this scenario, the participants create an avatar of themselves and watch their avatar be charged with a crime. A judge explains their charges to them, they see the evidence against them, and are presented with a plea offer by the prosecutor. Preliminary evidence suggested that participants reported higher engagement throughout the study and reported higher levels of immersion for the simulation as compared to the same situations presented in vignette form (Wilford, 2020), though to date there is no evidence that has suggested that the scenario affects plea rates. I have elected to use this newly developed simulation software for this dissertation; details on the specific scenario I used are described in the Method section.

Mental Illness

There has only been one study, to my knowledge, that looks at the relationship between mental illness and guilty plea decisions. Redlich and colleagues (2010) recruited 1,249 persons who had criminal charges and were diagnosed with mental illness from jails and the court system across the United States, which resulted in six different data collection sites that spanned the entire country. The participants were then extensively interviewed and were asked about past confessions and guilty pleas. The data showed that those with severe mental illness had a self-

reported false guilty plea rate ranging from 27% to 41% across six different U.S. jails and courts (Redlich et al., 2010) and while this study did not include those without severe mental illness, prevalence rates in the known exoneree population (without accounting for the presence/absence of mental illness) appear to be lower. Data from the National Registry of Exonerations (n.d.) and the Innocence Project (n.d.) suggests that current false guilty plea rates are between 18-25% among known exonerees.

While this is the only study that has looked specifically at plea bargaining, there is plenty of research to suggest that those with mental illness are at risk for adverse criminal justice outcomes (e.g., lacking legal knowledge, waiving their Miranda rights). For example, one study by Viljoen and colleagues (2002) compared the legal competencies of defendants without a mental health diagnosis to the legal competencies of defendants with various diagnoses, including primary psychotic disorders, affective disorders, and substance abuse disorders. The researchers administered a variety of assessments to gain an understanding of the defendant's knowledge of their rights throughout the legal process and their competency of legal proceedings. They found some evidence to suggest that defendants with primary psychotic disorders understood less about their rights during interrogations, the process of legal proceedings, the possible consequences of their legal pathways, and their ability to communicate with their attorney (Viljoen, Roesch, & Zapf, 2002). In addition, there is some evidence that has suggested that those with a mental health diagnosis are more likely to confess falsely in the context of interrogations than those without mental health diagnoses (Drizin & Leo, 2003; Gross et al., 2005; Redlich, 2004). Surprisingly, however, there are very few empirical studies that have looked at the effects of trauma response or PTSD on legal decision making. This is surprising given the overrepresentation of persons with trauma histories in the criminal justice system.

According to data from the World Mental Health Survey that included over 71,083 participants over the age of 18, the lifetime prevalence of PTSD was 3.9% in the total sample and samples from the United States have found that the lifetime prevalence rate for PTSD hovers around 5–10% (Breslau, 2002; Kessler et al., 1995). However, these prevalence rates are much higher in offender populations with estimates in sentenced prisoners hovering around 20-30% (Butler, Levy, Dolan & Kaldor, 2003; Powell, Holt, & Fondacaro, 1997), with higher rates among female offenders (16% to 58%) relative to male offenders (4% to 32%) (Baranyi et al., 2018). Even higher prevalence rates have been reported in forensic mental health populations. For example, in a sample of forensic mental health patients, 64% of the sample reported exposure to at least one traumatic event and 56% met lifetime criteria for PTSD (Spitzer et al., 2001). Furthermore, when comparing the rate of trauma exposure alone among the forensic population and the general population, Stinson et al. (2016), found that 75.1% of the forensic inpatient sample reported at least one type of childhood maltreatment (e.g., physical abuse, emotional abuse, neglect), compared to 63.9% of the original community Adverse Childhood Experiences (ACE) survey sample (Felitti et al., 1998) and were more likely to experience more than one ACE compared to the original community ACE sample. This pattern of results has been replicated across a wide range of legal-system involved populations including female offenders (e.g., Karatzias et al., 2018), young offenders (e.g., Paton et al., 2009), violent offenders (e.g., Rivera & Spatz-Widom, 1990), and sexual offenders (e.g., Levenson & Socia, 2016; Levenson & Grady, 2016).

While research on plea decisions may be lacking, the impact of trauma has been discussed in the context of competency to stand trial – with research suggesting that certain trauma symptoms, such as dissociation, disturbed thought and emotional processes, and

flashbacks, may be significant barriers to competency. In fact, one study found that those who carried a nonpsychotic major diagnosis, which included those with PTSD, were more likely to be found incompetent to stand trial relative to those with no psychiatric diagnosis or those diagnosed with a psychotic disorder (Cooper & Zapf, 2003). Unfortunately, the negative impacts of trauma symptoms on the adjudicative process maybe overlooked (Owen et al., 2020). Seamone (2009) discussed how the failure of the courts to take PTSD into account might adversely affect defendants' decisions during the pre-trial phase and how there should be more consideration for how the symptoms of PTSD may interact with how legal information is being interpreted. Furthermore, Seamone (2009) argued that psychoeducation on the ways that PTSD may alter legal advice can help attorneys understand and appreciate the conditions that may exacerbate the effect of PTSD on decision making, and also help them recognize when a) a client might need a formal evaluation of whether their legal abilities are compromised by their symptoms or b) if the client would benefit from individual counseling services to help them weigh their legal options and challenge distorted thought content (Seamone, 2009). Likewise, there is a growing expectation that forensic psychologists use a trauma-informed approach in their evaluations (Javier et al., 2020).

This growing call for attention to the effects of trauma on the adjudicative process is scientifically warranted. Compared to persons without trauma exposure or trauma symptoms, those with trauma histories may be more risk averse when facing potential losses (e.g., Ruderman et al., 2016), may have diminished sensitivity to rewards (e.g., May & Wisco, 2020), and may be more sensitive to time-delays such that they may be more likely to overvalue outcomes that come sooner in time rather than later in time (e.g., Acheson et al., 2019). These differences may have serious implications for decision making in the legal process. Given that

most cases are resolved by guilty plea, understanding whether and how these differences affect plea decision making is essential.

Trauma and Decision Making

The *Diagnostic and Statistical Manual of Mental Health Disorders, Fifth Edition* (American Psychiatric Association, 2013) considers exposure to death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence either through direct exposure, witnessing the trauma, learning that a relative or close friend was exposed to a trauma, or indirect exposure to aversive details of the trauma usually in the course of professional duties (e.g., first responders, medics) as potentially traumatic events. Estimates of the prevalence of exposure to potentially traumatic events varies widely across studies, depending on the population examined and the measures used to assess trauma exposure (i.e., using a single question vs. a checklist of traumatic events) (Breslau et al., 1998; Monson et al., 2016). Using a very liberal definition of trauma exposure, with small percentages of these individuals later developing any kind of symptomatology, it is generally accepted that individuals will experience at least one traumatic life event with general population estimates hovering around 80% (Benjet et al., 2016; Kilpatrick et al., 2009; Mills et al.,2011).

The fields of clinical psychology & psychiatry have long recognized the effects that exposure to traumatic events can have on some individuals, including, but not limited to, the development of post-traumatic stress disorder (PTSD). As defined by the DSM-5, PTSD is characterized by living in fear of re-experiencing a traumatic event, and is often accompanied by nightmares, intrusive thoughts, and sensory flashbacks (American Psychiatric Association,

2013).[3] Those experiencing PTSD may re-experience sensations and emotions that occurred at the time of a traumatic experience, which may result in physiological responses such as heart palpitations, shallow breathing, and even pain responses(American Psychiatric Association, 2013). As a result, those with PTSD frequently avoid trauma-related stimuli and often engage in avoidance behaviors (e.g., escapism, self-isolation, substance abuse) to prevent aversive physiological responses. Those with PTSD may also experience hyperarousal, which occurs when a person's body abruptly goes into fight-or-flight mode as a result of trauma triggers (e.g., loud noises, seeing someone who resembles a perpetrator). Hyperarousal can lead to other symptoms such as insomnia, hypervigilance, irritability, increased tension, risk-taking behavior, and/or aggressive behavior (Ellis & Zaretsky, 2018). According to the DSM-5, to meet diagnostic criteria for PTSD, symptoms must persist for more than a month post-trauma exposure and be associated with personal distress and functional impairment defined by a decline in an individual's ability to function in their everyday lives associated with their mental condition (American Psychiatric Association, 2013).

Functional impairments in PTSD have been extensively studied and research has suggested that those with the diagnosis have impairments across cognitive and social domains, including but not limited to, difficulties with intimate relationships, forming friendships, parenting, performance at work or in school, financial issues, and maintaining housing (e.g., Rodriguez et al., 2012). Of particular interest to me for this investigation, are impacts on decision making; specifically, individuals with PTSD have been shown to differ from those without PTSD on measures of risk aversion (e.g., Ruderman et al., 2016), reward processing (e.g., May &

3 It is important to note that exposure to a traumatic event may not necessarily lead to PTSD. Factors such as coping skills, affect, and resiliency may moderate the relationship (Tsai et al., 2012; Williams et al., 2010).

Wisco, 2020), and delayed discounting (e.g., Engelmann et al., 2013). While a lot of this research has focused on individuals who meet all of the criteria for PTSD, there is also some evidence to suggest that those who meet Criterion A alone (i.e., having been exposed to a traumatic life event) may also differ from persons without trauma histories in some of these areas (i.e., risk aversion, reward processing, and delayed discounting).

Risk Aversion

Risk aversion is defined as a general preference for certain outcomes over those that are uncertain, whereas preference for uncertain over certain outcomes reflects risk-seeking behavior. There are a host of factors that have been shown to affect risk preference including individual differences (e.g., race and gender, Arano et al., 2010; personality traits, Filbeck et al., 2005), outcome probability (e.g., Prospect Theory; Kahneman & Tversky, 1979) and outcome magnitude (e.g., hyperbolic discounting; Bommier, 2005).

Humans tend to become risk averse when facing certain losses, a phenomenon known as loss aversion. Loss aversion is a cognitive bias that describes why the pain of losing something valuable is often more salient than the pleasure from gaining a reward of similar value. As noted earlier, when a pair of options are framed as losses humans tend to become risk-seeking, in an effort to avoid loss. However, humans are sensitive to framing such that if a set of options with the same expected value is presented in a gain frame versus a loss frame, humans are more likely to choose the option with the certain outcome (i.e., exhibit risk averse behavior).

This phenomenon, known as framing effects, was demonstrated most famously in the classic “Asian Disease Study” (Tversky and Kahneman, 1981). The “Asian disease problem” asks participants to imagine that the United States was preparing for the outbreak of an unusual Asian disease expected to kill 600 people. Participants were asked to decide between two

proposed interventions, presented across two trials, where the options were presented in either a gain frame or a loss frame (italicized text indicate the study authors' interpretation of the options, and were not seen by participants):

> Gain frame: If Program A is adopted, 200 people will be saved (*risk averse option)*. If Program B is adopted, there is a 1/3 probability that 600 people will be saved and a 2/3 probability that no one will be saved (*risk seeking option).*
>
> Loss frame: If Program C is adopted, 400 people will die *(risk averse option)*. If Program D is adopted, there is a 1/3 probability that nobody will die and a 2/3 probability that 600 people will die *(risk seeking option)*."

The results showed that, even though the expected values are identical in both the loss frame and the gain frame (i.e., 400 people will die), participants presented with the gain frame were more likely to accept the risk-averse option, whereas in the loss frame participants were more likely to choose the risk seeking option. Interestingly, the sole difference was that one of the options was described as the number of people that would be saved and the other was described as the number of people that would die (Tversky and Kahneman, 1981). The difference in choice between these two sets of options can be explained by a shift in risk preference induced by a change in frame from gain to loss.

