Understanding short-term changes in substance use following the experience of sexual victimization among young women

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Abstract

Understanding short-term changes in substance use following the experience of sexual victimization among young women

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Introduction: Little is known about trajectories of alcohol and cannabis use in the months immediately following sexual victimization. Utilizing a community-based longitudinal study of young women, our study investigated changes in use of alcohol and cannabis in the months immediately following experience of sexual victimization among young women. We also examined whether these changes varied based on perceived levels of social support.

Methods: Our study utilized data collected monthly as part of *Project Transitions,* a longitudinal study with the objective of understanding influence of social role transitions on alcohol use and other behaviors among young adults in the Greater Seattle area. This current study included 85 women who reported any sexual victimization on the Sexual Experiences Survey (SES). Monthly data on alcohol and cannabis use were assessed. For the current analyses, we used data from one month prior to sexual victimization (Month -1), the month of (Month 0), and the three months following (Months 1-3). We calculated mean, standard deviation, median, and range of typical alcoholic drinks per week and days of cannabis use per month for each study month. These were calculated overall and among groups defined by social support (high vs. low based on the median) using the connectedness subscale from the Engagement, Perseverance, Optimism,

Connectedness, and Happiness Measure of Adolescent Wellbeing. To compare median levels of substance use at each month post-victimization to the reference month, we utilized the non-parametric sign test because of the non-normal distributions of the alcohol and cannabis use outcomes.

Results: Average weekly drinks increased between Month -1 (Mean: 5.73 SD: 5.27; Median: 5.0; Range: 0, 34) and Month 2 (Mean: 7.59; SD: 8.74; Median: 5.0; Range: 0, 48), and then dropped down closer to baseline levels during Month 3. The difference in median typical drinks per week was statistically significant between Month 0 and Month -1 ($p = 0.002$). Other comparisons were not statistically significant ($p > 0.05$). Trajectories for alcohol use differed by levels of connectedness with alcohol use peaking in Month 0 among women with low connectedness and Month 2 among those with high connectedness. Average days of cannabis use increased between Month -1 (Mean: 3.15; SD: 7.24; Median: 0.0; Range: 0, 30) and Month 2 (Mean: 5.38; SD: 9.53; Median: 0.0; Range: 0, 30), and dropped slightly at Month 3. None of the comparisons with the reference month were statistically significant ($p > 0.05$). Women with low connectedness generally reported higher levels of cannabis use when compared to those with high connectedness. Trajectories for cannabis use did not substantially differ by connectedness.

Conclusion: Consistent with past research, we observed that alcohol and cannabis use increased following sexual victimization among adult women. We also observed differences in levels and trajectories of alcohol and cannabis use following sexual victimization based on perceived social support. Larger longitudinal studies with longer follow-up periods are needed to better understand relationships between sexual victimization and substance use trajectories and mental health outcomes as well as the role of perceived social support in their relationships.

Introduction

Sexual victimization is defined as any sexual act inflicted against someone's will and can be committed by anyone in any setting regardless of their relationship to the victim.[1] It includes a range of non-consensual sexual experiences from unwanted sexual contact to completed rape.[1] In the United States, an estimated one in two women have experienced unwanted sexual contact,[2] one in four women have experienced sexual coercion,[2] and one in four women have experienced attempted or completed rape.[2,3] Globally, around 1 in 3 women or 736 million women across their lifetime are victim to physical or sexual violence.[4] Among women aged 15-24 years old globally, 1 in 4 will have already experienced violence from an intimate partner.[4] Victimization has severe impacts on the health and well-being of survivors.[5] In the weeks following victimization, survivors often experience an increase in psychological distress, including symptoms of depression, generalized anxiety, post-traumatic stress, disordered eating, and substance use.[6,7]

The literature surrounding associations of sexual victimization and substance use among women suggests that following an assault, substance use such as alcohol[8,9,10,11,12–15] and cannabis use [9,10,11,15] increase. Of note, most longitudinal studies on this topic assessed alcohol use only and assessed either young women enrolled in college[8,12,16] or transitioning out of college.[11] It is important to understand how sexual violence impacts cannabis use to fill this current gap in literature. There also is evidence in recent years that more women are using cannabis over pharmaceutical medications[17] to cope with distress related to PTSD.[17,18] Additionally, utilizing a community sample rather than college-based sample makes the results more generalizable.

Many studies use the self-medication model to frame research on associations of sexual victimization and substance use.[13,19,14] Self-medication is a maladaptive strategy that involves using substances to cope with distress.[20,21] For people who have experienced sexual victimization,

this commonly includes coping with symptoms of distress, such as re-experiencing the event and intrusive flashbacks.[19] Although distress may decrease temporarily while using substances, this practice may inadvertently prolong post-victimization recovery and result in a higher risk for chronic mental health problems,[19] and possibility of being revictimized.[13]

One potential factor that can protect a survivor from maladaptive substance and alcohol[22] use following their victimization is social support.[14,24] Social support can be defined as the degree of support the survivor receives from people in their lives including family, friends, and romantic partners.[24] Social support can be a protective factor in post-victimization recovery by helping to prevent further escalation in distress and substance use[3,25,22] and may provide a safe social environment which can increase survivors' psychological well-being following sexual victimization. Among a subset of college women who experienced sexual victimization and assessed their daily drinking levels, those with low levels of perceived social support had increased drinking in comparison to those with higher levels of perceived social support.[22] A study by Hirai et al supported positive effects of perceived social support and resilience among women adult sexual assault survivors, in contrast to the negative effects of maladaptive coping on a survivors post-traumatic stress severity.[26,27] Few studies have evaluated the role of social support as a protective factor against post-victimization substance use among women in the community.

The primary aim of this project was to examine monthly changes in alcohol and cannabis use in the three months following sexual victimization among a community sample of young women. Our second aim was to examine whether these changes varied by perceived levels of social support. We hypothesized that experiencing sexual victimization will lead to an increase in alcohol and cannabis use in the months following victimization. Additionally, we hypothesized that women having high levels of perceived social support will have lower increases in substance

use post-victimization compared with women who have lower levels of perceived social support. This research has important prevention and intervention implications as it will provide evidence related to short-term trajectories in alcohol and cannabis use following sexual victimization among women. Gained knowledge can inform prioritization of medical and social services and resources to sexual victimization survivors and identifying the key time frames for high-risk periods of substance use among this population.

Methods

Study Setting and Study Participants

Data for this project were from *Project Transitions*, a longitudinal study that aimed to understand the influence of social role transitions on alcohol use and other health behaviors among young adults in the Greater Seattle area.[28] The *Project Transitions* study sample was comprised of 778 participants. Participants were recruited between February 2015 and January 2016 through social media, print and online advertisements, referrals from friends, flyers, and outreach towards organizations focused on working with youth.[28] Participants were eligible if they were between 18-23 years old at time of recruitment, drank at least one alcoholic drink in the last year, lived in the greater Seattle area, were willing to come into the research office to be informed additionally of this study, and had a valid email address.[28] Our current study included 85 women (sex assigned female at birth) who reported experiencing sexual victimization during the course of the study in the Sexual Experiences Survey (SES) (see below). The University of Washington institutional review board (IRB) approved the human subjects research pertaining to this study, and at the beginning of the project's initial survey, informed consent agreements were collected from all participants.

