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Examination of the UPPS and Its Relation to Alcohol Use and Generalized Substance Use Problems in Rural African American Males

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Examination of the UPPS and Its Relation to Alcohol Use and Generalized Substance Use Problems in Rural African American Males

By

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B.A., City University of New York at Hunter College, 2017

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An abstract of
a thesis submitted to the Faculty of the
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Abstract

Examination of the UPPS and Its Relation to Alcohol Use and Generalized Substance Use Problems in Rural African American Males

By: Lauren Bertin

Substance use (SU) remains a ubiquitous problem in the United States. Accumulating evidence suggests that racial/ethnic differences influence patterns of SU. For instance, although African Americans' SU peaks later than peers of other racial/ethnic backgrounds, African Americans endorse more SU problems later in life. Studying protective and risk factors associated with SU may explain these population differences. The present study examined how impulsivity is related to future alcohol use and generalized SU problems in a cohort of African American males. Data were drawn from the African-American Men's Project, an ongoing longitudinal study which recruited participants (N_{WAVE1}=505; mean age_{WAVE1} =20.7; N_{WAVE3}=380; mean age_{WAVE3}=23.6) from 11 rural counties of South Georgia. Participants responded to 20 items from the UPPS-P Impulsive Behavior Scale at wave 1. Confirmatory factor analyses (CFA) were used to confirm the best fitting model of impulsivity. Alcohol, tobacco, and marijuana use was assessed at each wave. The number of DSM-5 SU problems were assessed using responses to the Minnesota Survey of SU Problem Scale. We compared four regression models (negative binomial, zero-inflated negative binomial, poisson, and zero-inflated poisson) to determine which best described the relations between wave 1 impulsivity factors and wave 3 alcohol use and substance-related problems. Analyses controlled for the effects of age, income, education, economic distress, and prior SU during wave 1. Consistent with the UPPS-P literature, a five-factor impulsivity model was confirmed via CFA in the full sample. Contrary to prior studies, zero-inflated models provided the best fit to these data for both outcomes. Higher scores on the Lack of Perseverance and Sensation Seeking were associated with greater odds of being a non-alcohol user (Odds Ratio = 7.46 [CI = 1.12, 50.40]; 1.99 [CI = 1.03, 3.82], respectively). Moreover, increased Lack of Premeditation was associated with reduced odds of being an non-alcohol user (0.14 [CI = 0.02,0.84]). Impulsivity did not predict individual differences in levels of typical past month consumption. Lastly, higher Negative Urgency was associated with increased generalized SU problems by a factor of 1.42 [CI =1.02,1.95]) per unit increase in Negative Urgency. Overall, the current study provides novel insight into the relationship between impulsivity and substance involvement during emerging adulthood in African Americans males. Notably, all facets of impulsivity are not alike in predicting SU in non-European American samples.

Keywords: Impulsivity, Substance Use, African Americans

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Examination of the UPPS and Its Relation to Alcohol Use and Generalized Substance Use Problems in Rural African American Males

Substance misuse has been and continues to be a major health concern in the United States (US) and around the world. Excessive alcohol consumption alone represented 1 in every 20 deaths world-wide in 2016 (World Health Organization, 2018). The 2018 World Drug Report estimated that during that same year 1 in every 10 individuals who used substances also experienced a substance use disorder (SUD) (United Nations, 2018). Specifically in the US, there were approximately 19.7 million individuals aged 12 or older diagnosed with SUDs (Bose, Hedden, Lipari, & Park-Lee, 2018). To address these ongoing concerns regarding substance use (SU) and SUDs, various researchers in the field have underscored the need to study patterns of use across key developmental periods. These researchers often highlight adolescence through emerging adulthood (usually defined as age 18 to 26) as critical to the underpinning of SU and SUDs (e.g., Nelson, Van Ryzin, & Dishion, 2015). These are periods of heightened vulnerability for future SUDs (Casey & Jones, 2010; Chambers, Taylor, & Potenza, 2003; Degenhardt, Stockings, Patton, Hall, & Lynskey, 2016; Jordan & Andersen, 2017; McGue, Irons, & Iacono, 2014; Merikangas & McClair, 2012; Wetherill & Tapert, 2013), as well as a period of time where SU can have both short-term and long-term consequences on cognitive, behavioral, and emotional functioning (Hall et al., 2016; Silveri, Dager, Cohen-Gilbert, & Sneider, 2016; Squeglia, Jacobus, & Tapert, 2009). Further, SU among men ages 20-24 accounts for 14% of the health burden globally, providing another reason to examine this age range (Degenhardt et al., 2016).

Studies based in the US suggest that increasing levels of substance involvement begin during early adolescence (Chen & Jacobson, 2012; Palmer et al., 2009). Most adolescents initiate

and experiment with alcohol, tobacco, and/or marijuana (Caris, Wagner, Ríos-Bedoya, & Anthony, 2009; Degenhardt et al., 2010; Lipari, Ahrnsbrak, Pemberton, & Porter, 2017; Vaughn, Wallace, Perron, Copeland, & Howard, 2008). By the time high school students in the US reach their senior year about 60% have drank alcohol, approximately 25% have smoked cigarettes, and slightly less than 50% have used marijuana (Johnston et al., 2018). SU typically will continue to increase during emerging adulthood, peak between the ages of 24 and 26, and then decline (Chen & Jacobson, 2012; Palmer et al., 2009). Nevertheless, these patterns of involvement may not be the case for all who engage with these substances.

Accumulating evidence indicates that racial/ethnic differences influence the sequence of the substances used (Guerra, Romano, Samuels, & Kass, 2000; Vaughn et al., 2008) and the patterns of use during adolescence and into adulthood (Chen & Jacobson, 2012; Finlay, White, Mun, Cronley, & Lee, 2012; Flory et al., 2006; White, Nagin, Replogle, & Stouthamer-Loeber, 2004). Paschall, Bersamin, and Flewelling (2005) found that college attendance increased the likelihood of heavy drinking in European Americans, but appeared to decrease the likelihood in African Americans. Moreover, race/ethnicity appears to influence the amount of treatment for SU received, for which individuals who identify as non-European American seek out and are offered less assistance (Acevedo et al., 2012; Szapocznik, Prado, Burlew, Williams, & Santisteban, 2007; Wells, Klap, Koike, & Sherbourne, 2001). The past 40 years of research in this area has led to enough studies where entire books have been dedicated to solely describing the role of race/ethnicity on SU (e.g., Ma & Henderson, 2002; Thomas & Price, 2016). Notably, researchers have been perplexed by the consistent and paradoxical findings regarding SU in African Americans. Even though African Americans initiate SU later, peak later, and report lower general involvement with substances than peers of other racial/ethnic backgrounds, they

tend to maintain higher levels of use and endorse more substance use problems (SUP) later during adulthood (Chen & Jacobson, 2012; Keyes et al., 2015; Witbrodt, Mulia, Zemore, & Kerr, 2014; Zapolski, Pedersen, McCarthy, & Smith, 2014). These negative substance-related consequences can be both health and social/interpersonal problems. For instance, African Americans report the lowest lifetime prevelance of heavy drinking and intoxication (Taylor, Walker, Austin, Thoth, & Welch, 2011), yet they are more likely to develop alcohol-related illnesses than European Americans, such as liver cirrhosis, esophageal cancer and pancreatic disease (Flores et al., 2008; Polednak, 2007; Yang, Vadhavkar, Singh, & Omary, 2008). Analogously, after controlling for such factors as racial stigma and poverty, African Americans have been shown to be more than three times more likely to be reported for heavy drinking issues, such as fights and accidents (Mulia, Ye, Greenfield, & Zemore, 2009). Mulia et al. (2009) also found that the incidence of physiological symptoms related to dependence were five times higher among African Americans (compared to European Americans), suggesting that less SU can lead to the same SUD criteria endorsed. Complicating these findings, Alvanzo et al. (2011) found that the progression from initation to SUDs occurs slower in African Americans than other racial/ethinic peers.

Several explanations have been offered to understand these paradoxical findings pertaining to African Americans' substance involvement, patterns, and problems. Racial identity has often been cited as a potential factor for engaging in less heavy drinking (Szapocznik et al., 2007; Zapolski et al., 2014). Support for this theory on racial identity comes from studies that have shown that African Americans with a more positive race identity also had more negative attitudes towards SU (Belgrave, Brome, & Hampton, 2000; Brook & Pahl, 2005; Rivas-Drake et al., 2014; Zapolski, Fisher, Banks, Hensel, & Barnes-Najor, 2017). Others have offered up

historical perspectives, such as limited use dating back to pre-colonial times in Africa and during times of slavery in the US persisting to current times (see Zapolski et al., 2014). Alternatively, higher levels of religiosity have been largely associated with less SU (Galen & Rogers, 2004), and African Americans report some of the highest levels of religiosity in the US (Chatters, Taylor, Bullard, & Jackson, 2008). In line with this, racial discrimination is often cited as a risk factor for more SUP. Support for this comes from a study which suggested that intoxicated African Americans are more likely to be arrested (Brown & Frank, 2006); however, this finding has not always replicated (Borrell et al., 2007).

In addition to the potential protective and risk factors specific to influencing SU and SUP in African Americans, there are a number of established predisposing influences that are considered rather universal through the SU literature. Early SU involvement (e.g., initiation, intoxication, dependence on others substances during adolescence is a well-established predictor of future drug use and problems) (Bolland et al., 2016; Jennison, 2014; Odgers et al., 2008; Windle & Windle, 2012). In a study that compared across 11 ethnic groups, Chen and Jacobson (2002) found adolescents' prior use of cigarettes elevated risk of subsequent alcohol use over past 30 days use differently among the groups—even though risk increased for all who had prior cigarette use. Still, African Americans were found to have generally lower SU risk over time than their Caucasian, Hispanic and Asian counterparts.

A substantial body of human and animal research has also linked impulsivity to excessive SU, as both a risk factor and consequence (Argyriou, Um, Carron, & Cyders, 2018; Dick et al., 2010; Verdejo-García, Lawrence, & Clark, 2008; Winstanley, Olausson, Taylor, & Jentsch, 2010). The construct of impulsivity is rather vast and complex, and there appears to be inconsistency on how to best define and measure it in the literature (Dick et al., 2010). Dozens of

psychological tests and behavioral paradigms have been developed by researchers to measure impulsivity (Dick et al., 2010; Lane, Cherek, Rhoades, Pietras, & Tcheremissine, 2003). Many of these measures differentially have been associated with various stages of SU: initiation, use, maintenance, dependence, and relapse. However, there has been a lack of consistency between impulsivity measures as predictors of SU, as well as among the measures themselves; these impulsivity measures do not always correlate (Reynolds, Ortengren, Richards, & de Wit, 2006), nor do they usually load on a single factor—especially when examining the relationship between self-report and behavioral measures (Cyders & Coskunpinar, 2012). As a result, researchers no longer view impulsivity as a unitary construct, but as heterogeneous trait with multiple underlying subfacets. Cyders (2015) explained how this construct confusion has "led to inconsistencies across studies and a stalemate in the accumulation of scientific knowledge" (p. 204).