This pattern of results has been replicated across decades of research, with one review paper finding that, 70-80% of respondents become risk seeking when choices are framed as losses (Choosing Program D) and become risk averse (Choosing Program A) when choices are framed as gains (Dawes, 1998). However, there has been evidence to suggest that certain personality traits, such as fearful disposition, may affect participant choices in the Asian Disease Problem and in other similar scenarios used to measure the construct of risk aversion (Lerner & Keltner (2001).

In their first series of studies, Lerner & Keltner (2001) hypothesized that fearful individuals would be more likely to select the risk-averse decision in the Asian Disease Problem across trials whereas angry and happy individuals would be more likely to select the risk-seeking decision across trials. To test this, they administered a series of self-report measures that assessed levels of dispositional fear, anger, and happiness and then measured performance on the Asian Disease Problem. The results supported their hypothesis that the more fearful individuals would select the risk-averse option more often than those who had higher levels of dispositional anger and happiness (Lerner & Keltner, 2001). As part of a subsequent set of studies, Lerner and Keltner (2001) explored whether fearful individuals would differ from angry or happy people in their expectations of experiencing positive and negative future events that could be classified as ambiguous (operationalized as uncontrollable /uncertain, like an earthquake) or unambiguous life events (operationalized as controllable/certain events, like brushing your teeth). When events were ambiguous, fearful individuals were much less likely to believe that they would experience positive life events relative to those who were happy and angry. When events were unambiguous, fearful and angry individuals were both less likely to believe they would experience positive life events relative to those who were happy (Lerner & Keltner, 2001). The authors concluded that individuals who have high levels of dispositional fear may be more likely to engage in risk-averse decision-making relative to persons who rate higher on dispositional happiness or anger, especially when outcomes were uncertain (Lerner & Keltner, 2001).

Given that those who experience trauma may be more likely to score higher on measures of dispositional fear due to having higher sensitivity to threats and difficulties extinguishing their fear response (Zoellner et al., 2014), it is perhaps unsurprising that studies have shown a similar relationship between trauma history and risk aversion. For example, in a study conducted by

Ruderman and colleagues (2016), the researchers compared decision making of combat veterans with PTSD to those without PTSD (i.e., those who were exposed to a traumatic life event but did not go on to develop PTSD, which I will refer to as "trauma controls" from this point forward). The researchers used a novel decision-making task that required participants to select between two gambling options on 320 trials that pitted a certain option against an ambiguous "gamble" option. Each trial varied in terms of frame (gain vs. loss), probability of success/failure, and magnitude of the potential reward. Their results suggested that participants with PTSD were significantly more likely to choose the sure bet compared to trauma controls, but only when their choice was associated with a potentially negative outcome (Ruderman et al., 2016). This result suggested to the authors that, relative to trauma controls, those with PTSD may have a specific sensitivity to ambiguous loss that may be associated with increased risk aversion (i.e., loss-dependent risk aversion).

Jia and colleagues (2020) opined that the differences in risk aversion between those with PTSD and trauma controls found in Ruderman et al., (2016) might be explained by differences in brain function. The researchers recorded fMRI in a sample of combat veterans who performed a monetary gambling task. Results showed reduced activity in the ventromedial prefrontal cortex (vmPFC)—an area known for aiding in valuation of rewards and punishments—in veterans with PTSD relative to trauma controls. Additionally, results from the gambling task indicated that those with higher PTSD symptoms were less likely to approach risky monetary gains (low probability wins) and were also less likely to approach ambiguous monetary losses (low probability losses) relative to those with lower PTSD symptoms (Jia et al., 2020). These results corroborated earlier findings that individuals with PTSD become risk averse when facing loss and that these effects are exacerbated when the outcomes are ambiguous (Ruderman et al.,

2016). It also adds to the literature, by highlighting a potential neuro-functional basis for the differences in behavior between participants with PTSD relative to trauma controls. Taken together, the results suggest that compared to trauma controls, persons with PTSD symptoms may be more risk averse when facing decisions that entail loss, and additionally may overestimate the likelihood of loss or underestimate their odds of success, rendering them generally more risk averse.

Reward Processing

Reward processing can be defined as the response to a rewarding stimulus, including the ability to learn from reward, anticipate future rewards, and engage in behaviors that increase the likelihood of receiving future rewards (Berridge and Robinson, 2003, Rizvi et al., 2016; Novick et al., 2018). Some research has suggested that those with PTSD experience decreased reward anticipation and decreased approach behaviors for potential rewards compared to those without PTSD (see Nawjin et al., 2015; Lokshina et al., 2021 for comprehensive reviews).

Nawjin et al. (2015) systematically reviewed 29 studies that compared reward processing between PTSD patients and both trauma-exposed controls and non-trauma-exposed controls. While the results were generally mixed, there were consistent associations between PTSD symptoms and lower reward expectancy and between PTSD symptoms and lower approach to potential rewards when compared to those without PTSD. Additionally, hedonic response to the receipt of reward was reduced in those with PTSD relative to those without PTSD.

Among the studies reviewed by Nawjin et al. (2015), Hopper et al., (2008) is worth reviewing in detail as it has recently been extended in ways that are of particular relevance to this dissertation. In this study, Hopper and colleagues (2008) compared participants with PTSD to trauma controls. The researchers used a computerized wheel-of-fortune type decision-making

task that included three different types of spinners: the bad spinner, the intermediate spinner, and the good spinner. For the ‘‘bad’’ spinner, two out of three outcomes included a loss with the third outcome being neutral (i.e., no monetary loss or gain); the ‘‘intermediate’’ spinner, included a potential win, a potential loss, and the neutral outcome; and for the ‘‘good’’ spinner, two of three possible outcomes were winning with the third outcome being neutral. For each trial, the participants were shown the spinner that was in-play and asked to provide their expected outcome. Next, the arrow would appear and spin until it stopped over one of the possible outcomes and the participants were asked to record their feelings in response (i.e., their outcome satisfaction). The results suggested that participants with PTSD (compared to trauma controls) had were less likely to expect rewards across all three spinners, had lower satisfaction when they did receive a reward across all three spinner types, and did not experience an increased hedonic response upon receipt of an unexpected reward[4].

May & Wisco (2020) sought to replicate and extend upon this research in a subsequent study using a similar wheel-of-fortune task. Like Hopper and colleagues (2008), these authors also compared results from those with PTSD to trauma controls. During each trial, the participant was provided with possible outcomes for the monetary amount they could possibly gain and lose. They were presented three good spinners, three bad spinners, and nine intermediate spinners across 15 trials. The good spinners had the potential for larger gains relative to intermediate and bad spinners, and intermediate spinners had the potential for larger gain relative to the bad spinners. They were told the result immediately after their spin. Similarly, to Hopper et al.

[4] In this context, an unexpected reward is defined as a positive outcome when the probability for such an outcome is known to the participant to be low. Outcomes that are both positive and unexpected typically result in an uptick in a pleasure/dopaminergic response (e.g., Walentowska et al, 2019), an effect that was not observed in this study for participants with PTSD.

(2008), the participants rated their expectations of reward before each spin and their satisfaction after each outcome.

The researchers were also interested in whether or not introducing a trauma prime (i.e., the participant was asked to provide details regarding a traumatic life event or a neutral life event, depending on the prime condition, to the examiner and then had to listen to it before engaging in the decision-making task) and if allowing the participant to choose whether to spin the wheel would change the pattern of the results. Therefore, they added two additional between-subject manipulations wherein they compared results of participants who heard a trauma prime with results from those who heard a neutral prime before completing the task; and they also added an additional decision-making task wherein participants could select whether or not to spin the wheel. Participants with PTSD expected to receive rewards significant less than trauma controls, but only for intermediate spinners and not for good and bad spinners. These results contradicted the findings from Hopper et al., (2008), who found decreased expectation of reward for those with PTSD regardless of spinner type. Also contrary to Hopper et al., (2008), May and Wisco (2020) did not find a significant difference for outcome satisfaction between those with PTSD and trauma controls. However, May and Wisco (2020) opined that these differences in the findings may be related to the dollar amounts provided in the monetary tasks (i.e., 50% lower than in Hopper et al., 2008) and that further research was required to understand these differences in the data. There was no effect of trauma prime across conditions on reward expectation for those with PTSD, but as further evidence of loss aversion among these participants (see Ruderman et al., 2016), when given the option to spin the spinners or not, those with PTSD spun the bad and intermediate spinners less than trauma controls.

In another study that explored reward processing in persons with PTSD, Dretsch et al. (2013) compared performance on the Iowa Gambling Task (IGT; Bechara et al., 1994) and a modified form of the task (variant version, vIGT; Bechara, Dolan, & Hindes, 2002) in a sample of soldiers with and without PTSD. The IGT is a task designed to assess emotion-based decision-making under conditions of uncertainty wherein making decisions that will result in a long-term net gain is dependent both on trial-by-error learning and a willingness to withstand short term loss in service of long-term gain (Bechara et al., 1994). Both the original IGT and vIGT have participants select 100 cards from four separate decks (each with a fixed schedule of monetary losses and gains) and ask the participants to attempt to maximize their net gains over the course of the task. The primary difference between the two tasks is that the win-loss payout schedules of the vIGT decks are opposite to the IGT, such that, for example, an advantageous deck that pays out smaller frequent wins and intermittent losses, would pay out larger frequent losses and intermittent wins. Using the two tasks together permits the researcher to differentiate among impairments that reflect hyper/hypo sensitivity to reward, hyper/hyposensitivity to punishment, or insensitivity to both.

When comparing those with PTSD to trauma controls, there were no significant group differences on the Iowa Gambling Task, but there was a significant difference in performance between the groups on the variant IGT (vIGT). Specifically, they found that on the vIGT task, those with PTSD had difficulties adjusting their behavior to attain delayed rewards after being presented with immediate punishments resulting in higher net losses, suggesting that those with PTSD relative to trauma controls, were hypersensitive to immediate punishments and hyposensitive to delayed rewards (Drestch et al., 2013).

Although these studies described to this point suggest that persons with PTSD are less likely to approach rewards and view them as pleasurable relative to trauma controls, the data do not permit any conclusions as to whether trauma exposure alone, without the emergence of PTSD, may impact reward processing relative to those without a history of trauma exposure. There are a handful of studies, however, that suggest this may in fact be the case. For example, Kasparek et al. (2020) studied the effects of early traumatic exposure on reward processing in a sample of children between the ages of 8 and 10. The children completed a monetary incentive delay (MID) task that depicted cartoon animal piñatas with somewhere between zero and four stars inside the piñata (Helfinstein et al., 2013). Across 132 trials, children had a limited amount of time to respond to a target in order to earn the stars inside the piñata. As described by the authors (Kasparek et al. 2020), each trial had three stages which were defined as the anticipation stage, response stage, and feedback stage. In the anticipation stage, children saw a cue indicating the number of stars within the piñata for that trial. In the response stage, the piñata appeared on the screen and the children hit the piñata in an attempt to earn as many stars as possible. In the outcome stage, children received feedback indicating whether or not their response was fast enough (i.e., earned enough stars) to receive the monetary reward. The researchers found that children with a history of trauma were less motivated to approach potential rewards and, as a result, received fewer stars across tasks relative to those without trauma exposure (Kasparek et al., 2020), corroborating earlier findings from Hanson et al., (2017) and Guyer (2006).

