

SUBSTANCE USE AND POST-TRAUMATIC STRESS IN
VICTIMS OF TRAUMA:
THE ROLE OF INTEROCEPTIVE BODY AWARENESS

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ABSTRACT

SUBSTANCE USE AND POST-TRAUMATIC STRESS IN VICTIMS OF INTERPERSONAL TRAUMA: THE ROLE OF INTEROCEPTIVE BODY AWARENESS

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The experience of trauma (e.g., interpersonal violence, sexual assault) is associated with a range of adverse outcomes, including an increased risk for misusing substances (Ullman et al., 2013), often in an attempt to cope (Asberg & Renk, 2012; Hogarth et al., 2019). However, the association between trauma symptoms and substance use consequences might be explained by other processes that could be targeted for intervention. For example, paying attention to inner body sensations (interoceptive body awareness; IBA) predicts lower Post-Traumatic Stress Disorder (PTSD) symptoms (Reinhardt et al., 2020), but IBA has not been examined in relation to adverse substance use consequences. Thus, the present study examined associations among trauma symptoms, IBA, and substance use consequences. Specifically, we hypothesized that higher levels of trauma symptoms would correspond with less IBA and, in turn, more frequent adverse consequences of substance use. Moreover, we examined the assertion that interoceptive body awareness would mediate the association between trauma symptoms and problematic substance use. Participants (N = 271) age 18-years or older were recruited from various online sources (Reddit, Facebook) and a university research participant pool (SONA). Results suggest that trauma symptom severity was associated with less interoception and more substance use

consequences, while interoceptive awareness was inversely associated with substance use consequences. However, interoceptive awareness was not a significant mediator for this relationship once the effect of trauma symptoms was accounted for. This is the first study to examine IBA as a correlate of substance use consequences to the best of our knowledge. Although IBA failed to mediate the effects of trauma symptoms on substance use outcomes in this convenience sample, future studies may examine the role of body awareness on substance among survivors of interpersonal violence, specifically. Findings highlight the importance of understanding trauma correlations (i.e., body awareness and substance misuse) and may inform treatment modalities for individuals at risk of substance misuse.

CHAPTER ONE: INTRODUCTION

The link between the experience of trauma and a heightened risk of adverse outcomes has been established, although the impact of trauma depends on a variety of intermediate factors and contexts (Tripp et al., 2020). For example, an individual's tendency to self-medicate following a traumatic event is associated with higher levels of trauma symptoms (i.e., using substances to alleviate instances of dissociation; Khantzian, 2003). There has been little focus on how body awareness among trauma survivors plays a role in using substances to mitigate symptoms through self-medication (Hogarth et al., 2019). Recent research has shown that accurately paying attention to inner body sensations predicts lower Post-Traumatic Stress Disorder (PTSD) symptoms (Reinhardt et al., 2020). Furthermore, Mehling et al. (2018) found significant improvement in mindfulness, interoceptive body awareness, and positive states of mind following a 12-week integrative exercise program for trauma survivors with PTSD, which, in turn, may reduce reliance on substance use coping. Though these previous studies examined PTSD symptoms as part of diagnostic criteria, the present study will view trauma symptoms on a continuum (Dell'Osso et al., 2009), irrespective of diagnosis. Consistent with this approach, previous studies have demonstrated positive effects of trauma-informed interventions and highlight the challenges an individual may face in the aftermath of trauma without a formal diagnosis of PTSD (Shavel & Ursano, 2003). Specifically, various degrees of trauma-related symptoms, such as re-experiencing the trauma, avoidance, negative cognitions and mood, and changes in reactivity (e.g., hypervigilance), can increase the risk of maladaptive coping in survivors. Moreover, there are many mediators between trauma and substance use (e.g., Lecigne

& Tapia, 2018). Empirical research has not yet examined interoceptive body awareness (IBA) as a mediating factor in this relationship.

Post-Traumatic Stress

Traumatic events or experiences that elicit trauma reactions can occur at any point in a person's life. Examples of trauma or a traumatic event include motor vehicle accidents, natural disasters, or combat, but trauma can take many forms. Interpersonal trauma is a subgrouping of traumatic events that refers to experiences that involve another person, typically a perpetrator. Examples of events that fall under the label of interpersonal trauma include witnessing or experiencing a physical assault, rape, molestation, or attempted sexual assault (Cogle et al., 2009). The prevalence rate of trauma varies in the literature based on the type of interpersonal trauma being defined (e.g., childhood sexual assault, domestic violence, rape, etc.).

When considering all types of trauma, nearly 90% of Americans will report having experienced at least one such event in their lifetime (National Institute of Mental Health; NIMH, 2017). An overwhelming majority of individuals who have experienced trauma do not meet the criteria for PTSD, which has a lifetime prevalence rate of 6.8%. When an individual does receive a diagnosis, they may see a reduced likelihood of receiving evidence-based treatment. Beyond the subsequent psychosocial adjustment period, trauma is also associated with a heightened risk of revictimization (e.g., Reichert, 2015). That is to say that experiencing one trauma often predicts the occurrence of another trauma. Trauma symptoms are common in the aftermath of traumatic incidents (Reichert, 2015; Jaffe et al., 2019). Theoretical models have shown that it is not necessarily the trauma itself that predicts this posttraumatic stress, but rather how the individual interprets the incident (Bell et al., 2019).

Individuals who experience this posttraumatic stress often face frightening situations and do not have appropriate coping skills to manage this stress (Garami et al., 2019). Posttraumatic stress symptoms can often be as frightening as the traumatic event itself for the individual experiencing it (Halligan, 2003). The symptoms after a traumatic event fall on a continuum of re-experiencing the trauma, avoidance, negative cognitions and mood, and changes in reactivity (American Psychiatric Association [APA], 2013).

Halligan (2003) conducted two studies focused on victims of interpersonal trauma, specifically individuals who had experienced sexual or physical assault. This study investigated potential predictors of trauma such as trauma memories, cognitive processing in the development of these memories, and dissociation and negative appraisal of these memories. Through two self-report studies, both s verified that the presence of trauma memories, negative cognitive processing in the development of these memories, and dissociation with a negative appraisal of these memories were strong predictors of posttraumatic stress symptoms. This research has since been verified by others (Herta et al., 2017, Jaffe et al., 2019).

As discussed previously, individuals are likely to experience more than one trauma in their lifetime (Jaffe et al., 2019). Trauma can increase the risk of an individual developing other mental health concerns. Some of these include but are not limited to posttraumatic stress symptoms (PTS), depression, and substance use disorders. Many times, these mental health concerns can have co-morbidity with one another. Moreover, individuals who experience traumatic events are more likely to partake in maladaptive coping mechanisms such as substance use, unsafe sexual practices, or binge drinking (Sanders et al., 2018). In a study conducted by Narvaez et al. (2019), individuals who had experienced child sexual abuse (CSA) and presented with the diagnosable levels of posttraumatic stress were more likely to engage in risky sexual

behaviors. These individuals also reported the use of ecstasy, LSD, and cocaine, whereas those who did not have diagnosable levels of posttraumatic stress, but experienced CSA did not report drug use. As made evident by this research, drug use is a significant potential consequence of experiencing trauma.