An unanswered question in the impulsivity literature is 'Whether races/ethnicities differ in these facets (i.e., factor structure and/or loading similarity)?'. In particular, whether the observed relations between facets of impulsivity and behaviors are robust across race. An extant review of the literature identified only three studies that have explicitly investigated whether impulsivity facets differ in terms of the sample's race (Collado et al., 2017; Pedersen, Molina, Belendiuk, & Donovan, 2012; Stevens, Blanchard, Shi, & Littlefield, 2018). However, only two of these also examined how these differences predict SU (Pedersen et al., 2012; Stevens et al., 2018). Pedersen et al. (2012) observed that in a longitudinal study of 8 and 10-year older children through adolescence, European Americans had higher initial levels and steeper slopes in sensation seeking compared to African American peers. The results further suggested higher levels of sensation seeking (measured using the Zukerman Sensation Seeking Scale) might be

driving higher levels of alcohol use during adolescence in European Americans, but not African Americans. Still, these results are rather preliminary in offering impulsivity facets as another possible reason for the observed SU/SUP differences in African Americans. Moreover, the study only examined at impulsivity predicting SU up to 15 years old, and only probed sensation seeking and a generalized scale of impulsivity. Alternatively, Stevens et al. (2018) observed that impulsivity across Hispanic/Latinos verse Non-Hispanic Latinos similarly predicted substance use outcomes.

Among the many assessments of impulsivity, the UPPS Impulsive Behavioral Scale (UPPS) has been popularized. Since its development, the UPPS has been repeatedly utilized in the SU literature to examine the intricate relationship between impulsivity and SU (e.g., Coskunpinar, Dir, & Cyders, 2013; Hershberger, Um, & Cyders, 2017; Magid & Colder, 2007; VanderVeen, Hershberger, & Cyders, 2016). For many researchers, the UPPS over the past decade has become almost a gold standard as it is believed to measure various subfacets of impulsivity and has been widely validated in college and non-college samples. Its conception was largely based on the inconsistences among definitions of and findings on impulsivity, as described above. As such, Whiteside and Lynam (2001) sought out to "identify facets of impulsivity that are common across measures and place them in an inclusive model of personality" (p. 673). To achieve this, they conducted an exploratory factor analysis of 20 scales previously regarded as representative of impulsigenic traits in sample of 437 undergraduates. These scales were drawn from nine well-validated existing measures of impulsivity that were generated from diverse perspectives (e.g., Zuckerman's Sensation Seeking Scale, Barratt Impulsiveness Scale-11, and The Revised Neo Personality Inventory). From this analysis, the researchers proposed a new scale to assess the four discrete impulsivity factors which emerged

from the preceding measures: Urgency (i.e., tendency to act rashly under extreme negative emotions), Lack of Premeditation (i.e., tendency to act without thinking), Lack of Perseverance (i.e., inability to remain focused on a task) and Sensation Seeking (i.e., tendency to seek out novel and thrilling experiences).

This scale, along with its revision—the UPPS-P, which includes an additional fifth subscale corresponding to Positive Urgency (i.e., tendency to act rashly under extreme positive emotions) (Cyders et al., 2007; Lynam, Smith, Cyders, Fischer, & Whiteside, 2007)—has since been validated in larger samples (Smith et al., 2007), as well as populations containing older participants with more severe and diverse psychopathology (Miller, Flory, Lynam, & Leukefeld, 2003). It has also been translated into over 10 languages (Billieux et al., 2012; Bteich, Berbiche, & Khazaal, 2017; Keye, Wilhelm, & Oberauer, 2009; Lim & Lee, 2014; Shokri & Sanaeepour, 2016; Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010). Further, Cyders, Littlefield, Coffey, and Karyadi (2014) created a brief version of the UPPS-P (S-UPPS-P), which only entails 20 of the original 59 items, in order to reduce the time it takes to administer by approximately 66% and improve the scales general utility. Still, researchers utilize the UPPS, UPPS-P, and S-UPPS-P differently. For instance, researchers have varied the way in which they derive and use the facets. While some choose to operationalize the facets as factors at the item or parcel level, others have utilized primarily composite scores (i.e., scale means or sums).

Research has suggested that the UPPS facets differentially predict SU outcomes. For instance, both Negative and Positive Urgency have often been associated with SUP (Lejuez et al., 2010). Alternatively, Sensation Seeking has largely in the literature been related to frequency of drinks (Cyders et al., 2009; Fisher & Smith, 2008; Smith et al., 2007). Often, however, when using UPPS to predict SU/SUPs, researchers do not include all UPPS impulsivity facets in a

multiple regression, which results in biased model parameters, as factor models have shown these facets to be inter-correlated. In a more recent study, Tran, Teese, and Gill (2018) included all facets simultaneously in their regression models and found that both urgency facets were associated with alcohol use problems, and that Lack of Premeditation was positively associated with alcohol consumption and bingeing among emerging adults from Australia. While the UPPS has been extensively validated in its predictive ability, there remains questions regarding its structure and ability to predict substance use in a solely African American sample. Examining the UPPS in a single race/ethnicity (i.e., African Americans) may offer more insight into impulsivity and its relationship with SU/SUP than controlling for racial/ethnic differences between large groups of Caucasians versus "others," which has been more common in the impulsivity literature.

The Present Study

The objectives of the present study were to: 1) confirm the structure of an abbreviated UPPS Impulsive Behavior Scale in a cohort of African American males from rural Georgia, and 2) examine how facets of impulsivity relate to alcohol use and generalized SUP. Given the lack of studies examining the structure of the UPPS in a solely African American sample, we compared several structural equation models (SEM) seen in the extant literature. We hypothesized that the five-factor structure of impulsivity previously found in large measurement studies would be the most robust model and would emerge as the best fitting model in these data. The best fitting model of impulsivity was used to examine the association between impulsivity and future patterns of alcohol use and SUP. We hypothesized that UPPS factors when simultaneously included in a model would differentially predict future alcohol use and SUP, while accounting for demographic information and prior SU. This etic approach to studying the

UPPS provides novel insight into the relationship between impulsivity and SU during emerging adulthood in African Americans males.

Method

Sample

Data were drawn from the African-American Men's Project (AMP), an ongoing longitudinal study approved by the IRB of the University of Georgia. Participants (N_{W1} = 505) were initially recruited from Winter 2012 to Summer 2013 (baseline assessment-Wave 1; W1) and were selected based on the following inclusion criteria: 1) residence in one of 11 rural counties of South Georgia, 2) self-identify as African American, and 3) be between the ages of 18 and 21 years during W1. The present study utilizes data from the first and third wave (W3; collected during Spring 2015 to Summer 2016) of data collection. Of the original 505 males at W1 (M_{age} = 20.71, SD_{age} = 1.14), there were 380 who participated in W3 (M_{age} = 23.02, SD_{age} = 1.24). The average amount of time between W1 and W3 for those who remained in the study was 2.98 years (SD_{years} = 0.43).

Measures

Background Questionnaires. Participants responded to questions pertaining to their demographics at each wave. This included, but was not limited to, date of birth, monthly income, working status, educational attainment, and living arrangements. Participant age at time of assessment was calculated to the second decimal place using their date of birth. Highest level of education was binned into three categories: those who did not complete high school, those who graduated with a high school degree, and those who graduated with a high school and pursued a higher degree. Economic distress over the last 3 months was assessed using a modified 5-item

version of the Unmet Material Needs Scale (Conger et al., 2002). Participants were asked to rate whether they "had enough money to afford" suitable housing, clothing, food, medical care, and entertainment/leisure on a scale of 1 (*Strongly Disagree*) to 4 (*Strongly Agree*). These ratings were then averaged together to obtain an overall economic distress score.

Substance Use and Generalized Substance-Related Problems. At each wave, individuals were asked about their alcohol, tobacco, and marijuana use, as well as generalized substance use-related problems using a modified version of the Minnesota Survey of Substance Use Problem Scale (MSS) (Harrison, Fulkerson, & Beebe, 1998). For alcohol and marijuana use, participants were asked open-response questions: "Typically, about how many days per month do you (drink alcohol/ use marijuana)?". For tobacco use, participants were asked the following question: "In the past 3 months, how much did you smoke cigarettes?". They responded with: 1) *None at all*-0; 2) *Less than 1 cigarette a day*-1; 3) *1 to 5 cigarettes a day*-2; 4) *About a half a pack a day*-3; 5) *About a pack a day*-4; 6) *About 1 and a half packs a day*-5; 7) *About 2 packs a day*-6; or 8) *More than 2 packs a day*-7. SUP was defined as the total number, or sum, of items endorsed from the MSS which corresponded to 9 of the 11 SUD criteria for the DSM-5 (i.e., craving and withdrawal history excluded; see Appendix A). Unlike the SU measures, questions about SUP did not explicitly state a reference period, implying general lifetime endorsement.

Impulsivity. A modified version of the UPPS Impulsive Behavior Scale was used to measure impulsivity facets. Participants responded to 20 items that have previously been shown to load unto the five commonly delineated domains: Negative Urgency, Positive Urgency, (lack of) Premeditation, (lack of) Perseverance, and Sensation Seeking. Each item was rated on a 4-point Likert-type scale of 1 (*Strongly Agree*) to 4 (*Strongly Disagree*). Items were reverse coded where appropriate prior to analysis. Cronbach's alpha in this sample for UPPS domains ranged

from 0.61 [Sensation Seeking] to 0.77 [Negative Urgency], reflecting moderate internal consistency when compared to the shorter SUPPS-P (Cyders et al., 2014) and the original longer versions (UPPS-P (Cyders, 2013) of the UPPS in groups of primarily European American participants (α ranges: 0.74 to 0.88 and 0.82 to 0.94, respectively).

Statistical Analysis

Data Preparation. Data manipulation and sample descriptives (e.g., normality checks, means, variances, and bivariate correlations) were conducted using R version 3.5.1 (R Core Team, 2018) and Rstudio version 1.1456 (Rstudio Team, 2016).

Confirmatory Factor Analysis of Impulsivity. Mplus (Version 8; Muthén & Muthén, 2017) was used to conduct multiple confirmatory factor analyses (CFA). As we were interested in assessing how the five-factor model of the UPPS fit these data, we compared/contrasted one-, four- and five-factor structures that have been previously observed in the literature (see Figure 1). For all factor analyses, we used the weighted least squares estimator (WLSMV) to account for the categorical nature of the UPPS items (Brown, 2006). All models were fitted to the data using full-information maximum likelihood (FIML), which allows for missing data and produces less biased parameter estimates compared to listwise and pairwise deletion (Enders & Bandalos, 2001). Based on Hu and Bentler (1999) recommendations, the best fitting model was determined using Tucker Lewis Index (TLI; ≥ 0.95), Comparative Fit Index (CFI; ≥ 0.95), and Root Mean Square Error of Approximation (RMSEA; ≤ 0.06).