Data Collection

Surveys were administered online monthly for 24 consecutive months. Participants were asked to complete the surveys during the first week of each month, reporting on what occurred during the month prior (e.g., during first week of February, they reported on what happened during January). To assess sexual victimization, we utilized the Sexual Experiences Survey (SES) measure.[29] This measure was administered at month 12 and month 24 and was only

administered to participants who reported their "Sex" as "Woman". Participants were asked to report on five different categories of sexual victimization: 1) Sexual Contact, 2) Attempted Rape by Coercion, 3) Completed Rape by Coercion, 4) Attempted Rape by Intoxication or Force, and/or 5) Completed Rape by Intoxication or Force. For each of the five experiences, participants were asked to indicate which month(s) during the past year the sexual victimization took place.

To assess alcohol use, we reviewed responses from the Daily Drinking Questionnaire (DDQ) which was administered at the end of each month. The DDQ asks about alcohol use during each day of the week by asking "How much alcohol, on average, (measured in number of drinks), did you drink on each day of a typical week?", with responses provided numerically for all seven days of the week. The sum across the seven days was calculated to obtain the typical number of drinks consumed per week. To assess cannabis use, participants were asked each month the following question: "In the past 30 days, how many days did you use marijuana?" The responses ranged between 0-30 days.

To assess perceived social support, we utilized the Connectedness subscale from the Engagement, Perseverance, Optimism, Connectedness, and Happiness (EPOCH) Measure of Adolescent Wellbeing, which was administered during month five and month 23. Items included "When something good happens to me, I have people who I like to share the good news with", "When I have a problem, I have someone who will be there for me", "There are people in my life who really care about me", and "I have friends that I really care about". Each of these questions had response options between 1-5, with 1 being "almost never/not at all"; 2 being "sometimes"; 3 being "often"; 4 being "very often" and 5 being "almost always/very much like me".[30] A total score was created at each month based on the sum of the five item scores listed above. For

analyses, the scores at month 5 and month 23 were averaged, and then dichotomized using the median to define low and high levels of connectedness.

Data were also collected on race and ethnicity, work status, sexual orientation, relationship status, personal education attainment, parental education attainment, and age. Participants were categorized based on similar responses and categories were collapsed to protect the privacy of the participants due to the study's small sample size. Sexual orientation was categorized as Heterosexual (Straight/Heterosexual) and LGBQ+ (Bisexual, Lesbian, Queer, Questioning, Other). Race and Ethnicity was categorized as White (White/Caucasian) and Minoritized Racial and/or Ethnic Identity (Asian or South Asian, Black or African American, American Indian, Alaskan Native, Native Hawaiian, other Pacific Islander, Hispanic (ethnicity), or more than one race). Current education status was categorized based on their response at baseline into not currently a student; high school student; trade/vocational or community college student; or 4-year university, graduate, or professional student. Parent's (*mother and/or father*) combined highest level of education was categorized as less than 4-year college degree (<high school, high school degree, GED, trade or vocational degree, some college, or Associate's degree) or 4-year college degree or higher (Bachelor's, graduate, or professional degree). Work status was collapsed into two categories based on multiple response options on the basis of whether or not they were receiving income from their current work situation: (1) Employed (working part-time [paid], working full-time [paid] and/or working more than one job [paid]) or (2) Unemployed (volunteer work, internship/apprenticeship [paid or unpaid], unemployed, and/or homemaker). Relationship status was pooled into three categories based on multiple response options: (1) Single (*if responded to 'single'*), (2) Dating *(if responded to 'dating casually', 'single' if also responded to 'dating casually')*, or (3) Committed Relationship *(if*

responded to 'dating seriously', 'dating seriously' if also responded to 'dating casually', 'dating seriously' is also responded to 'committed partners', 'engaged').

Data Analysis

We calculated the means of substance use (alcohol and cannabis use, separately) the month before (Month -1), month of (Month 0), and the three months following (Months 1-3) self-reported sexual victimization. We used the month prior to victimization (Month -1) as a reference for comparisons of substance use in the other months. To compare median levels of substance use at each month post-victimization to the reference month, we utilized the non-parametric sign test because of the non-normal distributions of the alcohol and cannabis use outcomes.

To address aim 2, we repeated the primary analyses described above among subgroups of participants defined by levels of social support based on the EPOCH Connectedness subscale. Scores were dichotomized by low vs. high levels of connectedness. Within each stratum of connectedness, we again ran sign tests to assess the difference in median substance use between the reference month (Month -1) and all following study months (Months 0-3).

As sensitivity analyses, we excluded participants who reported multiple sexual victimizations during the study months of interest from both analyses. Excluding these participants was important to understand if multiple sexual victimizations influence the substance use change for survivors of sexual violence. In addition, in sensitivity analyses assessing cannabis use, participants who did not use cannabis over our 5-month study period were excluded because only 36% (n = 31) of our sample population reported any cannabis use.

In all statistical tests, a p-value <0.05 cutoff was used to determine statistical significance. Data analyses were completed using R statistical software. Statistical packages utilized included "tidyverse"[31] for data cleaning purposes, "ggstatsplot"[32] for visualizations, and "BSDA"[33] for the sign tests.

Results

The average age of participants was 21.07 (SD: 1.74) years old (**Table 1**). A sizable proportion of the sample reported their sexual identity as LGBQ+ (34.1%). A majority of the sample reported their race as white (62.4%). Overall, the study participants were highly educated (58.8% in 4-year college or graduate or professional school) and 68.2% were employed. The largest proportion of participants were in a committed relationship (36.5%), followed by participants who were dating (35.3%) and single (28.2%).

The mean typical number of alcoholic drinks consumed per week following sexual victimization increased from 5.73 in Month -1 (SD: 5.27; Median: 5.0; Range: 0.00, 21.00) to 7.25 in Month 0 (SD: 6.75; Median: 6.0; Range: 0, 34), 6.92 in Month 1 (SD: 6.46; Median: 6.0; Range: 0, 26), and 7.59 in Month 2 (SD: 8.74; Median: 5.0; Range: 0, 48) (**Table 2, Figure 1.1**). At Month 3, level of typical drinking returned to pre-victimization levels 5.60, (SD: 6.56; Median: 3.0; Range: 0, 28). It should be noted that the last two months of observation had the highest number of missing values with Month 2 missing 31 surveys and Month 3 missing 28 surveys. The difference in median typical drinks per week was statistically significant between the month of victimization (Month 0) and month prior to victimization (Month -1) ($p = 0.002$). Other comparisons were not statistically significant at $p < 0.05$ for primary analysis.

Mean days of cannabis use increased slightly from 3.15 at Month -1 (SD: 7.24; Median: 0.0; Range: 0, 30) to 5.38 at Month 2 (SD: 9.53; Median: 0.0; Range: 0, 30), and plateaued at Month 3 (Mean: 5.33; SD: 9.45; Median: 0.0; Range: 0, 30) (**Table 3, Figure 2.1**). None of the follow-up months' (Months 0-3) differences in median days of cannabis use were statistically significant in comparison to the reference month (Month -1) for primary analysis.