Substance Use

Substance use problems remain a significant concern in the United States and worldwide (Peacock et al., 2017). According to the World Health Organization, drug use was responsible for approximately 11.8 million deaths reported in 2017 (Ritchie & Roser, 2020). Substance use, in turn, is often associated with a variety of secondary challenges and a high degree of stigma (Smith & Borden, 2020). For example, common issues include job loss from substance use, lack of resources like insurance, and access to treatment, having been labeled "treatment failure" if already seen at a treatment facility. Many individuals dealing with substance use concerns become homeless, are discriminated against, or lose familial support, and may experience feelings of helplessness, shame, dependency on others as well as the drug(s) itself.

As mentioned previously, experiencing trauma symptoms can increase the reliance on substances to cope or manage these symptoms (Ullman et al., 2013). This theory is in line with Cappell and Greeley's (1987) self-medicating hypothesis. They theorized that individuals consume alcohol as a way of reducing tension. Though the literature provides evidence of short-term relief, this strategy often leads to prolonged or worsened posttraumatic stress symptoms (Ullman et al., 2013). Similarly, individuals may use substances to cope with the stress experienced after trauma (Hogarth et al., 2019). Numerous studies support the idea that coping motives drive the use of substances in vulnerable populations (Hogarth et al., 2019). In previous research, it has been found that the association between trauma symptoms and substance use

problems is mediated by coping motives (Vilhena-Churchill & Goldstein, 2014). Vilhena-Churchill and Goldstein found that emotional dysregulation and coping motives contribute uniquely to substance use. Similarly, among survivors of childhood sexual abuse, the association between trauma symptoms and adverse substance use consequences was mediated fully by coping motives (Asberg & Renk, 2012).

This concept of emotional dysregulation, or the executive dysfunctions related to cognitive self-regulation, is a crucial component found in many studies of substance use problems (Cavicchioli et al., 2020). It is considered a neurobiological underpinning of addictive behaviors. In a study by Cavicchioli et al. (2018), they found that substance use and other addictive behaviors, such as gambling and sex, were regulated by emotional dysregulation and their functional connectivity. Another study by Paulus et al. (2018) found that significant emotional dysregulation was correlated with increased anxiety and cannabis use.

In contrast, mindfulness has been suggested as playing a role in neurocognitive functions, such that when an individual engages in mindfulness-based practices, the result is improvements in self-regulation (Cavicchioli et al., 2020). In a pilot efficacy study, Bowen et al. (2009) analyzed the effects of an 8-week, 2-hour long outpatient program around Mindfulness-Based Relapse Prevention (MBRP) versus that of a treatment as usual (TAU) program. Results suggested that those who received MBPR experienced a significant decrease in cravings and judgment, an increase in awareness, and not "reacting" but "skillfully responding," compared to the TAU group (Bowen et al., 2009). This study provided preliminary support for the use of MBRP for individuals who have struggled with substance use previously. Furthermore, among adolescents with co-occurring substance use and posttraumatic symptoms, it was found that a

mindfulness-based intervention was successful in achieving a moderate decrease in posttraumatic symptomology as well as substance use for participants (Fortuna et al., 2018).

While mindfulness has been incorporated into treatments for substance use, few studies have examined the more specific construct of interoceptive body awareness concerning trauma and substance use consequences.

Interoceptive Body Awareness

In the extant literature, the terms body awareness and interoception are often used interchangeably, although definitions vary slightly (Gibson, 2019). Body awareness alone requires an attentional focus on and awareness of internal body sensations (Emanuelson et al., 2015; Gibson, 2019). This awareness can be viewed as adaptive or maladaptive, depending on the situation. For example, heightened awareness of somatic issues potentially distressing may be seen as maladaptive or interfering with functioning (Mehling et al., 2017). Similarly, interoception is the perceived sensations from inside the body, including heartbeat, respiration, satiety, and autonomic nervous system activity related to emotions (Price & Hooven, 2018). The awareness of these physical sensations allows for processing of the sensation, is a crucial element for regulating affect, and contributes to an individual's overall sense of self. In other words, interoceptive body awareness involves a capacity to recognize. More specifically, it is conceptualized as "the bi-directional communication between bodily sensation and multiple levels of cortical oversight...and support effective response" (Price & Hooven, 2018, p. 2-3). Further, without recognizing or noticing what the body is communicating, the practice of mindfulness has no basis for development.

Mindfulness and interoceptive body awareness share many similar features; for example, both focus on internal sensations (Gibson, 2019). Mindfulness, however, is a broad term used to

define different practices, processes, and characteristics, and the definition of mindfulness varies depending on the field or discipline (Grossman & Van Dam, 2011). Some psychologists argue that interoception is the basis of mindfulness. Meaning that once the level of interoception an individual has is measured, psychologists can then increase that individuals interoceptive ability. This process then allows that individual to gain benefits from the practice of mindfulness (Mehling et al., 2009). Both interoceptive body awareness and mindfulness, however, are independently associated with enhanced psychological well-being.

The Current Study

Overall, interoceptive body awareness is critical to focus on for those who have experienced trauma, given that these individuals are often prone to avoidance and misinterpretation of physical sensations (Huckshorn, 2013). In turn, interoceptive body awareness promotes a more accurate interpretation of physical sensations and aid also in selecting more effective emotion regulation skills (Mehling et al., 2009). Although overall interoceptive capacity, and different dimensions of interoceptive awareness (e.g., Mehling et al., 2012), have garnered some attention in the last decade, less is known about the possible mediating effects of such awareness on the association between trauma symptoms and substance use. Given that increased interoceptive awareness has been associated with improvements in trauma symptoms (Mehling et al., 2018), more research is needed to understand its role in substance use outcomes, often co-occur with trauma symptoms.

Based on the literature, the experience of trauma is associated with a range of adverse outcomes, including consequences of substance use. For example, victims of interpersonal trauma (e.g., sexual assault) are at a higher risk for abusing substances (Ullman et al., 2013), but this association may be explained by processes involving awareness. Specifically, interoceptive

body awareness has been implicated in the association between trauma and adjustment (Price, 2018). Thus, the present study examined the association between trauma symptoms and different aspects of awareness of internal body sensations (i.e., interoception) and the indirect effect on substance use consequences. Based on the previous literature, the following hypotheses were derived.

Hypotheses

Hypothesis 1: Trauma symptoms (PTSD Checklist for the DSM-5; PCL-5) would be positively associated with substance use consequences (Short Inventory of Problems; SIP-R).

Hypothesis 2: Trauma symptoms (PCL-5) would be negatively associated with interoceptive body awareness (Multidimensional Assessment of Interoceptive Body Awareness Version 2; MAIA-2).

