Exploring the Associations between Trait Boredom and Cannabis Use Habits

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Abstract

Context: Excessive cannabis may lead to significant related problems in a small proportion of those who use. There is growing support for positive associations between trait boredom and both cannabis use and related harms. *State Boredom* is the aversive experience of wishing but being incapable of participating in fulfilling activity. *Trait boredom* is the frequency of experiencing state boredom. Recent literature suggests that trait boredom reflects a chronic lack of agency rather than being a component of sensation seeking. Theories of addiction suggest that people who experience aversive affect frequently (i.e., trait boredom as a lack of agency) tend to use for coping motives (i.e., reduce negative affect), and those who are high on sensation seeking tend to use for expansion motives (i.e., heighten mental experience). **Hypotheses:** I expected trait boredom to positively predict cannabis use and related harms and that these associations would be explained by coping motives. Furthermore, I expected sensation seeking to predict cannabis use and related harms and that these associations would be explained by expansion motives. Exploratory gender specific moderation effects were examined. **Methods:** Data were collected in a single wave on MTurk. 489 North American participant who had used cannabis in the past month were included. Participants were asked about their motivation to use cannabis, problems related to cannabis-use, sensation seeking, and their cannabis use disorder related symptoms. **Results:** I observed high collinearity between the cannabis motives (suggesting they were not unique), and the sensation seeking measure had a large portion of missing responses. Therefore, I was unable to examine initially planned mediation models. Instead, simple linear regressions were performed to examine how trait boredom related to cannabis outcomes. In line with the hypothesis, trait boredom was positively associated with cannabis problems and cannabis use disorder symptoms. Moderation analysis showed that men's CUD-related

symptoms were positively affected by boredom but not women's**. Significance:** This study found associations between trait boredom as a lack of agency and cannabis outcomes. Future research should investigate the mechanisms of these associations and expand on our understanding of trait boredom in the etiology of excessive cannabis use and harms.

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Introduction

The Scope of the Problem

In Canada, cannabis is a widely used psychoactive substance. Since the legalization of cannabis in 2018, its use has become increasingly popular among Canadians, especially young adults (D. Hasin & Walsh, 2021; Haug et al., 2017; Johnston et al., 2021; Moroz et al., 2020; Reece & Hulse, 2021). In fact, surveys conducted by the government of Canada in 2019 and 2022 revealed increases in the prevalence of cannabis use; in 2022, 27% of Canadians aged 16 and older, 37% of Canadians aged 16-19, and 50% of Canadians aged 20-24 reported cannabis use in the past 12 months compared to 21%, 22%, and 45% respectively in 2019 (Government of Canada, 2022; Government of Canada, 2021).

For most people, cannabis use is a recreational activity that provides enjoyment and relaxation. However, a small percentage of people who use cannabis excessively may experience severe related problems (Walden & Earleywine, 2008). Research suggests that daily or almost daily cannabis use has negative short-term and long-term effects. Short-term effects of cannabis use include impaired driving ability (Hartman & Huestis, 2013), impaired memory recall and encoding, increased risk of experiencing anxiety and panic, and in rare cases, a psychotic episode (World Health Organization [WHO], 2016). Long-term effects of daily or nearly daily cannabis use include lung damage (Martinasek et al., 2016), worsening of anxiety and depression, increased risk of suicidal ideations, plans, and attempts (Han et al., 2021), increased risk of arrythmia (Patel et al., 2021), sleep disturbances (Bolla et al., 2008), gastrointestinal discomfort, physical dependence (Razban et al., 2022), and cannabis use disorder (CUD; American Psychiatric Association [APA], 2022). Among Canadians who reported using cannabis in the past year, 1% were at a high risk of developing CUD due to their cannabis use (Government of Canada, 2021). Another study based on the results of the national epidemiologic survey on

alcohol and related conditions in the U.S., which also looked at cannabis use, showed an 8.9% cumulative probability of meeting criteria for CUD, with half of the cases observed met criteria for diagnosis within 4 years from first use (Lopez-Quintero et al., 2011). There is a need to examine contributing factors and mechanisms of heavy cannabis use and related problems.

One individual difference that has been explored in the literature is boredom. Recent advances in theory posit that trait boredom arises from chronic lack of agency. However, links between the new conceptualization of trait boredom as a lack of agency and cannabis use and related outcomes are not well understood. Accordingly, the goal of this thesis was to explore these associations, as well as the underlying motivations. A secondary goal was to explore the association between sensation-seeking and excessive cannabis use and related problems.

Boredom

State Vs. Trait Boredom

Theories of boredom consist of several conceptualizations of the experience of boredom. Within this framework, two conceptualizations are *state boredom* and *trait boredom*. *State boredom* is an unpleasant and aversive experience of being unable to engage in satisfying activities, despite a yearning to do so. This experience is transient, much like a mood. A person who experiences state boredom may be interested in engaging in an activity, but not any of the activities that are available to them in their environment. This leaves the person with available and unused cognitive resources (Gorelik & Eastwood, 2023). Research suggests that state boredom is not caused by an unstimulating environment alone; it includes co-occurring psychological factors- cognitive (i.e., diminished ability to concentrate and reduced executive functioning), motivational (i.e., action that is motivated by seeking external rewards, seeking pleasure, and avoiding pain), volitional/self-regulatory (i.e., high impulsivity, disinhibition, and low self-control), emotional (i.e., alexithymia, experiential avoidance, and lacking meaning) and

physiological (i.e., non-optimal arousal levels and diminished alertness) (Gorelik & Eastwood, 2023).

Trait boredom is defined as the frequent recurrence of *state boredom* in conjecture with the theorized psychological causes of state boredom (i.e., cognitive, motivational, volitional/self-regulatory, emotional, and physiological factors). Furthermore, the conceptualization of *trait boredom* asserts it as an enduring trait, rather than a transient state, that varies in its intensity between individuals and is measured with the Trait Boredom Scale (TBS; Gorelik & Eastwood, 2023).