Multiple Regression Analyses. The primary hypothesis focuses on how impulsivity factors of the best fitting CFA model differentially predict future alcohol use and SUP. We considered several types of regression models in order to appropriately account for the non-

normality of the alcohol and SUD outcomes (i.e., count distributions): Poisson regression (PR), Zero-inflated Poisson regression (ZIPR), Negative binomial regression (NBR), and Zero-inflated negative binomial regression (ZINBR). PR assumes that the conditional variance of each predictor in the model is equal to their conditional mean; however, this does not always occur. There are a number of extensions of PR that account for this violation (i.e., overdispersion)—among other violations that arise. It is often the case when analyzing SU data that despite the prevalence of use, involvement does not occur within the reference period participants are asked about—resulting in zeros that occur by chance and have unknown underlying causes. This can be difficult to tease apart from zeros in the data that occur due to actual abstinence. Descriptives of our outcome variables indicated possible overdispersion and excessive zeros indicating that ZIPR, NBR, and ZINBR models were better equipped to test the associations of interest. ZIPR and ZINBR have been shown to handle excessive zeros. Particular to our study, these types of regressions are able partition zeros into those that occur as a result of never initiating and those that occur by chance (i.e., a result of not drinking in the past 30 days or not endorsing any SUD criteria at any point in one's life) (Hilbe, 2011). Ultimately, zero-inflated models are able estimate the two processes simultaneously: a logistic component and a count component. Notably, excessive zeros can also produce the overdispersion, making it all the more essential to compare estimates from both the ZIPR and ZINBR. Recent reviews on how to best analyze SU variables have emphasized the need to consider the characteristic distribution of SU outcomes and to handle the violations of distributional assumptions that we observe in SU data (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013; Wagner, Riggs, & Mikulich-Gilbertson, 2015).

Compared to prior literature, the current analyses employed the UPPS facets as factors rather than composite scales to reduce measurement errors, eliminate response bias, and allow

for differential weighting of the items, ultimately increasing the power of our analysis. While uncommon in the UPPS literature, other researcher have used factors to predict SU (Magid & Colder, 2007). Specific to our study as well, we fitted a multivariate regression model in order to obtain more robust estimates of association between each impulsivity facet with alcohol use or SUP. Consequently, we interpret these estimates as the "unique" effect of each facet as it is not confounded by other facets of impulsivity. Covariates in the regression models included age, educational attainment, income, economic distress and prior substance use. Income and economic distress were both included as covariates because past studies suggest that income levels and high economic distress are associated with a greater likelihood of initiation and levels of consumption (Collins, 2016; Keyes et al., 2015). While many studies have indicated that higher income is associated with higher drinking frequency (Casswell, Pledger, & Hooper, 2003; Collins, 2016), some researchers have observed that there also is a subset of African Americans men in extreme poverty who do not fit general trends and are at higher risk of excessive drinking and dependence (Gilman et al., 2008; Zapolski et al., 2014).

Three different sets of models were applied to the data in order to understand the contribution of the impulsivity facets and covariates on SU and generalized problems at wave 3 (i.e., Model 1-3). Model 1 included only the impulsivity factors as predictors. Model 2 built upon Model 1 by also including pertinent demographic covariates (i.e., age, educational attainment, income, and economic distress). Lastly, Model 3, which was specific to the study's hypotheses, additionally controlled for SU at Wave 1 (i.e., alcohol, as well as marijuana and tobacco use). As noted above, zero-inflated regression models (i.e., ZIPR and ZINBR) contain two processes in one model—a logistic component and a count component. In the binary component of our zero-inflated models, we selected to regress inflation variables on solely impulsivity factors. This was

run as opposed to having both the dependent variable and the inflated variable regressed on to all potential predictors (i.e., impulsivity factors, demographic variables and prior SU variables) as we were particularly interested in whether the impulsivity factors predicted zero-inflation (i.e., refraining from alcohol use over the past month or lack of SUP over the past month).

Given that Model 3 was more central to the study's hypotheses, we determined the best-fitting model for these data by comparing estimates for Model 3. We focused on changes in Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), sample-size adjusted BIC (sBIC), the dispersion parameter (provided by MPLUS for NBR and ZINBR) and the mean differences between the observed and predicted count (i.e., model residuals) among regression types (determined using Countfit function in STATA; Appendix D). In situations where BIC and AIC did not lead us to the same decisions regarding the best fitting regression model, we considered BIC to be the more favorable statistic as it penalizes model complexity more heavily. Besides fit statistics and dispersion, we considered the meaningfulness of the zeros and how the zeros influenced any dispersion observed. These type of count analyses yield coefficients which are difficult to interpret as the formula for the predicted outcomes in our count model involve an exponential function; to ease interpretation, we exponentiated significant regression coefficients to obtain the change in odds of a structural zero in the logistic process of the model and the levels of alcohol use/endorsement of problems in the count process.

Results

Description of Variables of Interest

Summary statistics were calculated for alcohol use/SUP outcomes and covariates at both waves and we confirmed the suspected skew and kurtosis for our outcome variables (Table 1),

which are characteristic of non-normal distributions. Further, there appeared to be overdispersion as the variance of the alcohol use and SUP outcomes were larger than their means. This was later confirmed by the estimate of the natural log of the overdispersion coefficient, alpha, in the regression models. Given the known attrition over time, we examined the differences in the UPPS factor scores (described below), substance variables and covariates during W1, between those who completed both waves compared to those who only completed W1. We identified no differences among our variables with the exception of level of education; specifically, individuals who completed both waves had a higher level of education during the original assessment ($\beta = 0.122$; 95% $CI = 0.01, 0.24$; $p < .05$).

Regarding our SU variables at W1 approximately 22% reported having at least smoked one cigarette (in past 3 months), 47% used alcohol at least once (over past month), 30% used marijuana at least once (over past month), and 16% endorsed at least one SUD criteria (over past month), respectively. At W3, these reports of use and endorsement of problems appeared to increase in our sample to 54%, 72%, 59%, and 44%, respectively. This increase in SU/SUP was not the result of the attrition in our sample from W1 to W3. When looking solely at the individuals who participated in both waves ($N = 380$), 183 (48%) did not engage in any cigarette smoking behavior across both waves, 87 (23%) did not engage in any alcohol use across both waves, 148 (38%) did not engage in any marijuana use across both waves, and 196 (52%) did not endorse any SUD criteria across both waves. Mean difference across waves in the use and endorsement for individuals varied by SU variable (Cigarettes: $M_{diff} = 0.03$, $SD_{diff} = 1.27$; Alcohol: $M_{diff} = 0.02$, $SD_{diff} = 5.20$; Marijuana: $M_{diff} = 1.22$, $SD_{diff} = 11.58$; SUD Criteria: $M_{diff} = 0.43$, $SD_{diff} = 2.81$). These values, as well as the weak to moderate correlations between each

type of SU and SUP at W1 and W3 (r = 0.24 to 0.57; see Table 6), implied that individuals' SU and SUP varied and were not consistent during the study.

The Factor Structure of Impulsivity in African American Males

Correlations among the UPPS items within each of the frequently characterized domains at W1 indicated modest to moderate correlations, ranging from 0.15 to 0.57 (see Table 2). Comparison of the three models of impulsivity in the full data indicated that the five-factor model, which has been extensively used in the literature, provided the best fit to the data (see Table 3). Accordingly, we retained the five-factor structure of impulsivity and applied it in our regression models. Results from the CFA also evidenced strong inter-factor correlations; specifically, this was observed between Lack of Premeditation and Lack of Perseverance (r = 0.85), as well as Negative and Positive Urgency (r = 0.72; see Table 4). This supported our hypothesis for the need to model the effect of these constructs simultaneously in order to obtain their unique effects. Standardized factor loadings for the five-factor model are reported in Table 5. The proportion of variance accounted for by each item in relation to its respective factor varied from an R^2 = 0.28 (Item 11 on Lack of Perseverance) to R^2 = 0.64 (Item 17 on Sensation Seeking).

Impulsivity Predicts Alcohol Use and Substance Problems in African American Males

Given the highly correlated nature of the factors in the five-factor CFA Model, we calculated the zero-order correlations between the factors and the SU outcomes (W1 and W3) for individuals who participated in both waves (see Table 6). This further allowed us to assess for potential problems of multicollinearity and provided insight into what to expect for our multiple regression models. These zero-order correlations between the Negative Urgency (Neg Urg),

Positive Urgency (Pos Urg), Lack of Perseverance (Lac Per), Lack of Premeditation (Lac Pre), and Sensation Seeking (Sen Seek) factors with the substance use phenotypes at W1 and W3 indicated that many of the factors were significantly, but weakly associated with W1 and W2 substance use variables (see Table 6). In particular, Negative and Positive Urgency were positively associated with cigarette use (W1 and W3), alcohol use (W1) and SUP (W1), but not with marijuana use at W1 or W3. Negative Urgency was also positively associated with SUP use at W3. Alternatively, Lack of Perseverance was weakly associated with SUP at W3. Lack of Premeditation was also positively related to SUP and alcohol use at W1 and W3. Lastly, Sensation Seeking was positively associated with W1 alcohol use and SUP, as well as cigarette use (W1 and W3).

Results from the multivariate regression models testing the primary study hypotheses (i.e., Model-3) are presented in Tables 7 thru 9. Table 7 summarizes the fit of the PR, ZIPR, NBR, and ZINBR models (see Appendix B for Models 1, 2 and 3). When comparing regression models for alcohol use, we observed that the NBR and the ZINBR provided the best fit based on the fit statistics (i.e., AIC, BIC and sBIC). The AIC statistic was in favor of the ZINBR, while BIC and sBIC were in favor of the NBR, suggesting that the NBR and ZINBR are not meaningfully different from each other. Comparison of the mean difference between our observed and predicted count estimates supported ZINBR over NBRM ($M_{\text{diff}} = 0.014$ vs. 0.023, respectively; see Appendix C). An examination the estimate of the overdispersion coefficient (alpha), indicated that less dispersion the ZINBR compared to NBR ($\alpha = 1.49$ to 0.76, both $p < .001$), suggesting that the excessive zeros (i.e., 28% refraining from drinking alcohol over the past month at W3) are to some extent influencing the overall dispersion when only the count process was modelled. For these reasons, we selected and focused our interpretation on the

ZINBR as the best-fitting model for alcohol consumption; additional details on these models (i.e., parameter estimates and fit are in Appendix C). Results of the ZINBR analyses of alcohol use over the past month are presented in Table 8. These results suggested that after controlling for all our covariates in Model 3, Lack of Perseverance, Lack of Premeditation and Sensation Seeking were associated with zero-inflation (b = 2.01, -1.95, and 0.69, respectively). In other words, as a person's Lack of Perseverance factor score increases by one point, their odds of being a non-alcohol user increases by a factor of 7.46 [*CI* = 1.12, 50.40] (i.e., Odds-ratio (OR) = $e^{1.83}$). Likewise, as a person's Sensation Seeking factor score increases by one point, their odds of being a non-alcohol user by 1.99 [*CI* = 1.03,3.82]. For Lack of Premeditation, as a person's factor score increases by one unit, their odds for being a non-alcohol user decreases by a factor of 0.14 [*CI* = 0.02,0.84]. These findings were consistent with observations seen in Models 1 and 2; however, it appears that Lack of Perseverance only became significant when accounting for the demographic covariates. Not surprising, prior alcohol use at W1 was associated with increased odds of levels of drinking at W3 (OR = 1.08 [*CI* = 1.05,1.12]). Regression coefficients and standard errors for the aforementioned model of SU are also available in Appendix D (D1 thru D6).