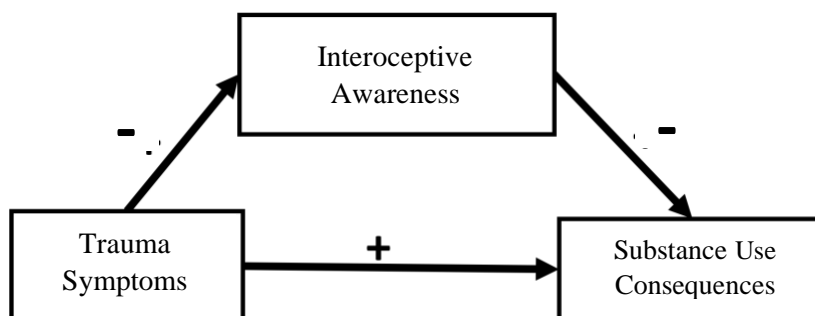
Hypothesis 3: Interoceptive body awareness (MAIA-2) would be negatively associated with substance use consequences (SIP-R).

Hypothesis 4: The association between trauma symptoms (PCL-5) and substance use consequences (SIP-R) were expected to be mediated by interoceptive body awareness (MAIA-2).

See Figure 1.

Figure 1

Illustration of Mediation Model for Final Hypothesis



CHAPTER TWO: METHOD

Participants

A total of 502 individuals began the survey, however, once the incomplete and bogus data was removed, our sample included 271 participants ages 18-years and older. Data considered incomplete or bogus were surveys less than 50% complete or data from participants who were not 18-year-old (i.e., spelling out “seventeen” in age response allowed 17-year-olds to begin the survey). Based on guidelines from Cohen (1988) and Kenny (2017), a sample size of 211 was needed to detect a large effect size ($d = .8$). Our study aimed for a larger effect size than typical to compensate for our inability to obtain the exact effect size for this type of mediation. Data was collected via an online self-report survey (Qualtrics) that was posted on social media (Reddit and Facebook). We also recruited undergraduate students via the psychology research participant pool (SONA) at a regional comprehensive university. The procedure is described in more detail below.

Descriptive statistics of the sample ($N = 271$) indicated that 93 participants were men (33.9% of the sample) and 149 were women (55% of the sample). In addition, 21 participants identified themselves as non-binary (7.7%), 7 as ‘Other’ (2.6%), and 2 selected Prefer Not to Answer (0.7%). The average age of participants was 25.33-years ($SD = 9.09$). Moreover, 217 of the participants were White (80.1%), 14 were Black or African American (5.2%), 10 were Hispanic or Latino (3.7%), 11 were Asian (4.1%), 3 were American Indian or Alaska Native (1.1%), 1 was Native Hawaiian or Other Pacific Islander (0.4%), and 15 identified as Other (5.5%). A summary of participant’s characteristics can be also be found in Table 1.

Table 1.*Demographic Characteristics of Final Sample (N = 271)*

Variables	N (%)
Age	
18-24	174 (64.2%)
25-34	62 (22.9%)
35-44	20 (7.4%)
45-54	12 (4.4%)
55-64	2 (0.7%)
65-74	1 (0.4%)
Gender	
Woman	149 (55%)
Man	92 (33.9%)
Non-Binary	21 (7.7%)
Other	7 (2.6%)
Prefer not to answer	2 (0.7%)
Ethnicity	
White	217 (80.1%)
Black or African American	14 (5.2%)
Hispanic or Latino	10 (3.7%)
Asian	11 (4.1%)
American Indian or Alaska Native	3 (1.1%)
Native Hawaiian or Other Pacific Islander	1 (0.4%)
Other	15 (5.5%)

Measures

Participants completed a series of questionnaires online using Qualtrics. In addition to a demographic form (see Appendix for sample items), participants completed the PTSD Checklist 5 (trauma symptoms), the shortened inventory of problems related to substance use (substance use consequences), as well as a self-report assessment of interoceptive body awareness. As part of a larger study on interpersonal violence and coping, participants also completed two trauma screeners (i.e., general traumatic events and sexual victimization, respectively) as well as a measure of substance use coping (i.e., drinking or using drugs to cope with negative affect). Each of the measures and their psychometric properties are described below.

Trauma Symptoms. The PTSD Checklist for DSM-5 (PCL-5; Weathers et al., 2013) was used to assess symptoms related to experiences of trauma. The specific symptom clusters include intrusion, avoidance, negative alterations in cognitions and mood, and arousal/ reactivity. The PCL-5 utilizes a five-point Likert scale (0 = "Not at all" to 4 = "Extremely"), where participants will rate their level intrusion from trauma symptoms. A sample item is, "In the past month, how much were you been bothered by: 'Repeated, disturbing, and unwanted memories of the stressful experience?'" The total sum of all 20 items will be utilized as a measure of post-trauma symptomatology, with potential scores ranging from 0 to 80. In previous studies, the PCL-5 demonstrates strong internal consistency ($\alpha = .96$) (Bovin et al., 2016). In this study, the Cronbach alpha also demonstrates strong internal consistency ($\alpha = .94$).

Interoceptive Awareness. The Multidimensional Assessment of Interoceptive Awareness, Version 2 (MAIA-2; Mehling et al., 2018) was used to assess interoceptive awareness through the use of eight subscales (each with a separate score), as well as a total score. The eight subscales are: 1) noticing (awareness of bodily discomfort, comfort, and neutrality sensations); 2) not distracting (ability to not distract or ignore discomfort or painful sensations); 3) not worrying (proneness to not be emotionally distressed or worried by painful or uncomfortable sensations); 4) attention regulation (paying attention to and controlling that attention on body sensations); 5) emotional awareness (awareness of the connection between emotions and bodily sensations); 6) self-regulation (aptness to control distress felt by paying attention to body sensations); 7) body listening (tendency to purposefully listen to information from the body), and 8) trusting (feeling trust and safety in the body) (Mehling et al., 2018). A sample item on this scale is, "I can stay calm and not worry when I have feelings of discomfort or pain." Scores on each subscale item range from 0 to 5; 0 being 'never' and 5 being 'always'.

Prior research has supported the scale's ability to discriminate high body awareness from groups who may have lower body awareness. The initial scale development study results reflected internal consistency in the questionable ($.7 > \alpha \geq .6$) to good ($.9 > \alpha \geq .8$) ranges as follows: noticing: $\alpha = .64$; not-distracting: $\alpha = .74$; not-worrying: $\alpha = .67$; attention regulation: $\alpha = .83$; emotional awareness: $\alpha = .79$; self-regulation: $\alpha = .79$; body listening: $\alpha = .80$; trusting: $\alpha = .83$ (Mehling et al., 2018). In this study, the Cronbach alpha for the total score demonstrates strong internal consistency ($\alpha = .92$).

Substance Use Consequences. The Short Inventory of Problems - Revised (SIP-R; Tonigan & Miller, 2002) is a 17-item survey based on the 50-item Drinker Inventory of Consequences (DrInC) scale by the same authors. The SIP-R utilizes five subscales that relate to the negative outcomes of substance use and/or polysubstance use. The five subscales focus on physical ("My physical health has been harmed by my drinking or drug use"), interpersonal ("My family has been hurt by my drinking or drug use"), intrapersonal ("I have felt guilty or ashamed because of my drinking or drug use"), social responsibility ("I have had money problems because of my drinking or drug use"), and impulse control ("I have had an accident while drinking or intoxicated or using drugs or high). Participants typically select how often referenced consequence applies to them from the past three months ("never," "once or a few times," "once or twice a week," "daily or almost daily"; scored 0-3). Higher scores for participants indicate greater problems. In previous studies (e.g., Forcehimes et al., 2007), SIP was found to have strongly related corresponding scores to DrInC scores, with SIP accounting for 64 to 85% of subscale variance. Due to error in survey transposition for online distribution, the present study used a yes/no scale for participant response options ("yes" = 1 and "no" = 0) (implications discussed in limitations). Still, this study concluded that the SIP is reliable in

accounting for substance related problems as the Cronbach alpha demonstrates strong internal consistency ($\alpha = .93$).