Similar effects have been observed in adults on a different reward-processing task. Ousdal and colleagues (2018) explored the effect of trauma exposure on reward processing using a computerized trial-by-error go/no-go task (Guitart-Masip et al., 2012), where each trial began by showing a picture of a geometric shape which indicated one of four conditions: Go to win, go

to avoid punishment, no-go to win, and no-go to avoid punishment. After seeing the image, participants had to learn whether to press (or not press) a button to obtain a reward or avoid losing money. Compared to those without trauma exposure, trauma-exposed participants learned (and preformed similarly to controls) in go to win trials and no-go to avoid punishment trials, showcasing that learning took place for both groups when rewards were associated with approach behaviors and punishments were associated with avoidance behaviors. However, trauma-exposed participants (relative to controls) tended to unsuccessfully avoid loss in go-to avoid punishment trials and no-go to win trials, showcasing that those with trauma exposure may have tendency to rigidly associate behavioral approach with receipt of reward and behavioral avoidance with the avoidance of punishment (known as a "Pavlovian Bias") which led to greater losses on the go to avoid punishment trials and no-go to win trials (Ousdal et al., 2018).

Taken together, these results suggest that those with PTSD are less likely both to approach rewards and to perceive rewards as "pleasurable" compared to trauma controls (Hopper et al., 2008; Nawjin et al., 2015). Some of these effects have also been observed in individuals with trauma exposure alone relative to those without trauma exposure (Kasparak et al., 2018; Ousdal et al., 2018). Moreover, as seen in Drestch et al. (2013), there is also some evidence to suggest that those with PTSD relative to trauma controls may be disproportionately affected by immediate punishments.

Delay Discounting

Finally, there is research to suggest that persons who have experienced trauma may have an enhanced response to outcome temporality. Specifically, persons with trauma histories tend to show steeper discounting on delay discounting tasks than those who have not experienced a trauma; that is, they are more likely to prefer smaller rewards that are offered sooner in time

rather than larger rewards offered later in time (Acheson et al., 2019; Imas et al., 2015; Li et al., 2012; Simmen-Janevska et al., 2015). This preference for immediate rewards, relative to those without trauma histories, has been observed in a wide class of trauma-exposed samples, including but not limited to, those who were exposed to early childhood aversity (Acheson et al., 2019; Simmen-Janevska et al., 2015), traumatic violence (Imas et al., 2015), and earthquakes (Li et al., 2012).

To highlight one study, Van den Berk-Clark and colleagues (2018) explored how those with trauma exposure assessed delayed rewards and payments in a sample of low-income, urban, African Americans. Participants engaged in three decision making tasks that assessed how individuals would value various monetary rewards and payments across different probabilities and time delays. For each of the decision-making tasks, participants made choices at each of six delays (2 weeks, 1 month, 6 months, 1 year, 3 years, or 5 years) or probabilities (95, 80, 60, 40, 20, or 5% chance) totaling six trials. Their findings suggested that those who had trauma exposure compared to those without trauma exposure discounted preferred more immediate outcomes as opposed to delayed outcomes (though these effects were dependent on gender) – meaning that, delayed rewards and delayed payments carried less subjective value for specifically males with trauma histories regardless if it was framed as a loss or a gain.

Indeed, this tendency to prefer immediate awards may underlie some of the differences between trauma exposed and non-trauma exposed groups in the risk aversion and reward processing studies previously discussed. For instance, Engelmann and colleagues (2013) compared the performance of patients with major depressive disorder (MDD) or comorbid PTSD and MDD to healthy controls on two decision making tasks, one that assessed decisions under risky outcomes and the other that assessed delayed outcomes. Results suggested that those with

comorbid PTSD+MDD were more willing to accept an immediate loss to avoid a larger one later on. They were also more willing to accept an immediate gain instead of waiting for a delayed larger gain relative to those without a diagnosis, which is consistent with the above research on reward processing and, therefore, may be related to lower reward expectation, satisfaction regarding rewards, and a higher preference for immediate outcomes (Drestch et al., 2013; Hopper et al., 2008).

Taken together, the research on risk aversion, reward processing, and temporal discounting has suggested that those with trauma histories tend to be more risk-averse and less reward-seeking than those without such histories, suggesting they will prefer certain outcomes of lesser value to an uncertain outcome of potentially greater value. In addition, they tend to be steeper future discounters, preferring immediate certain rewards to delayed certain rewards of greater value. Given that guilty plea decisions very often pit a certain loss (i.e., the plea sentence) against a potential outcome (i.e., the sentence if found guilty at trial or freedom), it stands up to reason that defendants with trauma histories may approach plea decisions differently from those without such histories. Despite the over-representation of trauma-exposed individuals in the criminal justice system and the concerns regarding how this population may interpret legal information (e.g., Seamone, 2009), to date, no one has studied plea decision making in this population. Such research is long overdue, especially given the high rate of exonerations in the United States that have involved defendants who falsely pleaded guilty.

Current Study

This dissertation was the first, to my knowledge, that studied the effect of trauma history on plea decisions. Specifically, I compared differences in the guilty plea decisions of participants with trauma histories and participants without trauma histories, using a computerized interactive

plea simulation developed by Wilford (2020). In the simulation, participants took on the role of an innocent defendant who was detained in a holding cell while awaiting trial. They were facing 12 months in jail if convicted at trial, but could plead guilty in exchange for a 4-month sentence. The primary outcome variable was acceptance of the plea offer. In addition, all participants were asked to indicate the maximum (longest) sentence to which they would plead guilty, if any.

Since this is the first investigation of its kind, this dissertation should be considered exploratory. Nevertheless, given the research suggesting that, compared to others, people with trauma histories are more risk averse when facing ambiguous losses (e.g., Ruderman et al., 2016), tend to show an exaggerated preference for immediate rewards (e.g., Acheson et al., 2019; Van den Berk-Clark et al., 2020), and may be less likely to expect positive outcomes in ambiguous circumstances (e.g., Hopper et al, 2008), I designed the study to permit testing of the following three hypotheses:

1. Participants with trauma histories will plead guilty at a higher rate than those without a trauma history.
2. Among participants who are willing to plead guilty, those with a prior history of trauma will indicate a willingness to accept offers for longer sentences than those without a trauma history.
3. The relationship between trauma history and plea outcomes will be explained, at least in part by differences in risk aversion and delayed discounting, such that unique trauma exposures would lead to increased risk aversion and steeper future discounting, and increased risk aversion and steeper future discounting would be associated with higher plea acceptance rates and longer maximum acceptable plea sentences. Each mediator was tested separately due to the sample size.

In addition to testing these explicit hypotheses, I explored the relationships among a number of other potential variables (e.g., trauma symptom severity) on plea decisions. Finally, I explored all of these relations in the subsample of trauma-exposed individuals, comparing those with suspected PTSD to trauma controls.

Chapter 3: Methodology

Participants

1,000 U.S.-based participants were recruited from Amazon Mechanical Turk (MTurk; Litman et al., 2017), using the MTurk Toolkit provided by Cloud Research Inc. (Prime Research Solutions, 2018). Participants of age 18 or older were required to provide informed consent through the online survey. The procedures used in this study met the APA ethical guidelines for the treatment of human subjects and were approved by the IRB of Montclair State University (IRB-FY20-21-2062). I compensated participants with $4 through Amazon MTurk. The median salary of MTurkers is $2/hour (Hara, et al., 2018); our tasks were designed to be completed in less than 45 minutes.

Participants were excluded from data analysis if they failed any one of two attention checks (N = 126). Additionally, some of the participants refreshed the survey which resulted in the survey starting over, if they restarted the survey and provided a different response than their original attempt, they were considered an "inconsistent responder" and their data was removed as I was unable to determine their "true" response (N = 7). The final sample comprised of 867 participants who ranged in age from 18 to 77, with a mean of 39.81 years (SD = 13.15). The sample comprised of 346 males (39.9%), 507 females (58.5%), and 8 who identified as gender non-specific (0.9%). In terms of race, 76.9% of the sample identified as White, 12.8% identified as Black/African American, 7.5% identified as Asian, 2% as American Indian or Alaskan Native, 0.1% as Native Hawaiian or Pacific Islander, and 2.5% as Other/Prefer Not to Say. In terms of ethnicity, 7.8% identified as ethnically Hispanic. Lastly, 16.6% of the sample stated that they had previous legal encounters.

Study Variables

Independent Variables

Trauma Exposure. To assess for the presence of life-time trauma exposure, I used the 19 listed *unique* traumatic life events from the Traumatic Life Event Screener (TLE) developed by Breslau and colleagues (1998). These unique traumatic life events could be further categorized into four different groups based on trauma type: assaultive violence, other injury or shocking experience, learning about trauma to a loved one, and sudden unexpected death of a loved one. I used the number of unique traumatic events reported on the TLE as the primary independent variable. I decided to use the number of unique traumatic events as previous research that has focused on trauma has focused on a single type of traumatic event (e.g., exposure to an earthquake or being in combat) or has looked at trauma categories (e.g., research on ACEs).

I also created two different three-level categorical variables for number of reported unique traumatic exposures. The first was operationalized as no trauma exposure; low frequency exposures (1 to 3 unique traumatic exposures); and higher frequency exposures (four or more unique traumatic exposures). The second was operationalized as no traumatic exposures, one unique traumatic exposure, and two or more instances of unique traumatic exposure. The second of these variables reflected the most natural three way split among participants.

PCL-5_Symptom Severity and Probable PTSD Measure. I used the PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013), a 20-item self-report measure of symptoms of PTSD established by the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychological Association [APA], 2013), to assess the presence and severity of PTSD symptoms. This measure assesses the various criteria for PTSD: criteria B (reexperiencing, disassociation), C (avoidance and emotional numbing), D (negative alterations in cognitions or

mood), and Criterion E (increased arousal). Participants rated each symptom on a five-point scale indicating the degree to which they have been affected by that symptom from 1 (Not at all) to 5 (Extremely) over the past month. All items were coded and summed together in order to generate a continuous variable for symptom severity. I also used the PCL-5 to determine the presence/absence of probable PTSD. Based on the published psychometric data for the PCL-5, I used a cutoff score of at 33 and above for the presence/absence of probable PTSD (Blevins et al., 2015; Bovin et al., 2016).

Potential Mediating Variables

Risk Aversion. Risk aversion as defined above (i.e., a higher preference for economic certainty versus uncertainty) is a difficult construct to measure cleanly. Most well-known, standardized assessments either include temporal components (e.g., delay discounting tasks), which I have included as a measure (discussed below), or measure risk-seeking behavior. While it is reasonable to assume that risk seeking behavior would be generally lower among persons who are risk averse, existing measures of risk seeking behaviors tend to ask questions about varied sexual experiences, thrill seeking, and preferences for unpredictable friends—constructs that overlap considerably with impulsivity and novelty seeking, as opposed to the preference for economic certainty that I am interested in here. To address these potential complexities in measuring risk aversion, I used two measures: the General Risk Question from the German Socio-Economic Panel (SOEP; Wagner, 1993) and Zuckerman Sensation Seeking Scale (SSS-V; Zuckerman et al., 1978). The SOEP has not been widely used but is simple in its application and shows promise in predicting actual risk preferences as opposed to differences in novelty-seeking/impulsivity (Doheman et al., 2011). The SSS-V is a standardized measure and reported widely in decision-making literature.