Trait Boredom as a Chronic Lack of Agency

Gorelik and Eastwood (2023) postulated that *trait boredom* reflects a chronic lack of agency. They refer to agency as the ability to impact one's life events and outcomes. That is, agency is the capacity to create goals, act on tasks that are required for these goals to be achieved and follow through with these goals. They propose that the psychological factors that are theorised to cause state boredom can be unified under the overarching construct of agency. Their conceptualization is based on Bandura's four tenants of agency: intentionality, forethought, self-reactiveness, and self-reflectiveness (Bandura, 1997). Bandura (1997) argued that to be agentic means to possess all four properties. *Intentionality* refers to making deliberate decisions and choices regarding what actions one wants to take. Having *forethought* means being self-motivated to achieve a pre-determined goal by envisaging a desired future. *Self-reactiveness* reflects the ability to adjust the level of effort being invested in goal directed tasks in accordance with the desired outcome. Lastly, *self-reflectiveness* is one's ability to be self-aware, engage in thought, and produce meaning from one's own actions (Bandura, 2000; Bandura et al., 1999).

In the past, it has been suggested that boredom is comprised of two factors. The first is an external stimulation factor, theorized to capture people whose boredom may be associated with a

deficiency in generating internal stimulation, whereas the lack of external stimulation (perceived or real) may be responsible for the person's boredom. The second factor is an internal stimulation factor, theorized to capture people whose boredom may be influenced by lack of external stimulation (perceived or real) (Vodanovich et al., 2005). Most past literature used other tools and different conceptualization to measure boredom proneness (i.e., Boredom Proneness Scale; BPS) The BPS was theorised to measure internalizing stimulation and showed good statistical internal consistency and test-retest reliability (Farmer & Sundberg, 1986). However, recent research suggests that a problematic structure of items artificially created a multi-factor structure within the scale (Struk et al., 2015). Another tool commonly used in boredom research is the Boredom Susceptibility Scale (ZBS). The ZBS was theorised to measure externalizing stimulation and is a subscale of the Sensation Seeking Scale. It is a part of a general construct of sensation seeking (Zuckerman, 1979). However, the ZBS has been shown to have low internal consistency reliability (Vodanovich & Watt, 2016). The TBS offers a statistically superior scale with a contemporary theory for trait boredom (Gorelik & Eastwood, 2023).

Unlike the BPS and the ZBS, the TBS is designed to assess for trait boredom as a chronic lack of agency, and was found to have strong psychometric properties, with adequate internal consistency, interindividual stability, and acceptable model fit (Gorelik & Eastwood, 2023). Yet, studies included in this current literature review used the BPS, ZBS, and other boredom scales that were assumed to assess the frequency of the experience of state boredom. However, it is unclear how a lack of agency is associated with excessive cannabis use and related problems. It is possible that the current literature over-captured state boredom while missing the piece of self agency, an important aspect of trait boredom that may help explain its association with cannabis use.

Sensation-Seeking

Sensation-seeking is defined as a preference for novel experiences and increasingly greater stimulation, being unable to withstand boredom, and being willing to take risks despite their negative consequences (Arnett, 1994; Castellanos-Ryan & Conrod, 2012; Dahlen et al., 2005; Zuckerman, 1979). People high on sensation-seeking have a lower threshold for feeling elation and other pleasurable sensations and have high arousal needs (Zuckerman, 1979). These individuals experience pleasure more intensely, which reinforces even the smallest of enjoyable experiences. Those high on sensation-seeking are at an increased risk of developing behaviours that enhance psycho-stimulation (i.e., cannabis use) (Castellanos-Ryan & Conrod, 2012).

Boredom as a Lack of Agency Vs. Sensation Seeking

Research indicates that sensation-seeking and boredom are bi-directionally associated with one another. In fact, until recently, many studies that measured boredom susceptibility used a subscale from Zuckerman's (1979) sensation-seeking scale to measure it- the ZBS. Sensation seeking was found to be positively correlated with boredom by Dahlen et al. (2005) in their study into anger-driving and individual differences. Another study by Dahlen et al., (2004) had replicated and expanded a study by Rupp and Vodanovich (1997) examining the roles of boredom, sensation seeking and impulsivity in aggression. Both studies used hierarchical multiple regression analyses and found a positive association between boredom and sensation seeking. More recently, Nabilla et al. (2019) discovered a significant association between sensation-seeking and trait boredom in a sample of Indonesian adults and adolescents who had previously used substances and were abstinent at the time of the study. Notably, many of these studies used several scales, including the ZBS, to measure boredom proneness. Considering the more recent conceptualization of trait boredom as a lack of agency, it is possible that using the

ZBS scale, originally intended to measure sensation-seeking, inflated the level of association between boredom and sensation-seeking.

However, when thinking of boredom as a lack of agency, it would appear that lack of agency and sensation seeking are conceptually distinct. Someone who is high on the sensation seeking trait may have the *forethought* to set a goal of achieving greater stimulation with *intentionality*, despite negative consequences or risks. They are likely to be *self-reactive* and adjust the level of effort in achieving the goal of greater stimulation, and be *self-reflective*, as this ability seems to be conceptually unrelated to sensation seeking (Arnett, 1994; Bandura et al., 1999; Bandura, 2000; Castellanos-Ryan & Conrod, 2012; Dahlen et al., 2005; Zuckerman, 1979). Therefore, one may be high on sensation-seeking and either high or low on self-agency and vice versa. It is possible that effectively coping with sensations seeking may be vastly different from effectively coping with trait boredom. Therefore, it is also possible that cannabis use would be driven by different motives for individuals who are high on sensation seeking compared to those high on trait boredom.

Previous Boredom Conceptions and Cannabis Use

Research supports the association between boredom and cannabis use. A study by Schofield et al. (2006) used qualitative analysis of interviews with an in-patient clinical population. The results showed that 79% of the participants reported using cannabis to reduce boredom. Weybright et al. (2015) discovered that on average, individuals with higher trait boredom used greater amounts of cannabis compared to those with lower trait boredom scores. The COVID-19 pandemic posed an ideal opportunity to study the association between boredom and substance use. A survey that was conducted in Canada in 2020 showed that 65% of those who increased their cannabis use over the past 12 months, did so because they were bored (Government of Canada, 2020). Furthermore, continued research post the COVID-19 pandemic

supports the association between boredom and cannabis use. Mielau et al. (2023) conducted an international survey across 53 countries examining cannabis use patterns prior to and during the early stages of the COVID-19 pandemic. They discovered that out of 5,049 participants, 63.5% used cannabis in either 2019 or 2020, and out of those who used cannabis 36-37% endorsed boredom as a reason for using cannabis, although state and trait boredom were not measured distinctly. Doering et al. (2023) conducted multivariate logistic regressions to evaluate the associations between trait boredom and frequency of cannabis use among college students. After controlling for age, sex, and race, they found that boredom susceptibility was a significant predictor of annual, monthly, and weekly cannabis use.

