

EXPLORING THE RELATIONSHIP BETWEEN TRAUMA AND DICHOTOMOUS
THINKING

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Abstract

The purpose of this study is to examine the relationship between dichotomous thinking and exposure to traumatic life events. This quantitative, cross-sectional correlational study hypothesized that there are positive correlations between: 1) traumatic event exposure frequency and degrees of dichotomous thinking, 2) severity of events and degrees of dichotomous thinking, 3) posttraumatic stress symptoms and degrees of dichotomous thinking, and hypothesized that 4) those who experienced their first traumatic event before age 20 will have greater degrees of dichotomous thinking than those who were exposed after the age of 20. Nine hundred eighty-one University of Hawai‘i at Mānoa students completed a demographics page, the Dichotomous Thinking Inventory, the Cognitive Distortions Questionnaire Short Form-9, the Trauma History Questionnaire, and the Posttraumatic Stress Disorder Checklist-5. Results showed that posttraumatic stress symptoms were significantly correlated with degrees of dichotomous thinking. Frequency of event exposure, severity of events, and age at/during event exposure were not significantly associated with degrees of dichotomous thinking. This signifies that it is essential to consider how people respond to traumatic event exposure when discussing psychological flexibility. Despite the associations found in literature between experiencing trauma and cognitive distortions, there are possibly other interactions involved between the maintenance of black-and-white cognition in a trauma-exposed sample. Further research should examine covariates and potential moderators, such as resilience, coping styles, and social support, to clarify the impact of these variables on dichotomous thinking styles. Limitations of the study include the use of categorical free-response answers in participant responses to specific event frequencies and a small sample size of participants older than 20.

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List of Abbreviations

PTSD.....	Posttraumatic Stress Disorder
DSM5-TR.....	Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition Text Revision
DTI.....	Dichotomous Thinking Inventory
CD-Quest-S9.....	Cognitive Distortion Questionnaire Short Form 9
THQ.....	Trauma History Questionnaire
PCL-5.....	Posttraumatic Stress Disorder Checklist-5

Exploring the Relationship Between Trauma and Dichotomous Thinking

Globally, exposure to traumatic events is an unbounded human experience without boundaries such as age, socioeconomic status, health, and physical location. Anyone at any moment in their life can potentially experience a traumatic event. A worldwide study conducted in 2016 showed that out of 68,894 adults, 70% reported having experienced a traumatic event (Benjet et al., 2016). Experiencing traumatic events is a significant factor that can negatively influence and distort an individual's cognitive patterns and thinking processes. A form of distorted cognition that people can suffer from is dichotomous thinking (Yurica & DiTomaso, 2019). Dichotomous thinking involves dualistic assessments of experiences that lack a nuanced middle ground. These cognitions consist of binary views such as “good or bad”, “all or nothing”, and “black or white” (Oshio, 2009). In the cognitive view, the more extreme a person’s evaluations are, the more extreme emotional responses will occur (Beck et al., 2015). Thus, this dualistic appraisal can be problematic when real-life situations are often more nuanced.

Individuals’ perceptions and behaviors interact bi-directionally, which can affect the maintenance of psychopathological symptoms such as posttraumatic stress disorder (PTSD) symptoms and how schemas are shaped. Schemas are mental structures or frameworks that individuals use to organize and interpret information about the world (Piaget, 1952). Research has shown that interpersonal trauma, especially when experienced before adolescence, is strongly associated with the formation of maladaptive schemas and cognitive distortions (Karatzias et al., 2016; Lorzangeneh & Esazadegan, 2022). Therefore, understanding the relationship between trauma phenomenon and dichotomous thinking is essential for gaining insights into the lasting psychological impacts of traumatic experiences and the maintenance of well-being. While there is a plethora of research focusing on the connections between

posttraumatic stress disorder (PTSD) and cognitive distortions, there is little specifically exploring the association between dichotomous thinking, exposure to traumatic events, and related phenomena. This study explores the relationship between trauma-related phenomena and dichotomous thinking.

Trauma

The DSM-5-TR defines a traumatic event as “exposure to actual or threatened death, serious injury, or sexual violence” (American Psychiatric Association, 2022). This exposure can happen by directly experiencing the event, witnessing the event happen to others in person, learning that the traumatic event happened to a close family member or loved one (e.g. accidental death, violent accident), or repeated exposure to aversive details of the traumatic event (e.g. police officers, firefighters). According to Google Trends (n.d), search volume in the United States for “trauma” peaked in February 2023, steadily rising since January 2004. While the word trauma has become a popular idiom and there is still contention around the definition (Dalenberg et al., 2017), it is currently defined by the American Psychological Association (n.d) as, “any disturbing experience that results in significant fear, helplessness, dissociation, confusion, or other disruptive feelings intense enough to have a long-lasting negative effect on a person’s attitudes, behavior, and other aspects of functioning”. A 2023 annual report by The Pennsylvania State University under the Center for Collegiate Mental Health (2024) reported a 47% rise over the past 11 years in students seeking counseling services with a history of trauma. With the continuing rise in interest in trauma and the ubiquity of the experience, trauma has become a central theme of investigation for researchers and clinicians.

There are vast arrays of different circumstances that can expose people to trauma. Some examples include living in poverty, experiencing racism/oppression, exposure to violence,

childhood neglect, and living with family members who have mental health and/or substance use disorders (Trauma-Informed Care Implementation Resource Center, 2018). Traumatic events are extreme from a person's ordinary life stressors, and therefore heterogeneous amongst people. Taxonomy of direct individual trauma can include identity/autonomy/individuation (personal, or collective) trauma, attachment trauma, interdependence/disconnectedness trauma, achievement/self-actualization trauma, and survival trauma (Kira, 2001). However, trauma can also stem from cultural, generational, and indirect/vicarious situations. Those who have experienced one traumatic event often experience multiple traumatic events in a lifetime (Kilpatrick et al., 2013). A study done by Schimmenti (2017) found that childhood attachment trauma was significantly associated with the co-occurrence of other traumas. Research has also shown that exposure to multiple traumatic events is associated with higher rates of PTSD symptomology (Frans et al., 2005; Hageaars et al., 2011; Priebe et al., 2018; Scott, 2007). Due to the convoluted matrix in which exposure to trauma and its symptoms can become embedded in a person's life, it is an area of concern to understand more deeply, especially for those working in mental health. Intensity levels of traumatic events are also associated with degrees of PTSD symptomology (Ganzel et al., 2007; Karstoft & Armour, 2022; Lauterbach & Vrana, 2001). One way that individuals are affected by the experience of trauma includes the formation and maladaptation of cognitive distortions, where a person's appraisal of their life is influenced by these traumatic encounters (LoSavio et al., 2017).

Cognitive Distortions

Cognitive distortions are ways of thinking that do not logically and accurately represent reality, thus affecting an individual's perceptions of reality (Beck, 1963). This phenomenon was first distinguished by Aaron T. Beck (1963) as he observed that individuals who held negatively

biased, inaccurate thoughts and representations of reality further exacerbate their symptoms of depression. Examples of cognitive distortions include overgeneralization, magnification, dichotomous thinking, jumping to conclusions, and emotional reasoning (Gilbert, 1998; Mandelli et al., 2015; Substance Abuse and Mental Health Services Administration, 2014; Yurica & DiTomasso, 2019).

Cognitive distortions may represent how our brains use heuristics to adapt to our environment defensively and quickly process information (Gilbert, 1998). Evolution benefited from fear-based reactions like the “fight or flight” binary (Bishop, 2023). This phenomenon allows for simplified categorization, though it feeds the logical fallacy of a false dilemma, which can be harmful when making judgments about complex human conditions. However, utilizing fast algorithms such as overreacting and assuming the worst has evolutionary advantages. For instance, if a mouse sees a cat, the error cost of assuming the worst by scattering away hastily is more adaptive than lingering to rationalize whether there is a threat now. The latter could cost the mouse its life. The brain is a predictive processor, integrating prior knowledge learned about what was once adaptive to generate future hypotheses about what to expect in the body and the environment (Bubic et al., 2010; Gregory, 1980). However, cognitive distortions can become maladaptive if they are no longer helpful or appropriate to a person’s current situation. Research has shown that cognitive distortions predict concurrent symptom severity in those who experienced acute trauma (Daniels et al., 2011). Other research found that distorted cognition is positively correlated with PTSD and psychiatric comorbidity (Chung & Shakra, 2020). Cognitive distortions are also linked to be a mediating factor between trauma types and degrees of suicidal ideation (Whiteman et al., 2019; Whiteman et al., 2020) and between separation anxiety and childhood sexual abuse (Çolak et al., 2023). In addition, people with greater cognitive flexibility

are associated with lower levels of PTSD symptoms (Ben-Zion et al., 2018), further promoting the support for cognitive insights into addressing the effects of trauma. The specific class of cognitive distortions this study is interested in is known as dichotomous thinking (also referred to as black-and-white, all-or-nothing, polarized, and binary thinking).

Dichotomous Thinking

Dichotomous thinking is the tendency to think in all-or-nothing ways without acknowledging the possibilities between the two extremes (APA Dictionary of Psychology, 2014). It is an “either-or” style of valued thinking rather than an “and” way of thinking and is polarized with little “shades of gray” (Neuringer, 1961). William G. Perry’s (1970) intellectual and ethical development scheme outlines four primary stages of cognitive change: dualism, multiplicity, relativism, and commitment. He observed undergraduate college students as they journeyed through these different stages, proposing that the way a person reasons (i.e., reflective judgment) changes with maturity. The first stage of dualism (viewing the world in polarities such as right/wrong, black/white, we/they) was embodied more frequently in younger college students, where a shift happens around age 20 (Perry, 1970).

While perceiving events in dichotomous ways is a universal phenomenon, extreme manifestations correlate with psychopathological symptoms and emotional distress (Antoniou et al., 2017; Bonfá-Araujo et al., 2021; Egan et al., 2007). One study showed that compared to non-traumatized controls, soldiers who were exposed to war trauma exhibited negative interpretation biases when interpreting ambiguous emotional expressions (Gebhardt et al., 2017). Unlike the control group, traumatized individuals also did not discriminate between nuanced intensities of emotional expressions, implying the existence of stronger binary cognitions. In another study, researchers found that dichotomous thinking increased traumatic and depressive

symptomatology 5-fold during COVID-19 lockdowns in Italy (Giusti et al., 2020). Dichotomous thinking was also found to increase depression levels (Kawabata et al., 2021) and was correlated with higher scores on the PCL-5 (Ouhmad et al., 2023). Research has also been done on the associations between dichotomous thinking and eating disorders (Byrne et al., 2008), perfectionism (Egan et al., 2007), suicidality (Neuringer, 1961), and personality disorders such as narcissistic and borderline personality disorder (BPD; Arntz & Haaf, 2012; Chapman et al., 2022; Jonason et al., 2018; Napolitano & McKay, 2007; Oshio, 2009; Oshio, 2012a; Watson & Biderman, 1993). While personality disorders have been linked to dichotomous thinking, it has also been shown that personality disorders are associated with exposure to various traumas (Yen & Shea, 2001). Exposure to multiple traumas and interpersonal traumas is linked to risk factors for both PTSD and BPD (Jowett et al., 2019). Despite the existing relationships found between trauma phenomenon, cognitive distortions, and other psychopathological symptoms, there is not much research done exploring the relationship between trauma exposure and dichotomous thinking.