SOEP_General Risk Question. The German Socio-Economic Panel (SOEP; Wagner, 1993), was a large-scale survey that measured the risk attitudes of more than 22,000 individuals living in Germany. The SOEP utilized multiple approaches in order to capture the construct of risk attitudes, with one of those approaches being asking participants a simple question regarding their willingness to take risks, which became known as the General Risk Question, or GRQ (Dohmen et al., 2011). Specifically, participants were asked "How willing are you to take risks, in general?" Then, participants rate their willingness on a scale from 0 to 10. Researchers have studied the stand-alone predictive utility of the General Risk Question and have found that it is a reliable and valid predictor of risk-taking behavior, such that those who indicated they would be more willing to take risks on the GRQ were also more likely to take risks when engaging in a lottery experiment, even after controlling for gender, age, height, and parental background (Dohmen et al., 2011).

SSS-V_Sensation seeking scale. The Zuckerman Sensation Seeking Scale (SSS-V; Zuckerman et al., 1978), is a 40-item self-report measure that measures risk seeking behavior by forcing individuals to choose between two options, one that reflects greater sensation seeking (e.g., wanting to gamble or fly a plane) and the other that reflects lower sensation seeking (e.g., not wanting to gamble or fly a plane). The SSS-V can be scored on a continuous scale from zero to 40 to form an overall total score, wherein higher numbers reflect higher levels of sensation seeking and lower numbers reflect lower levels of sensation seeking. It can also be separated into four separate scales: Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility. For the purposes of this study, I used the total score to gain an understanding of risk seeking behavior and how that may impact guilty plea decision making.

The SSS-V was shown to have adequate internal consistency (a = 0.83 to 0.86) for the total score, but the four subscales had moderate internal consistency (a = 0.6 to 0.8), these results were consistent for both males and females and for both English and American samples (Zuckerman, 1978). The measure also had both convergent and divergent validity with the NEO Personality Inventory, generating moderate correlations for the total score and weak to moderate correlations for the subscales (Aluja et al, 2003). Importantly, The SSS-V has shown to be predictive of a variety of risk seeking behaviors, such as sex risk taking and risky driving (Jonah, 1997).

Delayed Discounting. I measured delayed discounting using the 27-item Monetary-Choice Questionnaire (MCQ;Kirby & Petry, 2004). For each item, participants chose between an amount of money available today and an amount available at a later time (i.e., "Would you prefer $54 today or 55 in 117 days?"). Each choice is associated with a discounting score, which is a value of how much of an increase in value is needed for the person to be willing to wait the specified time for the future award. The decision between the choice pairs will be used to compute a hyperbolic discounting parameter (k) for each participant, which was automatically calculated using the Kaplan et al. (2016) automated scoring system. Values of "k" typically fall between 0.0 and 0.5, with smaller values indicating a preference for delayed rewards (i.e., weaker discounting) and higher values indicating a preference for immediate rewards (i.e., stronger/steeper discounting).

The MCQ has demonstrated adequate test-retest reliability and criterion validity (Hamilton et al., 2015). For example, as summarized by Hamilton and colleagues (2015), the MCQ has shown adequate test-retest reliability (r =.71) across a period of one year (Kirby, 2009)

and persons who have a preference for immediate rewards on the task tend to engage in more impulsive behaviors, such as drug use (Audrain-McGovern et al., 2009; MacKillop et al., 2011).

Dependent Variables

Plea Offer Acceptance. All participants were placed in a computerized simulation (described in detail below) wherein they were charged with a crime and faced with a choice between pleading guilty and going to jail for four months or going to trial where if they were found guilty, they would go to jail for 12 months. Participants made a dichotomous choice to accept or reject the plea offer, and this response was used as the primary dependent variable.

Willingness to Plead Guilty and Maximum Acceptable Plea Sentence. Participants who rejected their plea offers were asked, "Do you think you might have pleaded guilty if you had received a better offer?" and were asked for the maximum sentence to which they would plead guilty. All participants who provided a deal above zero were classified as "willing to plead guilty", likewise, if they indicated a value of zero on the scale they were classified as plea rejecters.

Participants who accepted the initial plea offer were given the following prompt and question: "We are interested in knowing the maximum amount of prison time you would have agreed to. Do you think you would have taken a plea deal that involved a longer sentence?" and were asked for the maximum sentence to which they would plead guilty. Thus, for all participants who were classified as willing to plead guilty I recorded the maximum sentence to which they would be willing to plead.

The Plea Simulation and Online Survey

The plea simulation software used in this dissertation was developed by Wilford (2020). According to preliminary analyses, use of these simulations in laboratory settings increased immersion in the hypothetical scenarios, as well as participant engagement (Wilford, 2020).

The Simulation

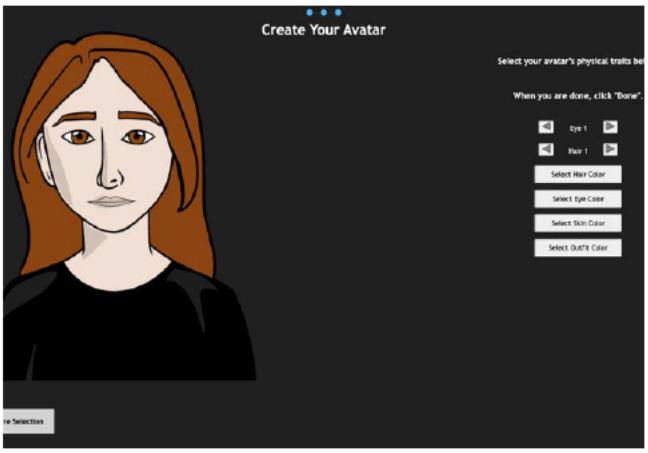
As originally described by Wilford (2020), the simulation began by allowing the participant to construct an avatar that resembled their physical characteristics (e.g., their hair color, skin color). Once their avatar was completed, the simulation showed their avatar walking through a mall, arriving at a sunglasses store, asking the clerk for a pair behind the counter, and walking towards a mirror. Their avatar then received a series of texts, leading them to lift the sunglasses to the top of their heads to read the messages. The text messages were from friend who were in a move theater wondering where the participant was, as the movie was about to start. Their participant's avatar then glanced back at the store clerk before the scene fades. Additional text appeared to convey that two weeks have passed before a court summons arrived.

Then, the simulation transitioned to a courtroom where the participant was appeared before a judge. The judge described a police report received and provided a description of the case (i.e., the charge, defining the crime, and the scene of the crime). Then, the prosecutor presented video evidence of the crime to the judge. The video showed their avatar walking toward a mirror, pausing, and then walking toward the exit with the missing sunglasses. Importantly, the creators of the vignette created ambiguity as to whether or not the avatar actually left with the sunglasses in the video footage. The judge then described how the crime fits the requirements of theft and explained that this is a serious misdemeanor offense. The prosecutor then requested a court date and the judge read the avatar their rights. The judge then instructed the avatar to wait until counsel

can be assigned to the case. Then, their avatar appeared in a holding cell where they are shown recalling the events on the day of the incident.

This recall showed them to be innocent. Specifically, the avatar was shown looking toward the salesclerk after receiving multiple text messages from friends, with the sunglasses resting atop their head. Upon seeing the salesclerk engaged in conversation with a different customer, the avatar removed the sunglasses and set them on a counter immediately before exiting (which was not seen in the security footage). The recollection then concluded, and the simulation returned to their avatar in the holding cell. The simulation then transitioned to the prosecutor who appeared in a meeting room. The prosecutor introduced himself and stated that he was working on scheduling a court date, but that he would like to avoid a trial. He stated that he is confident he could get a conviction at trial based on the security camera footage. He then stated that if the participant-avatar is not willing to plead guilty, he would recommend a minimum penalty of 12 months in jail. The prosecutor offered the participant-avatar a plea deal of 4 months. Once the deal was presented, the prosecutor left, and the participant was asked to make a decision to accept or reject the offer. See Figure 1 for screenshots of the simulation.

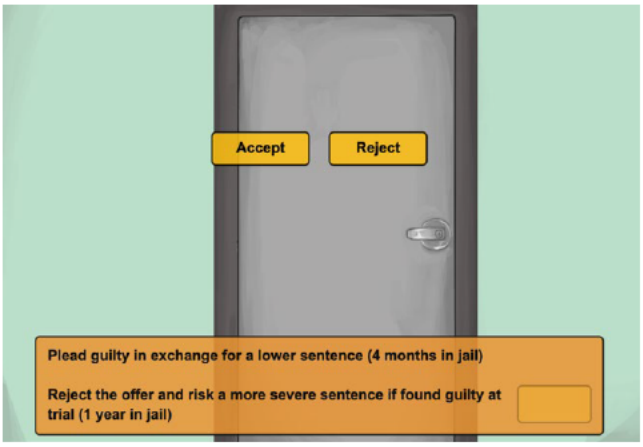
Figure 1: Plea Simulation Screenshots



Avatar Customization Menu

The judge describing the facts of the case

The prosecutor preparing to offer a plea deal



Here, the defendant chooses whether to accept or reject the plea offer

Procedure

After clicking the link to the survey, participants were informed that they will be playing an innocent defendant in a mock plea scenario and were asked for their consent. Following consent, they provided demographics information. Then, the participants were directed either to

the battery of questionnaires related to trauma history, discounting, and risk preference or to the plea simulation; the order of presentation between the battery of questionnaires and the simulation was counterbalanced to mitigate order effects. I also randomized the order of the battery of questionnaires related to trauma history, discounting, and risk preference to similarly prevent order effects.

If they were directed to the battery of questionnaires first, they would complete these randomized questionnaires then be routed to the plea simulation. After rendering a decision in the plea simulation participants were routed back to the Qualtrics platform where they responded to two manipulation/attention checks (i.e., "how many years were you facing at trial?" and "were you guilty or innocent of the crime?"). Then, as described above, all participants were asked to indicate the maximum plea offer they would be willing to accept (if any).

If they were directed to the simulation first, then they completed the randomized battery of questionnaires related to trauma history, discounting, and risk preference after answering all questions related to their plea decision. After completing the study, participants received a code that they could enter on MTurk to receive compensation.

Planned Data Analysis

Preliminary Analyses and Data Checks

All analyses were conducted with SPSS 25.0 (IBM Corp., 2017). Preliminary analyses included checks for missing data, tests of associations among demographic variables and outcome variables, as well as checks that demographic variables were balanced across experimental conditions, and tests that assumptions underlying statistical tests were met. I used a logistic regression model to test the effect of unique trauma exposures on plea acceptance (Hypothesis 1), and an Analysis of Variance (ANOVA) to test the effect of unique trauma exposures on the longest

acceptable plea sentence (Hypothesis 2). For both of these analyses, unique trauma exposures had three levels as defined by scores on the TLE (no history of trauma; 1-3 traumatic experiences, 4 or more; 0,1 traumatic experience ,2+ traumatic experiences). Additional post-hoc and other exploratory analyses will be reported below. I planned to use SPSS PROCESS (Hayes, 2012), simple mediation model #4, to test whether effects of unique trauma exposures on plea decisions were mediated by the risk aversion or delayed discounting measures (Hypothesis 3). However, as reported below, there were no associations between the independent variables and the hypothesized mediators, so these analyses were not conducted.

Logistic Regression Models

Logistic regression models assume that the dependent variable is dichotomous, the categories of the dependent variable are mutually exclusive and exhaustive, there are at least 15 cases per predictor and observations are independent. Each of these conditions were met by the study design. In addition, there must be a linear relationship between continuous independent variables and the logit transformation of the dependent variable, no significant outliers and minimal collinearity among predictors.