Motivation to Use Cannabis

The motivation to use cannabis has also been shown to predict negative outcomes in cannabis use (Anderson et al., 2015; Glodosky & Cuttler, 2020; Hecimovic et al., 2014; Moitra et al., 2015). Theories of addictive behaviours suggest that motivations to use substances arise from a need to change one's mood by either diminishing negative affect (i.e., negative reinforcement) or inducing positive affect (i.e., positive reinforcement) (Bartel et al., 2023; Cooper, 1994; Simons et al., 1998). These motivations include: (1) substance use to intensify or induce positive affect (*enhancement motives*), (2) substance use to regulate negative affect (*coping motives*), (3) substance use to receive positive social rewards (*social motives*), (4) substance use to avoid social costs and to fit in (*conformity motives*). Cannabis use specific models splits the *enhancement motives* motive into *enhancement* and *expansion* motives involving cannabis use to expand perceptual and cognitive experience (Bartel et al., 2023; Cooper, 1994; Cooper et al., 2016; Simons et al., 1998).

Boredom, Sensation Seeking, and the Motivation to Use Cannabis

Evidence in support of motivational models of addiction shows that different motivations predict different aspects of substance use behaviour (Naegele et al., 2022; Simons et al., 1998). Boredom is defined as an aversive state, and trait boredom is defined as a repeated experience of said aversive state. Therefore, it is reasonable to assume that for those who are high on trait boredom, the motivation to use cannabis would be to cope (i.e., *coping motives*). Meaning, these individuals may use cannabis to regulate negative affect and avoid unpleasant experiences. In this context, coping motives have specifically been shown to predict more excessive cannabis use and related problems (Fox et al., 2011; Hecimovic et al., 2014; Naegele et al., 2022). Research indicates that sensation seeking is a robust positive predictor of cannabis use and related harms (Freund et al., 2021; Kentopp et al., 2019; Neugebauer et al., 2019; Parnes et al., 2024). The literature suggests that individuals who are high on sensation seeking are more likely to use substances for enhancement motives (Cooper, 1994). Furthermore, cannabis specific research shows that individuals who are high on sensation seeking are more likely to use cannabis for expansion motives (Hecimovic et al., 2014). Moreover, enhancement and expansion motives to use cannabis have been shown to predict worse outcomes among those who use cannabis excessively (Cooper et al., 2016; Glodosky & Cuttler, 2020).

Difference in Boredom, Sensation Seeking and Cannabis Use between Genders

Limited prior research has examined gender differences in associations of trait boredom as a lack of agency, sensation seeking, and cannabis use. However, there are gender differences in the experience of boredom, sensation seeking, and in cannabis use patterns (Vodanovich et al., 2011). Research into boredom proneness suggests that women are more likely to experience boredom related to anxiety and social anxiety, and men are more likely to experience boredom related to physically being constrained (i.e. standing in line) or being forced to wait (Vodanovich

et al., 2011). Research into gender differences in agency shows that women tend to perceive themselves as more agentic in interpersonal relationships by striving for connection and unity with others. They tend to lean towards cooperation and coexistence. However, men perceive themselves to be more competent, independent, competitive, ambitious, in control, and power seeking. Research shows that these perceptions are based on the social constructs of gender roles rather than biological differences between the sexes (Kurt & Frimer, 2015). Differences between genders in the expression and experience of sensation seeking have been documented such that men are more likely and willing to engage in novel and intense experiences than women (Cross et al., 2013). Lastly, research into cannabis use differences between genders indicates that men tend to use cannabis more frequently in higher quantities than women. Men were more likely than women to report insomnia and vivid dreams during periods of withdrawal, while women were more likely than men to report nausea and anxiety as withdrawal symptoms (Cuttler et al., 2016). Of note, a study by Rochat et al (2024) found that women were more likely to use cannabis for coping motives than men while using the application “Stop Cannabis”. Furthermore, coping and conformity motives were both associated with problematic cannabis use. To my knowledge, the aggregate of research into cannabis use, sensation seeking, and boredom differences between genders has thus far failed to include non-binary genders. The main interest in in this study was trait boredom as a lack of agency. As research into agency shows that differences between genders are based on socially constructed gender roles and not on biological sex, the analyses in this study were run based on gender rather than biological sex assigned at birth.

The Current Study

This study was the first to explore the association between the novel trait boredom conceptualization of a chronic lack of agency and both excessive cannabis-use and related harms.

Furthermore, it was the first study to contrast trait boredom (as a lack of agency) with sensation seeking, as they relate to excessive cannabis use and underlying motivational mechanisms. I predicted that higher trait boredom would positively predict more excessive cannabis use and related problems, and I expected this association to be explained by the *coping* motive to use cannabis (above and beyond other motivations to use). Furthermore, I expected higher sensation seeking to positively predict excessive cannabis use and related harms, and that this association would be explained by the *expansion* motive to use cannabis (above and beyond other motives to use). Given that the literature is unclear with respect to gender-specific effects, I examined gender as an exploratory moderator in statistical models.