In regards to predicting SUP, two types of regressions, the ZINBR and the ZIPR, provided similar fit to the data for Model 3 (see Table 7).The comparison of the absolute mean difference between our observed and predicted count for ZIPR and ZINBR offered no further insight into which model should be used (M_{diff} = 0.020 vs. -0.020, respectively; see Appendix C). Our decision of the best-fitting model was based on the overdispersion coefficient, which suggested that the 56% who reported no SUP over the past month were largely influencing the overall dispersion in the count model as it decreased from 5.28 ($p < 0.001$) in the NBR to 0.02 (p

>0.05) in the ZINBR. This suggested that the excessive zeros were causing the majority of the overdispersion and that the ZIPR should be used to examine the relationship between the impulsivity factors at W1 and SUP at W3 as it makes fewest assumptions. Nonetheless, it should be stated that the model estimates of the ZIP and the ZINB were near identical. Results of the ZIPR analyses of SUP over the past month are presented in Table 9. There was no evidence to suggest that impulsivity facets predicted whether a person meets DSM-5 SUP or not (i.e. the zero-inflation component of the model). Rather, the higher a person's Negative Urgency factor score at W1, the higher their level of SUP at W3 (i.e., their score increases by a factor of 1.42 [*CI* = 1.02,1.95]), such that higher negative urgency was associated with increased problems. This relationship was also apparent in the count process of Models 1 and 2. None of the other impulsivity facets were associated with SUP. Regression coefficients and standard errors for the aforementioned model of SUP are also available in Appendix E (E1 thru E6).

Discussion

The current study adds to the sparse literature on the effects of impulsivity in African Americans by confirming the UPPS factor structure and demonstrating the prospective effects of impulsivity on alcohol use and generalized substance-related problems. Confirming the factor structure of impulsivity in African Americans was a necessary step towards achieving our second goal to determine how facets of impulsivity predict future alcohol use and SUP. To our knowledge, this is the first study to model the UPPS Impulsivity Behavior Scale in an exclusively African American male sample. Previous literature has suggested that there are racial/ethnic differences in both substance use and impulsivity between African Americans and European Americans (Collado et al., 2017; Pedersen et al., 2012); however, the five-factor model of the UPPS, which is predominantly used in primarily European American samples, fit the

African American sample best. This suggests structural similarities, which should be explored in future studies with a sufficiently large sample of different racial/ethnic groups to also examine measurement invariance. It has been common for researchers to utilize composite scores for the impulsivity facets, rather than factors. Likewise, SU/SUP are often regressed on composite scores individually when the literature has suggested that, while separate entities, the impulsivity facets are associated with one another and result in what we commonly describe as impulsivity. We have addressed this in the current study by including all impulsivity factors in our models simultaneously as predictors of future alcohol use and SUP. Causal inferences have often been drawn in the literature regarding the direction by which impulsivity facets influence alcohol use and SUP. In our study, we have utilized data from a longitudinal study in which impulsivity effects are able to be examined while controlling for prior substance behavior.

Three alternative models of impulsivity (i.e., a four-factor, a five-factor, and a one-factor model) that have been proposed in the UPPS literature were tested in our sample. Of the CFA models, the five-factor model fit best and was most parsimonious. In relation to the literature at large, which often supports a five-factor model over a four-factor model, our findings suggest that the structure of impulsivity is no different in an African American sample. Nevertheless, it is possible that how the items load onto the 5 factors may be different and remains something to be explored in future studies by testing measurement invariance of the scale in an African America and Non-African American males. Implications of this arise from studying the inter-factor correlations, which would be categorized as strong as opposed to moderate, which has been seen in prior studies. This type of analysis has been conducted recently to assess for invariance in a Hispanic/Latino sample, and the UPPS-P was found to be invariant between groups (Stevens et al., 2018), but should be also conducted in an African American sample.

The current study also accounted for methodological concerns that have been raised about past studies that have analyzed the relationship between impulsivity and SU/SUP or substance outcomes using only linear regression. To our knowledge, only two studies have investigated the association between the impulsivity facets while accounting for overdispersion and/or zero-inflation (Kaiser, Milich, Lynam, & Charnigo, 2012; McCarty, Morris, Hatz, & McCarthy, 2017). Kaiser et al. (2012) solely examined the relationship of Negative Urgency composite score, rather than look at all UPPS impulsivity facets, with weekly alcohol, marijuana, and tobacco use, as well as problematic drinking, using ZINBR in a mixed-race college sample. "Weekly use" in their study was calculated using the Life History Calendar with frequency being multiplied by the number of uses during a given day for the "current time period." The Alcohol Use Disorders Identification Test (AUDIT) was used as a measure of problematic drinking. They found that for each unit increase observed in Negative Urgency, the odds that the person's number of drinks per week increased by a factor of 1.04, number of marijuana use per week increased by a factor of 1.14, and number of tobacco used increased by a factor of 1.13, while controlling for race. In their study, one unit increase in Negative Urgency also predicted an increase in the AUDIT score by a factor of 1.04 (compared to our 1.42), while controlling for race. Unfortunately, the authors did not include estimates for the zero-inflated portion of their model and the study was cross-sectional, making results difficult to compare. Nevertheless, it appears that the small increase in drinks per week may be indicative of Negative Urgency predicting alcohol users verse non-users in the apparent logit component. This is somewhat inconsistent with our findings as Negative Urgency was not associated with either the zero-inflated estimate or count estimate for alcohol use. Similarly, the increase of the AUDIT score per unit increase of Negative Urgency seems quite a bit lower than our increase by a factor of

1.42 observed for our SUP variable. There are many reasons why this may have occurred including, but not limited to, different measures being used to capture levels of substance use problems, sample composition, as well as the use of a composite score of Negative Urgency.

In comparison, McCarthy et al. (2017) utilized NBR to examine the cross-sectional relationship between alcohol-related consequences (i.e., the 8 subscales of the Young Adult Alcohol Consequences Questionnaire) and all 5 facets impulsivity of the UPPS using composite scores, while controlling for sex and binge drinking, in two separate samples of college students. Similar to Kaiser et al. (2012) and our study, Negative Urgency was positively associated with most of the scales related to alcohol-related problems (i.e., Social/interpersonal, Impaired control, Self-perception, Self-care, Risky behaviors, Academic/occupational, Physiological dependence and Blackout drinking) reported in both samples. A unit increase of Negative Urgency predicted between an increase in participants' Impaired control score by a factor of 1.25 to an increase in their Self-Perception score by a factor of 2.77. Interestingly and the most related to our SUP outcome in our study, physiological dependence was found only in one of the samples to be positively associated with Negative Urgency by which a unit increase in Negative Urgency was related to an increase in Physiological dependence by a factor of 1.70. Additionally, McCarthy et al. (2017) found that Positive Urgency was associated with some, but not all of the alcohol-related problem scales in both samples (OR= 1.34-1.82). This finding is different from ours as we did not find SUP to be associated with Positive Urgency in our ZIPR model. However, given that Negative Urgency is similarly related to SUP across our study, Kaiser et al. (2012) and McCarthy et al. (2017)—regardless of the type of count regression or the way in which Negative Urgency is utilized (i.e., composite score or factor)—suggests a strong relationship between SUP and the Negative Urgency facet of the UPPS. These findings are

consistent with the prior studies that used generalized linear regression to find UPPS's Negative Urgency subscale positively associated with SUP (Lejuez et al., 2010).

A crucial finding in our study was that individuals within our sample had characteristic responding in relation to their alcohol use, as was illustrated by Lack of Perseverance, Lack of Premeditation and Sensation Seeking predicting non-users in the zero-inflated process of our model. In past cases when substance use outcomes have been treated as continuous—and not as count variables—results may have been biased with regard to investigating the relationship between alcohol use and the UPPS, as they did not account for the inflation of zeros. Further, this study drives home recent arguments in the literature by confirming that these data are 1) count variables, 2) have excessive zeroes, and 3) can be over-dispersed (depending on the outcomes) (Atkins et al., 2013; Wagner et al., 2015).

Limitations/ Future Directions

Although the present study has many strengths, such as the use of count analyses and factors as opposed to composite scores, the results should be interpreted within the frame of several limitations. In additional to normal recall concerns, recall of participants regarding their SU can be questionable given that SU impedes memory. Related to this is that we only used a single item to measure alcohol use (i.e., drinking days over the past 30 days). Other SU studies have incorporated more detailed assessments of use over the past month by incorporating calendars and having participants fill in drink per day for the entire month (i.e., Timeline Followback (Sobell, Brown, Leo, & Sobell, 1996)). These often also include key dates to serve as anchors or memory aids so that the participant can better recall actual involvement over the past month, as well as obtain better approximations of participants use by obtaining quantity of

drinks/day in addition to frequency of use (Jackson & Sher, 2005). Another consideration was that we did not have information on initiation. Our study would have benefited greatly from a single question asking participants about any initiation of SU in the past. It is plausible that initiation would have been a better predictor of the users verse non-users than UPPS impulsivity facets in our ZINB of alcohol use. Similarly, this would have clarified if the zeros observed were a result of never having used or not using within the reference period allotted (i.e., past month). In other words, it is hard to differentiate whether the responses provided are representative of participants' general SU or not.

While it is important to examine the factor structure of the UPPS in a solely African American sample, there are some further consideration that must be accounted for with our sample. First, generalizability was limited because the sample consisted of only males. Additionally, the sample consisted of African Americans from rural Georgia, which suggests that the findings are limited regarding their generalizability to other African Americans in the US. Further, participants did not distinguish between African American and Caribbean Black when reporting on their race/ethnicity. It is therefore feasible that certain findings were masked as past literature has indicated there are differences among these groups in their substance use (Broman, Neighbors, Delva, Torres, & Jackson, 2008).

Prior to our analyses, we chose to focus on W1 and W3, and not consider impulsivity or substance use at W2, since we recognized that not much time had elapsed between W1 and W2 or W2 and W3 (typically less than 2 years). We were particularly interested in how time effects the predictive utility of the UPPS impulsivity facets on SU/SUP. We recognize the limitation that information may have been ignored by not considering W2 data. Additionally, recent studies have suggested that the UPPS impulsivity facets are not stable in the same way that researchers

have historically thought of other personality traits. A recent paper suggests that there is a bidirectional relationship between the UPPS Sensation Seeking facet and alcohol use, and that drinking problems can predict increases in the UPPS Negative Urgency facet (Kaisser et al., 2018). Kaiser et al. (2018) findings were based on observations between the UPPS and alcohol use over a three-year period. Likewise, results from a study published Mulhauser et al. (2019) suggest that Negative Urgency and Lack of Premeditation decrease over time amongst treatment seeking individuals with SUDs. Taken together, this indicates that additionally analyzing W2 may offer information in the present study.

Despite limitations, the current study provides a good precedent for future studies in the UPPS and SU literature alike as it helps to advance current practices in examining the UPPS in relation to substance-related outcomes. Additional work is needed to examine the prospective relationship between impulsivity and SU across African American and other samples.