Drinking Motives Questionnaire Revised Short Form (DMQ-R SF; Kuntsche & Kuntsche, 2009) is a survey related to the frequency of drinking. The 12 items related to the motivation of drinking are rated on a frequency scale ranging from "Never" (coded as 1) to "Almost always" (coded as 3) and categorized into four distinct dimensions (i.e. enhancement, social, conformity, and coping motives). A sample coping item of this scale is, "In the last 12 months, how often did you drink... Because it helps you when you feel depressed or nervous?". Previously, Mazzardis et al. (2010) found the internal consistencies for this measure fell within conventional limits, ranging from $\alpha = .64$ to $\alpha = .79$. The subscales for this measure fall within conventional to strong limits in this study, ranging from $\alpha = .84$ to $\alpha = .96$, specifically, the Cronbach alpha for the coping motives scale demonstrated strong reliability ($\alpha = .94$).

Secondary Measures

In the event our sample size allowed for the identification of trauma survivors, and a subsequent within-group analysis of the hypothesized associations, the study procedure included a trauma screener and a measure of sexual victimization.

Trauma Screener. The Life Events Checklist for DSM-5 and Extended Criterion A (LEC-5; Weathers et al., 2013) is a screener for potentially traumatic events (PTE). Participants indicated through selection whether any of the 16 PTE have happened to them personally; witnessed it happen to someone else; learned about it happening to a close family member or close friend; exposed to it as part of your job (for example, paramedic, police, military, or another first responder); or are not sure if it fits; or if it doesn't apply- all of which are listed on a

6-point nominal scale. An example of a qualification is, “Natural disaster (for example, flood, hurricane, tornado, earthquake). Response: Happened to me; Witnessed it; Learned about it; Part of my job; Not sure; Doesn't apply.” There is no composite score yielded by this measure, rather, this scale indicates whether a person has experienced one or more of the events listed. Further, qualitative data is collected in the four question Criterion A survey to ensure accurate qualification of a traumatic event. An example of a question asked in Criterion A is, “Briefly describe the worst event (for example, what happened, who was involved, etc.).” This is collected for the purpose of establishing exposure to a PTSD Criterion A traumatic event. Based on Bovin et al., (2016) study, the Cronbach’s α for the 20 LEC-5 items was .96, indicating excellent internal consistency.

Sexual Victimization. The Sexual Experience Survey – Short Form Victimization (SES-SFV; Koss & the SES Collaborative, 2006) is an adapted 12 item measure which examines different aspects of victimization that an individual has experienced based on their sex. Within the survey there are four categories: no victimization, unwanted sexual contact, sexual coercion, and attempted rape/rape. The SES-SFV has 25 items for males and 35 for females and uses a stem item (describing a type of adverse or coerced sexual experience) followed by five options. A sample item is “Someone had oral sex with me or made me have oral sex with them without my consent by: a. telling lies..., b. criticizing my sexuality..., c. taking advantage of me when I was too drunk..., d. threatening to physically harm me..., e. using force...” Responses were categorized into two groups, “How many times in the past 12 months: 0, 1, 2, 3+?” and “How many times since age 14: 0, 1, 2, 3+?” Anderson, Cahill, and Delahanty (2018) found test-retest reliability to be a more accurate measure of reliability. The aforementioned study found that for a 7-to-10-day time difference, test-retest significantly correlated ($r_s = .41$).

Procedure

Upon approval from the Institutional Review Board, recruitment of participants began. As noted, participants age 18-years and older were recruited via the psychology department undergraduate research participation system (SONA), and the link was posted to multiple forums on Reddit and Facebook. Participants who gave their electronic consent (by clicking continue) were presented with the study questionnaires. All data collected from online surveys was entirely anonymous, data could not be linked to any identifying information. Data was logged on a file within a password protected computer which participants identity was not disclosed.

The risk to participants was no more than minimal foreseeable psychological risk. As this research is inherently related to trauma, additional steps were taken to assure the safety of participants. Potential for triggering thoughts while filling out the surveys could have presented as minimal risk. Even so, research has shown that recollection and reflection of traumatic events may not produce unwanted feelings but, rather, be a positive outcome for the participant (Legerski & Bunnell, 2010; Yeater et al., 2012). Contact information to national- and university related psychological assistance was provided at the end of the survey, and participants were made aware that they could choose to stop the survey at any time.

Analytic Strategy

First, in order to test the hypotheses pertaining to bivariate associations (hypothesis 1-3), a correlation matrix was examined (see Table 2). Among the 271 cases, any missing values were recoded and transformed into mean values within each measure. The drinking motives subscale was added to the correlation matrix as a proxy for coping through self-medication (a form of avoidant coping). In addition, to test the significance of the indirect effect of trauma symptoms on substance use through the hypothesized mediator (interoceptive awareness) the PROCESS

macro v3.0 for SPSS (model 4; Hayes, 2017) was applied. As recommended by Hayes and Rockwood (2016), significant mediation exists if the bootstrap confidence interval for the indirect effect does not include zero. The indirect effect was tested using 5,000 resampled bootstrap confidence intervals (95% CI).

In exploratory analyses (i.e., post hoc), we tested whether the correlations described above were mediated by any of the interoceptive awareness sub-scales (Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-Regulation, Body-Listening, and Trusting).

CHAPTER THREE: RESULTS

Descriptive Statistics

First, we computed means, standard deviations, and bivariate correlations for the variables included in hypothesis 1 through 3 (see Table 2). Based on previous research, we expected to see a positive correlation between trauma and substance use consequences (hypothesis 1). Additionally, we predicted a negative correlation between trauma symptoms and interoceptive body awareness (hypothesis 2), as well as a negative correlation between interoceptive body awareness and substance use consequences (hypothesis 3).

Correlations

For hypothesis 1, as expected, a significant positive correlation between trauma symptoms and substance use consequences was observed, with $r = .376$, $p < .001$. The more trauma symptoms an individual experienced the more negative repercussions were noted from substance use. Next, we hypothesized that there would be a significant negative correlation between trauma symptomatology and interoceptive body awareness (hypothesis 2). Results indicated that trauma symptomatology was negatively correlated with interoceptive body awareness, $r = -.356$, $p < .001$. For hypothesis 3, we theorized that there would be significant negative correlations between interoceptive body awareness and substance use consequences, respectively. This hypothesis was confirmed, such that interoceptive awareness was negatively correlated with substance use consequences, $r = -.195$, $p < .001$. Overall, hypotheses 1 through 3 were fully supported (Table 2).