Trauma and Cognition

The DSM-5-TR lists negative alterations in cognition and mood as symptoms in cluster D for PTSD (American Psychiatric Association, 2022). A great deal of psychological and neuropsychological research has highlighted the existing relationship between trauma and cognitive impairment (Brewin & Holmes, 2003; Daniels et al., 2011; Fang & Chung, 2019; Hayes et al., 2012; Kim et al., 2013; Kleim et al., 2007; Ouhmad et al., 2023; Qureshi et al., 2011; Solomon & Heide, 2005; Whiteman et al., 2009). Aaron T. Beck (1971) posited that the relationship between cognition and affect in those with psychopathology is molded by preserved faulty conceptualizations, which lead to affective disturbances that are not veridical to the

stimulus presented. While everyone experiences stressors in life, the subjective evaluation and behaviors exhibited from these appraisals are what promote psychological distress. He developed a cognitive model to explain the maintenance of such distress, which includes negative self-schemas, maladaptive beliefs and assumptions, and negative automatic thoughts (Dozois & Beck, 2008). Multiple cognitive theories expand upon Beck's insights to further elucidate the pivotal role cognitions and beliefs play in the development and maintenance of PTSD symptoms, including schema-based theory, emotional processing theory, dual representation theory, and cognitive theory (Beck et al., 2013, pp. 167–190).

The cognitive model of PTSD proposed by Ehlers and Clark (2000) highlights the impact negative appraisals have on amplifying current senses of threat after trauma. Their theory suggests that “1) individual differences in the appraisal of the trauma and/or its sequelae and 2) individual differences like the memory for the event and its link to other autobiographical memories” lead people to perceive the threats as still present. The perception of the threat as current leads to behavioral and cognitive reactions intended to reduce distress. However, these patterns prevent cognitive growth and therefore help maintain PTSD symptoms. Negative appraisals such as “nowhere is safe,” “nobody is there for me,” “my body is ruined,” and “I cannot cope with stress” can contribute to persistent trauma symptoms. The adaptation of cognitive distortions is one way that trauma survivors try to cope and emotionally regulate the aftermath of experiencing trauma (Ouhmad et al., 2023). However, these negative appraisals engender adverse emotional reactions (e.g., anxiety and depression), which can engage individuals in dysfunctional coping strategies that paradoxically maintain PTSD symptoms (Ehlers & Clark, 2000). For example, suppose a person who gets bitten by a dog believes that all dogs are dangerous and are still in danger whenever they come across one. In that case, they will

continue to respond negatively to the sight of every dog, maintaining PTSD symptoms. One study showed that the relationship between multiple traumatic event exposure and PTSD symptom severity was mediated by dysfunctional cognitions (Kube et al., 2023).

Childhood Trauma and Schema Development

There is evidence that experiencing childhood trauma leads to a greater risk of developing PTSD, distortions in cognition, and personality disorders (Arntz, 1994; Ball & Links, 2009; Gama et al., 2021; Kessler et al., 2017; Lorzangeneh & Esazadegan, 2022). From a cognitive view, schemas play an important role in how children learn and can be disrupted by the experience of traumatic events (Beck, 1979). Schemas are knowledge categories that guide interpreting information, which adapt and assimilate as new information gets integrated (Muuss, 1967). According to Jean Piaget's theory of cognitive development, children in the preoperational stage start to develop the use of symbols and schemas to communicate with the world (Piaget, 1952). However, they cannot grasp varied aspects of an object or situation as they focus on one point and the most salient attribute. They can also not logically "seriate" (i.e., organize) objects in order.

An example is a little girl who grows up with a big black dog. She develops a schema of the object "dog" represented by a big black animal. As she continues developing, she observes that dogs come in different sizes and colors. This new information becomes assimilated into her pre-existing schema of a dog. Accommodation is another adaptation process where people make new schemas or adjust their existing schema to accommodate the new information, rather than integrating the new information into the existing schema. For instance, the child points to a bear and calls it a dog. Accommodation allows the child to learn that there is another type of animal with four legs called a bear. As children become adolescents, they try to balance new and old

information using equilibration. Cognitive disequilibrium occurs when there is an imbalance in integrating new information into existing schemas (Kibler, 2011). This is an unpleasant state that can cause frustration. As human brains are constantly inundated with information, schemas are another heuristic that helps individuals process information quickly. However, children who experience trauma may try to avoid and cope with this uncomfortable feeling of disequilibrium maladaptively by developing new distorted schemas and cognitions through this recursive feedback (Cason et al., 2002; Bourdon et al., 2019). For instance, a confident child who has been abused may adopt the core belief that they are worthless, which may promote disengagement from activities and building social relationships. Individuals who experience childhood trauma may develop binary schemas of themselves or the world (e.g., “people cannot be trusted,” “everyone hates me”), and therefore may be more susceptible to dichotomous thinking in adult life as core beliefs become stable over time. Work by Gisela Labouvie-Vief (2006) and Michael Basseches (1984) highlights that dialectical thinking and pragmatism develop later during the emerging adulthood time of life (around ages 18-25).

Piaget’s pioneering concept of schemas in developmental cognitive psychology has primarily contributed to research and further theories studying the relationship between schema development and psychopathological symptoms (Capella, 2016; Dalgleish, 2004; Dozois & Beck, 2008). The theories of Aaron T. Beck (1963), Mardi J. Horowitz (1983), and Jeffrey Young (2003) incorporate the notable role of schemas into psychopathology. Beck proposed that enduring, negative self-schemas often developed in childhood maintain cognitive biases and irrational views of ourselves and the world around us (Kovacs & Beck, 1978). Horowitz (1983) proposed a schema theory of PTSD, associating trauma with cognitive overload as schemata slowly get revised to accord with reality (Jind, 2001). Jeffrey Young (2003) developed schema

therapy, which outlines early maladaptive schemas and how to treat them, especially regarding those with personality disorders such as narcissistic and borderline personality disorder (Meneguzzo et al., 2021). Suppose schemata are often developed and refined throughout childhood and adolescence, and there is an extensive reference to the importance of schemata in psychopathological symptoms. In that case, it is reasonable to believe that early exposure to trauma may impact cognition.

Mental health professionals need to be trauma-informed due to the wide prevalence of trauma vulnerability for both children and adults. Understanding the lasting effects of trauma on the way individuals perceive and judge themselves within their milieu can give clinicians further insights into how to address maladaptive symptoms. It has already been well established through the DSM-5-TR and research that trauma is linked to distortions in cognition. Therefore, it is reasonable to believe that trauma is associated with degrees of dichotomous thinking. Additionally, suppose core beliefs are developed and strengthened throughout childhood and adolescence. In that case, it is reasonable to believe that early traumatic experiences have a greater influence on an individual's cognitive development.

The Present Study

The goals of this study were to explore the research gap on the relationship between trauma exposure phenomenon and dichotomous thinking. Polarized, black-and-white thinking is prevalent in American mainstream culture (social media, news pundits). It has also been shown to be associated with emotional distress, emotional reasoning, and other psychopathological symptoms. Trauma phenomenon is a theme that emerges in literature on cognitive distortions, personality disorders, schema development, and PTSD symptoms. Traumatic event exposure is also a global human experience. Therefore, this study aimed to explore the relationship between

these two culturally relevant topics. Human cognition represents how individuals perceive the world. Therefore, addressing healthy cognitive congruency is important for mental health professionals. There is currently no research specifically investigating dichotomous thinking and how it relates to the trauma phenomenon. This study has four main hypotheses: 1) there is a positive correlation between the frequency of exposure to traumatic events and the degrees of dichotomous thinking, 2) there is a positive correlation between severity of events experienced and degrees of dichotomous thinking, 3) there is a positive correlation between posttraumatic stress symptoms and degrees of dichotomous thinking, and 4) those who experienced their first traumatic event before age 20 will have greater degrees of dichotomous thinking than those who were exposed after the age of 20. Exploring these associations contributes to a deeper understanding of the relationship between trauma phenomenon, black-and-white thinking, and psychological well-being.

Methodology

Research Design

This study employed a quantitative, cross-sectional correlational design to examine the relationship between dichotomous thinking and trauma phenomenon (PTSD symptoms, frequency of event exposure, intensity of event exposure) in college students. A correlational approach was chosen because it allows for assessing naturally occurring associations between variables without manipulation. Data was collected at a single point in time using the following validated self-report measures: the Dichotomous Thinking Inventory (DTI) to measure all-or-nothing thinking patterns, the Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) to evaluate PTSD symptom severity, a modified Trauma History Questionnaire (THQ) to document the frequency and intensity of traumatic events, and the Cognitive Distortions Questionnaire

Short Form-9 (CD-Quest-S9) to assess various cognitive distortions. Complete questionnaires can be found in Appendix B-E.

This study has four main hypotheses:

Hypothesis 1: It is hypothesized that there is a positive correlation between the frequency of traumatic event exposure and degrees of dichotomous thinking. The less one has been exposed to a traumatic event (e.g., an answer of 0 on the THQ), the less their degrees of dichotomous thinking will be as measured by the DTI. Moreover, the more traumatic events a person has been exposed to, the greater their levels of dichotomous thinking will be.

Hypothesis 2: It is hypothesized that there is a positive correlation between the degrees of traumatic event severity symptoms and the degrees of dichotomous thinking on the DTI. The higher a person scores their event severity, the greater their degrees of dichotomous thinking will be.

Hypothesis 3: It is hypothesized that there is a positive correlation between posttraumatic stress symptoms and degrees of dichotomous thinking. The more posttraumatic stress symptoms endorsed on the PCL-5, the greater the degrees of dichotomous thinking will be on the DTI.

Hypothesis 4: It is hypothesized that those who experienced their first traumatic event before age 20 will have greater degrees of dichotomous thinking than those who were exposed after the age of 20. This is due to the sensitivity of schema formation and the development of dialectical thinking.

Participants and Procedure

An anonymous online survey was created on Qualtrics and uploaded onto the University of Hawai‘i at Mānoa’s SONA system. An informed consent form was provided before each survey, and participants had to agree to proceed. No monetary compensation was provided for

taking the survey; participants could stop at any point. Inclusion criteria included being 18 years of age or older and proficiency in English. Exclusion criteria included being under 18, having less than an 8th-grade understanding of English, and failing to finish 80% of the survey. Choosing 80% allowed the collection of most data and the exploration of potential covariates that possibly affected dropout rates.