I used the Box-Tidwell procedure (Box & Tidwell, 1962) to test for linear relationships between continuous independent variables and the logit of the dependent variable (e.g., Hosmer & Lemeshow, 1989; Menard, 2002, 2010). This assumption was met for all logistic models that used a continuous predictor. In logistic regression, a set of observations whose values produce extremely large residuals are considered outliers. In accordance with standard practice, I defined cases with residuals that were above/below three standard deviations of the mean as outliers. No outliers were identified for any logistic model. Finally, given that I had only one independent variable, there was no concern regarding multicollinearity.

Analyses of Variance

ANOVA models require a continuous dependent variable, categorical predictors and independence of observations. Again, each of these assumptions were met by the study design. In addition, ANOVA assumes homogeneity of variance and that residuals should be approximately normally distributed with no significant outliers. Outliers were identified initially with boxplots and confirmed with studentized residuals that exceeded three standard deviations above the mean. Normality was checked using the Shapiro-Wilk test (Shapiro & Wilk, 1965) and Levene's test (Levene, 1960) was used to check for equality of variances. Data generally violated the assumption of normality, but deviations were mild, and no adjustments were made to models. I noted in text any adjustments made to the reporting of results for cases where equal variances could not be assumed.

Chapter 4: Results

Demographic Checks

Perhaps unsurprisingly (e.g., gender, Tolin et al., 2006; Inslight et al., 2013; Olff et al., 2017; legal backgrounds, Baranyi et al., 2018; Brink, et al., 2001; Butler, et al., 2003; Goff et al., 2007; Powell, et al., 1997; age, Burnett et al., 2010; Paulsen et al., 2012), demographic variables were associated with trauma exposure variables[5] and with the potential mediators. Specifically, participants who identified as female were more likely than those who identified as male to report both a lifetime history of traumatic exposure and more unique types of exposures. Those who identified as female were also more likely to report more severe trauma symptoms and were more likely to meet criteria for probable PTSD than those who identified as male. Females also scored lower on the SSS-V and GRQ than males. Among those who experienced trauma, older participants were more likely than younger to have experienced a lifetime traumatic event; they also reported fewer trauma symptoms and were less likely to meet criteria for probable PTSD relative to those who were older. In addition, age was negatively correlated with scores on the SSS-V, GRQ, and MCQ. Finally, those with previous legal encounters were less likely than those without prior encounters to report a lifetime history of traumatic exposure, but of those who did experience trauma, persons with a legal history reported more unique types of traumatic exposures; those with prior legal encounters reported more severe trauma symptoms and were more likely to meet criteria for probable PTSD on the PCL-5 relative to those without legal encounters; they also tended to have higher scores on the SSS-V. Previous legal encounters were also associated with

[5] Patterns of associations between demographic variables and trauma exposure variables were generally consistent across all operational definitions (i.e., categorical and count).

two of the dependent variables (plea acceptance in the simulation and the longest acceptable plea sentence).

With the exception of previous legal encounters, there were no associations among the demographic variables and the primary dependent variables, precluding concern that demographic variables might confound relationships between the trauma exposure variables and the dependent variables. As such, I did not include age or gender in models that tested hypotheses 1 and 2. In contrast, since prior legal encounters was associated with two of the primary dependent variables, I controlled for prior legal encounters in analyses examining the relationship between trauma exposure and these dependent variables. Where relevant, I also included demographic variables in models that included potential mediators; unless otherwise noted, the pattern of results was generally unchanged by the inclusion of demographic variables.

Hypothesis 1: Number of Unique Traumatic Exposures Will Affect the Decision to Plead Guilty

Within the computerized scenario, all participants were told that they faced a jail sentence of one year if they were convicted at trial and were offered a sentence of four months in exchange for pleading guilty. Just over 20% ($N = 174$) of participants accepted the plea offer, though contrary to my hypothesis, the number of unique traumatic exposures was not associated with offer acceptance. Participants who accepted the offer reported an average of 1.82 (mode =1.00) unique traumatic exposures across the life span compared to 2.07 (mode = 1.00) for those who did not accept the offer. Accordingly, a logistic regression model with number of unique traumatic exposures entered as a predictor and plea acceptance as the dependent variable was not a good fit to the data, Model $\chi^2(1, N = 867) = 2.55$, $p = .110$, Negelkerke $R^2 = .005$. Utilizing categorical operationalizations of unique traumatic exposures variable did not improve model fit, whether coded 0,1,2+ exposures, Model $\chi^2(2, N = 867) = 1.29$, $p = .256$, Negelkerke $R^2 = .002$, or as 0, 1-

3, 4+ exposures, Model $\chi^2(2, N = 867) = 2.49$, $p = .115$, Negelkerke $R^2 = .005$. The effect of unique traumatic exposures remained insignificant when controlling for legal encounters, whether unique traumatic exposure was coded as 0,1,2+ exposures, $p = .456$, Exp$(\beta) = .918$, or as 0, 1-3, 4+ exposures, $p = .238$, $Exp(\beta) = .841$.

Willingness to Plead Guilty

Participants who rejected the offer were asked if they would plead guilty if they received a better offer. Those who indicated a value greater than zero were categorized, along with those who accepted the offer, as willing to plead.

In contrast to the relatively small number (i.e., about 20%) that accepted the explicit offer, in total, 60.7% (n = 526) of participants were willing to plead guilty falsely for some amount of jail time. Again, however, unique traumatic exposure was not associated with willingness to plead. Participants who said they were willing to plead guilty reported an average of 1.94 (mode = 1.00) unique traumatic exposures across the life span compared to 2.14 (mode = 1.00) for those who said they would not plead. A logistic regression model with number of unique traumatic exposures as the predictor and willingness to plead as the dependent variable was a poor fit to the data, Model $\chi^2(1, N = 867) = 2.17$, $p = .141$, Negelkerke $R^2 = .003$. As before, categorizing unique traumatic exposures as 0,1,2+ instances, Model $\chi^2(2, N = 867) = 2.60$, $p = .107$, Negelkerke $R^2 = .004$, or as 0, 1-3, 4+ instances, Model $\chi^2(2, N = 867) = 0.90$, $p = .343$, Negelkerke $R^2 = .001$, did not improve model fit.

Hypothesis 2: Number of Unique Traumatic Exposures Will Affect the Longest Acceptable Plea Deal Participants Would Be Willing to Accept in Exchange for a Guilty Plea

All participants who were willing to plead guilty indicated the longest plea sentence they would be willing to accept. There was no significant *linear* relationship between number of

reported unique traumatic exposures and the longest plea sentence participants were willing to accept, $r(526) = -.07$, $p = .090$. Relatively few people would accept sentences longer than 6 months, and relatively few people reported more than four unique traumatic exposures.

Likewise, after adjusting outliers to maintain rank[6], unique traumatic exposures was not related to longest acceptance plea deal whether operationalized categorically as 0, 1, 2+ instances of unique traumatic exposures, $F(2, 523) = 1.14$, $p = .321$, $\eta p^2 = .004$, or as 0, 1-3, 4+ instances of unique traumatic exposures, $F(2, 523) = 2.22$, $p = .110$., $\eta p^2 = .008$. This pattern of results did not change when controlling for legal encounters for 0, 1-3, 4+ instances of unique traumatic exposures, $F(2, 522) = 1.32$, $p = .267$., $\eta p^2 = .005$, or 0,1,2+ instances of unique traumatic exposures, $F(2, 522) = 0.68$, $p = .505$., $\eta p^2 = .003$. See Table 1 for average number of unique traumatic exposures broken out by participants plea decisions. Table 2 shows the average maximum plea sentence broken out by number of unique traumatic exposures, (0, 1, 2 or more).

Table 1: Average Number of Unique Traumatic Exposures by Plea Decision

	Accepted plea offer in scenario *N = 174*	Unwilling to plead for any offer *N =341*	Willing to plead to some offer *N =526*
Average Number of Traumatic Exposures	1.82	2.14	1.94

[6] Pattern of results were similar when outliers were not adjusted: $F(2, 523) = 1.16$, $p = .314$, $\eta_p^2 = .004$, for 0, 1, 2+ instances of traumatic exposure; and, $F(2, 523) = 2.13$, $p = .120$, $\eta p^2 = .008$, for 0, 1-3, 4+ instances of traumatic exposure.

Table 2: Percentages for Plea Acceptance and Willingness to Plea, as well as, the Average Longest Acceptable Plea Deal Across Unique Traumatic Exposure Conditions (0, 1, 2+)

Trauma Level	*N*	Plea Acceptance (%)	*N*	Willingness to Plea (%)	*N*	Average Longest Acceptable Plea ($\bar{x}$)
No Traumatic Exposure	147	22.4%	147	63.9%	94	2.83
1 Traumatic Exposure	314	21.0%	314	63.1%	198	2.46
2+ Traumatic Exposure	406	18.5%	406	57.6%	234	2.36

Hypothesis 3. Effects of Unique Traumatic Exposure and Plea Outcome Will Be Mediated by Risk Aversion and/or Delayed Discounting

Since unique traumatic exposure was not appreciably associated with plea decisions or with plea sentence length, no mediation models were tested. However, I tested the relationships between unique traumatic exposure and each of the mediating variables. The average discounting parameter ("k") for participants on the MCQ was 0.03 (*SD* = .05) and was -1.97 (*SD* = .71) after a log transformation (the log transformation was used due to issues with normality and will be used from this point forward), and average scores of the SSS-V and General Risk Question were 15.49 (*SD* = 6.57) and 4.93 (*SD* = 2.18), respectively. As confirmed via visual inspection of the scatterplot, there were no significant relationships between unique traumatic exposure and the general risk question, $r(867) = .04$, $p = .255$ or the MCQ, $r(867) = .07$, $p = .051$. However, there was a small, significant relationship between number of unique traumatic exposures and the SSS-V, $r(867) = .10$, $p = .003$, such that the more unique traumatic exposures one reported the higher they scored on the SSS-V. These scores on the MCQ did not reach the threshold for significance, but they were close, and the data suggests, consistent with other delayed discounting literature (e.g., Acheson et

al., 2019; Simmen-Janevska et al., 2015), that those with higher traumatic exposure preferred more immediate rewards relative to those without trauma exposure.

Table 3 shows average scores on each measure broken out number of unique trauma exposures.

Table 3: Average Scores on Each of the Proposed Mediators Categorized by 0,1,2+ Instances of Unique Traumatic Exposures

Mediator	Trauma Level	N	Mean	Std. Deviation	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
SSS-V	.00	147	14.72	6.39	13.66	15.78
	1.00	314	15.24	6.83	14.51	15.97
	2.00	406	15.97	6.41	15.67	17.05
	Total	867	15.49	6.57	14.83	15.78
MCQ	.00	147	-2.06	.81	-2.17	-1.94
	1.00	314	-1.97	.72	-2.05	-1.89
	2.00	406	-1.94	.66	-2.01	-1.87
	Total	867	-1.97	.71	-2.04	-1.94
General Risk Question	.00	147	4.76	2.14	4.40	5.12
	1.00	314	5.00	2.27	4.76	5.24
	2.00	406	4.95	2.13	4.73	5.16
	Total	867	4.93	2.18	4.74	5.06

Note. The above MCQ scores were adjusted using a log transformation to address issues of normality.