Although not included in hypotheses 1-3, the bivariate association between coping motives for using alcohol or drugs and relevant study variables (trauma

symptoms, substance use consequences, and body awareness), was also examined. The drinking motives coping-subscale was positively correlated with trauma symptoms, $r = .334$, $p < .001$, as well as the substance use consequences scale, $r = .467$, $p < .001$. Additionally, the coping subscale had a significant negative correlation to interoceptive awareness, $r = -.178$, $p < .001$.

Table 2.

Pearson Correlations, Means, and Standard Deviations for Key Variables

	<i>M</i>	<i>SD</i>	2.	3.	4.
1. Trauma symptoms (PCL-5)	28.75	16.71	.376**	.334**	-.356**
2. Substance use consequences (SIP-R)	3.94	4.52		.467**	-.159**
3. Coping drinking motives (DMQ-R SF <i>Coping</i>)	2.09	2.79			-.178**
4. Interoceptive body awareness (MAIA-2)	96.93	25.09			

Note. $N = 271$. ** $p < .001$

For the fourth and final hypothesis, significance of the indirect effect of trauma symptoms on substance use consequences through the hypothesized mediator (interoceptive awareness) was examined with the PROCESS macro v3.0 for SPSS (model 4; Hayes, 2017). As recommended by Hayes and Rockwood (2016), significant mediation exists if the bootstrap confidence interval for the indirect effect does not include zero. The indirect effect will be tested using 5,000 resampled bootstrap confidence intervals (95% CI). For the indirect effect of trauma symptomatology on substance use consequences through the hypothesized mediator interoceptive awareness, $B = .0028$, $SE = .0064$, 95% CI for $B [-.0093, .0155]$. Because the confidence interval for the indirect effect included zero, the indirect effect was not significant. Thus, results did not support this hypothesis.

Examination of individual model paths

Trauma symptoms → interoceptive awareness. Examining the first path in the model showed that trauma symptoms was not significantly associated with interoceptive awareness (see Table 3).

Interoceptive awareness → substance use consequences. Interoceptive awareness was not associated with substance use consequences (see Table 3).

Trauma symptoms → substance use consequences. Trauma symptoms were associated with more substance use consequences (see Table 3).

Table 3.

Tests of the Indirect Effects of Trauma Symptoms on Substance Use Consequences via Interoceptive Awareness as the Mediator

	<i>b</i>	β	<i>SE</i>	95% CI for <i>b</i>	
				Lower	Upper
Mediation					
Indirect effect*	0.0028	0.0028	0.0064	-0.0093	0.0155
<i>a</i> ₁ path (trauma to interoception)	-0.5341*	-0.5341	0.0856	-0.7025	-0.3656
<i>b</i> ₁ path (interoception to substance use)	-0.0051	-0.0051	0.109	-0.0266	0.0266
<i>c</i> ₁ path (trauma to substance use)	0.1017*	0.1017	0.5076	0.0169	2.0155

Note. *N* = 271. Indirect effects represent effects of trauma symptoms on substance use through the mediating variable. β s are fully standardized regression coefficients. Standard errors (SE) and the lower and upper bounds for the 95% confidence interval (CI) reflect 5000 resampled bootstrap CIs. *Indicates significant indirect effect (i.e., CI excludes zero).

Exploratory Analyses

In addition to the aforementioned model, which failed to support the expected meditation model, exploratory analyses were conducted to examine interoceptive awareness sub-scales (Noticing, Not-Distracting, Not-Worrying, Attention Regulation, Emotional Awareness, Self-

Regulation, Body-Listening, and Trusting) as potential mediators of the link between trauma symptoms and substance use consequences. No significance was found for any of the interoceptive sub-scales.

Overall, there are direct correlations observed between the variables, however, results from this study suggest that interoceptive awareness does not serve as a mediator for the association seen between trauma symptoms and substance use consequences. Findings will be discussed in lieu of several limitations.

CHAPTER 4: DISCUSSION

Although the direct link between trauma symptoms and increased use of substances is well established, a number of mediators have also been identified (Lecigne & Tapia, 2018). For example, using substances to cope (e.g., coping motives; Garami et al., 2019), mediates the aforementioned link (e.g., Asberg & Renk, 2012). As fewer studies have focused on interoceptive awareness as a potential mediator, this study sought to fill this gap. Specifically, we hypothesized that Interoceptive Body Awareness (IBA) is the process by which trauma symptoms impacts substance use consequences (i.e., IBA as a mediator).

Findings of the current study (N = 271) indicate that although trauma symptoms are associated with more substance use consequences and with lower IBA, respectively; and IBA is independently associated also with substance use consequences, IBA fails to mediate the relationship between trauma and substance use consequences in this sample. It should be noted, however, that neither mean trauma symptom scores nor adverse consequences of substance use were severe in this non-clinical convenience sample, and it is possible that IBA would be more effective in explaining within-group variations in outcomes among individuals who have experienced victimization, such as sexual assault. Given that IBA is inversely associated with PTSD symptoms in previous studies (Reinhardt et al., 2020), and with substance use consequences in our study, it may be important to assess the extent to which *specific* trauma symptom clusters (e.g., intrusion, avoidance, alterations in cognitions and mood, and arousal/reactivity) drive the association. Given that coping motives have been found to mediate the link between trauma symptoms and substance use consequences (e.g., Asberg & Renk, 2012), future

studies may examine the interaction between IBA and coping motives (i.e., low interoceptive awareness with high avoidant coping) as it relates to trauma symptoms and substance misuse.

Limitations

There were several limitations to this study. First, it is important to consider the timing of this survey. The effect the COVID-19 pandemic is not accounted for in this study, especially as it relates to the general decline in mental health that is seen globally (Rosenfeld et al., 2020). Other studies suggest that COVID-19's effect on the general population mimics that of trauma symptoms (Rossi et al., 2021), thus the present study may have an over estimation of trauma symptoms compared to precedented times. To further understand the effect of trauma in this sample, within group association, where trauma is salient may result in more accurate interpretation of trauma effects. In this context, it is possible that more tangible resources, such as social support, may help explain adjustment outcomes among trauma survivors. Additionally, given the recruitment and data collection procedures (social media, undergraduate participant pool), our sample lacked diversity; participants were largely white (80% of the sample), self-identified women, aged 18 to 24-years. Future studies should make an attempt to recruit a more diverse sample. Further, the study did not analyze separate gender identity nor the distinctions between biological sex.

Another limitation to account for is our unintended use of a dichotomous substance use consequences scale. Specifically, the present study utilized a dichotomous measure of adverse substance use consequences (Yes/No), rather than the Likert-type scale where 0=never and 3=always. This which may have failed to capture nuances of participants' substance use consequences and resulted in over-simplification of the data (Altman & Royston, 2006). However, the dichotomous measure of substance use consequences and the drinking motives

survey (coping subscale) were positively correlated, suggesting that the measure of adverse consequences was still relevant.