Methods

Participants

A single wave survey study was use to collect data in May of 2024. A crowdsourcing platform (i.e., Amazon's Mechanical Turk; MTurk) was used to recruit participant from North America, and participants were compensated for completion of the survey at the MTurk rate of $7.25. The survey was advertised as a survey assessing "Addictive Behaviours and Well-Being". Only participants who had an MTurk submission HIT rate above 90% were eligible to participate in the study. A total sample of $N = 985$ responses was obtained. Data cleaning was done by excluding individuals who completed the survey faster than two standard-deviations below the mean completion time. Additionally, individuals who failed any of the attention checks and individuals whose reCAPTCHA score was below 0.5 were excluded. reCAPTCHA is software developed by Google that uses an advanced risk analysis engine and adaptive challenges to keep malicious software (i.e., "bots") from engaging in abusive activities on websites (Google, n.d.) (Bauer et al., 2020; Cobanoglu et al., 2021; Smith, 2019). The analysis included only individuals who reported at least one episode of cannabis use in the past month (i.e., "Have you used any

type of cannabis (i.e., marijuana, cannabis concentrates [wax, shatter, oils], cannabis edibles or beverages, etc.) in the past month?"). Following data cleaning, a sample of $N = 489$ was retained for analysis. Out of the 489 individuals in the sample, 59 had missing data for CUDIT-R score. Out of the remaining 430 individuals, 97.91% met the hazardous using threshold, and 86.52% met the threshold that screens for a likelihood of a CUD. The sample age mean was 34.86, with a minimum of 22 and a maximum of 65. The sample was predominantly Caucasian or White (82%), followed by Latinx (14.7%), East Asian (11.7%), Aboriginal (10.4%), Middle Eastern (9.2%), Black (8.8%), South Asian (7.4%) and other (2.5%). 46.4% of the sample reported not being a student, 39.7% of the sample reported being full-time students, and 11.7% reported being part time students. 64.4% of the sample reported having a college or university degree and 22.3% reported having achieved a post-graduate degree. 91.6% of the sample was married, 7% were single, and 88.6% of the sample had children. The participants in the sample only identified as man and women in the gender choice options, even though they were given other options to choose from (i.e., "Transgender", "Non-binary", "Other (please specify)"). 73.2% of the participants identified as male (assigned at birth) and 26.8% of the participants identified female (assigned at birth). 72.4% identified as men and 27.6% identified as women (see Table 1.0). My analyses were based on self-identified gender and not assigned sex at birth.

Procedure

Data was collected after the procurement of ethical approval from the REB committee from York University. All participants provided informed consent prior to participating in the survey. The survey was administered at a single time point. Participants indicated their consent by digitally signing an informed consent form that explained the risks and the benefits of the study. The study was programmed and delivered on the MTurk crowd sourcing platform and collected through the Qualtrics survey platform. The survey had an estimated 1-hour completion

time. Participants were compensated with the standard rate of $7.25 for completing the survey. To ensure high quality data, only participants who had an MTurk submission HIT rate above 90% were eligible to participate in the study. Precautions such as attention checks (i.e., we inserted items within the questionnaire such as: “Choose the first option - “strongly disagree”, in answering this question.”, and “To respond to this question, please choose option number five, “slightly agree””) were taken. Out of the 985 participants, 36 failed the attention checks, 352 received a reCAPTCHA score below 0.5, and 78 participants answered the survey faster than two standard deviations below the mean completion time.

Measures

Boredom Measure

Trait Boredom Scale. The trait boredom scale (TBS; Gorelik & Eastwood, 2023). The TBS is a six-item scale that measures the frequency of experiencing state boredom. Participants are instructed to reflect on their experience in general (i.e., “Please respond to each question indicating how you generally feel about yourself and your life, even if it is different from how you feel right now”) and to indicate the level to which they agree or disagree with each item on a 7-point Likert scale (i.e., “I often feel like there is nothing fun to do”). Due to an administrative error, the TBS in this study used a 5-point Likert scale. The scale was shown to have adequate internal consistency (ω = .84 -.93), good predictive validity (r = .63, p < .001), and strong reliability Coefficient Omega of .95 (Gorelik & Eastwood, 2023). In this study, the internal consistency was excellent (ω = .91).

Sensation Seeking Measures

Short Impulsive Behaviour Scale. The Short Impulsive Behaviour Scale (SUPPS-P) is a 20-item scale that is used to measure impulsivity. The scale assesses for five facets of impulsivity (Cyders et al., 2014; Cyders & Coskunpinar, 2011; Lynam et al., 2011): sensation seeking (i.e., “I

generally seek new and exciting experiences and activities"), lack of premeditation (i.e., "I usually make up my mind through careful reasoning (reverse scored)"), lack of perseverance (i.e., "I am a productive person who always gets the job done (reverse scored)"), negative urgency (i.e., "When I am upset I often act without thinking"), and positive urgency (i.e., "I tend to act without thinking when I am really excited"). The scale showed adequate internal (0.74-0.88 across subscales) and adequate inter-scale correlations and is considered valid (Cyders et al., 2014). This study used only the sensation seeking subscale, which had adequate internal consistency (ω = .789)

Motives Measure

The Marijuana Motives Measures. The marijuana motives measures (MMM; Simons et al., 1998) is a self-report cannabis use measure. The scale asks participants to identify what was their motivation to use cannabis in the past 30 days. The measure consists of 25 items with a 5point Likert scale that spans from "almost never/never" to "almost always/always". The measure assesses five different motivations to use: (1) *enhancement motives* to increase or induce positive emotions (i.e., "Because it gives me a pleasant feeling"), (2) *conformity motives* to avoid social rejection (i.e., "So that others won't kid me about not using marijuana"), (3) *expansion motives* to expand perceptual and mental experiences (i.e., "To be more open to experiences"), (4) *coping motives* to regulate aversive emotions (i.e., "To forget my worries"), and (5) *social motives* to improve social interactions (i.e., "Because it helps me enjoy a party"). This study found good internal consistency within each motive: Enhancing (ω = .849), Conformity (ω = .838), Expansion (ω = .859), Coping (ω = .742), and Social (ω = .853).

Cannabis Use and Related Problems Measures

The Cannabis Use Disorders Identification Test-Revised. The CUD identification test-revised (CUDIT-R; Adamson et al., 2010) is an 8 item self-report measure that screens for

individuals who are more likely to be diagnosed with a CUD. It assesses consumption, cannabis-use related problems, dependence, and cannabis-use related psychological features. Seven of the items' score ranges from 0-4 (higher frequency/severity of symptoms is reflects higher ratings), and the concluding question concerning cutting down use is scored as 0 (no), 2 (yes, but not in the past 6 months), and 4 (yes, during the past 6 months). Scores are summed to a total score, ranging from 0 to 32. A score of 8 or more suggests "hazardous cannabis use," and scores of 13 or more indicate "possible cannabis use disorder" (Adamson et al., 2010; Adamson & Sellman, 2003). The CUDIT-R was shown to be internally consistent (Cronbach's $\alpha = .914$), discriminately valid (Mann–Whitney-U Z-score = 8.547), and test-retest reliable ($r = 0.871$) (Adamson et al., 2010). For this sample, the internal consistency was good ($\alpha = .833$).