Mean alcohol use among participants with low connectedness increased between Month -1 (Mean=5.15; SD: 5.10; Median: 4.0; Range: 0, 16) and Month 0 (Mean=7.63; SD: 8.39; Median: 6.0; Range: 0, 34), then decreased to near baseline levels at Month 1 (Mean=6.00; SD: 5.75; Median: 5.5; Range: 0, 25), Month 2 (Mean=6.48; SD: 6.17; Median: 4.0; Range: 0, 20), and Month 3 (Mean=5.50; SD: 7.40; Median: 3.0; Range: 0, 28) (**Table 4, Figures 3.1**). The trajectory for participants with high connectedness differs, showing participants typical drinks per week increasing between Month -1 (Mean=5.97; SD: 5.16; Median: 4.5; Range: 0, 21) and Month 2 (Mean=8.04; SD: 10.22; Median: 6.0; Range: 0, 48), and then decreased closer to baseline levels at Month 3 (Mean=5.66; SD: 5.89; Median: 4.0; Range: 0, 24). The difference in median number of typical alcoholic drinks per week was statistically significant when comparing Month -1 and Month 0 ($p = 0.013$) for participants experiencing low connectedness. None of the other comparisons among participants with low levels of connectedness were statistically significant at $p < 0.05$. In addition, none of the median drinks per week at Month's 0-3 were significantly (statistically) different from median drinks per week at Month -1 among participants with high levels of connectedness.

Overall, participants with high level of connectedness had lower levels of cannabis use across all months compared to those reporting low levels of connectedness (**Table 5, Figure 4.1**). Participants with low connectedness had an increase in mean days of cannabis use between Month -1 (Mean=3.32; SD: 6.95; Median: 0.0; Range: 0, 30) and Month 2 (Mean=6.07; SD: 10.17; Median: 0.0; Range: 0, 30) and Month 3 (Mean=5.82; SD: 9.60; Median: 0.0; Range: 0, 30). In comparison, we observed participants with high connectedness show an initial decrease in mean days of cannabis use between Month -1 (Mean=3.39; SD: 7.95; Median: 0.0; Range: 0, 30) and Month 0 (Mean=2.57; SD: 6.69; Median: 0.0; Range: 0, 30). We then observed consistent

increases in cannabis use between Month 1 (Mean=2.97 SD: 7.43; Median: 0.0; Range: 0, 30) and Month 2 (Mean=5.21; SD: 9.36; Median: 0.0; Range: 0, 30) and Month 3 (Mean=5.24; SD: 9.65; Median: 0.0; Range: 0, 30). This pattern differs between the month prior to victimization (Month -1) and the month following victimization (Month 1), indicating participants with low connectedness use cannabis at higher levels during the month of victimization compared to their baseline (Month -1); Whereas those with high connectedness use cannabis at lower levels compared to their baseline (Month -1). None of the follow up months' (Month's 0-3) median days of cannabis use were significantly (statistically) different in comparison to the reference month (Month -1) among participants with low and high levels of connectedness for primary analysis.

Findings from the sensitivity analyses, excluding participants who reported any additional sexual victimization and who did not use cannabis (for the cannabis specific analyses) were largely similar to the findings from primary analyses reported above, with a few exceptions. In comparison to primary analyses, when stratified by connectedness, findings from sensitivity analyses showed no statistically significant differences when comparing median alcohol use scores among participants with low connectedness during the month of victimization (Month 0, p=0.065) to the month prior to victimization (Month -1, ref) (**Table 4, Figures 3.1 & 3.2)**. For sensitivity analyses related cannabis use, we observed greater mean days of use across all study months when compared with the primary analyses (**Table 3, Figures 2.1 & 2.2**). The trajectory for cannabis use differed from primary analyses slightly between Months -1 and 1. We observed an increase in mean days of cannabis use between Month -1 (Mean=4.24 SD: 7.56; Median: 1.0; Range: 0, 30) and Month 0 (Mean=6.56 SD: 9.55; Median: 2.0; Range: 0, 30), a decrease closer to baseline at Month 1 (Mean=4.79 SD: 7.69; Median: 1.0; Range: 0, 30), and then an increase

again between Month 2 (Mean=6.96 SD: 10.15; Median: 2.0; Range: 0, 30) and Month 3 (Mean=7.96 SD: 10.80; Median: 1.0; Range: 0, 30). In contrast to primary analyses, the difference in days of cannabis use was statistically significant when comparing Month -1 and Month 3 ($p = 0.031$) among participants with high connectedness (**Table 5, Figure 4.2**).

Discussion:

In this community-based sample of 85 women who experienced sexual victimization during the course of the original study project, we found an increase in mean number of typical alcoholic drinks per week between the month prior to victimization and the two months following victimization, and then a decline to baseline levels by the third month. We observed potential differences in alcohol use post victimization between women with low and high levels of connectedness, with those with higher connectedness having higher and sustained alcohol use, post-victimization, in comparison to those with low levels of connectedness. In contrast, we observed that mean days of cannabis use generally increased gradually between the month prior to victimization through the three months following victimization. We also observed greater days of cannabis use post-victimization among women with low levels of connectedness in comparison to those with high levels of connectedness.

Our findings related to alcohol use post-victimization were similar to what was reported in the literature.[8–15] For example, a study by Resnick et al. found that in comparison to substance use six weeks prior to sexual victimization, alcohol and drug use were higher six weeks post sexual victimization followed by a leveling off closer to baseline substance use levels 3-6 months post-victimization.[13] We saw an overall decline in alcohol use between two- and three-months post victimization. It will be important for future studies to assess the characteristics of women who do and do not show a decline, long-term, in alcohol use trajectory. This knowledge will help us to better understand possible strategies to prevent persistent alcohol use problems following sexual victimization.

While alcohol use dropped between two- and three-months post victimization, cannabis use increased between one month and three months post victimization. The elevated levels of

cannabis use observed in our study are consistent with a study by Stewart et. al. They found that female survivors of sexual assault reported higher cannabis use frequency and greater cannabis use to cope with psychological symptoms post trauma, in comparison to other forms of trauma or male survivors.[18] It is not clear why there are sustained higher levels of cannabis use compared to alcohol use post-victimization in our study. It is possible that the sustained levels of cannabis use may be related to cannabis being more likely used for coping reasons relative to alcohol, which instead may be more commonly used for social reasons.[34–37] In one study, although alcohol was not assessed, individuals with sexual assault related trauma were more likely to use cannabis to cope with both psychological symptoms and enhance positive mood in comparison to individuals facing other forms of trauma.[18] Further research is needed to understand why alcohol and cannabis use trajectories differ among female survivors of sexual victimization.

When comparing alcohol use by levels of social support, we found higher mean typical alcoholic drinks per week for women with high levels of connectedness in comparison to women with lower levels of connectedness following victimization. Women with high levels of social support may be encouraged by their peers to use alcohol following sexual victimization to cope with distress.[35,38]6/21/24 4:59:00 PM Further, because alcohol is commonly used for social reasons,[34,39] women with greater social support may have more opportunities to engage in social activities that involve alcohol.[24,34,35,39] Consistent with this, Simons et. al found that although alcohol and cannabis are equally utilized for coping motivations, alcohol use was more related to endorsement for social motives in comparison to cannabis use.[18,35]

In contrast to alcohol use, women with low levels of connectedness had higher levels of cannabis use in comparison to women with high levels of connectedness, particularly in the sensitivity analyses that excluded women with multiple reported sexual victimizations and

women who did not use cannabis. Our findings related to substance use trajectories may be consistent with findings from a longitudinal study by Blumberg et. al. that assessed alcohol and cannabis use during COVID-19 pandemic restrictions, a significant stressor that young people experienced.[40] They found that for individuals with low levels of social support, cannabis use remained consistent across three COVID timepoints.[40] Our findings show a steady increase of mean days of cannabis use between one month and three months post sexual victimization among women with low connectedness. In comparison, Blumberg et. al found that for individuals with moderate to high levels of social support, frequency of cannabis use increases between Pre-COVID to Lockdown, then decreases back down closer to baseline levels at COVID eased restrictions timepoint.[40] It is important to note that this study was not assessing substance use related to sexual assault, which may explain the differences in the trajectories of cannabis use.