Clinical Implications

Although interception does not independently factor into substance use consequences in this sample, and the prevalence of severe substance misuse was quite low, we did find significant bivariate associations between trauma symptoms, interoceptive body awareness, and substance use consequences. It is possible that trauma survivors who rely on self-medication (a form of avoidance) and who suffer more intrusive body sensations, may benefit from interventions (e.g., mindfulness) that help them address both avoidance and interpretation of physical symptoms.

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APPENDIX A: CONSENT FORM

Western Carolina University Consent Form to Participate in a Research Study

Project Title: Interoceptive Body Awareness and Adjustment

This study is being conducted by: Kia Asberg, Ph.D., and Madison Surret, B.S.

Description and Purpose of the Research: This study is interested in the potential connection between trauma, body awareness, and substance use.

What you will be asked to do: You will be asked to complete a demographic form and six surveys.

First, after providing consent, you will be asked to complete a 3-item survey related to your demographics (age in years, gender, and ethnicity).

Second, you will be asked to complete a 26-item survey related to specific traumas you may or may not have experienced.

Third, you will be asked to complete a 17-item survey related to the effects of trauma or stressful situations to the degree which you experience them.

Fourth, you will be asked to complete a 20-item survey related to sexual experiences you may or may not have encountered. You will be noting what you think is true about sexual experiences (i.e., sexual trauma) that you have experienced (if applicable).

Fifth, you will be asked to complete an 18-item survey related to consequences you have faced from using substances such as alcohol or drugs. You will be noting what you think is true about your alcohol and drug use.

Sixth, you will be asked to complete a 4-item survey related to your motivation for using alcohol or drugs. You will be noting what you think is true about your alcohol and drug use motivations.

Seventh, you will be asked to complete a 38-item related to your body awareness. You will be noting what you think is true about your level of attention to bodily sensations.

The entire procedure will be conducted online on your computer and take approximately 30 to 35 minutes to complete.

Please note that all of the information collected as part of this study will remain anonymous. In other words, there is no way anyone can connect your responses to you as a person, and analyses will only look at the group data. (See below for more information about how we will handle your data/responses).

Risks and Discomforts: There is minimal psychological and no physical risk to participants in any of the other tasks in this procedure. The minimal psychological risk may result from recalling traumatic events; however, research has shown that this recollection causes little to no distress to individuals and is potentially beneficial for processing the trauma (research citation below).

Legerski, J. P., & Bunnell, S. L. (2010). The risks, benefits, and ethics of trauma-focused research participation. *Ethics and Behavior, 20*(6), 429-442.

Benefits: There is no benefit to this study. If you are interested in the study results, please contact the PI (Dr. Kia Asberg) via email at kasberg@wcu.edu (Results should be available by summer semester 2021).

Privacy/Confidentiality/Data Security: Your name will not be used in this research. Instead of providing a signature or your name, you will indicate consent by clicking “the forward arrow” at the end of this online form. If you disclose any identifying information in your responses, the research team will remove the identifiers. If any personal information is provided when signing up for the study, your responses will not be linked with your identity. Likewise, the researcher will in no way connect you and the answers you provide.

Voluntary Participation: Participation in this study is entirely voluntary. You may choose to withdraw from the study/procedure at any time and without penalty. You may also decline to respond if you do not wish to answer any questions during the procedure. (Select “prefer not to answer”).

Compensation for Participation: All participants in PSY150 at WCU will receive partial credit for the course requirement. If you do not wish to participate, there are other studies listed in SONA, or you may look into the alternate assignment in place of participation. There is no further compensation for your participation.

Contact Information: For questions about this study, please contact Madison Surret at 828.227.3361 or mpsurret1@catamount.wcu.edu. You may also contact Dr. Asberg, the principal investigator and faculty advisor for this project, at 828.227.3451 or kasberg@email.wcu.edu. Note that email is the best way to reach the researchers!

If you have questions or concerns about your treatment as a participant in this study, you may contact the Western Carolina University Institutional Review Board through the Office of Research Administration by calling 828-227-7212 or emailing irb@wcu.edu. All reports or correspondence will be kept confidential to the extent possible.

If you experience any crisis during the completion of this survey, please reach out to the National Suicide Prevention Lifeline at 1-800-273-8255, or if you are a student, contact WCU’s Counseling & Psychological Services at 828.227.7469.

You will be given a copy of this information to keep for your records.

If you agree to participate, please click the forward arrow. If you wish to end your participation at any time, simply close your browser.

APPENDIX B: SURVEY

Hello! I am a researcher at Western Carolina University working with my faculty mentor, Dr. Kia Asberg, on a project that seeks to examine the connection between trauma and substance use when considering interoceptive body awareness. In the procedure, you will complete several tasks.

The purpose of the study is to help researchers understand how to best help individuals who have experienced trauma and subsequent substance use consequences. If you would like to answer questions about your own experiences and views, please follow the link below for more information and the survey questions. Some items may be sensitive, such as reflecting on questions about the trauma you may have experienced. Although there may be some transient discomfort, please note that previous studies have found no more than minimal risk to reflecting on these experiences. The survey takes about 35 minutes, and all of the information collected is anonymous. If you have any questions about this study, please contact Dr. Kia Asberg at kasberg@email.wcu.edu.

[Consent form; see Appendix A]

Demographics

What is your age (in years)?

[text box so that participants can enter their age in years]

*eject from study - inclusion criteria: must be 18 years of age or older

What gender do you identify with?

1 = *Man*

2 = *Woman*

3 = *Non-Binary*

4 = *Other*

5 = *Prefer Not to Answer*

What is your ethnicity?

1 = *American Indian or Alaskan Native*

2 = *Asian*

3 = *Black or African American*

4 = *Hispanic or Latino*

5 = *Native Hawaiian or Pacific Islander*

6 = *White*

7 = *Other*

PTSD Checklist for DSM-5 (PCL-5) with Life Events Checklist for DSM-5 (LEC-5) and Criterion A

Life Events Checklist for DSM-5 (LEC-5)

Part 1. Listed below are a number of difficult or stressful things that sometimes happen to people. For each event check one or more of the boxes to the right to indicate that: (a) it happened to you personally; (b) you witnessed it happen to someone else; (c) you learned about it happening to a close family member or close friend; (d) you were exposed to it as part of your job (for example, paramedic, police, military, or other first responder); (e) you're not sure if it fits; or (f) it doesn't apply to you.

Natural disaster (for example, flood, hurricane, tornado, earthquake).

Fire or explosion.

Transportation accident (for example, car accident, boat accident, train wreck, plane crash).

Serious accident at work, home, or during recreational activity.

Exposure to toxic substance (for example, dangerous chemicals, radiation).

Physical assault (for example, being attacked, hit, slapped, kicked, beaten up).

Assault with a weapon (for example, being shot, stabbed, threatened with a knife, gun, bomb).

Sexual assault (rape, attempted rape, made to perform any type of sexual act through force or threat of harm).

Other unwanted or uncomfortable sexual experience.

Combat or exposure to a war-zone (in the military or as a civilian).

Captivity (for example, being kidnapped, abducted, held hostage, prisoner of war).
Life-threatening illness or injury.
Severe human suffering.
Sudden violent death (for example, homicide, suicide).
Sudden accidental death.
Serious injury, harm, or death you caused to someone else.
Any other very stressful event or experience.