Marijuana Problem Scale. The Marijuana Problems Scale (MPS; Stephens et al., 2000), a 19-item 3-point Likert scale (0 = No problem, 1 = Minor problem, 2 = Serious problem) self-report measure. Participants are asked to answer questions regarding cannabis-use related problems in the past month (i.e., "To lose a job"). The MPS was shown to have good internal consistency (Cronbach's alpha = 0.84), and good reliability (Cronbach's alpha = 0.90) (Ketcherside & Filbey, 2015; Stephens et al., 2000). One item was excluded due to administrative error (i.e., "Lowered self-esteem"). In this study, the scale showed good internal consistency ($\alpha = .899$).

Statistical Analysis

Data Analysis

The originally suggested path model proposed that higher scores on trait boredom would predict greater cannabis use and related harms, and that these would be explained by the coping motive to use cannabis. Additionally, the model proposed that higher scores in sensation-seeking would predict greater cannabis use and related harms, and that these would be explained by the

expansion motive to use cannabis. Preliminary descriptive statistics revealed very high collinearity between the different motives for cannabis use (0.79-0.88; see Table 2.0). These very high correlations indicate that the different motives (i.e., coping, expansion, enhancement, social, and conformity) were not unique or distinct from each other in the present sample. This suggests that the collected sample may have had one common motive, and as such, it was not statistically permissible to examine distinct motives as mediators. Furthermore, we did not use an "overall motives score" for the motives as it is not informed by the literature. Therefore, this model was not tested, and multiple linear regression models were tested instead. Moreover, the percentage of the sample that had full scores for the SUPPS-P was only approximately 25%. Because of this, sensation seeking was not included in the regression models testing the effect of boredom on cannabis outcomes. Instead, simple linear regressions followed by moderation models were tested. The models tested associations from trait boredom to cannabis outcomes with gender as the moderator. Lastly, significant interactions were probed using the simple slopes method (Aiken & West, 1991). The trait boredom variable was centered to avoid multicollinearity with the interaction term. Results were computed using RStudio software.

Results

All variables included in the analyses had normal distributions on all the measures (skew> 3.0, kurtosis > 10; Kline, 2010). The correlations between trait boredom and cannabis use related problems and CUD-related symptoms were positively significant. The sample for this study presented with a CUD-related symptoms mean score (measured by the CUDIT-R) of 19.54 (*SD* = 5.920) which is comparable to mean scores that are found in clinical populations (Bonn-Miller et al., 2016). The sample had a cannabis use-related problems mean score (measured by the MPS) of 21.65 (*SD* = 7.311), which is higher than other community population scores reported (Hodgins & Stea, 2018).

Trait boredom was significantly associated with CUD-related symptoms (B= .248, R^2_{Adj}=.054, $F(1, 396)$=23.56, $p < .000$) and with cannabis use-related problems (B= .275, R^2_{Adj}=.044, $F(1, 323)$=15.97, $p < .000$).

Interactions with gender

A moderation analysis suggested that gender interacted with boredom to predict some cannabis use outcomes (see Figures 1.0 and 2.0). Probing the interaction revealed that there was a significant effect of boredom on CUD-related symptoms (*interaction*: B = -.229, t(395) = -2.071, p =.039, R^2_{Adj} = .061, $F(3,395)$ = 9 .627, $p < .000$) for men (B = .31, $t(395)$ = 5.14, $p < .000$), but not women (B = .10, $t(395)$ = 1.09, p = .28) (see Figure 1.0 and Table 3.0). Meaning, there was a positive association between trait boredom and CUD-related symptoms for men, but not for women. Lastly, there was no significant effect of boredom on cannabis use-related problem severity for either gender (see Figure 2.0 and Table 3.0). Noticeably, the R^2_{Adj} was small. That is, the predictors (gender/trait boredom and their interaction term) only explain a small proportion of the variance in CUD-related symptoms.

Discussion

To my knowledge, this study is the first to examine the associations between the novel TBS, which measures trait boredom as a chronic lack of agency, and cannabis outcomes. Significant associations were found between trait boredom and cannabis use outcomes (i.e., CUD-related symptoms and cannabis use-related problems). Interaction probing revealed significant interactions between gender and boredom as they relate to some cannabis use outcomes. Specifically, men's CUD-related symptoms were affected by boredom but not women's.

Unfortunately, due to the high collinearity between the motives in the MMM, I could not assess for coping motives as an explanatory mechanism for cannabis use for those high in trait

boredom. However, the data collected in this study are consistent with the overarching notion that people who are higher in trait boredom, when it is measured as a lack of agency, may be using cannabis to cope with the aversive experience of feeling bored on a chronic basis. This study's findings are aligned with previous research into boredom and cannabis associations. As in this study, past research had found that people higher in boredom, both state and trait, were more likely to use cannabis (Doering et al., 2023; Government of Canada, 2022; Government of Canada, 2020; Mielau et al., 2023; Schofield et al., 2006; Weybright et al., 2015). In turn, more excessive cannabis use has been shown to predict worse outcomes (Hasin, 2018; Lovell et al., 2020).