Participants were students recruited online from University of Hawai‘i at Mānoa. Based on a preliminary study examining cognitive distortions ($r^2 = .07$) with a sample size of 147, and using a G*Power analysis, the sample size needed to avoid a Type 2 error for this study is 142. This sample size was fulfilled. College students were recruited due to previous research utilizing this demographic, the convenience of obtaining data, and previously discussed theories of cognitive development. Demographic information that was collected consists of the following: Age, gender, sex, sexual orientation, ethnicity, ancestry, highest education obtained, employment status, primary language spoken, diagnosed mental condition history, and history of mental health services (yes or no).

The total number of participants collected was $N = 1061$. Eight participants were removed due to being under 18 years of age, 71 were removed for completing less than 80% of the survey, and one was removed for not understanding at least an 8th-grade level of English. The final sample consists of $N = 981$ participants with top three gender identities consisting of 75.50% women ($n = 741$), 22.40% men ($n = 220$), and 1.60% non-binary/third gender ($n = 16$), with ages ranging from 18 to 49 years ($M = 19.91$, $SD = 3.34$). Most participants were 18 ($n = 358$), making up 36.49% of the participants, followed by 19-year-olds, making up 25.90% ($n = 254$), and 20-year-olds, making up 14.50% ($n = 142$). Participants were 76.50% heterosexual ($n = 750$) followed by bi-sexual, making up 16% ($n = 157$) of data. 84.50% of participants were

non-Hispanic/Latino ($n = 829$), 82.80% reported having at most a high school diploma ($n = 812$), 48.60% were employed part-time ($n = 477$), followed by 46.60% of participants being unemployed ($n = 457$). 84.40% were born in the United States ($n = 916$). 50.40% had not received mental health services ($n = 494$), with 49.60% having received services ($n = 487$). 9.90% ($n = 97$) of participants had no diagnosed mental health condition despite having received mental health services, 8.30% ($n = 81$) had comorbid depression and anxiety, and 4.80% ($n = 47$) had anxiety. Single ancestries consisted of 60.35% of the participants ($n = 592$), 23.45% bi-racial ($n = 230$), and 16.21% multi-racial (3 or more) ($n = 159$). 23.10% of single ancestry participants identified as European (including Portuguese) ($n = 227$), followed by 12.00% Filipino ($n = 118$), and 8.20% Continental Asian (Ex, Korean, Chinese, Indian) ($n = 82$). 94.3% of participants reported primarily speaking English ($n = 925$). Full participant data can be found in Appendix G.

Materials

Survey Instruments

Posttraumatic Stress Disorder Checklist-5 (PCL-5) - Revised

The Posttraumatic Stress Disorder Checklist (PCL), a widely used tool for the assessment of PTSD symptoms, was amended in 2015 to meet the criteria for PTSD symptoms according to the DSM-5 (Blevins et al., 2015). This updated, self-report PCL checklist (PCL-5) without criterion A is used in this study to measure symptoms of posttraumatic stress. The PCL-5 is one of the most widely used scales to measure PTSD symptom severity and has been translated into different languages, showing strong psychometric properties (Ashbaugh et al., 2016; Islam et al., 2022; Krüger-Gottschalk et al., 2017). It measures the four cluster symptoms of PTSD: intrusion/re-experiencing (cluster B items 1-5), avoidance (cluster C items 6-7), negative alterations in cognition and mood (cluster D items 8-14), and alterations in arousal (cluster E

items 15-20). In a study of American college students, the PCL-5 showed strong internal consistency with Cronbach's $\alpha = .94$, test-retest reliability $r = .82$, and convergent ($r_s = .74$ to $.85$) and discriminant ($r_s = .31$ to $.60$) validity (Blevins et al., 2015). It is a 20-question, 5-point Likert-type scale questionnaire with answer options (0) none at all, (1) a little bit, (2) moderately, (3) quite a bit, and (4) extremely. The PCL-5 can be scored by adding the total scores (0-80) with a suggested cut-off of 31-33 for probable PTSD diagnoses or by summing the cluster groups (U.S. Department of Veterans Affairs, 2022). This scale was revised by removing the inclusion of keeping one specific event in mind while completing the questionnaire to generalize symptoms beyond single-event trauma exposure, such as what is represented in the Post-Traumatic Stress Disorder Checklist - Civilian Version (PCL-C). The wording was also edited to represent this generalization.

A reliability analysis was conducted for the PCL-5 to assess internal consistency. The scale demonstrated a Cronbach $\alpha = 0.95$, indicating excellent reliability. Examination of the 'Alpha if Item Deleted' values suggested that all items contributed positively to internal consistency. Descriptive statistics can be found in Appendix H.

Trauma History Questionnaire (THQ) - Revised

The Trauma History Questionnaire (THQ) is a self-report measure of exposure to various traumatic events. It is divided into three subscales: crime-related events (4 items), general disaster and trauma (13 items), and physical and sexual experiences (6 items) (Hooper et al., 2011). It is a widely used scale that has been translated into multiple languages. It has 24 items using a yes/no answer format. For items that have been experienced, users are asked to denote their age at the time of the event and the frequency of said event. For the physical and sexual experiences, the subject is asked whether the experience was repeated, along with the age and

approximate times the experience occurred. There is an “other” question (“Have you experienced any other extraordinary stressful situation or event that is not covered? If yes, please specify.”) that allows participants to report any extraordinary stressful situation that was not covered in the other items. The THQ was designed for general, community, and clinical populations. While the THQ is not founded in any specific theory, it is based on dimensions of trauma outlined by Bonnie L. Green (1993) and developed with other omnibus trauma inventories in mind. Due to the THQ being a data collection method and not a test, there is no standard scoring method. However, the totals of the 24 items and/or the subscale scores (e.g., crime-related events) are often collected. Interrater reliability between the THQ and Clinician-Administered Posttraumatic Stress Disorder Scale (CAPS) was high, along with test-retest reliability (Mueser et al., 2001).

The THQ was modified for this study to include measures of event intensity. Event intensity is difficult to define and quantify outside the immediate level of arousal and distress experienced when the event(s) occurred (Ganzel et al., 2007). Referencing Lauterbach & Vrana’s (2001) study, the intensity of events was measured using an additional 4-question sliding scale (from 0-100) that follows with each event endorsed on the THQ. This scale assesses: (1) the severity of injuries, (2) if they felt their life was in danger, (3) how emotionally disturbing/distressing the event was at the time, and (4) how emotionally disturbing/distressing the event is currently. For instance, if a participant endorsed yes to the question, “Has anyone ever tried to take something directly from you by using force or the threat of force, such as a stick-up or mugging?”, the following 4-question intensity scale would follow. Scores were added together and averaged out to get a final intensity sum.

A reliability analysis was conducted for the THQ to assess internal consistency. The scale demonstrated a Cronbach $\alpha = 0.72$, indicating acceptable reliability. Examination of the 'Alpha if

Item Deleted' values suggested that all items contributed positively to internal consistency.

Descriptive statistics can be found in Appendix H.

Dichotomous Thinking Inventory (DTI)

The 15-item Dichotomous Thinking Inventory (DTI) will be used to measure dichotomous thinking. This questionnaire was developed by Atsushi Oshio (2009) to apply to general populations (rather than strictly clinical populations) in psychological studies. It is a 6-point Likert-type scale measurement that contains three subscales: preference for dichotomy (5 items), dichotomous beliefs (5 items), and profit-and-loss thinking (5 items). A 6-point scale was deemed appropriate by the author because there is no middle point. Therefore, participants must endorse an opinion. The response options are as follows: (1) strongly disagree, (2) disagree, (3) slightly disagree, (4) slightly agree, (5) agree, (6) strongly agree, with higher scores/greater endorsement indicating greater dichotomous thinking. The scale has a Cronbach $\alpha = .84$ with a test-retest reliability of .81. The lowest possible score is 15 while the highest is 90. The DTI has shown positive correlations with borderline personality disorder and narcissism.

A reliability analysis was conducted for the DTI to assess internal consistency. The scale demonstrated a Cronbach $\alpha = .87$, indicating good reliability. Examination of the 'Alpha if Item Deleted' values suggested that all items contributed positively to internal consistency.

Descriptive statistics can be found in Appendix H.

Cognitive Distortions Questionnaire Short Form-9 (CD-Quest-S9)

The CD-Quest-S9 is a short-form adaptation of the original 15-item CD-Quest created by Irismar Reis de Oliveira, MD, PhD (2014, 2015). The CD-Quest-S9 was validated in an undergraduate student population and also in a clinical sample of patients with depression in Brazil (N = 62); patients with social anxiety disorder in the US (N = 198); and psychiatric

outpatients in Turkey (N = 269). Each item is rated on a 5-point Likert scale (0 to 4), with total scores ranging from 0 to 36, where higher scores indicate greater cognitive distortions. The S9 version captures key maladaptive thinking styles, including catastrophizing, overgeneralization, labeling, and emotional reasoning. Psychometric validation studies have shown that the CD-Quest-S9 maintains strong internal consistency (Cronbach's $\alpha > 0.85$) and correlates significantly with measures of depression and anxiety ($r > 0.60$). Factor analyses confirm that the nine items effectively represent a single underlying construct of cognitive distortions, supporting its validity.

The CD-Quest-S9 was modified in this study to include a sliding scale model to measure intensity from 0-100 rather than the original Likert-type matrix with three selections (a little (up to 30%), much (31% to 70%), very much (more than 70%)).

A reliability analysis was conducted for the CD-Quest-S9, which consisted of 18 items (9 measuring frequency and 9 measuring intensity). The standardized form of Cronbach's α was 0.91, indicating excellent internal consistency. This standardized α was used because the scale items were measured on different response formats. Examination of the 'Alpha if Item Deleted' values suggested that all items contributed positively to internal consistency. Descriptive statistics can be found in Appendix H.