Notably, a large portion, 40% (n=34), of our study sample reported multiple sexual victimizations. This is consistent with findings in the literature.[41–44] A meta-analysis on the prevalence of sexual revictimization found that 47.9% (n=12,252) of sexual victimization survivors were revictimized.[42] Sexual revictimization also places survivors at greater risk of developing substance use issues which is due to their increased odds of developing more severe psychological sequelae.[14,41] It is important to do further research among women who are revictimized to gain better understanding of patterns and timing of substance use in this population and inform preventive and therapeutic interventions.

Strengths of our study include inclusion of cannabis in assessing the short-term trajectories of substance use following sexual victimization. Additionally, findings, particularly those that relate to alcohol use, from our community-based sample may be more generalizable.

The longitudinal nature of our study provided timely and accurate alcohol and cannabis use measures on the monthly level. On the other hand, limitations of our study include selection bias as the sample only includes women based on sex assigned at birth as the project did not assess gender identities including transgender or non-binary. This is a gap in current literature and should be considered in future research, particularly due to the high rates of sexual victimization among people identifying as transgender. Transgender identifying individuals are four times more likely to be victim to a violent crime (rape, sexual assault, and aggravated or simple assault) than cisgender identifying individuals.[45] There is also potential for selection bias with the current study sample differing from the parent cohort due to missing surveys for the substance use measures. In addition, the sample was recruited using online strategies and required that participants drank at least one alcoholic drink in the last year, thus, was not a random sample, which may limit generalizability. Further, this study had a relatively small sample size, which limited statistical power. The timing of the social support measure (EPOCH) was not ideal. It was assessed during months 5 and 23 of the original research study. Ideally, having a social support score at each of our five study month visits in relation to sexual victimization would be preferred. Lastly, our results may not be generalizable to populations where cannabis use is not legalized, as our source population is from Seattle, Washington, where cannabis use has been legal for both non-medical and medical use since 2012.

Consistent with past research, we observed that alcohol and cannabis use increased post sexual victimization. We also observed differences in levels and trajectories based on perceived social support. Additional longitudinal studies should be conducted among women who experience sexual victimization to better understand substance use trajectories as well as mental health outcomes and how perceived social support may influence substance use trends and

trajectories and mental health comorbidity. Understanding the comorbidity of mental health and substance use behaviors observed post-victimization may provide tools for identification of high risk populations for substance use and related mental health disorders. Additionally, longer periods of follow up can provide a clearer picture on the longer-term impacts that sexual victimization may have on substance use trajectories and mental health comorbidities. Lastly, intervention research may assist towards designing and implementing a safe, healing, and supportive pro-social support group for survivors. Psychosocial interventions may be promising among this population. These interventions place the focus on a survivor's interpersonal, social, and environmental factors; and how they relate to their recovery from assault-related trauma rather than on the survivor. For example, a combination of group programs to provide survivors with social support in addition to psycho-education on adaptive and maladaptive coping mechanisms may be applied to target post assault maladaptive substance use and provide survivors with social and emotional support.[46] This style of intervention can be adapted to address sexual violence globally[46–49] and meet the needs of each survivor dependent on their circumstances and socio-cultural factors. Recovering from sexual violence should never be left for a survivor to deal with alone, but there is hope for building resilience through connection and support.

Table 1: Selected Demographic Characteristics of Study Participants

Demographic & Socio-Economic Characteristics (n = 85)	Mean or n	SD or (%)
Age (SD)	21.07	(1.74)
Sexual Orientation[1]		
Straight/Heterosexual	56	(65.9)
LGBTQ+	29	(34.1)
Race and Ethnicity[2]		
White	53	(62.4)
Minoritized Racial and/or Ethnic Identity	32	(37.6)
Current Education Status[3]		
Not a student	14	(16.5)
High School, Trade/Vocational, or Community College	21	(24.7)
University, Graduate, or Professional	50	(58.8)
Parent's Highest Level of Education[4]		
< High School - Associate Degree	27	(31.8)
Bachelor's, Graduate, or Professional Degree	58	(68.2)
Work Status[5]		
Employed	58	(68.2)
Unemployed	27	(31.8)
Relationship Status[6]		
Single	24	(28.2)
Dating	30	(35.3)
Committed Relationship	31	(36.5)

Notes:
[1]Heterosexual (Straight/Heterosexual) & LGBTQ+ (Bisexual, Lesbian, Queer, Questioning, Other)
[2] Combined Race and Ethnicity variables due to small sample size and protection of participants privacy into two groups: White & Minoritized Racial and/or Ethnic Identity (Asian or South Asian, Black or African American, American Indian, Alaskan Native, Native Hawaiian, other Pacific Islander, Hispanic (ethnicity), or more than one race)
[3] Education status at baseline of survey
[4] Parent's combined highest level of education (Less than High School - Associate's Degree category includes (<High School, High School, GED, Trade or Vocational, Some College, or Associate's Degree))
[5] Employment status collapsed into 2 categories based on multiple response options: Employed & Unemployed
[6] Pooled relationship status into 3 categories based on multiple response options: Single *[if responded to 'single']*, Dating *[if responded to 'dating casually', 'single' if also responded to 'dating casually']*, and Committed Relationship *[if responded to 'dating seriously', 'dating seriously' if also responded to 'dating casually', 'dating seriously' is also responded to 'committed partners', 'engaged']*

Table 2: Alcohol use pre, month of, and post sexual victimization					
Alcohol drinks per week					
	Reference Month *(Month -1)*	**Month of Sexual Victimization *(Month 0)***	**1 month post victimization *(Month 1)***	**2 months post victimization *(Month 2)***	**3 months post victimization *(Month 3)***
	Mean *SD* *Median* *(Range)* *n*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n*
Alcohol n = 85	5.73 5.27 5.0 (0, 21) n = 63	7.25 6.75 6.0 (0, 34) 0.002[*] n = 71	6.92 6.46 6.0 (0, 26) 0.430 n = 64	7.59 8.74 5.0 (0, 48) 0.736 n = 54	5.60 6.56 3.0 (0, 28) 0.487 n = 57
Alcohol (*sensitivity*)[#] n = 51	5.5 5.44 4.0 (0, 21) n = 40	6.63 5.69 5.5 (0, 27) 0.029[*] n = 44	6.62 6.88 5.0 (0, 26) 0.557 n = 39	7.77 10.00 4.5 (0, 48) 0.524 n = 34	4.94 5.98 3.0 (0, 25) 0.541 n = 35

Notes:

[#]Sensitivity analysis for mean alcoholic drinks per week excluded all of a participant's study months where an additional unwanted experience was reported by participant

[*] *p value* – statistical significance at ($p < 0.05$) comparing Median substance use scores from the reference month (Month -1) to the remaining study months (Month 0-3)