Some additional information was gleaned by analyzing unique traumatic exposure as a categorical variable. The relationship between SSS-V and unique traumatic exposures remained significant when trauma was operationalized as 0, 1, 2+ unique traumatic exposures only when controlling for gender, previous legal encounters, and age, $F(2, 855) = 5.24$, $p = .005$, $\eta p^2 = .012$; Otherwise, the relationship between SSS-V and unique traumatic exposures when categorized as 0,1,2+ did not reach the threshold for significance, $F(2, 864) = 2.32$, $p = .099$, $\eta p^2 = .005$. However, the relationship between SSS-V scores and unique traumatic exposure remained significant when operationalized as 0, 1-3, 4+ unique traumatic exposures without controls, $F(2, 864) = 5.56$, $p = .004$, $\eta p^2 = .013$ and with gender, age, and previous legal encounters controlled for, $F(2, 855) = 8.38$, $p < .001$, $\eta p^2 = .019$.

Without controlling for any demographic confounds, there were no relationships between unique traumatic exposure and the other two measures are apparent whether unique traumatic exposure was operationalized as 0, 1, 2+ unique traumatic exposures, MCQ: $F(2, 864) = 1.48$, $p = .228$, $\eta p^2 = .003$; GRQ: $F(2, 864) = .63$, $p = .533$, $\eta p^2 = .001$, or as 0, 1-3, 4+ unique traumatic exposures, MCQ: $F(2, 864) = 2.96$, $p = .051$, $\eta p^2 = .007$, or the GRQ: $F(2, 864) = 1.21$, $p = .300$, $\eta p^2 = .003$.

However, when controlling for age and gender, which were related to categorical operationalizations of trauma and GRQ scores, there was a relationship between GRQ scores and unique traumatic exposures operationalized as 0, 1, 2+ unique traumatic exposures, $F(2,856) = 3.04$, $p = .048$, $\eta p^2 = .007$ and as 0, 1-3, 4+, $F(2, 856) = 4.04$, $p = .018$, $\eta p^2 = .009$.

In contrast, when controlling for age, which were related to unique traumatic exposures categorized as 0,1,2+ and MCQ scores, there relationship also remained insignificant, $F(2, 857) = 1.91$, $p = .149$, $\eta p^2 = .004$.

Additionally, I tested the relationships between each of the mediators and dependent variables, offer acceptance, willingness to plead, and longest acceptable plea sentence. Table 4 shows the average scores on the SSS-V, MCQ and GRQ broken out by dichotomous plea decisions.

Table 4: Average Scores on Each of the Proposed Mediators for Plea Acceptance and Willingness to Plead

Mediator	Plea Outcome	Variable Level	N	Mean	Std. Deviation
SSS-V	Plea Acceptance	Accept	174	14.99	6.68
		Reject	693	15.61	6.54
	Willingness to Plead	Willing	526	15.78	6.64
		Unwilling	341	15.05	6.43
GRQ	Plea Acceptance	Accept	174	4.89	2.22
		Reject	693	4.94	2.17
	Willingness to Plead	Willing	526	4.94	2.13
		Unwilling	341	4.92	2.27
MCQ	Plea Acceptance	Accept	174	-1.96	.77
		Reject	693	-1.98	.70
	Willingness to Plead	Willing	526	-1.95	.72
		Unwilling	341	-2.01	.70

Scores on the SSS-V did not predict whether or not someone would accept our offered plea deal, Model $\chi^2(1, N = 867) = 1.29$, $p = .256$, Negelkerke $R^2 = .002$, $OR = 0.99$ or if they would

be willing or unwilling to plead at all, Model $\chi^2(1, N = 867) = 2.53$, $p = .112$, Negelkerke $R^2 = .004$, $OR = 1.02$, and scores on the SSS-V was not related to the longest acceptable plea sentence, $r(526) = -.066$, $p = 1.29$.

Similarly, scores on the GRQ did not predict whether or not someone would accept our offered plea deal, Model $\chi^2(1, N = 867) = 0.08$, $p = .781$, Negelkerke $R^2 = .000$, $OR = 0.99$, or if they would be willing or unwilling to plead at all, Model $\chi^2(1, N = 867) = 0.02$, $p = .878$, Negelkerke $R^2 = .000$, $OR = 1.01$ and GRQ was not related to the longest acceptable plea sentence, $r(526) = .10$, $p = .816$.

Finally, the average discounting parameter on the MCQ did not predict whether or not someone would accept our offered plea deal, Model $\chi^2(1, N = 867) = .077$, $p = .782$, Negelkerke $R^2 = .000$, $OR = 1.03$, or if they would be willing or unwilling to plead at all, Model $\chi^2(1, N = 867) = 1.77$, $p = .183$, Negelkerke $R^2 = .003$, $OR = 1.14$. Lastly, among those willing to plead, the discounting parameter was not associated with longest acceptable plea deal, $r(526) = .007$, $p = .874$.

Post-Hoc Analyses: Effects of Symptom Severity and Probable PTSD on Outcome Variables

Although I hypothesized that number of unique traumatic exposures would affect plea decisions, inherent in that hypothesis, of course, is the presumption that trauma produces relevant psychological changes that have bearing on plea decisions. Since not all people who experience trauma are affected the same way, I wanted to explore whether symptoms associated with trauma, within persons who have experienced trauma, specifically, might be better predictors of plea outcomes.

Unsurprisingly, the more unique exposures to trauma a person reported, the higher their scores were on the PCL-5, $r(867) = .32$, $p < .001$. Table 5 shows this relationship for trauma exposure categorized as 0, 1, 2+ unique exposures.

Table 5: Association Between PCL-5 Scores and Number of Unique Traumatic Exposures

Traumatic Events	Mean	Std. Dev.	95% Confidence Interval	
			Lower Bound	Upper Bound
0 ($N = 147$)	11.35	13.19	8.82	13.89
1 ($N = 314$)	18.14	15.87	16.41	19.88
2 or more ($N = 406$)	24.82	16.35	23.29	26.35

Symptom Severity and Plea Outcomes for the Trauma-exposed Sample

PCL-5 scores were associated with overall willingness plead guilty, among the 720 persons who had reported experiencing at least one type of traumatic event, $M_{willing} = 23.21$ ($SD = 16.48$) vs. $M_{unwilling} = 19.95$ ($SD = 16.28$), Model $\chi^2(1, N = 720) = 6.84$, $p = .009$, Negelkerke $R^2 = .013$, $OR = 1.01$. Additionally, PCL-5 scores *were* associated with acceptance of the offer in the vignette and with the maximum sentence length to which participants would plead. Specifically, those who accepted the offered deal scored higher the PCL-5, on average , 25.24 ($SD = 17.81$), than those who rejected it, , 21.10 ($SD = 16.04$), Model $\chi^2(1, N = 720) = 7.00$, $p = .008$, Negelkerke $R^2 = .015$, $OR = 1.02$ and also were willing to take longer sentences, $r(432) = .16$, $p = .001$ (See Figure 2).These effects were small—for instance, a 10-point increase on the PCL-5 increased the odds of accepting the offer in the scenario by a factor of only 1.20 –but given the base rates of trauma, the large range on the PCL-5, and likelihood of PTSD in the justice system, are nonetheless potentially meaningful.

Figure 2: Scatterplot of the relationship between Symptom Severity and Longest Acceptable Plea Deal

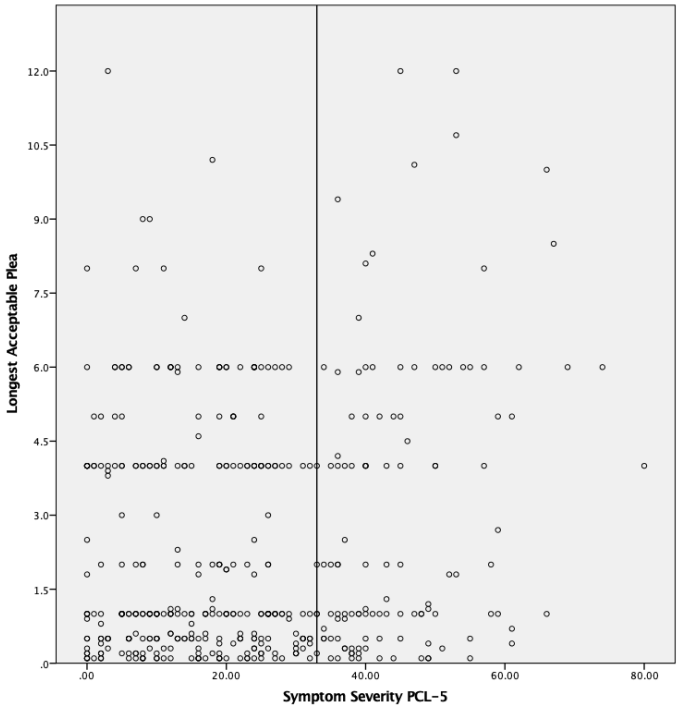


Figure 2. The black line represents the clinical threshold for probable PTSD as defined by the PCL-5 (33 and above). Interestingly, when looking at the participants that surpassed the clinical threshold for PTSD, there is a somewhat discernable trend that those with more severe symptoms were willing to accept longer plea sentences (in months), which was shown in the categorical analyses below that dichotomized the symptom severity into probable PTSD vs. no probable PTSD.

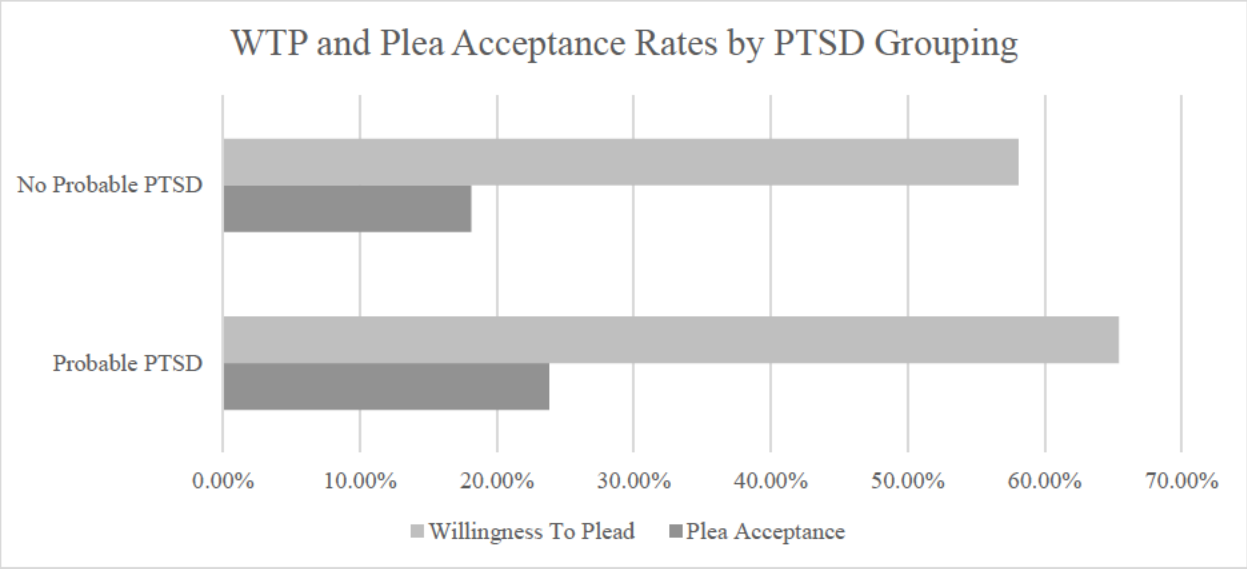
PTSD and Plea Outcomes for the Trauma-exposed Sample

Given that there was evidence to suggest that symptom severity does have an impact on plea decisions, an important research question is if those who met criteria for probable PTSD following exposure to a traumatic life event versus those who did not were more likely or willing

to accept a plea, and if so, what sentences they would be willing to accept. To test this, I created a dichotomous variable of Probable PTSD, with probable PTSD defined by a score of 33 or above on the PCL-5 (Blevins et al., 2015; Bovin et al., 2016). Approximately twenty-six percent ($N = 185$) of the trauma-exposed sample met criteria for probable PTSD. Those who had been exposed to at least one traumatic life event but did not exceed a score of 33 on the PCL-5 were considered "trauma controls" ($N = 535$).