Results

Hypothesis Testing

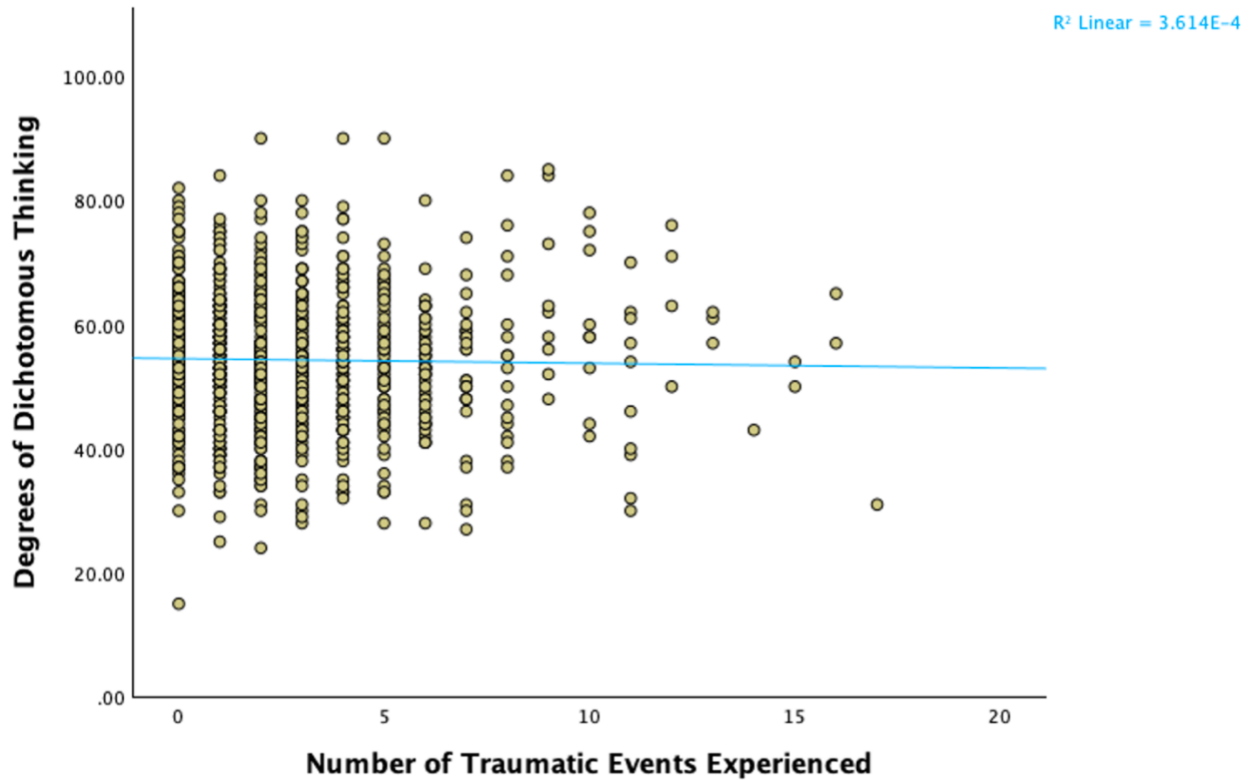
Hypothesis 1

The results for hypothesis 1 utilized a Pearson correlation to reveal [$r(978) = -0.02, p < 0.55$] as shown in Figure 1. The analysis between the DTI sums and the THQ sums revealed a negligible negative relationship. This correlation was not statistically significant. The sample

size was substantial, consisting of 978 participants. These findings suggest that there is no meaningful association between degrees of dichotomous thinking and frequency of traumatic event exposure in this sample.

Figure 1

Scatter Plot Comparing DTI Sums and THQ Sums

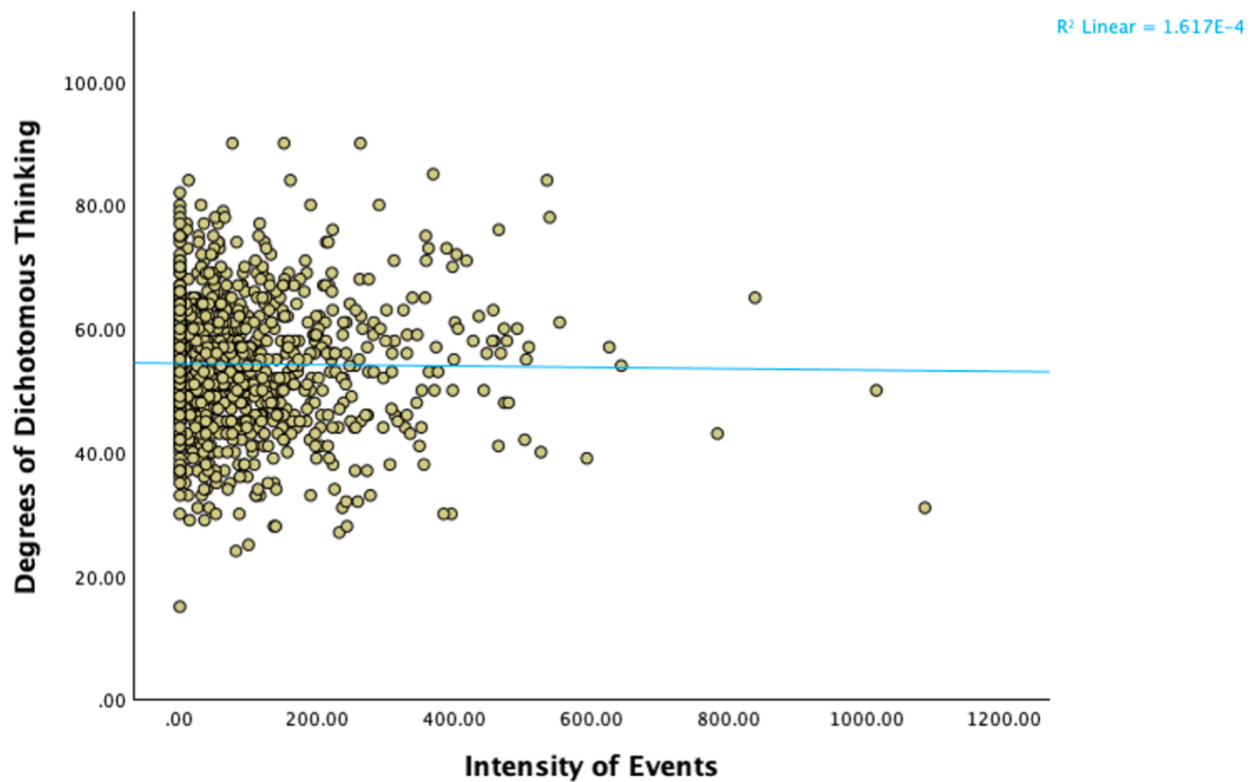


Hypothesis 2

The results for hypothesis 2 utilized a Pearson correlation to reveal [$r(981) = -0.013, p = 0.70$] as shown in Figure 2. This indicates a non-statistically significant linear relationship between the intensity of the endorsed traumatic events and the degrees of dichotomous thinking.

Figure 2

Scatter Plot Comparing DTI Sums and THQ Intensity Sums

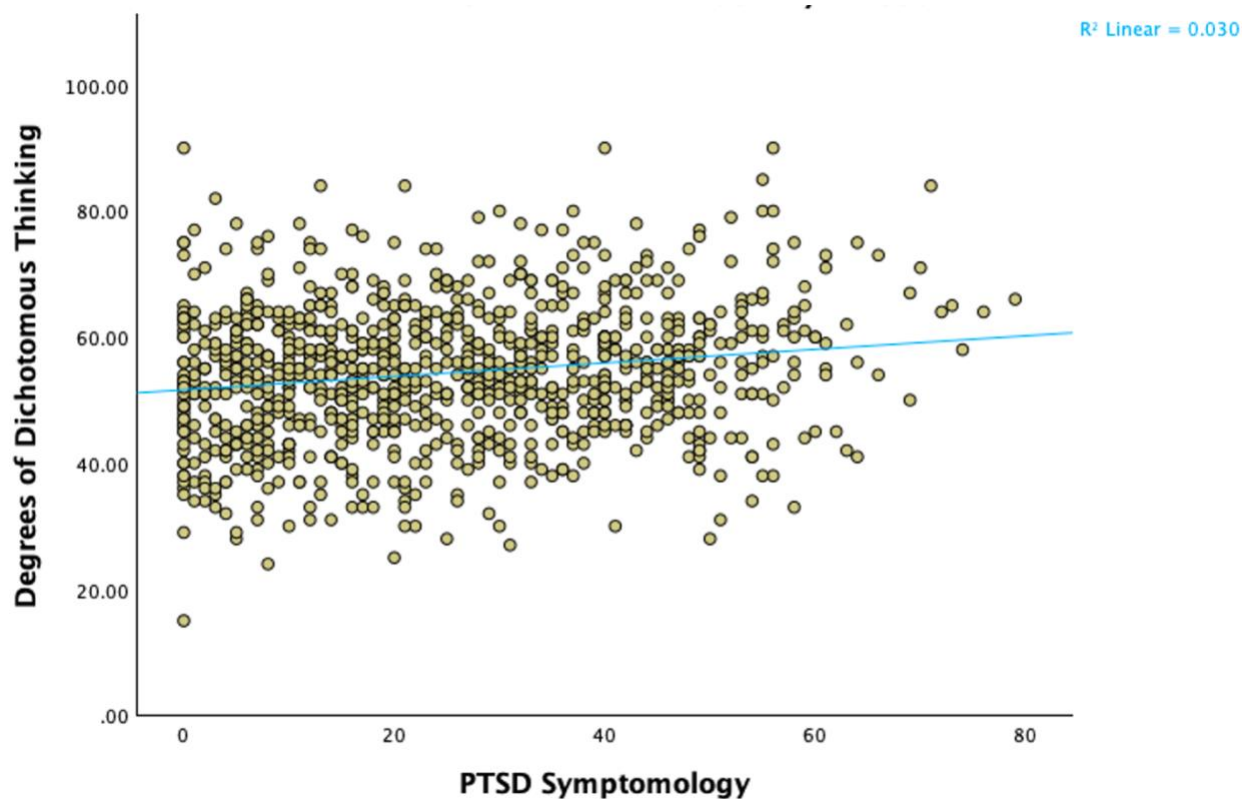


Hypothesis 3

A simple linear regression analysis was conducted and revealed a statistically significant, positive correlation as shown in Figure 3 ($F(1,973) = 30.49, p = <0.001$). The R^2 was .03, indicating that PTSD symptoms explained approximately 3% of the variance in dichotomous thinking. The regression equation was $DTI\ sums = 51.63 + 0.11(PCL-5\ sums)$. For each one-point increase in PCL-5 scores, the predicted DTI scores increased by approximately $B = 0.11$ points. Confidence intervals indicate that we can be 95% certain that the slope to predict DTI scores from PTSD scores is between 0.07 and 0.145. Six hundred and six participants (61.80%) scored under the sub-clinical range of PTSD (31 under), and 369 participants (37.60%) scored over.