Figure 1.1: Mean Number of Typical Alcoholic Drinks Per Week

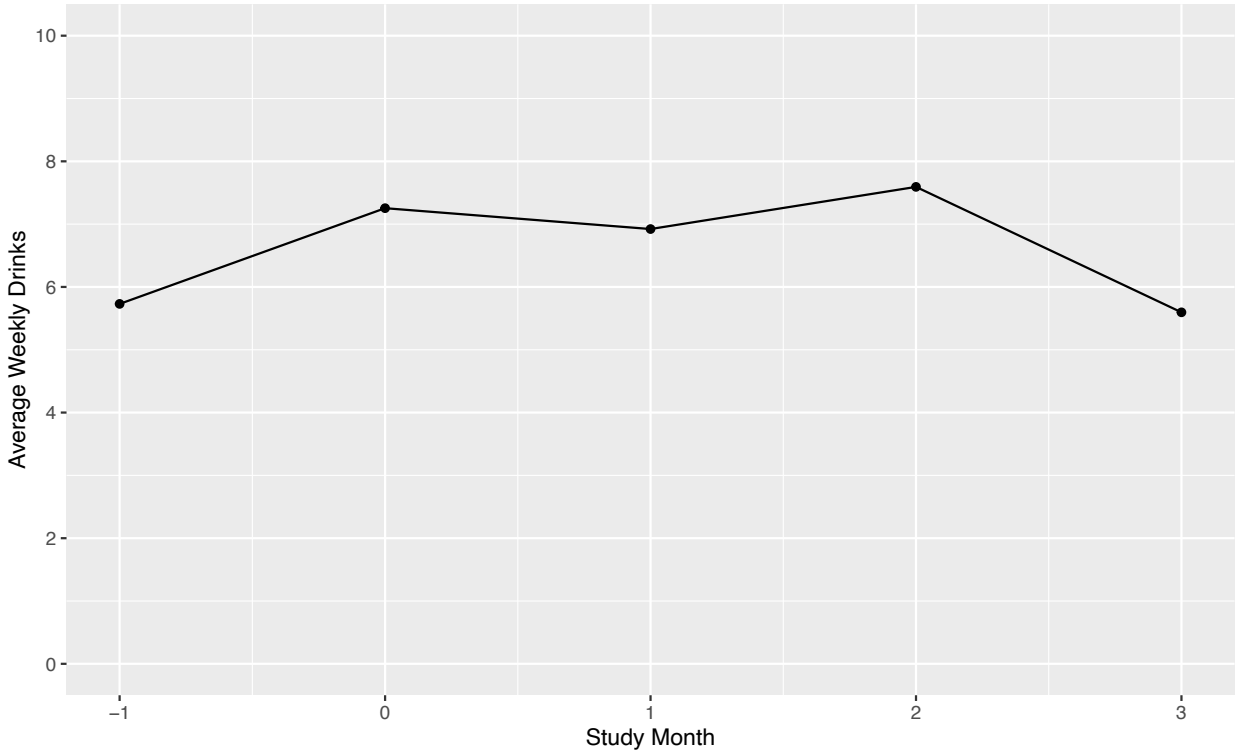


Figure 1.2: Mean Number of Typical Alcoholic Drinks Per Week
(Sensitivity Analyses – excluding women reporting multiple unwanted experiences)

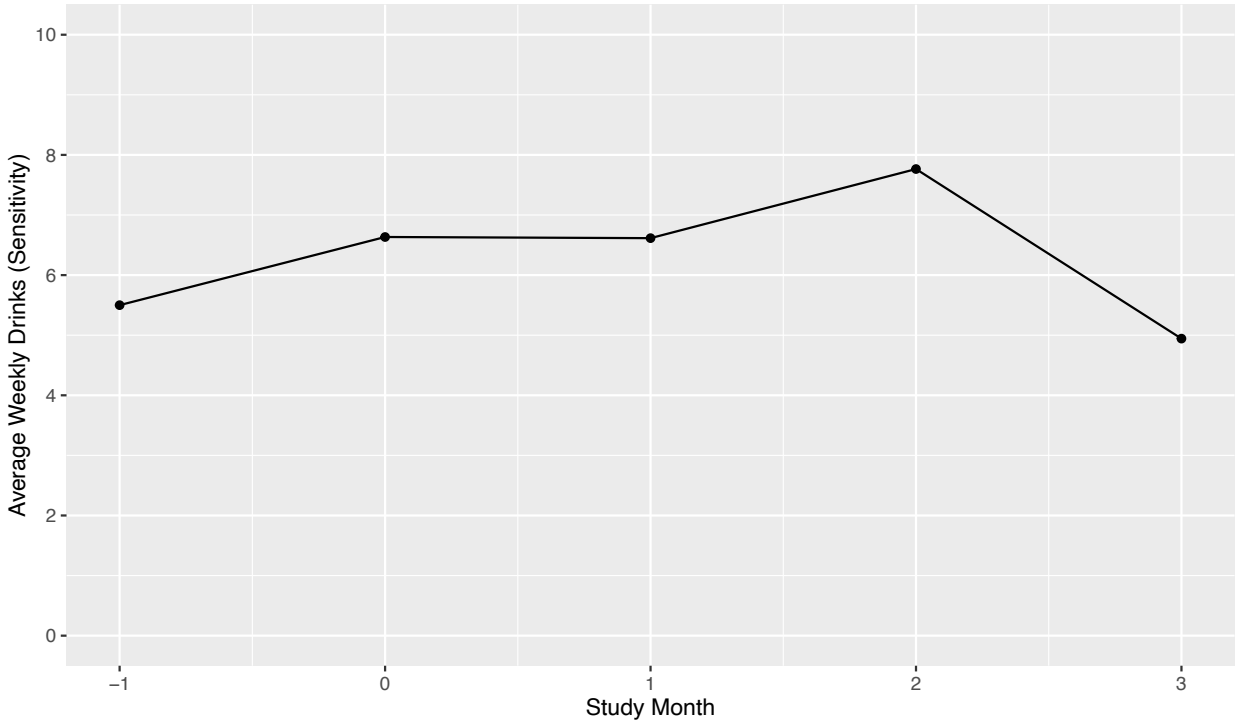


Table 3: Cannabis use pre, month of, and post sexual victimization					
Days of Cannabis use per month					
	Reference Month ***(Month -1)***	**Month of Sexual Victimization** ***(Month 0)***	**1 month post victimization** ***(Month 1)***	**2 months post victimization** ***(Month 2)***	**3 months post victimization** ***(Month 3)***
	Mean *SD* *Median* *(Range)* *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*
Cannabis n = 85	3.15 7.24 0.0 (0, 30) n = 60	3.80 7.69 0.0 (0, 30) 0.503 n = 69	3.79 7.79 0.0 (0, 30) 0.824 n = 75	5.38 9.53 0.0 (0, 30) > 0.999 n = 61	5.33 9.45 0.0 (0, 30) 0.524 n = 63
Cannabis (*sensitivity*)[#] n = 31	4.24 7.56 1.0 (0, 30) n = 21	6.56 9.55 2.0 (0, 30) 0.549 n = 27	4.79 7.69 1.0 (0, 30) > 0.999 n = 28	6.96 10.15 2.0 (0, 30) 0.791 n = 25	7.96 10.80 1.0 (0, 30) 0.424 n = 23

Notes:

[#] Sensitivity analysis for mean alcoholic drinks per week excluded all a participant's study months where an additional unwanted experience was reported by participant, in addition to excluding participants who did not use cannabis across the 5 study months

[*] *p value* – statistical significance at ($p < 0.05$) comparing Median substance use scores from the reference month (Month -1) to the remaining study months (Month 0-3)