Probable PTSD was not associated with either acceptance of the offer provided in the vignette or overall willingness to plead guilty. However, the data seemed to trend in the predicted direction, 23.8% of those with probable PTSD accepted the offered plea deal compared to 18.1% of those without. A logistic regression model with probable PTSD entered as a predictor and plea acceptance as the outcome variable was not a better fit to the data than a constant only model, Model $\chi^2(1, N = 720) = 2.70$, $p = .100$, Negelkerke $R^2 = .006$, $OR = 1.41$ and this remained insignificant when controlling for previous legal encounters (as previous legal encounters was associated with probable PTSD and plea acceptance), Probable PTSD $\chi^2(1, N = 720) = 3.71$, $p = .054$, $OR = 1.49$. Likewise, 65.4% of those with probable PTSD were willing to accept a deal above zero compared to 58.1% who did not met criteria for probable PTSD, and a logistic regression model with probable PTSD entered as the predictor and willingness to plea was also a poor fit to the data, Model $\chi^2(1, N = 720) = 3.07$, $p = .08$, Negelkerke $R^2 = .006$, $OR = 1.36$. See Figure 3 for a visual representation of this data.

Figure 3: Percentages of those with Probable PTSD vs. No Probable PTSD Who Were Willing to Plead and Accepted Offered Plea Deals

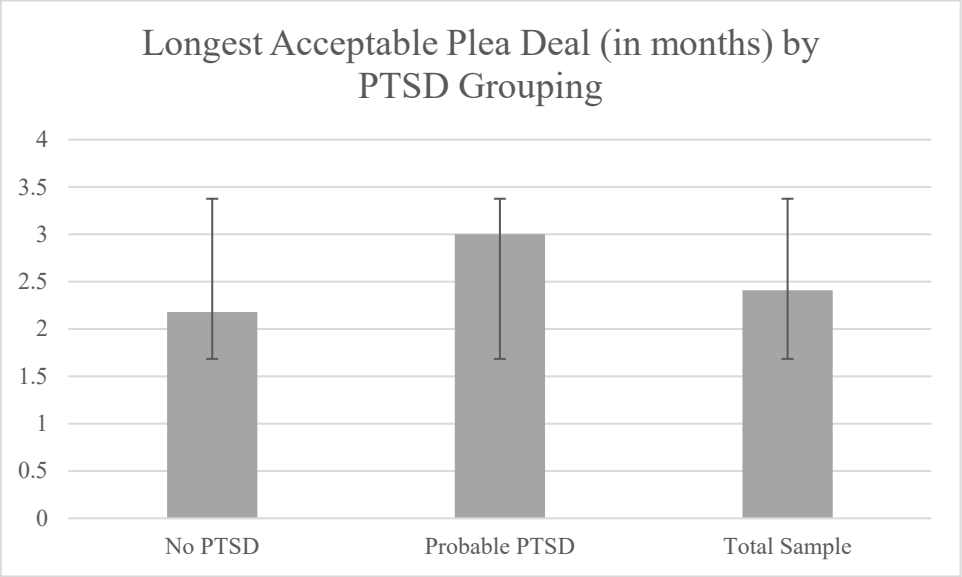


In contrast, probable PTSD was significantly associated with longest acceptable plea deal, $t(179.56) = -2.77$, $p = .006$, 95% CI = -1.40; -0.23; such that, on average, those who had met criteria for probable PTSD were more likely to accept longer plea deals relative to those who did not (see Table 6 for relevant statistics and Figure 4 for a visual representation of this data). Degrees of freedom were adjusted to account for unequal variances.

Table 6: Means of Longest Acceptable Plea Deals by PTSD Grouping

Variable	Mean	Std. Deviation	*N*
No PTSD	2.18	2.27	311
Probable PTSD	3.00	2.92	121
Total Sample	2.41	2.50	432

Figure 4:Longest Acceptable Plea Deals by PTSD Grouping



Effects of Probable PTSD on Proposed Mediating Variables

As already discussed in the primary analyses, the proposed mediators were not meaningfully associated with the outcome variables—therefore, there was no need to look at the full mediation model with symptom severity or probable PTSD as the independent variables. However, for exploratory purposes, I did look at the relationships among probable PTSD (who had at least one traumatic life event) and the proposed mediating variables. However, no significant relationships were apparent. The average SSS-V scores for those with probable PTSD was only slightly higher trauma controls, M_{ptsd} =16.45 (*SD* = 6.47), M_{ctl} = 15.37 (*SD* = 6.63) , *t*(718) = -1.93, *p* = .054, 95% CI = -2.19; 0.02. The average MCQ scores for those with probable PTSD was only slightly above trauma controls, M_{ptsd} =-1.93 (*SD* = 0.70), M_{ctl} = -1.96 (*SD* = 0.68), *t*(718) = -0.64, *p* = .526, 95% CI = -0.15 .08; and the average score on the General Risk Question for those with probable PTSD was only slightly higher than trauma controls, M_{ptsd} =5.11 (*SD* = 2.22), M_{ctl} = 4.92 (*SD* = 2.18), *t*(718) = -1.05, *p* = .295, 95% CI = -0.56; 0.17.

Chapter 5: Discussion

In this dissertation I explored the potential that traumatic experiences could increase an innocent person's risk for pleading guilty. Specifically, for participants placed in a virtual scenario wherein they were charged with a crime they did not commit, I hypothesized the number of unique traumatic exposures reported by a participant would be associated both with an increased likelihood to plead guilty and with a willingness to accept longer plea sentences than those without any reported lifetime traumatic experiences. Based on existing literature suggesting that trauma exposure is associated with increased risk aversion (e.g., Ruderman et al., 2018; Jia et al., 2020) and steeper future discounting (e.g., Acheson et al., 2019; Simmen-Janevska et al., 2015; Van-den Berk Clark et al., 2018), I further hypothesized that any effects of traumatic experiences on plea decision would be mediated by measures of risk aversion and discounting—specifically the likelihood to falsely plead guilty and willingness to accept longer plea sentences.

Contrary to expectations, the number of unique traumatic exposures reported by participants was not associated with plea decisions. However, within those who had at least one lifetime traumatic event, symptom severity, when examined as a continuous measure was associated with plea acceptance, willingness to plead, and longest acceptable plea deal, such that those with more severe symptoms were more likely to accept the deal offered in the virtual scenario, were more willing to plead to any deal, and were more willing to accept longer plea sentences relative to those with less severe symptoms. When operationalizing symptom severity scores as probable PTSD versus no probable PTSD, probable PTSD was only significantly associated with longest acceptable plea deal. However, the data on plea acceptance was trending

in the anticipated direction, such that those with probable PTSD accepted the offered plea deal at a higher rate, but it did not reach the threshold for significance.

These data are consistent with previous research that suggests that those with trauma histories may be more risk averse when facing a loss (i.e., loss-dependent risk aversion; Jia et al., 2020; Ruderman et al., 2016) and are less likely to approach rewards, anticipate/expect potential rewards, and view rewards as favorable (i.e., diminished reward expectancy and approach; May & Wisco, 2020; Nawjin et al., 2015; Ousdal et al., 2018). Previous research also suggests those with trauma histories tend to be steeper discounters preferring immediate rewards rather than delayed rewards relative to those without those histories (Acheson et al., 2019; Simmen-Janevska et al., 2015; Van den Berk-Clark et al., 2018). Given this research, it makes sense that in this study I observed a higher false guilty plea rate of those with more severe trauma symptoms, as those with trauma symptoms may be more likely to underestimate their chances of success at trial *(an example of diminished reward expectancy within the plea context),* may be more likely to overvalue the immediate plea option and undervalue future outcomes (such as acquittal) (*an example of how steeper discounting may impact plea decisions)* and may also be more likely to view the plea as favorable to the gamble of trial *(an example of loss-dependent risk aversion within the plea context).* Diminished reward expectation and approach to reward, as well as higher levels of risk aversion within the trauma population may also explain why those with more severe symptoms indicated longer plea deals (on average) relative to those with less severe symptoms (even when operationalized as probable PTSD versus no probable PTSD). If someone is risk averse and anticipates that their success at trial is likely low, then the certainty and immediacy of the plea deal may increase its' subjective value. In other words, even if the

plea contains a slightly higher sentence, the plea deal still maintains its' value for those with trauma symptoms because it is favorable to the gamble at trial.

However, it is important to note that my data do not permit me to draw any strong conclusions as to mechanisms underlying these effects. Contrary to my hypotheses, these effects were *not* explained by scores on self-report measures of risk aversion or delayed discounting. Somewhat surprisingly, neither the number of unique trauma exposures reported, nor symptom severity was associated with scores on the MCQ. On the other hand, participants reporting more unique lifetime traumatic exposures tended to score higher on the SSS-V and, when age and gender were controlled, the GRQ (those with PTSD relative to those without PTSD also seemed to have higher scores on the SSS-V but this did not reach the threshold for significance),a result that would appear to run counter to my hypotheses. However, as discussed earlier, the SSS-V is not necessarily capturing the preference for certainty versus uncertainty that I hypothesized would be a play. Rather, it is capturing risk-seeking behavior and preferences for novel life experiences. While research on those with trauma histories points to preference for certainty over uncertainty there is also, perhaps paradoxically, a literature that points to an increased in risk-taking behavior among those with trauma histories - and these behaviors tend to overlap with measures of risk seeking behavior (such as the SSS-V) – for instance, persons with trauma histories may engage in gambling, promiscuous sex, and substance use at higher rates than those without trauma histories (e.g., Strom et al., 2012; Rodriguez et al., 2012).

To reconcile this seemingly conflicting literature, it is important to recognize that, in general, those with trauma histories may be more likely to engage in risk-seeking behavior such as substance use as a function of avoidance behaviors and/or emotional numbing in their everyday lives which is likely what the scores on the SSS-V (and the GRQ scores) were tapping

into. However, this preference for risk and novelty seems to shift when those with trauma histories are facing a potential (ambiguous) loss (e.g., Ruderman et al., 2016). As with all humans, our preferences for certainty/uncertainty shift based on contextual variables (e.g., loss versus gain frames; Kahneman & Tversky, 1981) and those with trauma histories tend to be disproportionality effected by loss frames, especially when outcomes are ambiguous. Therefore, future research is required to not just tap into general risk seeking behaviors but shifts in risk preference when facing potential losses which will be further discussed in future directions.

Policy Implications

These data are exploratory and, as such, much care should be taken with respect to drawing any strong conclusions as to their implications for public policy. Nevertheless, consistent with the research literature on the effect of trauma on decision making, generally, the data give reason to believe that among many criminal defendants with trauma histories, the severity of their symptomatic response may affect the way in which they approach plea decisions. Although effects were relatively small, if they are to be replicated, the practical impact can be quite meaningful. For example, those with probable PTSD were, on average, willing to accept plea deals that were 38% longer than those without PTSD, which (in this case) was more than half a month longer in jail, on average. When one considers the economic and social impact of incarceration, not only to the individual but also to society, one (or just under) month is not negligible- especially if one considers the numbers of criminal defendants pleading guilty to misdemeanors each year in the United States. Were this difference to extend to charges with stiffer penalties, the long-term impact is magnified. As an example, consider a charge for which the average plea sentence is two years, the effect observed in this study equates to a difference of

approximately 9 months. Of course, when one considers that all participants were in the role of an innocent defendant, the concern should be elevated.