Figure 3

Scatter Plot Comparing DTI Sums and PCL-5 Sums

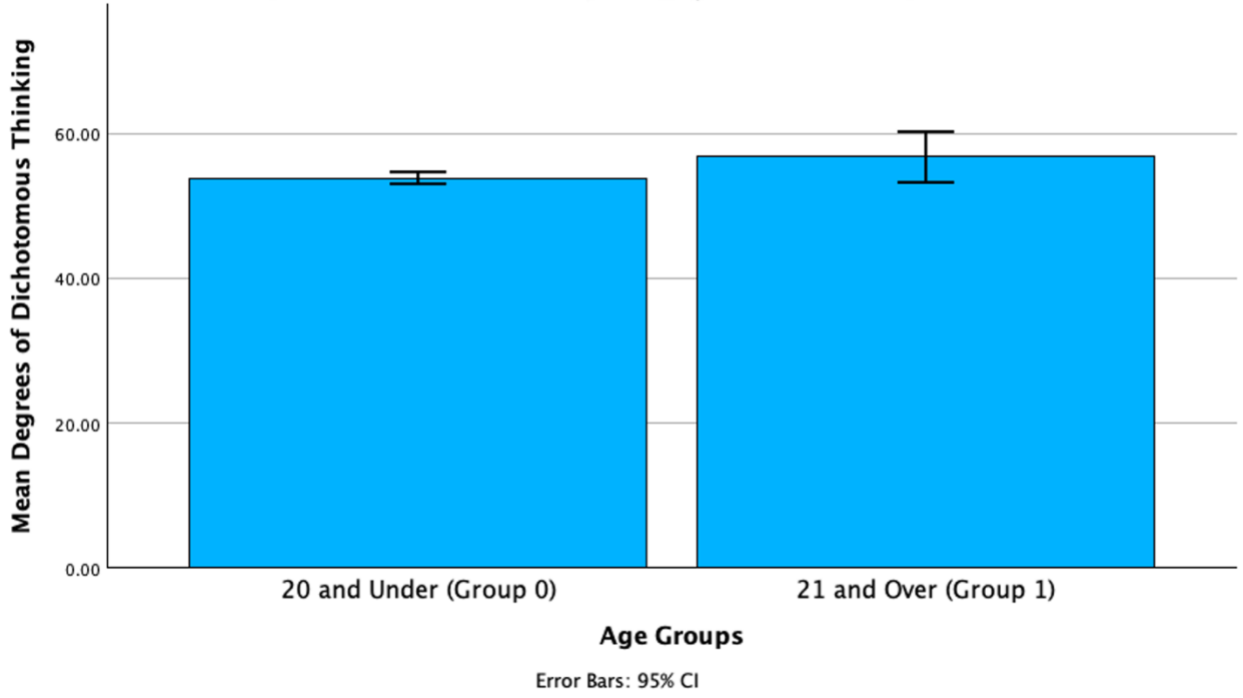


Hypothesis 4

The results for hypothesis 4 utilized a one-tailed independent samples T-test to compare mean DTI scores between participants who experienced a traumatic event at age 20 or younger (group 0) and participants 21 or older (group 1). The results showed a non-significant difference as shown in Figure 4, $t(731) = -1.40$, $p = 0.92$ (one-tailed), with group 0 ($M = 53.87$, $SD = 10.85$) and group 1 ($M = 56.78$, $SD = 8.86$). Shapiro-Wilks test confirmed DTI sums are normally distributed ($p = 0.06$, $w = 1.00$). Group 1 had more variance ($SEM = 1.70$) than group 0 ($SEM = 0.41$).

Figure 4

Bar Graph Comparing Mean Scores of Dichotomous Thinking and Age Groups



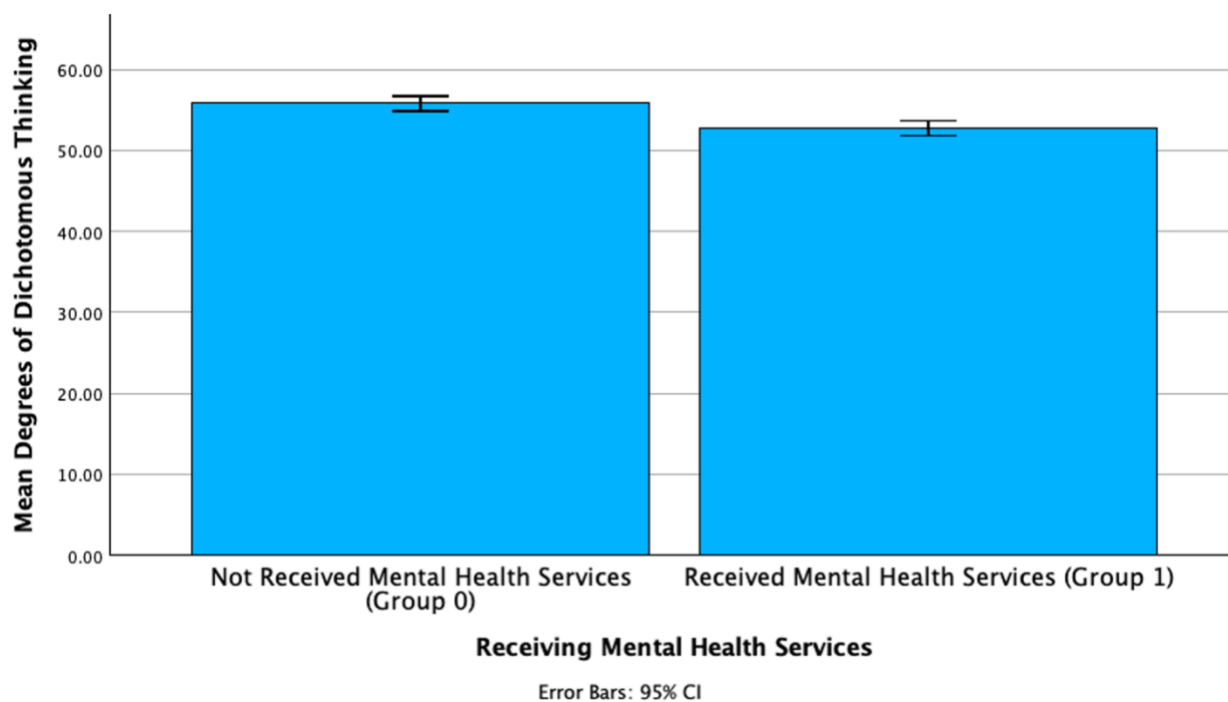
Post-Hoc Exploratory Analyses

Post-Hoc Exploratory Analyses 1

A post-hoc Kendall's Tau correlation analysis was run between DTI scores and mental health services to reveal [$r(981) = -0.12, p < 0.001$] as shown in Figure 5. The analysis suggests there is a slight negative correlation between dichotomous thinking and receiving mental health services.

Figure 5

Bar Graph Comparing DTI Sums and Utilization of Mental Health Services



Simple linear regression analysis was conducted to evaluate the extent to which receiving mental health services could predict dichotomous thinking. A significant regression was found ($F(1,979) = 10.40, p = <0.001$). The R^2 was 0.02, indicating that receiving mental health services explained approximately 2% of the variance in dichotomous thinking. The regression equation was $DTI\ sums = 55.79 + -3.05(\text{receiving mental health services})$. For every endorsement of

receiving mental health services, the predicted DTI scores decreased by approximately $B = -3.05$ points. Confidence intervals indicate that we can be 95% certain that the slope to predict DTI scores from mental health endorsement is between -4.38 and -1.72.

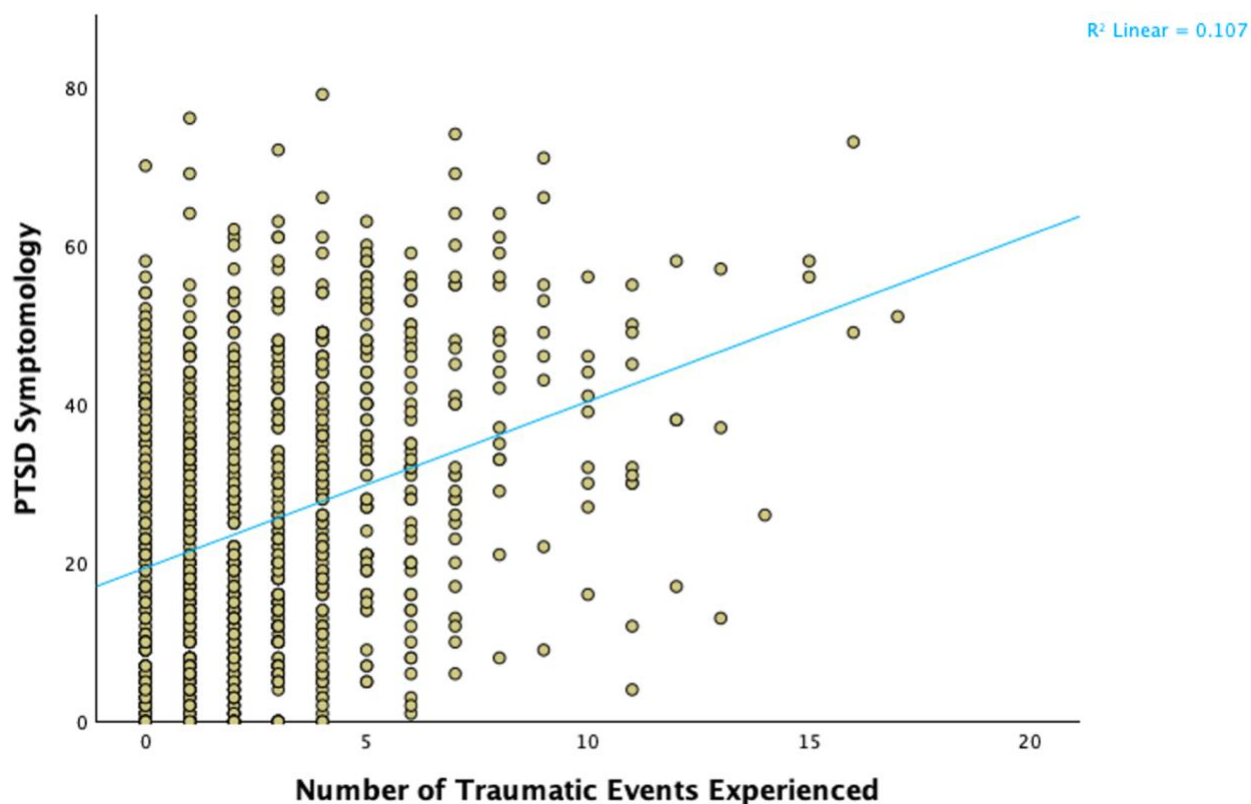
Post-Hoc Exploratory Analyses 2

A post-hoc correlation analysis was run between PCL-5 sums and THQ sums to reveal [$r(974) = 0.33, p < 0.001$] as shown in Figure 6. The analysis revealed a low positive correlation with a statistically significant relationship, indicating that greater PTSD symptoms are associated with more traumatic event exposure.

Simple linear regression analysis was conducted to evaluate the extent to which traumatic event exposure could predict PTSD symptoms. A significant regression was found ($F(1,972) = 116.45, p = <0.001$). The R^2 was 0.11, indicating that traumatic event exposure explained approximately 11% of the variance in PTSD symptoms. The regression equation was $\text{PCL-5 sums} = 19.34 + 2.10 (\text{THQ sums})$. For each event endorsement increase on the THQ scale, the predicted PCL-5 scores increased by approximately $B = 2.10$ points. Confidence intervals indicate that we can be 95% certain that the slope to predict PCL-5 scores from THQ scores is between 1.72 and 2.59.