Figure 2.1: Average Days of Cannabis Use

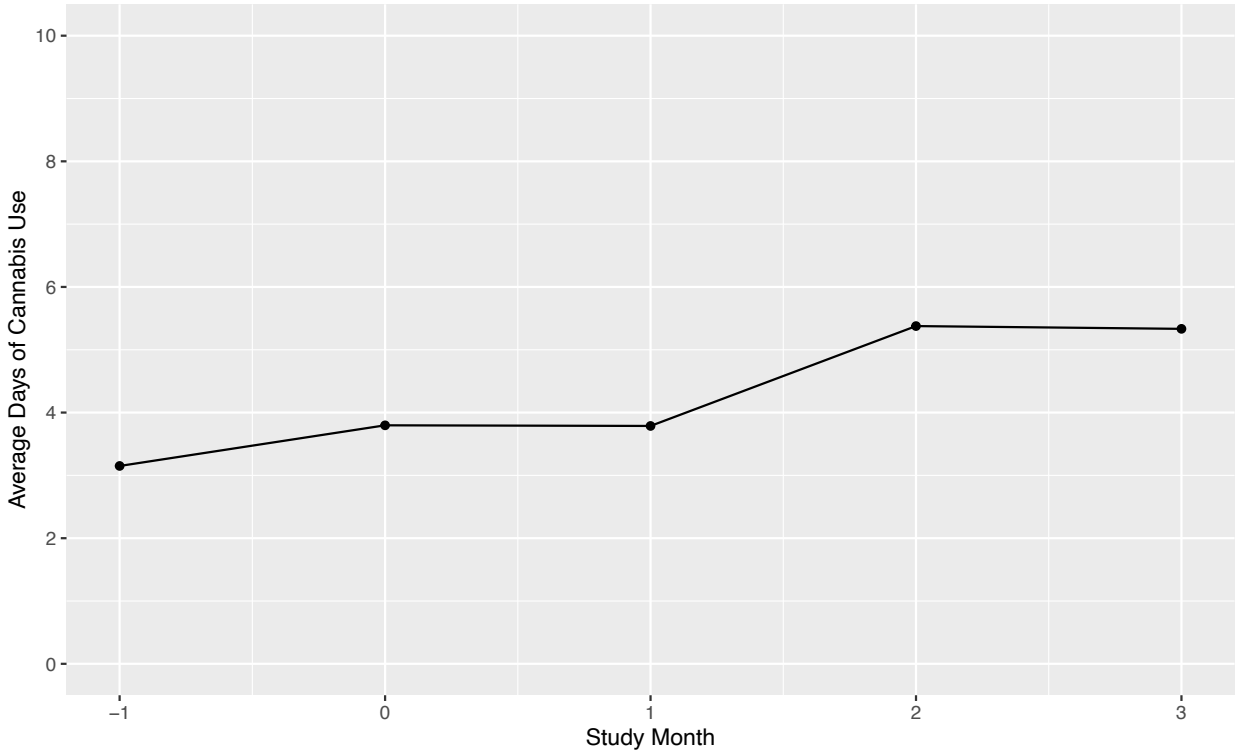


Figure 2.2: Average Days of Cannabis Use (Sensitivity Analyses)
Excluding women reporting multiple unwanted experiences & who did not use Cannabis

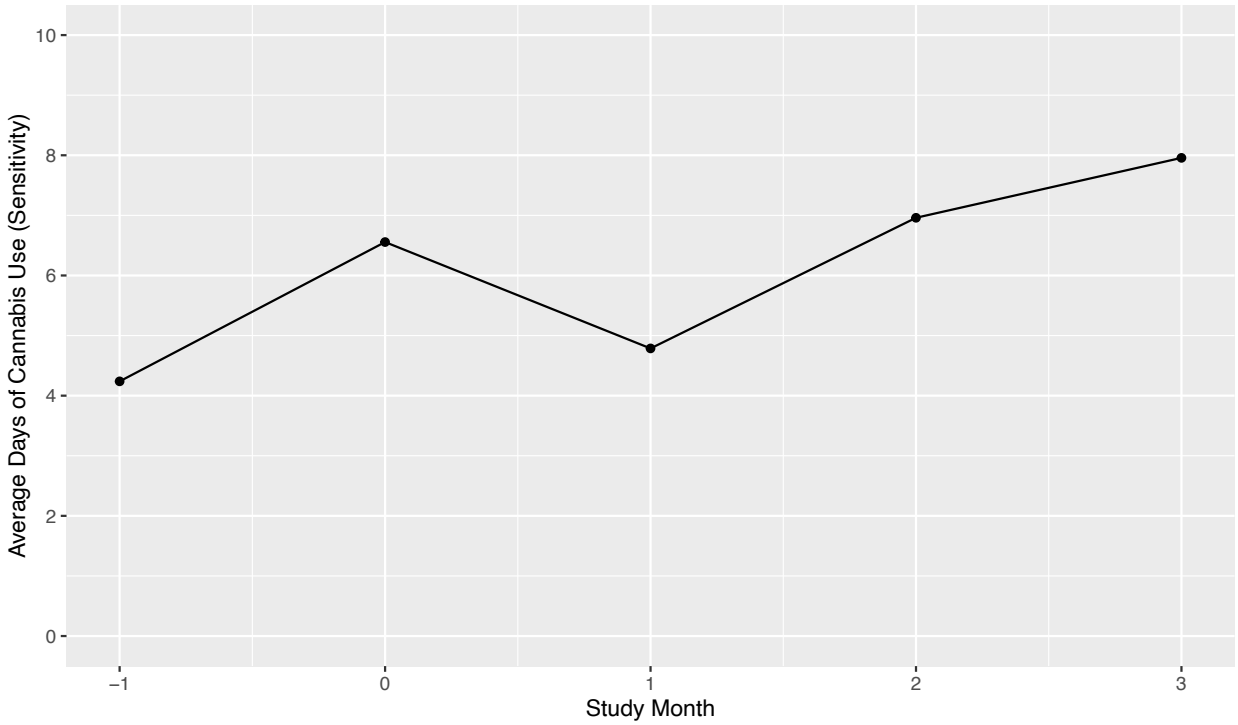


Table 4: Stratified Analysis for average weekly number of alcoholic drinks adjusted by perceived levels of social support

	Reference Month ***(Month -1)***	**Month of Sexual Victimization** ***(Month 0)***	**1 month post victimization** ***(Month 1)***	**2 months post victimization** ***(Month 2)***	**3 months post victimization** ***(Month 3)***
Alcohol	*Mean* *SD* *Median* *(Range)* *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*
Low Connectedness n = 37	5.15 5.10 4.0 (0, 16) n = 27	7.63 8.39 6.0 (0, 34) 0.013[*] n = 32	6.00 5.75 5.5 (0, 25) 0.210 n = 28	6.48 6.17 4.0 (0, 20) 0.267 n = 23	5.5 7.40 3.0 (0, 28) 0.791 n = 26
High Connectedness n = 44	5.97 5.16 4.5 (0, 21) n = 32	6.97 5.29 6.5 (0, 20) 0.152 n = 36	7.63 7.08 6.5 (0, 26) > 0.999 n = 32	8.04 10.22 6.0 (0, 48) 0.648 n = 28	5.66 5.89 4.0 (0, 24) 0.629 n = 29
Alcohol (*Sensitivity*)[#]	*Mean* *SD* *Median* *Range* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*
Low Connectedness[#] n = 23	4.94 18.08 3.5 (0, 16) n = 18	6.62 16.33 6.0 (0, 27) 0.065 n = 21	5.83 16.77 4.0 (0, 25) 0.227 n = 18	5.75 5.83 4.0 (0, 20) 0.508 n = 16	4.67 6.61 2.0 (0, 25) 0.754 n = 18
High Connectedness[#] n = 25	5.58 5.39 4.0 (0, 21) n = 19	6.24 4.97 5.0 (0, 20) 0.424 n = 21	6.83 7.73 4.0 (0, 26) 0.774 n = 18	8.69 12.60 4.5 (0, 48) > 0.999 n = 16	5.13 5.33 4.0 (0, 16) 0.774 n = 15