As discussed earlier in this paper, it would benefit us to implement a more trauma-informed legal system (Javier et al., 2020; Seamone, 2009); these results, however preliminary, suggest that taking trauma symptoms into consideration when attorneys advise their clients on plea options may help clients make more objective assessments of appropriate sentence length (e.g., helping the client understand what other's in similar situations have pled to) and may even help reduce false guilty pleas. In an article by McKenna and Holtfreter (2020), the authors argue that applying the principles posited by Substance Abuse and Mental Health Services Administration (SAMSHA) may be an appropriate model to apply to the adult court systems. According to SAMHSA and as described by Mckenna and Holtfreter (2020), trauma-informed practices are person-centered and use cultural humility by encouraging collaborative therapeutic relationships. The SAMHSA (2014b) model rests on the "four R's": Realizing and identifying trauma, Recognizing signs and symptoms of trauma, Responding through evidence-based trauma principles, and actively Resisting re-traumatization; the model also introduces six core principles to increase the effective application of these steps: safety, trustworthiness and transparency, peer support, collaboration and mutuality, empowerment, voice, and choice, and consideration of cultural, historical, and gender issues (SAMHSA, 2014b). To apply these steps and principles to the adult court system, as proposed by McKenna and Holtfreter (2020), court actors would have to realize that the population that they serve has likely been impacted by various forms of trauma and would have to receive education and training to recognize the signs and symptoms of trauma across various contexts, including the various triggers that may present within the legal system (e.g., having to testify, reviewing evidence). If provided the proper education, court actors could

respond using evidence-based interventions by helping to minimize potential triggers and maintain safety for the client. This would be beneficial because applying these principles and steps may allow those with severe trauma symptoms to more effectively evaluate their options by helping them weigh their legal pathways and increase long-term consequential thinking.

Limitations and Future Directions

While a directive to take trauma symptoms into consideration certainly follows from the data reported here, there are several limitations to this study that constrain interpretation of my results, and much more research is required before any direct recommendations can be made. First of all, my study focused on trauma-exposed individuals drawn from an MTurk population, who are unlikely to represent the typical criminal-justice population. To accommodate, I made an effort to create a scenario that individuals without a criminal history could easily imagine themselves in, such that most people could imagine themselves accidentally walking out of the store with sunglasses on their heads. Even so, the scenario is hypothetical and could never replicate the emotional context of a real criminal adjudication.

Additionally, it would be an important future to direction to understand if the effects found here—particularly in those with more severe trauma symptoms— occur in the real world or are limited to the studies that occur in the laboratory. To my knowledge, there are no empirical studies showing these effects on plea decisions among actual criminal defendants with trauma histories/symptoms, but there is clear evidence that those with trauma are over-represented in the legal system (Ardino, 2012; Donley et al., 2012; Taylor et al., 2020). Therefore, future researchers should explore if these effects are consistent with real-world findings by exploring false guilty plea rates among populations with high instances of traumatic

exposure, for example, those in an inpatient forensic hospital or those involved in the criminal justice system.

Also, while these data provided insight into how trauma may impact the quality and quantity of false guilty pleas, this study did not provide insights into the explanatory mechanisms behind these effects. A possible explanation for the lack of relationships found between unique trauma exposures and scores on the instruments used to measure the constructs of risk aversion and delayed discounting is that these measures were a poor fit to the context. As made evident by previous research in trauma populations, context matters. Specifically, those with trauma histories tend to become risk averse when facing losses (Ruderman et al., 2016; Acheson et al., 2019; Simmen-Janevska et al., 2015), and completing a self-report measure does not provide a decision that contains a loss (or a gain for that matter). Therefore, these self-report measures may not detect changes in risk preference or reward processing that may be elicited through the plea-bargaining context (or the decision-making process, in general). Thus, to see if differences on these constructs explain plea decisions, different tools might be required. This is an important avenue for future work, as to my knowledge there are no readily available tools that may separate the self-harm/addictive behaviors that typically correlate with risk seeking behavior observed in those with trauma histories from the risk-averse traits such as hypervigilance and loss aversion that are likely to be associate with the decision to prefer immediate and certain outcomes such as the plea deal. Instead of relying on outside measures of risk aversion/discounting, it may be useful to assess for cognitive biases using their assessments of probability of conviction at trial and their sentence expectations (if convicted) as a proxy for levels of risk aversion. Moreover, understanding how they assess these potential risks and outcomes would be helpful information when considering how to implement trauma-informed

care. For example, if we find that those with trauma histories are assessing their probability of conviction as higher than those without trauma, court actors can help facilitate discussions regarding these estimates to help those with trauma objectively assess their odds of success at trial.

Future investigations should also consider different ways of defining / classifying trauma. To measure symptom severity, I used the PCL-5. While this measure taps into the various PTSD diagnostic criteria, the symptoms also overlap with other diagnoses. For example, the PTSD symptoms of "feeling distant," "difficulty concentrating" and "trouble experiencing positive feelings" are also characteristic of depressive symptoms. Thus, the PCL-5 is likely going to capture more than just PTSD alone (depression, anxiety), which explains the higher prevalence rates of PTSD in this study (i.e., 25.7%) relative to the lifetime prevalence rate seen in the community (i.e., 5–10%; Breslau, 2002; Kessler et al., 1995). Thus, future research should seek to understand which symptom clusters may contribute to differences in plea decisions. To capture unique lifetime traumatic exposures, I used the TLE which is simply a list of various types of potentially traumatic experiences proposed by Breslau et al., (1998). I used the TLE to create a continuous variable and created two separate trichotomized variables to measure unique trauma exposure. While I made a reasonable effort to operationalize trauma exposure in various ways, only focusing on unique types of traumatic exposure omits other important pieces of information, such as the perceived intensity of the traumatic exposure (i.e., the impact of being a victim of assaultive violence may be more intense than vicarious trauma), how many times the trauma occurred throughout one's lifetime, and the age of first exposure. These are all equally important variables, as one would surmise that the frequency and the intensity of a particular trauma may impact an individual's psychosocial functioning. Understanding how this

information may contribute to an individual's functioning within plea context are equally important research questions. Exploring these factors could also provide additional insight into what is leading to the increase in symptom severity (if not trauma exposure alone) as this has been shown to be directly impacting plea decisions. Thus, as part of this study, I collected some of this information, which is available for future research for researchers interested in secondary data analysis.

There were also limitations regarding how I measured and explored plea decisions. First, I measured plea acceptance by first asking participants to accept or reject a plea deal (dichotomous question) then, if they accepted, I asked them what the largest deal they would be willing to accept (continuous scale) and, if they rejected, if they would be willing to accept any deal (continuous scale). Within the analyses of these data, anyone who indicated a plea deal above zero were considered plea acceptors, and anyone who indicated a deal of zero were considered a plea rejector – this categorization was used to form the willingness to plead variable and was also used to filter out individuals who were not willing to plead from the longest acceptable plea deal analyses. Future explorations should consider exploring the effects of longest acceptable plea deal and willingness to plead by not just looking at plea deals above zero but perhaps indicating a slightly larger number to avoid indications of "1 day" from being included in the data analysis, as a plea deal of one day is not a likely outcome in the real-world. It would also be helpful to explore and omit any inconsistencies in the data. For example, if someone indicated they would accept the plea of four months and then indicated something lower than that on the scale their data should be omitted from the analysis.

In addition to the above, without counterbalancing the order between the dichotomous accept/reject question and the continuous scale, it is possible that an anchoring effect occurred.

Specifically, since they were offered a plea deal before providing an answer to the maximum (longest) plea deal they would accept, it is possible that participants were likely to select an answer that was closely tied to the offered plea deal (i.e., going slightly above or below the offered 4 months). Furthermore, being that our offered plea deal was four months and the maximum sentence possible in this scenario was 12 months, the risk of taking the plea relative to gambling at trial is only an eight-month difference. Therefore, there was not a large discrepancy between the potential penalties if one were to take a plea versus pursue trial. Consequently, there was not much room to move across the continuous scale – that is, for those who accepted a plea offer and were asked to indicate the largest deal they would be willing to accept, they only had a range of 8 months (~4 months to 12 months); and for those who rejected the offered plea deal and were asked if they would be willing to accept any deal only had a range of approximately four months (~1 day to 4 months). Recent research suggests that individuals do not respond to small incremental changes to sentence length, rather, the difference between numbers needs to be large enough to create a categorical distinction (Zottoli et al., 2022). However, the main contribution of these data is the relative difference between those with trauma symptoms (and probable PTSD) relative to those with less severe symptoms (and no probable PTSD) and not the actual number of months accepted in any condition.

That being said, future research continue to understand the conditions in which these effects may be moderated, as previous research suggests that manipulating potential trial sentences and plea discounts (e.g., Schneider & Zottoli, 2019), probabilities of conviction (e.g., Bartlett & Zottoli, 2021; Peterson et al., 2020; Tor et al., 2010), and a whole host of other factors affects defendant decision-making, and given the data here, a fruitful area of research is to understand *how, when, and by how much* those with trauma histories/symptoms are being

impacted by these plea-related factors. Therefore, conducting a study that was to explore decision making in those with trauma histories using various custodial and non-custodial sentences would be useful in understanding the conditions in which decision making may shift in this clinical population. It would also be useful to see if manipulating guilt status moderates these decisions, as research suggests that innocent and guilty defendants engage in different cognitive processes that seem to motivate their decision making in the plea process (e.g., Garnier-Dykstra & Wilson, 2019; Helm & Reyna, 2017).

Finally, while this study focused on trauma, an important goal of those who study plea bargain decision making is to identify and understand the relevance of the numerous individual differences and contextual factors can affect plea outcomes. Thus, considering the various factors in the plea process and how they may impact decisions in those with trauma histories/symptoms requires more research. Studying defendant-level characteristics in the plea context is a fairly new area of research but understanding the ways our individual differences may impact our decision-making process can help reduce the false guilty plea problem. Some may argue that studying defendant characteristics and how they may impact plea decisions may not ultimately be that important, as accounting for *all* individual difference factors may not be helpful for informing public policy. However, if we can begin to identify how groups of individuals with the same defendant-level characteristic engage with the plea process, we can also begin to understand areas of convergence where the risk for a false guilty plea increases for a particular individual and may be compounded due to aspects of their identity.

Conclusion

The guilty plea is the most common form of adjudication in the United States. However, as a field, we know very little about how defendants from clinical populations are affected by the

plea process. This is concerning given that persons with serious mental illness are at greater risk for compromised legal decision making (Cooper & Zapf, 2003; Viljoen, Roesch, & Zapf, 2002) and persons who plead forgo a number of procedural and constitutional protections that are afforded to those who go to trial. In this study, I focused on persons who have experienced trauma—a clinical population that is over-represented in the legal system. My study contributes the first data on how trauma affects hypothetical plea decisions. Although the data should be considered preliminary, they point to potential risks for those with trauma exposure who are experiencing related symptomatology and suggest that continued research in this area be fruitful. Given that plea bargaining is here to stay, it behooves us to ensure that a person facing a plea decision is not put at a disadvantage by the system due to their trauma history.

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