Figure 6

Scatter Plot Comparing PCL-5 Sums and THQ Sums



Post-Hoc Exploratory Analyses 3

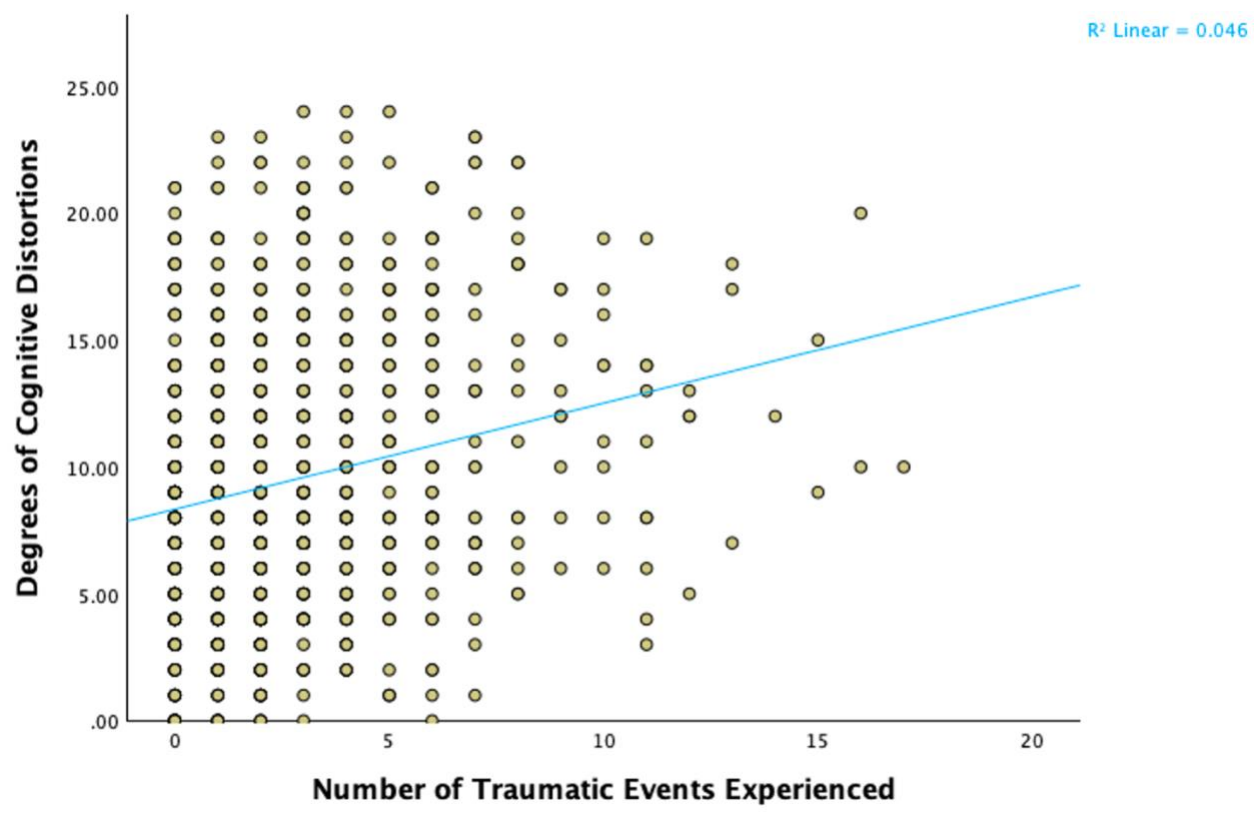
A post-hoc correlation analysis was run between CD-Quest-S9 sums and THQ sums to reveal [$r(978) = 0.21, p < 0.001$] as shown in Figure 7. The analysis revealed a low positive correlation with a statistically significant relationship, indicating that greater endorsement of cognitive distortions is associated with more traumatic event exposure.

Simple linear regression analysis was conducted to evaluate the extent to which traumatic event exposure could predict degrees of distorted cognition. A significant regression was found ($F(1,976) = 46.56, p < 0.001$). The R^2 was 0.05, indicating that traumatic event exposure explained approximately 5% of the variance in cognitive distortions. The regression equation

was $CD\text{-}Quest\text{-}S9 \text{ sums} = 8.33 + .49 (\text{THQ sums})$. For each event endorsement increase on the THQ scale, the predicted CD-Quest-S9 scores increased by approximately $B = .42$ points. Confidence intervals indicate that we can be 95% certain that the slope to predict CD-Quest-S9 scores from THQ scores is between 0.30 and 0.54.

Figure 7

Scatter Plot Comparing CD-Quest-S9 Sums and THQ Sums



Discussion

The lack of significant correlation results between degrees of dichotomous thinking, number of traumatic event exposures, and event severity scores is contrary to cognitive theories that posit trauma phenomena have a relationship with cognitive distortions. On average, participants showed moderate dichotomous thinking, with scores slightly above the Dichotomous Thinking Inventory's midpoint. The standard deviation showed considerable variation among scores. The data distribution was clustered around 0-5 traumatic event endorsements, and the vertical spread shows that participants who endorsed the same number of events varied in their degrees of dichotomous thinking. Event intensity scores were also heavily clustered to the left, indicating relatively low to moderate severity scores with variable degrees of dichotomous thinking. Even at higher event intensities, people vary in their thinking styles.

However, in alignment with previous research (Daniels et al., 2011; Frans et al., 2005; Hagnaars et al., 2011; Priebe et al., 2018; Scott, 2007), post-hoc analyses show significant correlations between overall cognitive distortions, PTSD symptoms, and the number of traumatic event endorsements. So while dichotomous thinking did not correlate with the number of traumatic event endorsements, the number of traumatic event endorsements and PTSD symptoms were significantly correlated and PTSD symptoms were significantly correlated with dichotomous thinking. These null findings suggest that these trauma phenomena may not be a direct driver of dichotomous thinking styles in this nonclinical student sample. The development of rigid thinking depends less on exposure alone and perhaps more on individual differences in information processing, such as attentional bias toward threat, or on secondary psychological processes, including rumination and memory fragmentation. For instance, Beck's (1971) cognitive model emphasizes that traumatic events activate maladaptive core beliefs. However,

the data imply that mere exposure or subjective distress intensity may not alter deep-seated schemas without intermediary factors (e.g., social support, resilience, stress tolerance, media consumption, mental health interventions). Post-hoc analyses showed that receiving mental health benefits significantly negatively correlated with degrees of dichotomous thinking. Perhaps the relationship between trauma and dichotomous thinking is nonlinear or moderated by mental health factors that promote psychological flexibility. The slight variance suggests that other factors play a role in dialectical thinking. However, the reduction in dichotomous thinking scores was moderate for those who had sought mental health services.

The significant correlation found between degrees of dichotomous thinking and PTSD symptoms aligns with existing literature that indicates cognitive styles are associated with emotional and psychological outcomes (Ben-Zion et al., 2018; Ehlers & Clark, 2000; Daniels et al., 2011; Ouhmad et al., 2023). It also supports the idea that the development of black-and-white thinking depends less on exposure alone and more on secondary psychological processes. It is not mere exposure to or perceived severity of traumatic events that relates to rigid cognitive styles, but rather the degree to which those events continue to produce PTSD symptoms. The weak significance also emphasizes that dichotomous thinking is not the sole contributor to PTSD symptomatology. The slight correlation may indicate that other factors, such as individual coping strategies, resilience, and social support systems, might play a significant role in the development and maintenance of PTSD symptoms. Data imply that schema activation may only manifest as dichotomous thinking when symptoms like hypervigilance, intrusive recollections, and emotional numbing are sufficiently elevated. Ongoing posttraumatic distress, rather than past trauma, appears to underlie black-and-white cognitive patterns. While the average scores on the PCL-5 were sub-clinical, there was a significant variance among scores, with more than a third

falling into the clinical range. Thus, the significant PCL-5 correlation underscores that those individuals with elevated symptoms are associated with rigid thinking, even if they did not necessarily endorse a high number or intensity of past events.

The non-significant correlation between the age of traumatic event exposure and degrees of dichotomous thinking is contrary to previous research and theories (Arntz, 1994; Ball & Links, 2009; Gama et al., 2021; Kessler et al., 2017; Labouvie-Vief, 2006; Lorzangeneh & Esazadegan, 2022; Perry, 1970). The mean scores of dichotomous thinking were greater in the older population, suggesting that, on average, they report greater degrees of dichotomous thinking. However, the variance is larger in this group, possibly due to a low sample size. These findings suggest that the timing of trauma exposure may not be a strong predictor of dichotomous thinking. One possible explanation is that dichotomous thinking tendencies are shaped by a variety of factors beyond the age of trauma, such as personality traits, coping mechanisms, culture, or parent attachment styles. Additionally, the small sample size for the 21 and over group may limit the ability to detect meaningful effects.

Limitations and Future Directions

Limitations of this study included the use of categorical variables with no clear definition due to free response options on the THQ. Responses such as “many,” “frequently,” and “often” are examples of unquantifiable responses when determining the frequency of a specific event. Therefore, a general sum of each event type endorsement was utilized to determine the frequency of event exposure. This only captures whether someone had endorsed yes or no to experiencing a particular event, not how often that event was experienced specifically. Future studies can adjust the THQ to only allow numerical inputs for how many times an individual experienced a particular event and remove the free response option.

Although bivariate correlations were non-significant, future research could explore the relationships among these variables using Structural Equation Modeling (SEM) to assess potential indirect effects and account for multiple predictors simultaneously. SEM would allow for a more nuanced understanding of how variables interact and contribute to variance in degrees of dichotomous thinking. Future research could also explore additional variables (e.g., mindfulness, resilience, coping styles, social support) that may affect the relationship between these constructs, thereby providing a more in-depth understanding of the interplay between cognitive styles and trauma phenomenon. Utilizing the mental health data collected in this survey and the post-hoc significant result found between dichotomous and receiving mental health services, future research could look at whether mental health variables affect the relationship between dichotomous thinking and traumatic event exposure.

The study's cross-sectional and self-report design limits causal conclusions and raises the possibility of response bias. Future longitudinal research should examine whether access to mental health resources predicts reductions in both PTSD symptoms and dichotomous thinking over time. Moreover, experimental designs could test whether interventions that enhance mental health access directly lead to improved cognitive flexibility among trauma-exposed populations. Expanding the sample beyond college students to include more clinically severe or underserved groups would further clarify generalizability.

Future research should aim to explore the mechanisms underlying the relationship between dichotomous thinking and PTSD. Looking at whether dichotomous thinking is a moderating variable between longitudinal studies could provide insights into the directionality of this link, while intervention studies could assess whether cognitive restructuring techniques targeting dichotomous thinking led to reductions in PTSD symptoms. Investigating additional

mediating and moderating variables, such as emotional regulation, mental health variables, and trauma type, will enhance our understanding of the interplay between cognitive styles and PTSD, ultimately informing more effective treatment approaches.