Notes:

[#] Sensitivity analysis for mean alcoholic drinks per week excluded all a participant's study months where an additional unwanted experience was reported by participant

[*] *p value* – statistical significance at ($p < 0.05$) comparing Median substance use scores from the reference month (Month -1) to the remaining study months (Month 0-3)

Figure 3.1: Mean Number of Typical Alcoholic Drinks Per Week
stratified Low vs High Connectedness

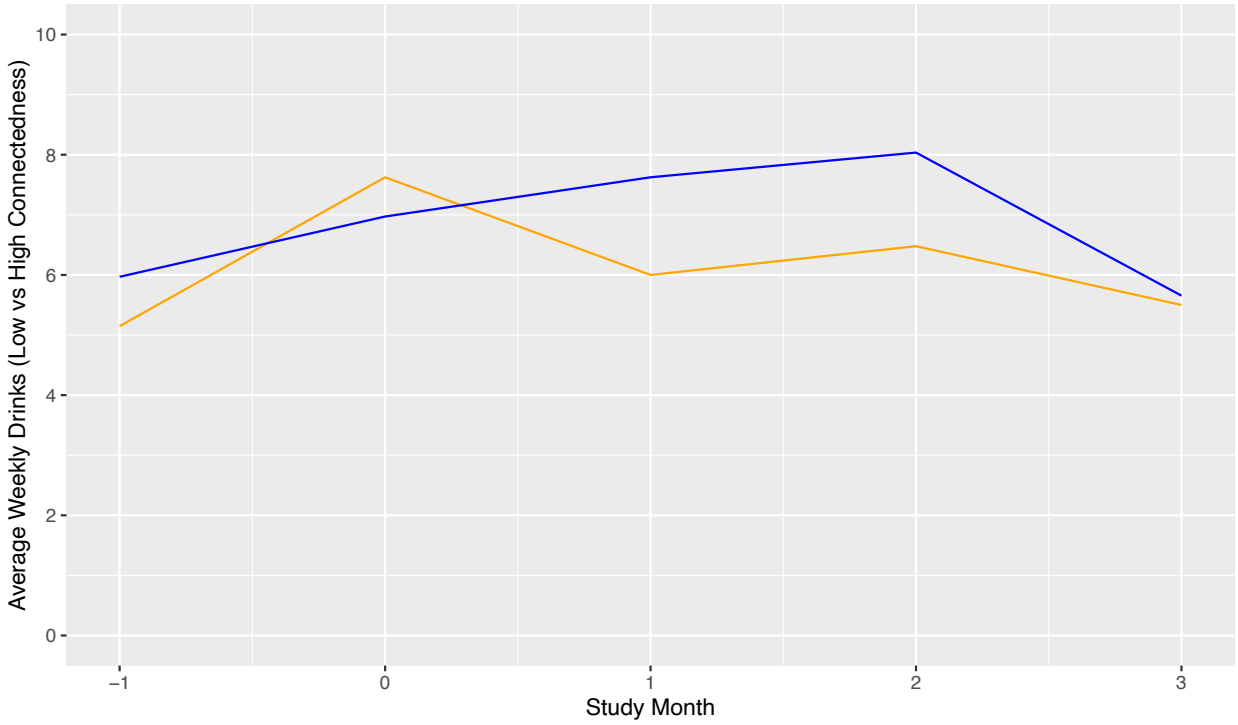


Figure 3.2: Mean Number of Typical Alcoholic Drinks Per Week
stratified Low vs High Connectedness
(Sensitivity – excluding women reporting multiple unwanted experiences)