1 – *Happened to me*
1 – *Witnessed it*
1 – *Learned about it*
1 – *Part of my job*
1 – *Not sure*
0 – *Doesn't apply*
[Check all items that apply]

Criterion A

Part 2.

A. If you checked anything for #17 in PART 1, briefly identify the event you were thinking of:
[Text box to provide response]

B. If you have experienced more than one of the events in PART 1, think about the event you consider the worst event, which for this questionnaire means the event that currently bothers you the most. If you have experienced only one of the events in PART 1, use that one as the worst event. Please answer the following questions about the worst event (check all options that apply):

Briefly describe the worst event (for example, what happened, who was involved, etc.).

[Text box to provide response]

How long ago did it happen? (please estimate if you are not sure)

[Text box to provide response]

How did you experience it?

1 - *It happened to me directly*

1 - *I witnessed it*

1 - *I learned about it happening to a close family member or close friend*

1 - *I was repeatedly exposed to details about it as part of my job (for example, paramedic, police, military, or other first responder)*

1 - *Other, please describe [Text box to provide response]*

Was someone's life in danger?

1 - *Yes, my life*

2 - *Yes, someone else's life*

0 - *No*

Was someone seriously injured or killed?

1 - *Yes, I was seriously injured*

2 - *Yes, someone else was seriously injured or killed*

0 - *No*

Did it involve sexual violence?

1 - Yes

0 - No

If the event involved the death of a close family member or close friend, was it due to some kind of accident or violence, or was it due to natural causes?

1 - Accident or violence

1 - Natural causes

0 - Not applicable (The event did not involve the death of a close family member or close friend)

How many times altogether have you experienced a similar event as stressful or nearly as stressful as the worst event?

1 - Just once

2 - More than once (please specify or estimate the total number of times you have had this experience) [Text box to provide response]

PCL-5

Part 3. INSTRUCTIONS: This section asks about problems and complaints that people sometimes have in response to stressful life experiences. Please read each one carefully, then select one of the answers to indicate how much you have been bothered by that problem in the past month.

- Repeated, disturbing, and unwanted memories of the stressful experience?
- Repeated, disturbing dreams of the stressful experience?
- Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?
- Feeling very upset when something reminded you of the stressful experience?
- Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?
- Avoiding memories, thoughts, or feelings related to the stressful experience?
- Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?
- Trouble remembering important parts of the stressful experience?
- 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)?
- Blaming yourself or someone else for the stressful experience or what happened after it?
- Having strong negative feelings such as fear, horror, anger, guilt, or shame?
- Loss of interest in activities that you used to enjoy?
- Feeling distant or cut off from other people?
- Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?
- Irritable behavior, angry outbursts, or acting aggressively?
- Taking too many risks or doing things that could cause you harm?
- Being “super alert” or watchful or on guard?
- Feeling jumpy or easily startled?
- Having difficulty concentrating?
- Trouble falling or staying asleep?

0 – *Not at all*

1 – *A little bit*

2 – *Moderately*

3 – *Quite a bit*

4 – *Extremely*

Sexual Experience Survey – Short Form Victim (SES-SFV)

The following questions concern sexual experiences that you may have had that were unwanted. We know that these are personal questions, so we do not ask your name or other identifying information. Your information is completely confidential. We hope that this helps you to feel comfortable answering each question honestly. Place a check mark in the box showing the number of times each experience has happened to you. If several experiences occurred on the same occasion--for example, if one night someone told you some lies and had sex with you when you were drunk, you would check both boxes a and c. The past 12 months refers to the past year going back from today. Since age 14 refers to your life starting on your 14th birthday and stopping one year ago from today.

Someone fondled, kissed, or rubbed up against the private areas of my body (lips, breast/chest, crotch or butt) or removed some of my clothes without my consent (but did not attempt sexual penetration) by:

- Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.
- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

Someone had oral sex with me or made me have oral sex with them without my consent by: Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.

- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

Is your biological sex male?

Yes [*Participants sent to “A man put his penis into my butt, or someone inserted fingers or objects without my consent by...”*]

No [*Participants sent to A man put his penis into my vagina, or someone inserted fingers or objects without my consent by...” then continues to “A man put his penis into my butt, or someone inserted fingers or objects without my consent by...”*]

A man put his penis into my vagina, or someone inserted fingers or objects without my consent by:

- Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.
- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

A man put his penis into my butt, or someone inserted fingers or objects without my consent by:

- Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.
- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

Even though it didn't happen, someone TRIED to have oral sex with me, or make me have oral sex with them without my consent by:

- Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.
- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

Is your biological sex male?

Yes *[Participants sent to "Even though it didn't happen, a man TRIED to put his penis into my butt, or someone inserted fingers or objects without my consent by..."]*

No *[Participants sent to "Even though it didn't happen, a man TRIED to put his penis into my vagina, or someone inserted fingers or objects without my consent by..." then continues to "A man put his penis into my butt, or someone inserted fingers or objects without my consent by..."]*

Even though it didn't happen, a man TRIED to put his penis into my vagina, or someone tried to stick in fingers or objects without my consent by:

- Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.
- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

Even though it didn't happen, a man TRIED to put his penis into my butt, or someone tried to stick in objects or fingers without my consent by:

- Telling lies, threatening to end the relationship, threatening to spread rumors about me, making promises I knew were untrue, or continually verbally pressuring me after I said I didn't want to.

- Showing displeasure, criticizing my sexuality or attractiveness, getting angry but not using physical force, after I said I didn't want to.
- Taking advantage of me when I was too drunk or out of it to stop what was happening.
- Threatening to physically harm me or someone close to me.
- Using force, for example holding me down with their body weight, pinning my arms, or having a weapon.

For each scenario:

How many times in the past 12 months?

How many times since age 14?

[Participants select 1, 2, or 3+]

Did any of the experiences described in this survey happen to you 1 or more times?

0 - No

1 - Yes

What was the sex of the person or persons who did them to you?

0 - I reported no experiences

1 - Female only

2 - Male only

3 - Both females and males

Have you ever been raped?

0 - No

1 - Yes

Short Inventory of Problems – Revised (SIP-R)

I have been unhappy because of my drinking or drug use.

0 - No 1 - Yes

Because of my drinking or drug use, I have lost weight or not eaten properly.

0 - No 1 - Yes

I have failed to do what is expected of me because of my drinking or drug use.

0 - No 1 - Yes

I have felt guilty or ashamed because of my drinking or drug use.

0 - No 1 - Yes

I have taken foolish risks when I have been drinking or using drugs.

0 - No 1 - Yes

When drinking or using drugs, I have done impulsive things that I regretted later.

0 - No 1 - Yes

Drinking or using one drug has caused me to use other drugs more.

0 - No 1 - Yes

I have gotten into trouble because of drinking or drug use.

0 - No 1 - Yes

The quality of my work has suffered because of my drinking or drug use.

0 - No 1 - Yes

My physical health has been harmed by my drinking or drug use.

0 - No 1 - Yes

I have had money problems because of my drinking or drug use.