The data presented with unusual CUDIT-R results. The CUDIT-R scores in this study were abnormally high. The sample in this study was a community sample. However, this study's CUD- related symptoms scores, measured through the CUDIT-R, were comparable to those found in clinical populations (M = 19.54, SD = 5.92) (Bonn-Miller et al., 2016). In comparison, previous research in non-clinical populations reported CUDIT-R mean score ranging from 6.4010.88 (Coelho et al., 2024; Risi et al., 2020). Lastly, unlike extensive previous research (Bartel et al., 2023; Haug et al., 2017; C. M. Lee et al., 2009; Rochat et al., 2024; Scavone, 2022; Simons et al., 1998), the subscales of the different motives in the MMM were all highly collinear. Simons et al. (1998) collected a sample of 161 psychology students who used cannabis at least once in their lifetime. They administered paper surveys. A factor analysis found that items loaded onto the five factors of the different MMM motives. Lee et al. (2009) ran a secondary data analysis on data that was collected for a longitudinal study evaluating the efficacy of feedback intervention for cannabis use among 346 first year college students. Factor analysis found that items loaded onto the five different MMM motives. Additionally, Rochat et al. (2024) collected data from 2951 individuals from French speaking countries (i.e., Switzerland, Canada, Belgium,

and Luxembourg) who used a phone app to manage cannabis use (i.e., “Stop Cannabis”). The mean age for this sample was 28, 41.7% were women and 58.3% were men. A factor analysis of the MMM results in this study found that the items loaded onto the five different MMM motives.

It is possible that in the data collected for this study, these motives did not differentiate due to the high CUDIR-T scores that the sample presented with. Such high CUDIT-R scores could indicate that the study participants were motivated to use for multiple reasons equally, rather than one motivation above others.

Limitations

This study’s original goal was to examine mediational associations between trait boredom and cannabis outcome through the motivation to use cannabis. Unlike previous research, which identified distinct motives to use cannabis, this study’s motives subscales were highly collinear (Bartel et al., 2023; Glodosky & Cuttler, 2020; Haug et al., 2017; C. M. Lee et al., 2009; Rochat et al., 2024; Simons et al., 1998). For reasons unbeknownst to me, individuals in this study’s sample did not have unique motivations to use cannabis as they are measured by the MMM. This high collinearity between the individual motives limited us from exploring novel and unique and theoretically informed mediational pathways from boredom and sensation seeking to excessive cannabis use and related harms, which is why replication of this study is needed.

This study is a cross sectional study, which limits the extent to which one can infer predictions from its findings. Additionally, this study used self-report data which carries a risk of inaccuracy and biases. Cannabis related problems and CUD-related symptoms may be underreported due to social desirability effects, albeit the sample presented with extremely high scores.

The sample that was collected for this study had a mean CUDIT-R score of 19.54, which

is closer to the mean CUDIT-R scores previously seen in clinical samples (i.e., those who are currently in residential treatment for CUD) than to the means seen in community samples, suggesting that this study is limited in its generalizability. Moreover, using a crowd sourcing platform carries a risk of collecting low-quality data which may include "bot" data. Research into the quality of data that is collected through MTurk, which was used for this study, is showing a decline in quality (Douglas et al., 2023; Peer et al., 2022). Douglas et al (2023) defined low quality data as being derived from low quality responding which consists of: *inattentive respondents* (i.e., those who rush through questions without following the directions), *dishonest respondents* (those who purposefully provide fabricated information), *respondents who fail to understand the study's directions,* or *unreliable respondents* (those who provide varying responses to similar or identical questions when repeated). They compared data quality by assessing the percentage of participants who meaningfully responded to the researcher's question (high quality) and comparing it to those who only contribute noise (low quality). They found that out of five different crowd sourcing platforms, MTurk yielded the lowest quality data based on the above criteria. To circumvent low quality data issues, I used several industry standards of quality assurance (i.e., attention checks, google embedded reCAPTCHA scores, and removal of surveys that were completed improbably fast). Furthermore, the participants in this study were granted anonymity, which aims to reduce the desirability effects.

Future Directions

This study found that trait boredom as a lack of agency is predictive of excessive cannabis use and related harms. Though trait boredom seems to play a part in excessive cannabis use, there is not enough research yet to suggest how and if it should be targeted in treatment setting. Trait boredom as a lack of agency and its association to cannabis outcomes remain poorly understood. Future research should focus on further etiological investigation of the

underpinnings of trait boredom as a lack of agency and its association to cannabis outcomes. Since trait boredom is the repeated and frequent experience of state boredom, it is likely that examining state boredom's associations with cannabis use in the moment of cannabis consumption can help explain the associations between boredom and cannabis use. Future research should use ecological momentary assessments (EMA), which assess individuals in their natural environment. An EMA study could check for levels of experienced boredom, tolerance of boredom, emotional valance, coping strategies, and cannabis use associations immediately prior and following a cannabis use event. Additionally, in-lab controlled studies where state boredom is induced and followed by cue exposure to cannabis stimuli can help elucidate the associations between cannabis use, cannabis use motives, and the experience of boredom.

It is unclear why the data collected in our sample presented with multiple challenges that prevented me from completing the intended analyses. In the future, this study should be replicated. Several improvements could be made when replicating this study. Looking at longitudinal data as opposed to cross sectional data would have the advantage of providing more prospective prediction. The data for the SUPPS-P sensation seeking subscale was missing for a large portion of the participants. In the future, an emphasis should be given to collecting a sample with full data for the specific scales to be used in the analyses. Additionally, future research should rely on crowd sourcing platform that yields responses form participants who have a proven track record of providing high quality data (e.g., Prolific) as it is defined above. Moreover, an emphasis should be given to collecting a sample with full data for the specific scales used in the analyses. Since the sample for this study only consisted of binary gender identities, future replications should target a more diverse sample that includes other gender identities to assess for the associations between other genders, trait boredom, and cannabis use problems. Likewise, It may be beneficial to target an emerging adulthood population, considering

that excessive cannabis use during emerging adulthood is predictive of greater harms than later in adulthood (Stone et al., 2012). Moreover, emerging adulthood is a time with the highest reported cannabis use both in quantity and frequency (Hasin & Walsh, 2021; Haug et al., 2017). Lastly, replications should consider adding other correlates of boredom. These boredom correlates may create a stronger association between trait boredom and cannabis use. One such correlate to consider may be neurodivergence such as Attention Deficit and Hyperactivity Disorder (ADHD). There is ample evidence to suggest that those who experience more ADHD related symptoms also experience boredom more frequently and as more aversive (Golubchik et al., 2020; Petranker, 2018; Young, 2005). Research suggests that those higher in ADHD symptoms are more likely to use cannabis, and tend to cope with aversive emotional valance by using self-destructive coping strategies (Bidwell et al., 2014; Brandt et al., 2018; S. S. Lee et al., 2011; Young, 2005).