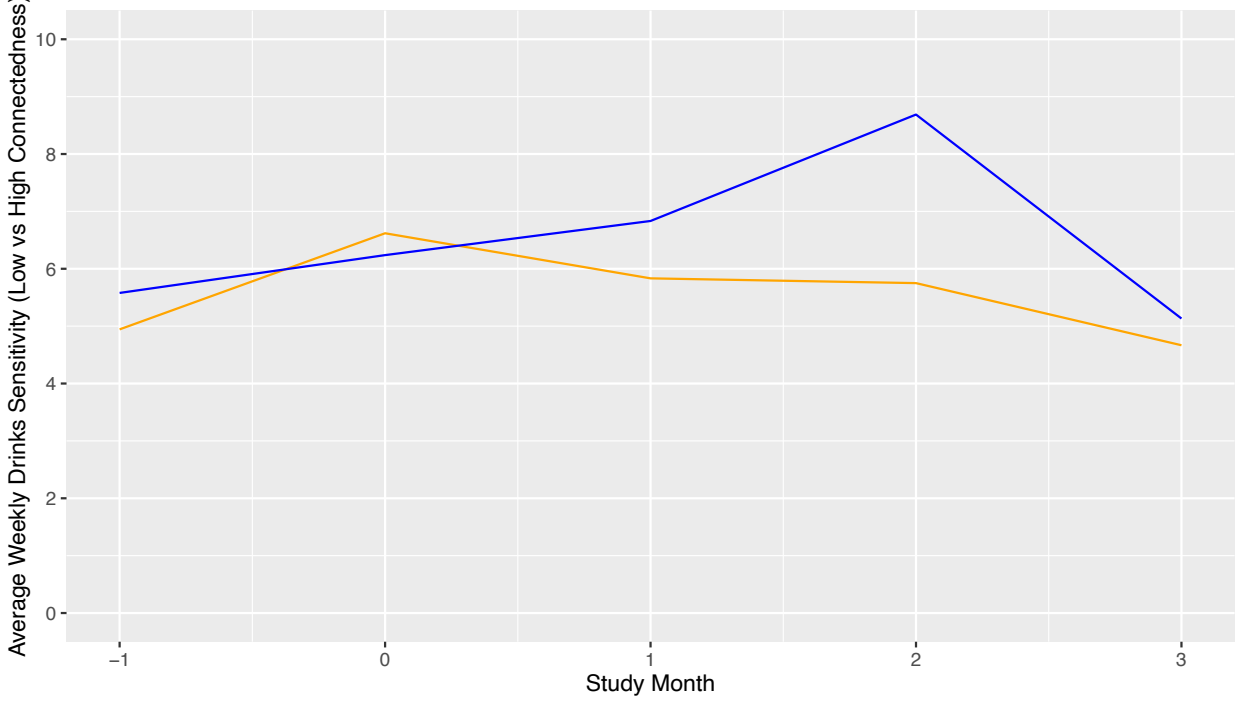


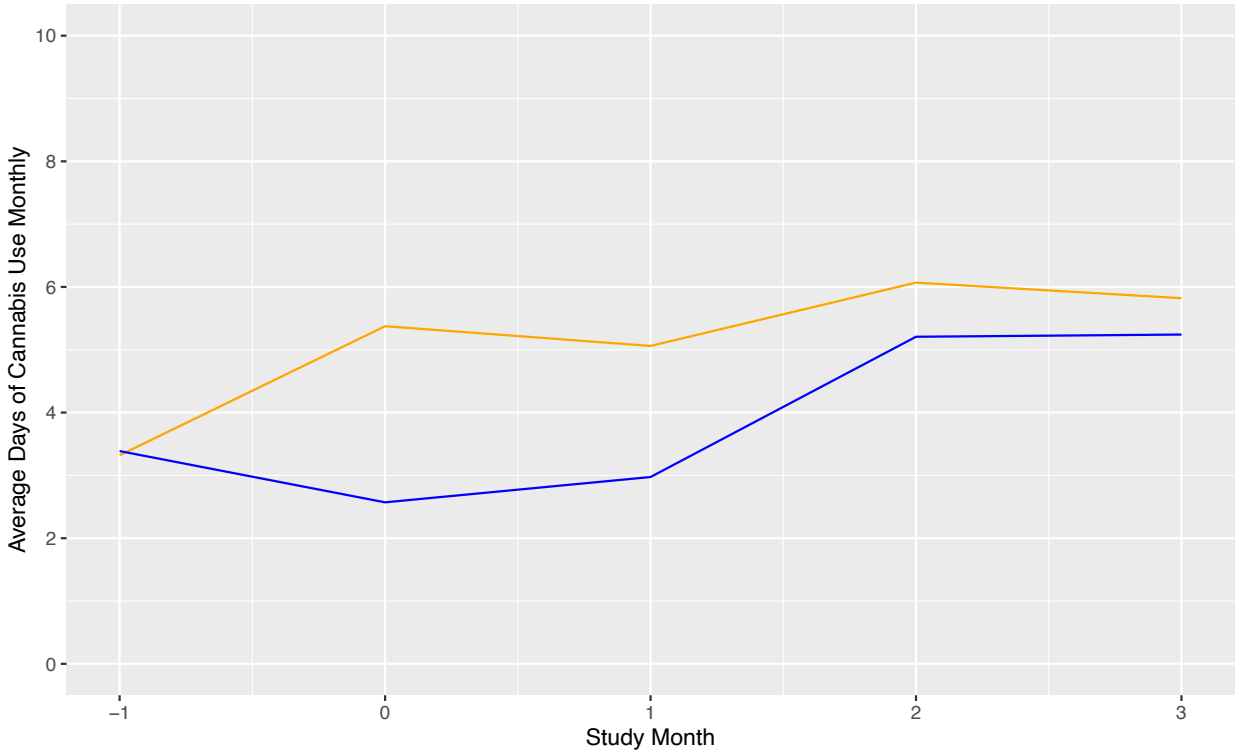
Table 5: Stratified Analysis for average monthly days of cannabis use adjusted by perceived levels of social support					
	Reference Month ***(Month -1)***	**Month of Sexual Victimization** ***(Month 0)***	**1 month post victimization** ***(Month 1)***	**2 months post victimization** ***(Month 2)***	**3 months post victimization** ***(Month 3)***
Cannabis	*Mean* *SD* *Median* *Range* *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*	*Mean* *SD* *Median* *(Range)* *p-value*[*] *n =*
Low Connectedness n = 37	3.32 6.95 0.0 (0, 30) n = 25	5.38 8.68 2.0 (0, 30) 0.549 n = 32	5.06 8.44 0.0 (0, 30) 0.508 n = 33	6.07 10.17 0.0 (0, 30) 0.754 n = 29	5.82 9.60 0.0 (0, 30) 0.754 n = 28
High Connectedness n = 44	3.39 7.95 0.0 (0, 30) n = 31	2.57 6.69 0.0 (0, 30) 0.727 n = 35	2.97 7.43 0.0 (0, 30) > 0.999 n = 39	5.21 9.36 0.0 (0, 30) 0.508 n = 29	5.24 9.65 0.0 (0, 30) 0.065 n = 33
Cannabis (*Sensitivity*)[#]	*Mean* *SD* *Median* *Range* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*	*Mean* *SD* *Median* *(Range)* *p* *n =*
Low Connectedness[#] n = 15	8.38 10.10 4.5 (0, 30) n = 8	9.8 10.91 5.0 (0, 30) > 0.999 n = 15	8.62 9.56 5.0 (0, 30) > 0.999 n = 13	9.92 11.65 5.0 (0, 30) > 0.999 n = 13	9.83 10.74 7.5 (0, 27) > 0.999 n = 12
High Connectedness[#] n = 14	1.91 4.53 0.0 (0, 15) n = 11	2.73 5.87 1.0 (0, 20) 0.375 n = 11	1.62 3.43 0.0 (0, 12) 0.625 n = 13	4.40 8.02 1.0 (0, 26) 0.375 n = 10	6.50 11.40 1.0 (0, 30) 0.031[*] n = 10

Notes:

[#] Sensitivity analysis for mean alcoholic drinks per week excluded all participant's study months where an additional unwanted experience was reported by participant, in addition to excluding participants who did not use cannabis across the 5 study months

[*] *p value* – statistical significance at ($p < 0.05$) comparing Median substance use scores from the reference month (Month -1) to the remaining study months (Month 0-3)

Figure 4.1: Average Days of Cannabis Use Monthly



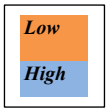
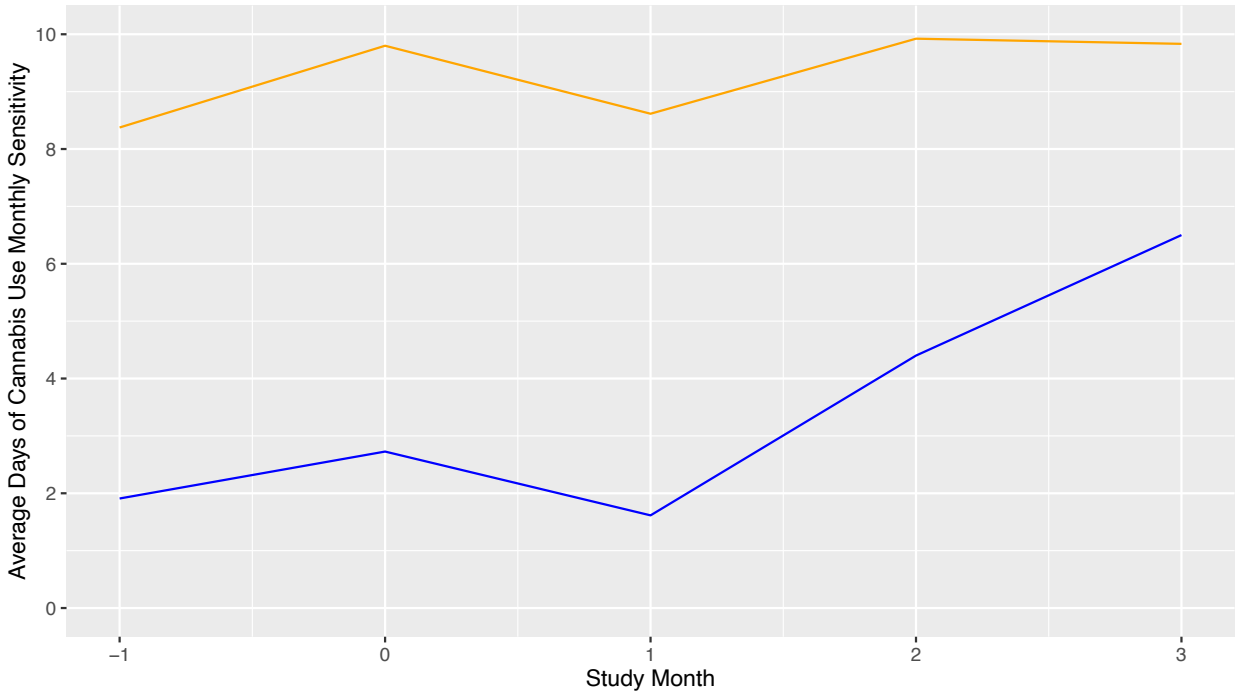


Figure 4.2: Average Days of Cannabis Use stratified Low vs High Connectedness
Sensitivity – excluding women reporting multiple unwanted experiences
& who did not use Cannabis



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