0 - No 1 - Yes

My physical appearance has been harmed by my drinking or drug use.

0 - No 1 - Yes

My family has been hurt by my drinking or drug use.

0 - No 1 - Yes

A friendship or close relationship has been damaged by my drinking or drug use.

0 - No 1 - Yes

My drinking or drug use has gotten in the way of my growth as a person.

0 - No 1 - Yes

My drinking or drug use has damaged my social life, popularity, or reputation.

0 - No 1 - Yes

I have spent too much or lost a lot of money because of my drinking or drug use.

0 - No 1 - Yes

Drinking Motives Questionnaire Revised Short Form (DMQ-RS)

In the last 12 months, how often did you drink . . .

- Because you like the feeling?
- To get high?
- Because it's fun?
- Because it helps you enjoy a party?
- Because it makes social gatherings more fun?
- Because it improves parties and celebrations?
- To fit in with a group you like?
- To be liked?
- So you won't feel left out?
- Because it helps you when you feel depressed or nervous?
- To cheer up when you're in a bad mood?
- To forget about your problems?

1 – Never

2 – Sometimes

3 – Almost Always

Multidimensional Assessment of Interoceptive Awareness – Version 2 (MAIA-2)

Please indicate how often each statement applies to you generally in daily life.

- When I am tense I notice where the tension is located in my body.
- I notice when I am uncomfortable in my body.
- I notice where in my body I am comfortable.
- I notice changes in my breathing, such as whether it slows down or speeds up.
- I ignore physical tension or discomfort until they become more severe.
- I distract myself from sensations of discomfort.
- When I feel pain or discomfort, I try to power through it.
- I try to ignore pain.
- I push feelings of discomfort away by focusing on something.
- When I feel unpleasant body sensations, I occupy myself with something else so I don't have to feel them.
- When I feel physical pain, I become upset.
- I start to worry that something is wrong if I feel any discomfort.
- I can notice an unpleasant body sensation without worrying about it.
- I can stay calm and not worry when I have feelings of discomfort or pain.
- When I am in discomfort or pain I can't get it out of my mind
- I can pay attention to my breath without being distracted by things happening around me.
- I can maintain awareness of my inner bodily sensations even when there is a lot going on around me.
- When I am in conversation with someone, I can pay attention to my posture.
- I can return awareness to my body if I am distracted.
- I can refocus my attention from thinking to sensing my body.
- I can maintain awareness of my whole body even when a part of me is in pain or discomfort.
- I am able to consciously focus on my body as a whole.
- I notice how my body changes when I am angry.
- When something is wrong in my life I can feel it in my body.
- I notice that my body feels different after a peaceful experience.
- I notice that my breathing becomes free and easy when I feel comfortable.
- I notice how my body changes when I feel happy / joyful.
- When I feel overwhelmed I can find a calm place inside.
- When I bring awareness to my body I feel a sense of calm.
- I can use my breath to reduce tension.
- When I am caught up in thoughts, I can calm my mind by focusing on my body/breathing.
- I listen for information from my body about my emotional state.
- When I am upset, I take time to explore how my body feels.
- I listen to my body to inform me about what to do.
- I am at home in my body.
- I feel my body is a safe place.
- I trust my body sensations.

0 – Never 1 – Very Rarely 2 – Rarely 3 – Occasionally 4 – Very Frequently 4 –Always

APPENDIX C: PARTICIPANT RESOURCE SHEET

Thank you for your participation in this research on interoceptive body awareness and adjustment. *Multiple-choice/scale questionnaires were used for participants age 18+ in this study. The questionnaires' goal was to gather information on past traumas and current substance use consequences to assess effects on self-reported body awareness. If you would like to learn more about trauma and substance use about interoceptive awareness, please see the contacts listed below.* * Though minimal psychological risk may result from having recalled traumatic events, research has shown that this recollection causes little to no distress to individuals and is potentially beneficial for processing the trauma (research citation below). *However, if you feel that you need assistance with trauma and/or substance use due to this study, please see the list of referral services below for available services.* **

Final results will be available from the investigator, Dr. Kia Asberg, by May 1, 2021. You may contact us at kasberg@email.wcu.edu to receive an email copy of the final report. All results will be grouped together; therefore, individual results are not available. Your participation, including your answers, will remain anonymous, even if the report is published. If you have any additional questions regarding this research, please contact Dr. Kia Asberg at Western Carolina University Psychology Department.

List of Referral Services

Emergency Medical Services: 911

Western Carolina University's Counseling and Psychological Services: 828-227-7469

National Suicide Prevention Lifeline: 1-800-273-TALK (8255)

SAMHSA Treatment Referral Helpline: 1-877-SAMHSA7 (1-877-726-4727)

References of Interest to Participants

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APPENDIX D: TABLES

Table 1

Demographic Characteristics of Final Sample (N = 271)

Variables	N (%)
Age	
18-24	174 (64.2%)
25-34	62 (22.9%)
35-44	20 (7.4%)
45-54	12 (4.4%)
55-64	2 (0.7%)
65-74	1 (0.4%)
Gender	
Woman	149 (55%)
Man	92 (33.9%)
Non-Binary	21 (7.7%)
Other	7 (2.6%)
Prefer not to answer	2 (0.7%)
Ethnicity	
White	217 (80.1%)
Black or African American	14 (5.2%)
Hispanic or Latino	10 (3.7%)
Asian	11 (4.1%)
American Indian or Alaska Native	3 (1.1%)
Native Hawaiian or Other Pacific Islander	1 (0.4%)
Other	15 (5.5%)

Table 2*Pearson Correlations, Means, and Standard Deviations for Key Variables*

	<i>M</i>	<i>SD</i>	2.	3.	4.
1. Trauma symptoms (PCL-5)	28.75	16.71	.376**	.334**	-.356**
2. Substance use consequences (SIP-R)	3.94	4.52		.467**	-.159**
3. Coping drinking motives (DMQ-R SF <i>Coping</i>)	2.09	2.79			-.178**
4. Interoceptive body awareness (MAIA-2)	96.93	25.09			

Note. $N = 271$. ** $p < .001$

Table 3

Tests of the Indirect Effects of Trauma Symptoms on Substance Use Consequences via Interoceptive Awareness as the Mediator

	<i>b</i>	β	<i>SE</i>	95% CI for <i>b</i>	
				Lower	Upper
Mediation					
Indirect effect*	0.0028	0.0028	0.0064	-0.0093	0.0155
<i>a</i> ₁ path (trauma to interoception)	-0.5341*	-0.5341	0.0856	-0.7025	-0.3656
<i>b</i> ₁ path (interoception to substance use)	-0.0051	-0.0051	0.109	-0.0266	0.0266
<i>c</i> ₁ path (trauma to substance use)	0.1017*	0.1017	0.5076	0.0169	2.0155

Note. *N* = 271. Indirect effects represent effects of trauma symptoms on substance use through the mediating variable. β s are fully standardized regression coefficients. Standard errors (*SE*) and the lower and upper bounds for the 95% confidence interval (*CI*) reflect 5000 resampled bootstrap *CI*s. *Indicates significant indirect effect (i.e., *CI* excludes zero).