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Table 1. Description of Variables of Interest at Wave 1 and Wave 3

	Wave 1					Wave 3				
Variables	**N**	**Mean**	**Std Dev**	**Skew**	**Kurtosis**	**N**	**Mean**	**Std Dev**	**Skew**	**Kurtosis**
Demographic Covariates										
Age at time of assessment	505	20.71	1.14	0.26	-1.08	380	23.56	1.18	0.32	-0.89
Educational Attainment	505	2.13	0.65	-0.14	-0.68	380	2.31	0.64	-0.37	-0.71
Monthly Income	505	693.79	587.24	2.92	13.63	313	819.20	743.27	2.16	8.29
Economic Distress	505	10.51	3.12	0.10	-0.20	380	14.03	3.67	-0.37	0.00
Substance Use and Problems										
Cigarette Use	505	0.99	1.38	1.14	0.22	380	0.94	1.40	1.40	1.35
Alcohol Use	505	3.18	4.27	2.11	5.96	380	3.34	4.76	2.40	6.95
Marijuana Use	505	8.44	12.13	1.01	-0.80	380	7.51	11.49	1.20	-0.31
DSM-5 Criteria Endorsed (SUP)	505	1.48	2.34	1.46	1.03	380	1.08	2.19	1.96	2.55

Note. Std Dev = Standard Deviation.

Table 2. Association Between UPPS Items

	V2	V7	V12	V17	V4	V9	V14	V19	V3	V8	V13	V18	V1	V6	V11	V16	V5	V10	V15	V20
V2	1																			
V7	**0.39**	1																		
V12	**0.38**	**0.57**	1																	
V17	**0.51**	**0.51**	**0.42**	1																
V4	**0.34**	**0.31**	**0.21**	**0.38**	1															
V9	**0.22**	**0.29**	**0.27**	**0.29**	**0.40**	1														
V14	**0.33**	**0.34**	**0.32**	**0.42**	**0.50**	**0.42**	1													
V19	**0.30**	**0.29**	**0.31**	**0.35**	**0.41**	**0.50**	**0.42**	1												
V3	0.07	0.07	0.01	**0.12**	**0.22**	**0.21**	**0.14**	**0.18**	1											
V8	0.01	**0.09**	0.04	**0.11**	**0.21**	**0.19**	**0.16**	**0.13**	**0.50**	1										
V13	0.09	0.04	0.07	**0.13**	**0.18**	**0.22**	**0.13**	**0.11**	**0.42**	**0.37**	1									
V18	0.09	**0.15**	0.07	**0.12**	**0.15**	**0.17**	**0.13**	0.08	**0.40**	**0.45**	**0.39**	1								
V1	0.01	**0.11**	**0.11**	0.09	0.08	0.08	**0.13**	0.08	**0.25**	**0.33**	**0.23**	**0.26**	1							
V6	**0.14**	**0.14**	**0.14**	**0.20**	**0.25**	**0.19**	**0.19**	**0.16**	**0.42**	**0.39**	**0.36**	**0.30**	**0.31**	1						
V11	0.05	**0.09**	**0.10**	**0.18**	**0.15**	**0.10**	**0.15**	**0.10**	**0.38**	**0.34**	**0.38**	**0.36**	**0.41**	**0.53**	1					
V16	**0.12**	**0.15**	0.07	**0.15**	**0.23**	**0.16**	**0.12**	**0.11**	**0.44**	**0.39**	**0.37**	**0.35**	**0.29**	**0.46**	**0.38**	1				
V5	**0.15**	**0.18**	**0.12**	**0.18**	**0.15**	**0.16**	**0.16**	**0.22**	-0.07	-0.05	-0.08	-0.08	0.03	0.01	-0.02	-0.07	1			
V10	0.08	**0.13**	**0.16**	**0.14**	**0.13**	**0.21**	**0.14**	**0.23**	-0.06	-0.07	-0.03	**-0.11**	**0.11**	-0.02	-0.03	0.00	**0.24**	1		
V15	0.02	0.00	**0.10**	0.05	0.07	0.08	0.08	**0.11**	-0.08	-0.07	0.01	-0.06	0.03	-0.01	-0.08	-0.01	**0.15**	**0.26**	1	
V20	0.08	0.05	**0.16**	**0.11**	**0.14**	0.05	**0.13**	**0.12**	**-0.13**	**-0.12**	-0.11	**-0.09**	0.02	-0.07	-0.06	-0.09	**0.22**	**0.32**	**0.48**	1

Note. Estimates are for zero-order spearman correlations (β). Items are organized by five domains commonly reported in the literature (i.e., Negative Urgency, Positive Urgency, Lack of Perseverance, Lack of Premeditation, and Sensation Seeking). Significant correlations ($p < .05$) are **bolded**.

Table 3. Goodness-of-fit Statistics for Alternative CFA Models of the UPPS at Wave 1 Using the Full Sample

Fit Statistics	***One-Factor***	***Four-Factor***	***Five-Factor***
$\chi 2$	2108.03	559.14	394.51
df	170	164	160
2/df	12.40	3.41	2.47
RMSEA	0.15	0.07	0.05
[90% *CI*]	[0.15, 0.16]	[0.06,0.08]	[0.05,0.06]
TLI	0.60	0.92	0.95
CFI	0.64	0.93	0.96
WRMR	3.52	1.45	1.16

Note. All models were fit using weighted least squares estimator (WLSMV) and full-information maximum likelihood (FIML). χ = Model Chi-Square; *df* = degrees of freedom; RMSEA= Root Mean Square Error of Approximation; *CI* = Confidence Interval; TLI = Tucker Lewis Index; CFI = Comparative Fit Index; WRMR= Weighted Root Mean Square Residual.

Table 4. UPPS Inter-factor correlations from Five-Factor CFA

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1. Neg Urg	1				
Factor 2. Pos Urg	**0.72 [0.67,0.77]**	1			
Factor 3. Lac Per	**0.17 [0.07,0.28]**	**0.36 [0.27,0.45]**	1		
Factor 4. Lac Pre	**0.27 [0.17,0.36]**	**0.31 [0.22,0.41]**	**0.85 [0.80,0.91]**	1	
Factor 5. Sen Seek	**0.32 [0.22,0.42]**	**0.42 [0.33,0.51]**	**-0.24[-0.35,-0.13]**	-0.09 [-0.20,0.03]	1

Note. Significant correlations ($p < .05$) are **bolded**. Neg Urg = Negative Urgency; Pos Urg = Positive Urgency; Lac Per = Lack of Perseverance; Lac Pre = Lack of Premeditation; Sen Seek = Sensation Seeking.

Table 5. Estimates of Loading for Five-Factor CFA

Item	Standardized Parameter Estimate	95% CI	
		Lower Limit	Upper Limit
Factor 1- "Negative Urgency"			
When I feel bad, I often do things I later regret in order to make myself feel better now.	0.655	0.596	0.714
When I am upset, I make things worse because I act without thinking.	0.761	0.709	0.804
When I am upset, I often act without thinking.	0.716	0.66	0.762
When I feel bad I do things I later regret.	0.785	0.737	0.825
Factor 2- "Positive Urgency"			
When I am very happy, I tend to do things that may cause problems in my life.	0.727	0.674	0.772
I tend to lose control when I am in a great mood.	0.686	0.632	0.731
When I feel really good I do things I later regret.	0.74	0.69	0.781
When I am really excited, I tend to get out of control.	0.703	0.649	0.748
Factor 3- "Lack of Perseverance"			
I finish what I start.	0.744	0.686	0.792
Once I start a project, I almost always finish it.	0.753	0.702	0.796
I am a person who always gets the job done.	0.631	0.567	0.684
I generally like to see things through to the end.	0.639	0.571	0.696
Factor 4- "Lack of Premeditation"			
I usually think carefully before doing anything.	0.518	0.442	0.593
I like to stop and think about things before I do them.	0.784	0.732	0.837
I am a cautious (careful) person.	0.722	0.665	0.78
Before making up my mind, I consider all the advantages and disadvantages.	0.754	0.692	0.816
Factor 5- "Sensation Seeking"			
I enjoy taking risks.	0.542	0.459	0.625
I sometimes like to do things that are a bit frightening.	0.577	0.495	0.658
I would enjoy parachute jumping.	0.583	0.505	0.661
I would enjoy the sensation of skiing vary fast down a high mountain slope.	0.698	0.623	0.773

Table 6. Bivariate Correlations Between UPPS Factors and Substance Use Outcomes/Covariates

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Neg Urg	1												
2. Pos Urg	**0.82 [0.79,0.85]**	1											
3. Lac Per	**0.24 [0.15,0.32]**	**0.42 [0.34,0.48]**	1										
4. Lac Pre	**0.32 [0.24,0.40]**	**0.40 [0.33,0.47]**	**0.94 [0.93,0.95]**	1									
5. Sen Seek	**0.41 [0.34,0.48]**	**0.51 [0.44,0.57]**	**-0.25 [-0.33,-0.17]**	**-0.11 [-0.20,-0.03]**	1								
6. Cig W1	**0.16 [0.08,0.25]**	**0.12 [0.03,0.21]**	0.03 [-0.11,0.61]	-0.01 [-0.10,0.08]	**0.12 [0.03,0.21]**	1							
7. Cig W3	**0.16 [0.06,0.25]**	**0.17 [0.07,0.27]**	0.03 [-0.07,0.13]	0.05 [-0.05,0.15]	**0.12 [0.02,0.22]**	**0.57 [0.50,0.64]**	1						
8. Alc W1	**0.14 [0.05,0.22]**	**0.17 [0.08,0.25]**	0.05 [-0.04,0.14]	**0.09 [0.001, 0.17]**	**0.15 [0.06,0.23]**	**0.30 [0.22,0.38]**	**0.19 [0.09,0.29]**	1					
9. Alc W3	0.06 [-0.04,0.16]	0.06 [-0.04,0.16]	0.06 [-0.04,0.16]	**0.12 [0.02,0.17]**	0.09 [-0.01,0.19]	**0.13 [0.03,0.23]**	**0.15 [0.05,0.24]**	**0.38 [0.29,0.46]**	1				
10. MJ W1	0.04 [-0.04,0.13]	0.04 [-0.04,0.13]	0.06 [-0.02,0.15]	0.08 [-0.01,0.16]	0.06 [-0.03,0.14]	**0.34 [0.26,0.41]**	**0.27 [0.17,0.36]**	**0.23 [0.14,0.31]**	0.05 [-0.05,0.15]	1			
11. MJ W3	0.06 [-0.04,0.16]	0.06 [-0.04,0.16]	0.06 [-0.04,0.16]	0.09 [-0.02,0.18]	0.06 [-0.04,0.16]	**0.15 [0.05,0.25]**	**0.16 [0.07,0.26]**	**0.14 [0.04,0.24]**	0.09 [-0.01,0.19]	**0.52 [0.44,0.59]**	1		
12. SUP W1	**0.15 [0.06,0.24]**	**0.12 [0.03,0.20]**	0.07 [-0.01,0.16]	**0.12 [0.03,0.20]**	**0.10 [0.01,0.18]**	**0.30 [0.21,0.37]**	**0.21 [0.12,0.31]**	**0.40 [0.32,0.47]**	**0.11 [0.01,0.21]**	**0.52 [0.45,0.58]**	**0.30 [0.20,0.39]**	1	
13. SUP W3	**0.13 [0.03, 0.23]**	0.07 [-0.02,0.18]	**0.10 [0.004,0.20]**	**0.13 [0.03,0.23]**	0.05 [-0.05,0.15]	**0.16 [0.06,0.25]**	**0.19 [0.09,0.29]**	**0.25 [0.16,0.35]**	**0.26 [0.16,0.35]**	**0.20 [0.10,0.30]**	**0.33 [0.24,0.42]**	**0.24 [0.15,0.34]**	1

Note. Estimates are for zero-order correlations (β [CI]). Correlations that are statistically significant ($p < 0.5$) are bold. CI = Confidence Intervals; β = Standardized Betas; Neg Urg = Negative Urgency; Pos Urg = Positive Urgency; Lac Per = Lack of Perseverance; Lac Pre = Lack of Premeditation; Sen Seek = Sensation Seeking; Cig = Cigarette use (past 3 months); Alc = Alcohol use (days over last month); MJ= Marijuana use (days over last month); SUP= Substance Use Problems (number DSM-5 criteria endorsed) ; W1 = Wave 1; W3 = Wave 3.