Another limitation of this study was the small sample size of people who experienced their first traumatic event at the age of 21 or older. Future studies should consider conducting bootstrapped resampling techniques to address the imbalance in sample sizes and evaluate whether the observed effect remains consistent across different subsamples. Randomly sampling smaller groups (e.g., $n = 27$) from the larger population and comparing them to the smaller group may help determine whether the observed difference is influenced by sample size limitations.

Conclusion

This study found that neither the number of traumatic events experienced, age, nor the intensity of trauma is associated with dichotomous thinking in this sample. However, there was a significant relationship between PTSD symptoms and degrees of dichotomous thinking. These findings suggest that it is not the occurrence, age, or severity of traumatic events themselves that are associated with rigid cognitive styles, but rather the ongoing psychological distress those events engender and the way people respond to them. This is consistent with cognitive-behavioral theories, which posit that trauma is associated with maladaptive core beliefs and cognitive distortions when left unresolved. Notably, the significant negative association between access to mental health benefits and dichotomous thinking points to a potential buffering effect: individuals who have support for mental health needs may be correlated with experiencing fewer rigid, extreme thought patterns, possibly through earlier intervention, coping skills training, or symptom reduction. These results refine cognitive-trauma frameworks by highlighting posttraumatic symptom severity as the proximal cognitive vulnerability factor, rather than trauma

exposure alone. Models should therefore integrate symptom-driven mechanisms, such as persistent negative appraisals, threat-focused attentional biases, and emotion-regulation deficits, that may mediate the trauma to rigidity pathway. Helping people see beyond the binary and think dialectically is a principal focus for those in the mental health field to consider helping survivors of traumatic experiences reduce negative symptoms and increase veridical cognitions.

Understanding the relationship between trauma phenomena and how it relates to cognition is important for clinicians to identify cognitive patterns in patients and the essence of their distortions. For instance, if an individual shows dichotomous thinking, it is helpful to further assess for PTSD symptoms and vice versa. Findings underscore the importance of screening for PTSD symptoms, not just trauma history, when assessing cognitive rigidity.

Furthermore, increasing access to mental health resources could serve not only to reduce PTSD symptoms but also to promote more flexible, adaptive thinking patterns. Interventions focusing on symptom reduction (e.g., cognitive processing therapy, exposure therapies) alongside cognitive flexibility training (e.g., mindfulness, decentering techniques) may be especially effective for trauma-affected individuals, particularly those with historically limited access to mental health services. Interventions targeting PTSD symptoms (e.g., cognitive processing therapy, prolonged exposure) may have the added benefit of reducing dichotomous thinking by ameliorating intrusive memories and maladaptive beliefs. Moreover, adjunctive strategies that bolster cognitive flexibility (e.g., mindfulness, decentering exercises) may be particularly valuable for those with subthreshold but clinically relevant symptom clusters.

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Appendix

Appendix A: Informed Consent

Informed Consent for an Anonymous Online Survey

Study Title: Exploring the Relationship Between Adverse Life Experiences and Ways of Thinking

Purpose of the Study: You are invited to participate in a research study examining the relationship between unpleasant life experiences and ways of thinking. You must be at least 18 years of age to participate.

Procedures: If you choose to participate, you will answer some questions about your past exposure to certain unpleasant life events and current ways of thinking. The study is expected to take approximately 15-30 minutes.

Potential Risks and Benefits: The questions may bring up uncomfortable memories. Otherwise, it is unlikely that you will experience any risks or discomforts beyond what would be experienced in everyday life by participating. There are no specific benefits associated with participating.

Wellness Resources: The following links provide lists of resources that you can contact if you feel stressed, overwhelmed, or uncomfortable after answering the questions in this survey. In addition to these listed supports, you may also call Hawai'i CARES at 800-753-6879 or text 988.

Hawai'i CARES 988 Resource Library: <https://hicares.hawaii.gov/resources/resource-library/>

Provides a list of resources for a variety of groups, including families, Native Hawaiians, and teens. Mental Health America Hawai'i: <https://mentalhealthhawaii.org/help/> Provides a list of agencies and services that participants can reach out to for mental health support. Please feel free to screenshot these resources. They will also re-appear at the end of the survey.

Compensation: No monetary compensation will be provided.

Confidentiality: The data collected in this study is completely anonymous. No personally identifiable information will be collected and the information you choose to provide in this study cannot be connected back to you. Results from this study may be published or presented at research conferences, and the anonymous data may be shared with other researchers through an online data repository.

Voluntary Participation: Your participation in this study is voluntary and you may choose to not participate or end your participation at any time without penalty.

Questions or Concerns: If you have any questions or comments about this study, you may contact the researcher: Juyeon Suh, Masters Candidate in Counseling Psychology, 808-224-1592, juyeons@hawaii.edu For questions regarding your rights as a participant in this research or IRB approval, contact Dr. Steven Herman, Professor of Psychology, IRB Chair, at 510-255-1083, or by email at hermans@hawaii.edu.

Consent: I have read and understand the above consent form. I certify that I am 18 years old or older.

By clicking the next button to enter the survey, I indicate my willingness to voluntarily take part in this study.

Appendix B: Demographics Form

1. Age: _____
2. Gender: Man _____ Woman _____ Non-Binary/Third Gender _____ Prefer to Self Describe _____
3. Sex: Male _____ Female _____ Trans-Male _____ Trans-Female _____ Prefer Not to Say _____
4. Sexual Orientation: Heterosexual/Straight _____ Gay/Lesbian _____ Bisexual _____ Prefer to Self Describe _____
5. Ethnic Category: Hispanic or Latino _____ Not Hispanic or Latino _____
6. Family Ancestry (select all that apply):
 - _____ European (including Portuguese)
 - _____ African (Ex: Igbo, Somali, Yoruba)
 - _____ Native American (Ex: Navajo, Cherokee, Choctaw)
 - _____ Filipino
 - _____ Latino (Ex: South/Central American, Puerto Rican, Cuban)
 - _____ Continental Asian (Ex: Korean, Chinese, Indian)
 - _____ Japanese
 - _____ Hawaiian
 - _____ Pacific Islander (other than Hawaiian)
 - _____ Other: _____
7. Choose the number of the highest level of education you have completed.
 1. Less than 12 years (number of years completed): _____
 2. GED (state your age when you completed it): _____

3. High school diploma
4. Technical / Vocational / Trade school diploma or certificate
5. College Freshman
6. College Sophomore / Associate's degree
7. College Junior
8. Bachelor's degree
9. Master's degree
10. J.D., M.D., or Ph.D.

8. What is your primary language? (Please put an X to indicate):

English ___ Other: _____

9. Do you have at least an 8th-grade understanding of the English language?

Yes ___ No ___

9. Marital Status: Single ___ Married ___ Domestic Partnership ___

10. Employment Status: Not Currently Employed ___ Part-Time Employment ___ Full-Time
Employment ___ Self-Employed ___

11. Diagnosed Mental Condition History: Depression ___ Anxiety ___ Personality

Disorder ___ Schizophrenia ___ Eating Disorder ___ Posttraumatic Stress

Disorder ___ None ___ Other ___ Unsure ___

12. Have you ever received mental health therapy from a licensed psychologist or mental health
counselor?: Yes ___ No ___

Appendix C: PCL-5 - Revised

Instructions: Below is a list of problems that people sometimes have in response to very stressful experiences. Please read each problem carefully and then select one of the numbers to indicate how much you have been bothered by that problem in the past month.

In the past month, how much were you bothered by:	Not at all	A little bit	Moderately	Quite a Bit	Extremely
Repeated, disturbing, and unwanted memories of a stressful experience?	0	1	2	3	4
Repeated, disturbing dreams of a stressful experience?	0	1	2	3	4
Suddenly feeling or acting as if a stressful experience were actually happening again (as if you were actually back there reliving it)?	0	1	2	3	4
Feeling very upset when something reminded you of a stressful experience?	0	1	2	3	4
Having strong physical reactions when something reminded you of a stressful experience (for example, heart pounding, trouble breathing, sweating)?	0	1	2	3	4
Avoiding memories, thoughts, or feelings related to a stressful experience?	0	1	2	3	4
Avoiding external reminders of a stressful experience (for example, people, places, conversations, activities, objects, or situations)?	0	1	2	3	4

Trouble remembering important parts of a stressful experience?	0	1	2	3	4
Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?	0	1	2	3	4
Blaming yourself or someone else for a stressful experience or what happened after it?	0	1	2	3	4
Having strong negative feelings such as fear, horror, anger, guilt, or shame?	0	1	2	3	4
Loss of interest in activities that you used to enjoy?	0	1	2	3	4
Feeling distant or cut off from other people?	0	1	2	3	4
Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?	0	1	2	3	4
Irritable behavior, angry outbursts, or acting aggressively?	0	1	2	3	4
Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
Being “superalert” or watchful or on guard?	0	1	2	3	4
Feeling jumpy or easily startled?	0	1	2	3	4
Having difficulty	0	1	2	3	4

concentrating?					
Trouble falling or staying asleep?	0	1	2	3	4

Appendix D: THQ

The following is a series of questions about serious or traumatic life events. These types of events actually occur with some regularity, although we would like to believe they are rare, and they affect how people feel about, react to, and/or think about things subsequently. Knowing about the occurrence of such events, and reactions to them, will help us to develop programs for prevention, education, and other services. The questionnaire is divided into questions covering crime experiences, general disaster and trauma questions, and questions about physical and sexual experiences.

For each event, please indicate (circle) whether it happened and, if it did, the number of times and your approximate age when it happened (give your best guess if you are not sure). Also note the nature of your relationship to the person involved and the specific nature of the event, if appropriate.