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Table 1.0
Participant Demographics

	M (SD) or n (%)
Age	34.86 (7.86)
Sex (assigned at birth)	
Male	358 (73.2%)
Female	131 (26.8%)
Gender	
Man	354 (72.4%)
Women	135 (27.6%)
Transgender	0 (0%)
Non-binary	0 (0%)
Ethnicity	
East Asian, South-East Asian, Pacific Islander	57 (11.7%)
Middle Eastern, North African, Central Asian	45 (9.2%)
Hispanic or Latino	72 (14.7%)
Caucasian or White	401 (82.0%)
Black	43 (8.8%)
Aboriginal	51 (10.4%)
South Asian	36 (7.4%)
Other	12 (2.5%)
Decline to answer	1 (0.2%)
Student status Full-time	
Part-time	194 (39.7%)
Not a student	57 (11.7%)
Declined to answer	227 (46.4%)
	10 (2.1%)
Education	
Less than high school	3 (0.6%)
High school diploma	28 (6%)
One or two year post high school but not college	3 (0.6%)
One- or two-year diploma from a trade or professional school but not college	6 (1.2%)
Some college or university education	8 (1.6%)
College or university degree (Bachelors)	315 (64.4%)
Post graduate work	20 (4.1%)
Post graduate degree	109 (22.3%)
Relationship Status Single,	
never married	34 (7.0%)
Single, divorced	2 (0.4%)
Single, widowed	0 (0.0%)
Married	448 (91.6%)
Living common-law	2 (0.4%)
Long term relationship but living separately	1 (0.2%)
Declined to answer	2 (0.4%)
Parents to children Yes	
No	433 (88.6%)
	56 (11.4%)

Table 2.0 *Descriptive Statistics and Bivariate Correlations*

	1	2	3	4	5	6	7	8	9	10
1. Coping	*									
2. Expansion	**0.79*** **	*								
3. Enhancement	**0.80*** **	**0.86*** **	*							
4. Social	**0.80*** **	**0.88*** **	**0.88*** **	*						
5. Conformity	**0.80*** **	**0.85*** **	**0.83*** **	**0.85*** **	*					
6. Sensation Seeking	0.04	0.08	0.08	0.05	0.00	*				
7. Trait Boredom Scale	0.02	0.00	-0.04	-0.04	0.04	-0.03	*			
8. Cannabis Use Frequency	**0.16*** **	**0.22*** **	**0.20*** **	**0.25*** **	**0.17*** **	0.06	-0.07	*		
9. Marijuana Problem Scale	**0.26*** **	**0.15** **	**0.17** **	**0.16** **	**0.24** **	0.03	**0.22*** **	-0.01	*	
10. CUDIT-R	**0.47*** **	**0.45*** **	**0.46*** **	**0.47*** **	**0.51*** **	-0.02	**0.24*** **	**0.11** **	**0.44*** **	*
M	14.28	17.53	17.67	17.70	17.49	8.20	21.38	6.12	21.65	19.56
SD	3.212	4.235	4.231	4.267	4.277	2.898	5.530	2.375	7.311	5.920
Range	4-20	5-25	5-25	5-25	5-25	4-16	6-30	2-15	0-36	1-32

* $p < .05$. ** $p < 0.01$. *** $p < .001$

CUDIT-R stands for the Cannabis Use Disorder Identification Test-Revised.

Table 3.0 *Interactions between Trait Boredom and Gender*

Predictors	***B***	***SE***	R^2_{adj}	***t***	***p***
Cannabis Use-Related Problems (critrion)					
Trait Boredom	.262	. 081		3.218	**.001 ****
Gender (women=1, men =0)	.856	.845		1.014	.311
Trait Boredom X Gender	.049	.153		.319	.750
			.042		
CUD-Related Symptoms (criterior)					
Trait Boredom	.318	.061		5.227	**< .000 *****
Gender (women=1, men =0)	.547	.629		.870	.385
Trait Boredom X Gender	-.230	.111		-	**.039 ***
			.061	2.071	