Table 7. Goodness of-fit Statistics for Alcohol Use and Substance Use Problems at W3

FIT STATISTICS	NEGATIVE BINOMAL	ZERO-INFLATED NEGATIVE BINOMIAL	POISSON	ZERO-INFLATED POISSON
Alcohol Use (Days over Last Month)				
AIC	1697.97	1695.87	2453.20	1992.57
BIC	1753.02	1774.51	2504.32	2067.28
sBIC	1708.60	1711.06	2463.07	2007.00
SUP (DSM-5 Criteria Endorsed over Lifetime)				
AIC	908.07	865.08	1370.16	864.79
BIC	963.13	943.72	1421.28	939.65
sBIC	918.71	880.27	1380.03	879.37

Note. Results from the multivariate regression models testing our primary study hypotheses (Model 3) are shown above. Model 3 controlled for demographic covariates (i.e., age, income, educational attainment and economic distress) and prior substance use at wave 1. AIC= Akaike Information Criterion; BIC= Bayesian Information Criterion; sBIC= sample-size adjusted BIC.

Table 8. Zero-Inflated Negative Binomial Models Predicting Days of Alcohol Use During the Past Month using the UPPS Impulsivity Factors

	Model 1	**Model 2**	**Model 3**
	b [*CI*]	**b [*CI*]**	**b [*CI*]**
Count Predictors			
Negative Urgency	-0.18 [-0.49,0.13]	-0.14 [-0.44,0.16]	-0.04 [-0.36,0.27]
Positive Urgency	0.15 [-0.22,0.53]	0.12 [-0.24,0.48]	-0.04 [-0.45,0.37]
Lack of Perseverance	-0.50 [-1.22,0.22]	-0.42 [-1.13,0.28]	-0.21 [-1.00,0.58]
Lack of Premeditation	0.58 [-0.08,1.23]	0.53 [-0.11,1.16]	0.36 [-0.35,1.07]
Sensation Seeking	0.07 [-0.21,0.35]	0.07 [-0.20,0.33]	0.04 [-0.24,0.33]
Zero-Inflated Predictors			
Negative Urgency	0.07 [-0.74,0.88]	0.08 [-0.77,0.93]	0.08 [-0.88,1.04]
Positive Urgency	-0.38 [-1.38,0.62]	-0.43 [-1.46,0.61]	-0.47 [-1.61,0.67]
Lack of Perseverance	1.69 [-0.01,3.38]	**1.83 [0.06,3.59]**	**2.01 [0.11,3.92]**
Lack of Premeditation	**-1.71 [-3.25,-0.16]**	**-1.82 [-3.44,-0.19]**	**-1.95[-3.71,-0.18]**
Sensation Seeking	**0.63 [0.02,1.23]**	**0.66 [0.04,1.28]**	**0.69 [0.03,1.34]**
Covariates			
Age	N/A	0.09 [-0.3, 0.21]	0.03 [-0.09,0.15]
Level of Education	N/A	0.20 [-0.03,0.42]	0.21 [-0.01,0.43]
Income	N/A	0 [0,0]	0 [0,0]
Economic Distress	N/A	-0.004 [-0.04,0.04]	0.01 [-0.04,0.05]
Cigarette at W1	N/A	N/A	0.05 [-0.06,0.16]
Alcohol at W1	N/A	N/A	**0.08 [0.05,0.11]**
Marijuana at W1	N/A	N/A	-0.01 [-0.02,0.002]

Note. Models were conducted using a hierarchical regression framework (N = 380). Regressions, which included covariates, employed those covariates as predictors in only count portion of the models. Significant correlations ($p < .05$) are **bolded**. See text for significant exponentiated coefficients. N/A- not applicable; b = Unstandardized Beta; *CI* = Confidence Interval.

Table 9. Zero-Inflated Poisson Models Predicting Generalized Substance Use Problems from the UPPS Impulsivity Factors

	Model 1	**Model 2**	**Model 3**
	b [CI]	**b [CI]**	**b [CI]**
Count Predictors			
Negative Urgency	**0.37 [0.11,0.63]**	**0.29 [0.03,0.55]**	**0.35 [0.02, 0.67]**
Positive Urgency	-0.36 [-0.74,0.03]	-0.289 [-0.65,0.07]	-0.37 [-0.82,0.08]
Lack of Perseverance	0.44 [-0.25,1.12]	0.32 [-0.36,1.00]	0.47 [-0.36,1.29]
Lack of Premeditation	-0.33 [-0.90,0.25]	-0.21 [-0.80,0.37]	-0.35 [-1.07,0.37]
Sensation Seeking	0.17 [-0.09,0.43]	0.09 [-0.19,0.38]	0.10 [-0.18,0.39]
Zero-Inflated Predictors			
Negative Urgency	-0.45 [-1.05,0.15]	-0.45 [-1.05,0.15]	-0.44 [-1.04,0.17]
Positive Urgency	0.58 [-0.24,1.39]	0.58 [-0.24,1.40]	0.57 [-0.26,1.39]
Lack of Perseverance	-0.62 [-1.86,0.63]	-0.62 [-1.87,0.63]	-0.61 [-1.87,0.65]
Lack of Premeditation	0.11 [-0.93,1.16]	0.12 [-0.93,1.17]	0.10 [-0.96,1.16]
Sensation Seeking	-0.41 [-0.96,0.15]	-0.41 [-0.97,0.14]	-0.41 [-0.97,0.14]
Covariates			
Age	N/A	-0.01 [-0.10,0.08]	-0.02 [-0.11,0.07]
Level of Education	N/A	**-0.23 [-0.39,-0.06]**	**-0.25 [-0.43,-0.07]**
Income	N/A	0 [0,0]	0 [0,0]
Economic Distress	N/A	-0.03 [-0.06,0.001]	-0.03 [-0.06,0.01]
Cigarette at W1	N/A	N/A	0.004 [-0.01,0.01]
Alcohol at W1	N/A	N/A	0.02 [-0.003,0.04]
Marijuana at W1	N/A	N/A	-0.001 [-0.01,0.01]

Note. Models were conducted using a hierarchical regression framework (N = 380). Regressions, which included covariates, employed those covariates as predictors in only count portion of the models. Significant correlations ($p < .05$) are **bolded**. See text for significant exponentiated coefficients. N/A- Not Applicable; b = Unstandardized Beta; *CI* = Confidence Interval.