Crime Related Events		Circle one		If you circled yes, please indicate	
				Number of times	Approximate age(s)
1	Has anyone ever tried to take something directly from you by using force or the threat of force, such as a stick-up or mugging?	no	yes		
2	Has anyone ever attempted to rob you or actually robbed you (i.e., stolen your personal belongings)?	no	yes		

3	Has anyone ever attempted to or succeeded in breaking into your home when you were not there?	no	yes		
4	Has anyone ever attempted to or succeeded in breaking into your home while you were there?	no	yes		
General Disaster and Trauma		Circle one		If you circled yes, please indicate	
				Number of times	Approximate age(s)
5	Have you ever had a serious accident at work, in a car, or somewhere else? (If yes, please specify below) _____	no	yes		
6	Have you ever experienced a natural disaster such as a tornado, hurricane, flood or major earthquake, etc., where you felt you or your loved ones were in danger of death or injury? (If yes, please specify below) _____	no	yes		
7	Have you ever experienced a “man-made” disaster such as a train crash, building collapse, bank robbery, fire, etc., where you felt you or your loved ones were in danger of death or injury? (If yes, please specify below) _____	no	yes		
8	Have you ever been exposed to dangerous chemicals or radioactivity that might threaten your health?	no	yes		
9	Have you ever been in any other situation in which you were seriously injured? (If yes, please specify below) _____	no	yes		
10	Have you ever been in any other situation in which you feared you might be killed or seriously injured? (If	no	yes		

	yes, please specify below) _____				
11	Have you ever seen someone seriously injured or killed? (If yes, please specify who below) _____	no	yes		
12	Have you ever seen dead bodies (other than at a funeral) or had to handle dead bodies for any reason? (If yes, please specify below) _____	no	yes		
13	Have you ever had a close friend or family member murdered, or killed by a drunk driver? (If yes, please specify relationship [e.g., mother, grandson, etc.] below) _____	no	yes		
14	Have you ever had a spouse, romantic partner, or child die? (If yes, please specify relationship below) _____	no	yes		
15	Have you ever had a serious or life-threatening illness? (If yes, please specify below) _____	no	yes		
16	Have you ever received news of a serious injury, life-threatening illness, or unexpected death of someone close to you? (If yes, please indicate below) _____	no	yes		
17	Have you ever had to engage in combat while in military service in an official or unofficial war zone? (If yes, please indicate where below) _____	no	yes		
Physical and Sexual Experiences		Circle one		If you circled yes, please indicate	

			Repeated ?	Approximate age(s) and frequency	
18	Has anyone ever made you have intercourse or oral or anal sex against your will? (If yes, please indicate nature of relationship with person [e.g., stranger, friend, relative, parent, sibling] below) _____	no	yes		
19	Has anyone ever touched private parts of your body, or made you touch theirs, under force or threat? (If yes, please indicate nature of relationship with person [e.g., stranger, friend, relative, parent, sibling] below) _____	no	yes		
20	Other than incidents mentioned in Questions 18 and 19, have there been any other situations in which another person tried to force you to have an unwanted sexual contact?	no	yes		
21	Has anyone, including family members or friends, ever attacked you with a gun, knife, or some other weapon?	no	yes		
22	Has anyone, including family members or friends, ever attacked you without a weapon and seriously injured you?	no	yes		
23	Has anyone in your family ever beaten, spanked, or pushed you hard enough to cause injury?	no	yes		
24	Have you experienced any other extraordinarily stressful situation or event that is not covered above? (If yes, please specify below) _____	no	yes		

Appendix E: DTI

To what extent do you agree with the following statements? For each statement, please circle one of the points on the scales from 1 = strongly disagree to 6 = strongly agree.

1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = slightly agree, 5 = agree, 6 = strongly agree

A.	All things work out better when likes and dislikes are clear.	1	2	3	4	5	6
B.	There are only “winners” and “losers” in this world.	1	2	3	4	5	6
C.	I want to clearly distinguish what is safe and what is dangerous.	1	2	3	4	5	6
D.	It works out best when even ambiguous things are made clear-cut.	1	2	3	4	5	6
E.	I think all people can be divided into “winners” and “losers”.	1	2	3	4	5	6
F.	Information should be defined as either true or false.	1	2	3	4	5	6
G.	I dislike ambiguous attitudes.	1	2	3	4	5	6
H.	People can clearly be distinguished as being “good” or “bad.”	1	2	3	4	5	6
I.	I want to clarify whether things are beneficial to me or not.	1	2	3	4	5	6
J.	I want to clarify whether things are “good” or “bad.”	1	2	3	4	5	6
K.	All questions have either a right answer or a wrong answer.	1	2	3	4	5	6
L.	I prefer to classify information as being useful or useless for me.	1	2	3	4	5	6
M.	It feels good when boundaries are clear for all things.	1	2	3	4	5	6
N.	I think of everyone as being either my friend or my enemy.	1	2	3	4	5	6

O.	It is best when competitions have clear outcomes.	1	2	3	4	5	6
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Appendix F: CD-Quest-S9

Please, make a circle around the number corresponding to each option below, indicating cognitive errors or distortions that you have made during this past week. When assessing each cognitive distortion, please, indicate how much you believed it in the exact moment it occurred (not how much you believe it now), and how often it occurred during this past week. Please, give your examples for any items you rate as occurring much of the time or almost all of the time. DURING THIS PAST WEEK, I FOUND MYSELF THINKING THIS WAY:

1. **Discounting the positive:** I disqualify positive experiences or events insisting that they do not count.

EXAMPLES: "I passed the exam, but I was just lucky." "Going to college is not a big deal, anyone can do it."

My example:

.....
.....

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		2	4	6
Much (31% to 70%)		4	6	6
Very much (More than 70%)		6	6	6

2. **Emotional reasoning:** I believe my emotions reflect reality and let them guide my attitudes and judgments.

EXAMPLES: "I feel she loves me, so it must be true." "I am terrified of airplanes, so flying must be dangerous." "My feelings tell me I should not believe him."

My

example:

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days)	Almost all of the time (6-7

			during the past week)	days during the past week)
I believed it...	0			
A little (Up to 30%)		2	4	4
Much (31% to 70%)		4	4	5
Very much (More than 70%)		4	5	9

3. Labeling: I put a fixed, global label, usually negative, on myself or others.

EXAMPLES: “I’m a loser.” “He’s a rotten person.” “She’s a complete jerk.”

My example:

.....

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		3	4	4
Much (31% to 70%)		4	4	4
Very much (More than 70%)		4	4	7

4. Selective abstraction (also called mental filter and tunnel vision): I pay attention to one or a few details and fail to see the whole picture.

EXAMPLES: “Michael pointed out an error in my work. So, I can be fired” (not considering Michael’s overall positive feedback). “I can’t forget that a small piece of information I gave during my presentation was wrong” (not considering its success and the audience’s great applause).

My example:

.....

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		1	3	6
Much (31% to 70%)		3	6	6
Very much (More than 70%)		6	6	9

5. Mind reading: I believe that I know the thoughts or intentions of others (or that they know my thoughts or intentions) without having sufficient evidence.

EXAMPLES: “He’s thinking that I failed.” “She thought I didn’t know the project.” “He knows I do not like to be touched this way.”

My example:

.....

.....

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		2	3	3
Much (31% to 70%)		3	3	7
Very much (More than 70%)		3	7	7

6. Overgeneralization: I take isolated negative cases and generalize them, transforming them in a never-ending pattern, by repeatedly using words such as “always”, “never”, “ever”, “whole”, “entire”, etc.

EXAMPLES: “It was raining this morning, which means it will rain during the whole weekend.” “What bad luck! I missed the plane, so this will interfere with my entire vacation.” “My headache will never stop.”

My

example:.....

.....

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		3	3	5
Much (31% to 70%)		3	5	7
Very much (More than 70%)		5	7	9

7. Should statements (also “musts”, “oughts”, “have to”): I tell myself that events, people’s behaviors, and my attitudes “should” be the way I expected them to be and not as they really are.

EXAMPLES: “I should have been a better mother”. “He should have married Ann instead of Mary”. “I shouldn’t have made so many mistakes.”

My

example:

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		0	2	2
Much (31% to 70%)		2	2	5
Very much (More than 70%)		2	5	8

8. **What if?:** I keep asking myself questions such as “what if something happens?”

EXAMPLES: “What if my car crashes?” “What if I have a heart attack?” “What if my husband leaves me?”

My

example:

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		0	2	4
Much (31% to 70%)		2	4	6
Very much (More than 70%)		4	6	6

9. **Unfair comparisons:** I compare myself with others who seem to do better than I do and place myself in a disadvantageous position.

EXAMPLES: “My father always preferred my elder brother because he is much smarter than I am.” “I can’t stand she is more successful than I am.”

My example:

.....

Frequency: Intensity:	No (It did not occur)	Occasional (1-2 days during the past week)	Much of the time (3-5 days during the past week)	Almost all of the time (6-7 days during the past week)
I believed it...	0			
A little (Up to 30%)		0	4	4

Much (31% to 70%)		4	4	7
Very much (More than 70%)		4	7	7

Appendix G: Table 1

Participant Demographics

Demographic Information	N	%
Age		
18	358	36.49
19	254	25.90
20	142	14.50
21 and older	227	23.11
Gender		
Woman	741	75.50
Man	220	22.40
Non-Binary/Third Gender	16	1.60
Transgender Woman	1	0.10
Transgender Man	3	0.30
Sex		
Female	756	77.10
Male	223	22.70
Intersex	1	0.10
Self-Described	1	0.10
Sexual Orientation		
Heterosexual/Straight	750	76.50
Gay/Lesbian	34	3.50

Bisexual	157	16.00
Self-Described	40	4.10
Ethnicity		
Hispanic or Latino	152	15.50
Not Hispanic or Latino	829	84.50
Family Ancestry		
European (including Portuguese)	227	23.10
African (Ex: Igbo, Somali, Yoruba)	6	0.60
Native American (Ex: Navajo, Cherokee Choctaw)	1	0.10
Filipino	118	12.00
Latino (Ex: South/Central American, Puerto Rican, Cuban)	43	4.40
Continental Asian (Ex: Korean, Chinese, Indian)	82	8.40
Japanese	48	4.90
Hawaiian	8	0.80
Pacific Islander (other than Hawaiian)	28	2.90
Other	31	3.10
Bi-Racial	230	23.45
Multi-Racial	159	16.21
Highest Education Obtained		
Some High School	3	0.30
High School Diploma	812	82.80
General Education Development (GED)	20	2.00
Associates Degree	109	11.10
Bachelor's Degree	31	3.20
Master's Degree	5	0.50
Doctorate Degree (Ex: PhD, MD)	1	0.10

Employment Status		
Not Currently Employed	457	46.60
Part-Time Employed	477	48.60
Full-Time Employed	40	4.10
Self-Employed	7	0.70
Primary Spoken Language		
English	925	94.30
Other	56	5.70
Birthplace		
United States of America	844	86.00
Other	56	5.70
Marital Status		
Single	916	93.40
Married	15	1.50
Domestic Partnership	46	4.70
Divorced/Separated	4	0.40
Mental Health Services		
Yes	487	49.60
No	494	50.40
Mental Health Diagnoses		
Depression	28	2.90
Anxiety	47	4.80
Feeding/Eating Disorder	5	0.50
Personality Disorder	2	0.20
Trauma/Stressor Disorder	9	0.90
Neurodevelopmental Disorder	26	2.70

None	97	9.90
Unsure	23	2.30
Comorbid	247	25.10
Never Received Mental Health Services	494	50.40

Appendix H: Table 2

Descriptive Statistics for Instruments Used and Their Additional Measurements

	N	Minimum	Maximum	M	SD
DTI	981	15.00	90.00	54.27	10.69
CD-Quest-S9	981	0.00	24.00	9.49	5.31
CD-Quest-Intensity	981	0.00	864.00	342.69	192.14
THQ	978	0.00	17.00	2.81	2.71
THQ-Severity-Index	981	0.00	1085.25	98.87	124.19
PCL-5	975	0.00	79.00	25.22	17.38