Figure 1.0

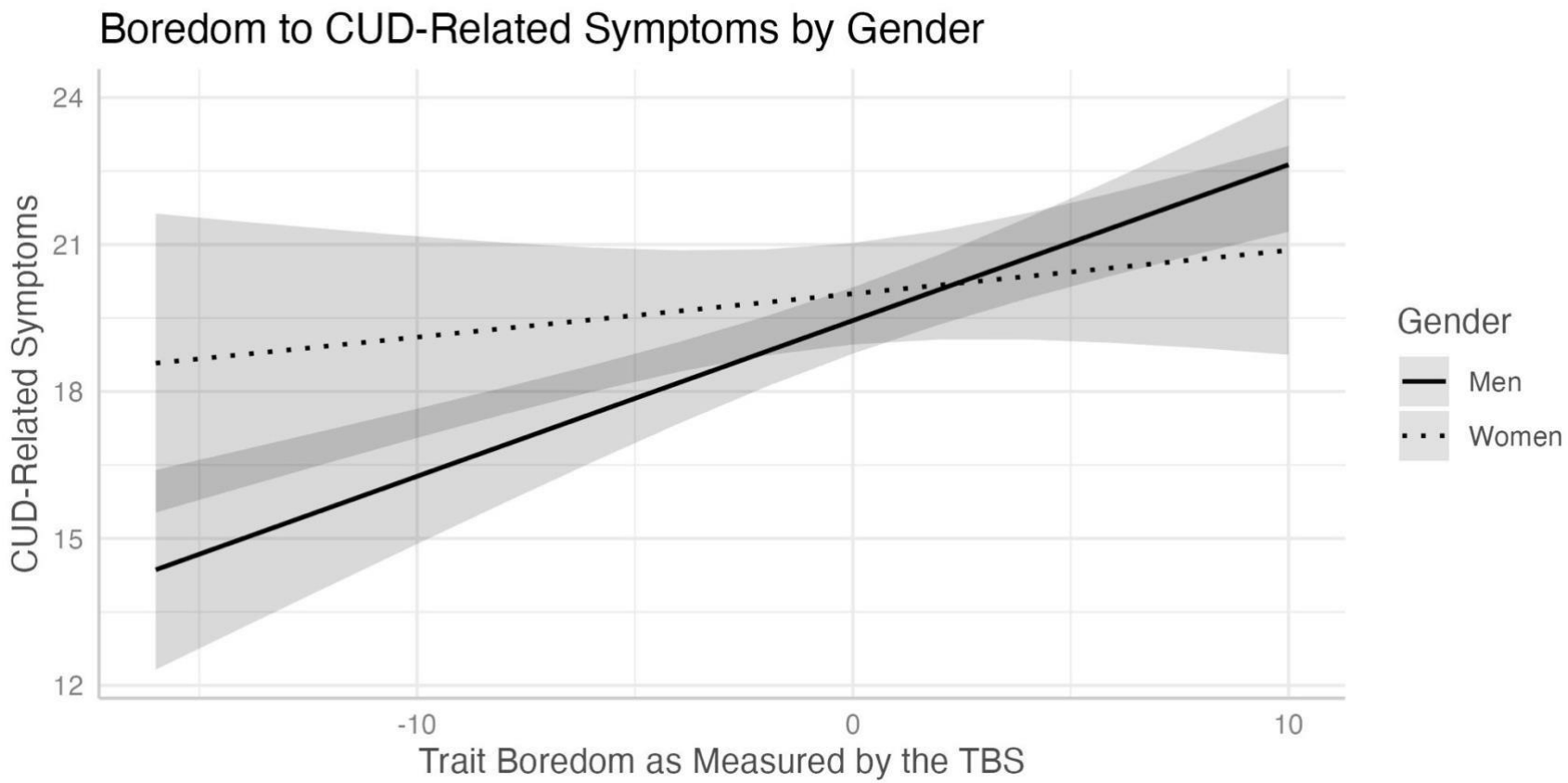
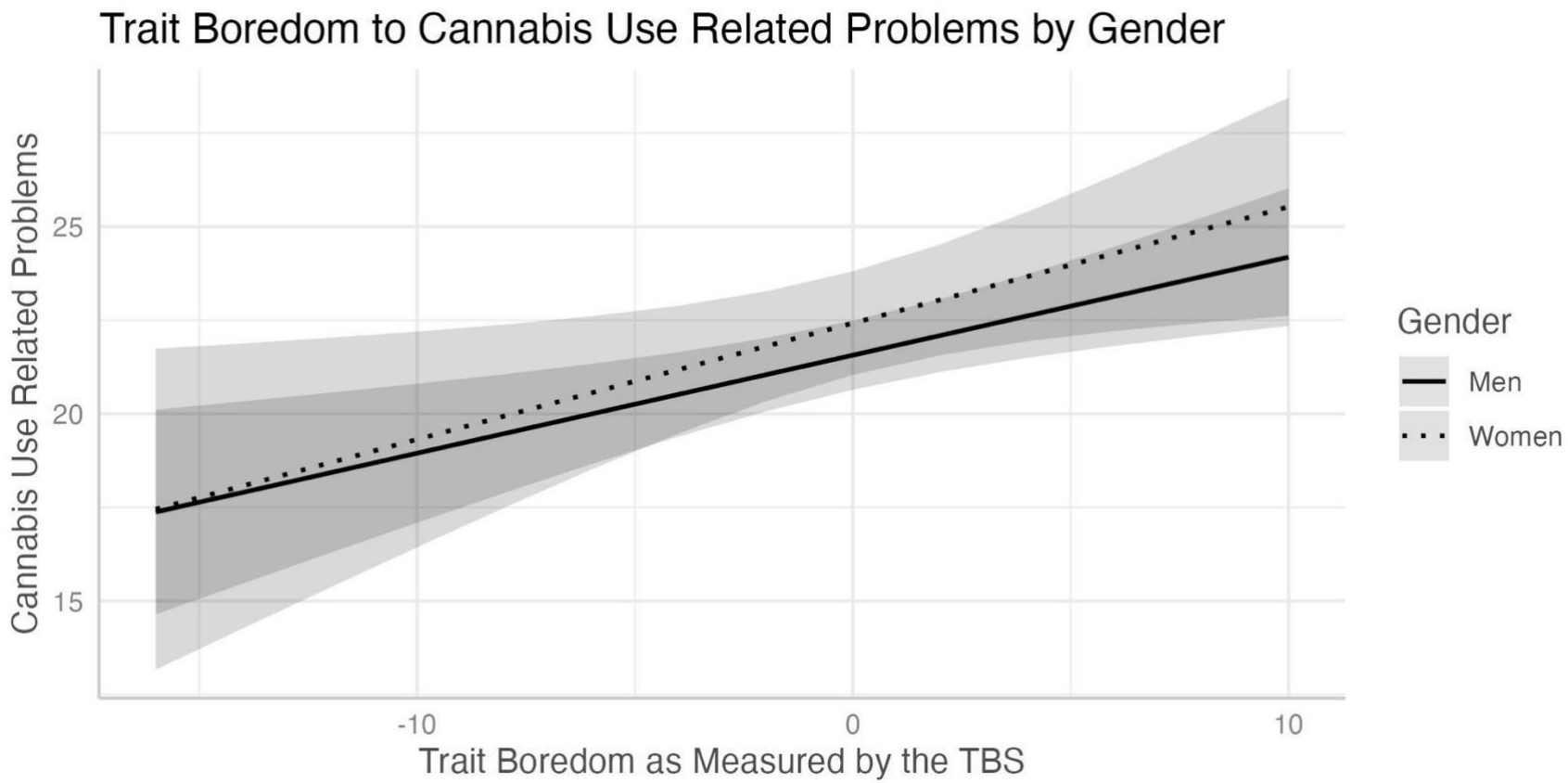

Boredom to CUD-Related Symptoms by Gender
CUD-Related Symptoms
24
21
18
15
12
-10
0
10
Trait Boredom as Measured by the TBS
Gender
Men
Women

Figure 2.0


Trait Boredom to Cannabis Use Related Problems by Gender
Cannabis Use Related Problems
25
20
15
-10
0
10
Trait Boredom as Measured by the TBS
Gender
Men
Women