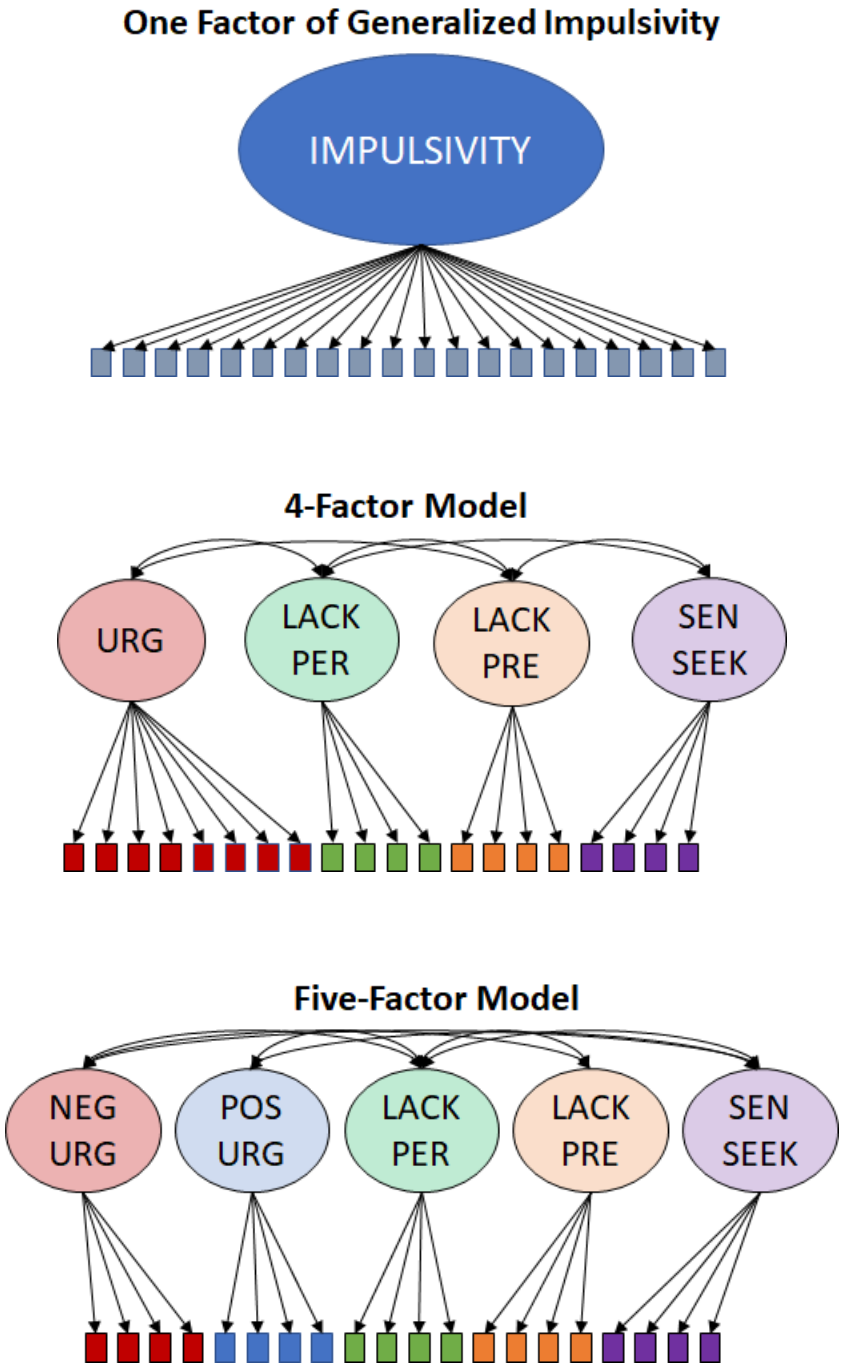

Figure 1. Three Alternative CFA Models of UPPS

Appendix A

Aligning Minnesota Survey of Substance Use Problem Scale with DSM-5

DSM-5 Criteria	MSS Item	Coding
1. Alcohol is often taken in larger amounts or over a longer period than was intended.	13. How many times have you used more alcohol or other drugs than you intended to?	If MSS13 > 1 then SUP=1
2. There is a persistent desire or unsuccessful efforts to cut down or control alcohol use.	2. Have you tried to cut down on your use of alcohol or other drugs but could not?	If MSS2 = 1 then SUP=1
3. A great deal of time is spent in activities necessary to obtain alcohol, use alcohol, or recover from its effects.	4. How many times have you spent all or most of the day using alcohol or other drugs, or getting over their effects?	If MSS4 > 1 then SUP=1
4. Craving, or a strong desire or urge to use alcohol.		
5. Recurrent alcohol use resulting in a failure to fulfill major role obligations at work, school, or home.	7. How many times have you neglected your responsibilities because of alcohol or other drug use? 8. How many times have you missed work or school because of alcohol or other drug use?	If MSS8 or MSS7 > 1 then SUP=1
6. Continued alcohol use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of alcohol.	3. Has alcohol or other drug use hurt your relationships with friends or family? 11. How many times have you hit someone or become violent while using alcohol or other drugs?	If MSS3 or MSS11 > 1 then SUP=1
7. Important social, occupational, or recreational activities are given up or reduced because of alcohol use.	5. How many times have you given up activities like sports, work, school, or being with friends or relatives in order to use alcohol or other drugs, or get over their effects?	If MSS5 > 1 then SUP=1
8. Recurrent alcohol use in situations in which it is physically hazardous.	9. How many times have you driven a motor vehicle after using alcohol or other drugs?	If MSS9 > 1 then SUP=1
9. Alcohol use is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by alcohol.	6. How many times has alcohol or other drug use left you feeling, depressed, agitated, paranoid, or unable to concentrate? 12. How many times have you used so much alcohol or other drugs that the next day you could not remember what you had said or done?	If MSS6 or MSS12 > 1 then SUP=1
10. Tolerance, as defined by either of the following: a) A need for markedly increased amounts of alcohol to achieve intoxication or desired effect b) A markedly diminished effect with continued use of the same amount of alcohol.	1. Have you found that you had to use a lot more alcohol or other drugs than before to get the same effect?	If MSS1=1 then SUP=1
11. Withdrawal, as manifested by either of the following: a) The characteristic withdrawal syndrome for alcohol (refer to criteria A and B of the criteria set for alcohol withdrawal) b) Alcohol (or a closely related substance, such as a benzodiazepine) is taken to relieve or avoid withdrawal symptoms.		

Appendix B

Supplementary Goodness-of-fit for All Models

Table B1. Goodness of-fit Statistics for Alcohol Use and Substance Use Problems at W3

FIT STATISTICS	NEGATIVE BINOMIAL			ZERO-INFLATED NEGATIVE BINOMIAL			POISSON			ZERO-INFLATED POISSON		
Alcohol Use (Days over Last Month)												
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
AIC	1737.91	1738.17	1697.97	1732.22	1733.75	1695.87	2742.45	2699.76	2453.20	2107.34	2100.96	1992.57
BIC	1765.49	1781.52	1753.02	1783.45	1800.73	1774.51	2766.09	2739.16	2504.32	2154.62	2164.01	2067.28
sBIC	1743.28	1746.62	1708.60	1742.20	1746.80	1711.06	2747.05	2707.43	2463.07	2116.55	2113.24	2007.00
SUP (DSM-5 Criteria Endorsed over Lifetime)												
AIC	917.67	918.87	908.07	870.05	864.39	865.08	1505.73	1473.87	1370.16	871.86	862.97	864.79
BIC	945.26	962.21	963.13	921.27	931.37	943.72	1529.37	1513.28	1421.28	919.14	926.01	939.65
sBIC	923.05	927.31	918.71	880.02	877.44	880.27	1510.33	1481.55	1380.03	881.07	875.25	879.37

Appendix C

Supplementary Output from STATA on Model Fits

Tests and Fit Statistics for Alcohol Use

PRM	BIC=	2504.319	AIC=	2453.200	Prefer	Over	Evidence
vs NBRM	BIC=	1753.018	dif=	751.301	NBRM	PRM	Very strong
	AIC=	1697.967	dif=	755.234	NBRM	PRM	
	LRX2=	757.234	prob=	0.000	NBRM	PRM	p=0.000
vs ZIP	BIC=	2067.279	dif=	437.041	ZIP	PRM	Very strong
	AIC=	1992.566	dif=	460.634	ZIP	PRM	
vs ZINB	BIC=	1774.513	dif=	729.807	ZINB	PRM	Very strong
	AIC=	1695.868	dif=	757.332	ZINB	PRM	
NBRM	BIC=	1753.018	AIC=	1697.967	Prefer	Over	Evidence
vs ZIP	BIC=	2067.279	dif=	-314.260	NBRM	ZIP	Very strong
	AIC=	1992.566	dif=	-294.599	NBRM	ZIP	
vs ZINB	BIC=	1774.513	dif=	-21.495	NBRM	ZINB	Very strong
	AIC=	1695.868	dif=	2.099	ZINB	NBRM	

```
-------------------------------------------------------------------------------
ZIP            BIC=  2067.279  AIC=  1992.566  Prefer  Over  Evidence
-------------------------------------------------------------------------------
  vs ZINB      BIC=  1774.513  dif=   292.766  ZINB    ZIP   Very strong
               AIC=  1695.868  dif=   296.698  ZINB    ZIP
               LRX2=  298.698  prob=    0.000  ZINB    ZIP   p=0.000
-------------------------------------------------------------------------------
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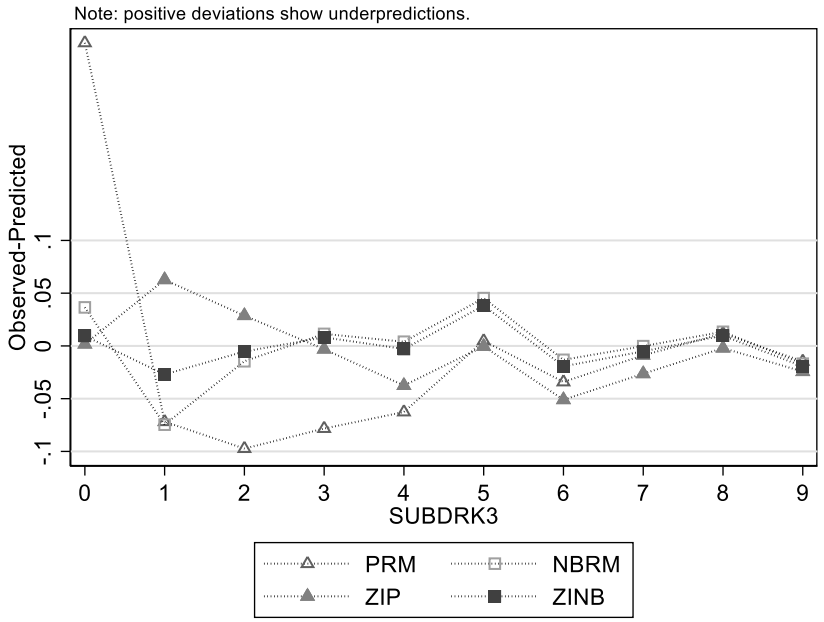
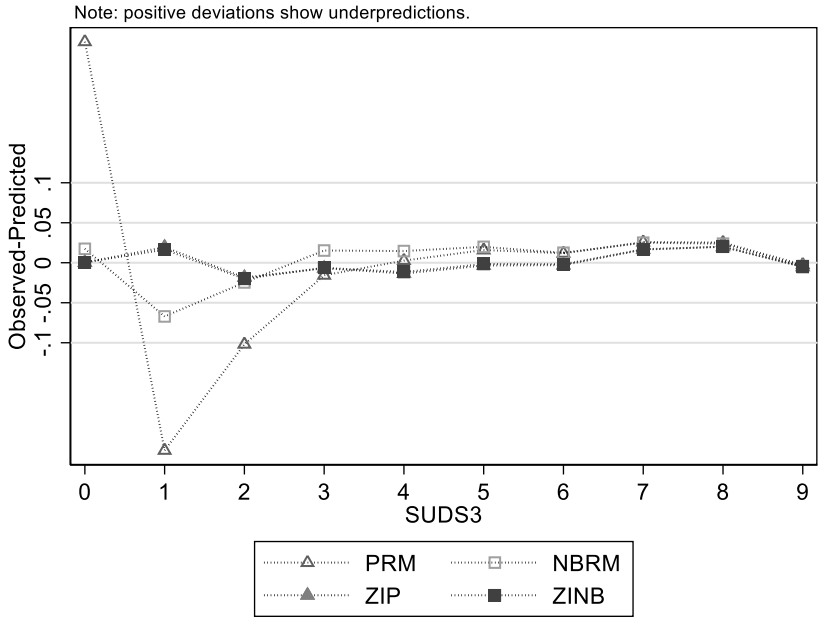


```
Tests and Fit Statistics for SUP MODELS
PRM BIC= 1311.903 AIC= 1260.681 Prefer Over Evidence
--------------------------------------------------------------------------
vs NBRM BIC= 932.450 dif= 379.454 NBRM PRM Very strong
AIC= 877.287 dif= 383.394 NBRM PRM
LRX2= 385.394 prob= 0.000 NBRM PRM p=0.000
--------------------------------------------------------------------------
vs ZIP BIC= 939.648 dif= 372.255 ZIP PRM Very strong
AIC= 864.785 dif= 395.896 ZIP PRM
Vuong= 6.105 prob= 0.000 ZIP PRM p=0.000
--------------------------------------------------------------------------
vs ZINB BIC= 945.241 dif= 366.662 ZINB PRM Very strong
AIC= 866.438 dif= 394.243 ZINB PRM
--------------------------------------------------------------------------
NBRM BIC= 932.450 AIC= 877.287 Prefer Over Evidence
--------------------------------------------------------------------------
vs ZIP BIC= 939.648 dif= -7.198 NBRM ZIP Strong
AIC= 864.785 dif= 12.502 ZIP NBRM
--------------------------------------------------------------------------
vs ZINB BIC= 945.241 dif= -12.791 NBRM ZINB Very strong
AIC= 866.438 dif= 10.850 ZINB NBRM
Vuong= 1.148 prob= 0.125 ZINB NBRM p=0.125
--------------------------------------------------------------------------
```

```
ZIP BIC= 939.648 AIC= 864.785 Prefer Over Evidence
----------------------------------------------------------------------------
vs ZINB BIC= 945.241 dif= -5.593 ZIP ZINB Positive
AIC= 866.438 dif= -1.653 ZIP ZINB
LRX2= 0.347 prob= 0.278 ZINB ZIP p=0.000
----------------------------------------------------------------------------
```



Appendix D: Supplementary Analyses for Alcohol Use

Table D1. Predicting Alcohol Use at Wave 3 (Estimates and Confidence Intervals)

	NEGATIVE BINOMIAL			ZERO-INFLATED NEGATIVE BINOMIAL			POISSON			ZERO-INFLATED POISSON		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
	b [CI]	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**
Count Predictors												
Negative Urgency	-0.21 [-0.53,0.11]	-0.16 [-0.47,0.16]	-0.02 [-0.34,0.30]	-0.18 [-0.49,0.13]	-0.14 [-0.44,0.16]	-0.04 [-0.36,0.27]	-0.19 [-0.55,0.17]	-0.14 [-0.50,0.21]	-0.07 [-0.37,0.23]	-0.16 [-0.45,0.14]	-0.14 [-0.42,0.14]	-0.09 [-0.35,0.18]
Positive Urgency	0.25 [-0.15,0.66]	0.22 [-0.17,0.61]	0.02 [-0.40,0.44]	0.15 [-0.22,0.53]	0.12 [-0.24,0.48]	-0.04 [-0.45,0.37]	0.21 [-0.25,0.66]	0.18 [-0.27,0.63]	-0.03 [-0.47,0.40]	0.09 [-0.26,0.45]	0.08 [-0.27,0.43]	-0.07 [-0.44,0.29]
Lack of Perseverance	-0.87 [-1.65,-0.10]	**-0.79 [-1.55,-0.03]**	-0.51 [-1.35,0.34]	-0.50 [-1.22,0.22]	-0.42 [-1.13,0.28]	-0.21 [-1.00,0.58]	**-0.83 [-1.66,-0.01]**	-0.77 [-1.60,0.06]	-0.57 [-1.36,0.22]	-0.37 [-1.06,0.32]	-0.32 [-1.01,0.37]	-0.19 [-0.88,0.51]
Lack of Premeditation	0.96 [0.28,1.64]	**0.90 [0.23,1.57]**	0.65 [-0.09,1.39]	0.58 [-0.08,1.23]	0.53 [-0.11,1.16]	0.36 [-0.35,1.07]	**0.95 [0.27,1.63]**	**0.89 [0.21,1.57]**	**0.76 [0.09,1.42]**	0.48 [-0.12,1.07]	0.44 [-0.15,1.03]	0.37 [-0.24,0.98]
Sensation Seeking	-0.08 [-0.38,0.22]	-0.09 [-0.38,0.20]	-0.11 [-0.41,0.19]	0.07 [-0.21,0.35]	0.07 [-0.20,0.33]	0.04 [-0.24,0.33]	-0.004 [-0.38,0.38]	-0.003 [-0.38,0.38]	-0.04 [-0.39,0.30]	0.13 [-0.15,0.42]	0.15 [-0.15,0.44]	0.13 [-0.16,0.41]
Zero-Inflated Predictors												
Negative Urgency	N/A	N/A	N/A	0.07 [-0.74,0.88]	0.08 [-0.77,0.93]	0.08 [-0.88,1.04]	N/A	N/A	N/A	0.15 [-0.41,0.70]	0.148	0.14 [-0.43,0.72]
Positive Urgency	N/A	N/A	N/A	-0.38 [-1.38,0.62]	-0.43 [-1.46,0.61]	-0.47 [-1.61,0.67]	N/A	N/A	N/A	-0.40 [-1.13,0.33]	-0.403	-0.43 [-1.18,0.33]
Lack of Perseverance	N/A	N/A	N/A	1.69 [-0.01,3.38]	**1.83 [0.06,3.59]**	**2.01 [0.11,3.92]**	N/A	N/A	N/A	**1.49 [0.26,2.72]**	**1.497**	**1.58 [0.32,2.85]**
Lack of Premeditation	**N/A**	N/A	N/A	**-1.71 [-3.25,-0.16]**	**-1.82 [-3.44,-0.19]**	**-1.95[-3.71,-0.18]**	N/A	N/A	N/A	**-1.49 [-2.55,-0.43]**	**-1.495**	**-1.56 [-2.65,-0.47]**
Sensation Seeking	**N/A**	N/A	N/A	**0.63 [0.02,1.23]**	**0.66 [0.04,1.28]**	**0.69 [0.03,1.34]**	N/A	N/A	N/A	**0.49 [0.01,0.97]**	**0.494**	**0.52 [0.03,1.02]**
Covariates												
Age	N/A	0.10 [-0.02,0.22]	0.03 [-0.10,0.16]	N/A	0.09 [-0.3, 0.21]	0.03 [-0.09,0.15]	N/A	0.08 [-0.05,0.21]	-0.01 [-0.14,0.13]	N/A	0.07 [-0.04,0.18]	0.02 [-0.11,0.14]
Level of Education	N/A	**0.25 [0.03,0.47]**	**0.26 [0.04,0.49]**	N/A	0.20 [-0.03,0.42]	0.21 [-0.01,0.43]	N/A	**0.25 [0.04,0.47]**	**0.29 [0.07,0.51]**	N/A	0.11 [-0.08,0.30]	0.14 [-0.06,0.34]
Income	N/A	0 [0,0]	0 [0,0]	N/A	0 [0,0]	0 [0,0]	N/A	0 [0,0]	0 [0,0]	N/A	0 [0,0]	0 [0,0]
Economic Distress	N/A	-0.02 [-0.04,0.04]	0.01 [-0.04,0.05]	N/A	-0.004 [-0.04,0.04]	0.01 [-0.04,0.05]	N/A	-0.003 [-0.05,0.04]	0.01 [-0.04,0.05]	N/A	-0.01 [-0.04,0.03]	0.002 [-0.04,0.04]
Cigarette at W1	N/A	N/A	0.05 [-0.07,0.16]	N/A	N/A	0.05 [-0.06,0.16]	N/A	N/A	0.08 [-0.03,0.18]	N/A	N/A	0.06 [-0.03,0.15]
Alcohol at W1	N/A	N/A	**0.10 [0.06,0.13]**	N/A	N/A	**0.08 [0.05,0.11]**	N/A	N/A	**0.08 [0.05,0.10]**	N/A	N/A	**0.05 [0.03,0.08]**
Marijuana at W1	N/A	N/A	-0.01 [-0.02,0.01]	N/A	N/A	-0.01 [-0.02,0.002]	N/A	N/A	-0.01 [-0.02,0.01]	N/A	N/A	-0.01[-0.02,0]

Note. Significant findings ($p < .05$) are **bolded**. N/A- Not Applicable; b = Unstandardized Beta; *CI* = Confidence Interval.

Table D2. Negative Urgency Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.21	0.16	-1.28	0.20				
Zero-Inflated Negative Binomial Regression	-0.18	0.16	-1.14	0.25	0.07	0.41	0.16	0.87
Poisson Regression	-0.19	0.18	-1.02	0.31				
Zero-Inflated Poisson Regression	-0.16	0.15	-1.05	0.30	0.15	0.28	0.52	0.61

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.16	0.16	-0.96	0.34				
Zero-Inflated Negative Binomial Regression	-0.14	0.15	-0.90	0.37	0.08	0.43	0.19	0.85
Poisson Regression	-0.14	0.18	-0.78	0.44				
Zero-Inflated Poisson Regression	-0.14	0.14	-0.96	0.34	0.15	0.28	0.52	0.60

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.02	0.16	-0.14	0.89				
Zero-Inflated Negative Binomial Regression	-0.04	0.16	-0.28	0.78	0.08	0.49	0.16	0.87
Poisson Regression	-0.07	0.15	-0.47	0.64				
Zero-Inflated Poisson Regression	-0.09	0.13	-0.64	0.52	0.14	0.29	0.49	0.63

Table D3. Positive Urgency Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.25	0.21	1.24	0.22				
Zero-Inflated Negative Binomial Regression	0.15	0.19	0.81	0.42	-0.38	0.51	-0.75	0.45
Poisson Regression	0.21	0.23	0.89	0.37				
Zero-Inflated Poisson Regression	0.09	0.18	0.52	0.60	-0.40	0.37	-1.07	0.29

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.22	0.20	1.10	0.27				
Zero-Inflated Negative Binomial Regression	0.12	0.18	0.68	0.50	-0.43	0.53	-0.81	0.42
Poisson Regression	0.18	0.23	0.79	0.43				
Zero-Inflated Poisson Regression	0.08	0.18	0.44	0.66	-0.40	0.38	-1.07	0.28

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.02	0.22	0.09	0.93				
Zero-Inflated Negative Binomial Regression	-0.04	0.21	-0.20	0.84	-0.47	0.58	-0.81	0.42
Poisson Regression	-0.03	0.22	-0.14	0.89				
Zero-Inflated Poisson Regression	-0.07	0.19	-0.39	0.69	-0.43	0.39	-1.10	0.27

Table D4. Lack of Perseverance Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.87	0.40	-2.21	0.03				
Zero-Inflated Negative Binomial Regression	-0.50	0.37	-1.36	0.17	1.69	0.86	1.95	0.05
Poisson Regression	-0.83	0.42	-1.98	0.05				
Zero-Inflated Poisson Regression	-0.37	0.35	-1.05	0.29	1.49	0.63	2.37	0.02

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.79	0.39	-2.02	0.04				
Zero-Inflated Negative Binomial Regression	-0.42	0.36	-1.18	0.24	1.83	0.90	2.03	0.04
Poisson Regression	-0.77	0.42	-1.83	0.07				
Zero-Inflated Poisson Regression	-0.32	0.35	-0.91	0.36	1.50	0.63	2.38	0.02

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.51	0.43	-1.18	0.24				
Zero-Inflated Negative Binomial Regression	-0.21	0.40	-0.52	0.60	2.01	0.97	2.07	0.04
Poisson Regression	-0.57	0.40	-1.42	0.16				
Zero-Inflated Poisson Regression	-0.19	0.36	-0.52	0.60	1.58	0.64	2.46	0.01

Table D5. Lack of Premeditation Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.96	0.35	2.78	0.01				
Zero-Inflated Negative Binomial Regression	0.58	0.34	1.73	0.08	-1.71	0.79	-2.17	0.03
Poisson Regression	0.95	0.35	2.74	0.01				
Zero-Inflated Poisson Regression	0.48	0.30	1.57	0.12	-1.49	0.54	-2.76	0.01

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.90	0.34	2.63	0.01				
Zero-Inflated Negative Binomial Regression	0.53	0.33	1.62	0.11	-1.82	0.83	-2.19	0.03
Poisson Regression	0.89	0.35	2.57	0.01				
Zero-Inflated Poisson Regression	0.44	0.30	1.46	0.15	-1.50	0.54	-2.76	0.01

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.65	0.38	1.73	0.08				
Zero-Inflated Negative Binomial Regression	0.36	0.36	1.00	0.32	-1.95	0.90	-2.16	0.03
Poisson Regression	0.76	0.34	2.24	0.03				
Zero-Inflated Poisson Regression	0.37	0.31	1.18	0.24	-1.56	0.56	-2.81	0.01

Table D6. Sensation Seeking Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.08	0.15	-0.50	0.62				
Zero-Inflated Negative Binomial Regression	0.07	0.14	0.49	0.63	0.63	0.31	2.04	0.04
Poisson Regression	0.00	0.19	-0.02	0.98				
Zero-Inflated Poisson Regression	0.13	0.15	0.90	0.37	0.49	0.25	1.98	0.05

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.09	0.15	-0.60	0.55				
Zero-Inflated Negative Binomial Regression	0.07	0.14	0.48	0.63	0.66	0.32	2.09	0.04
Poisson Regression	0.00	0.19	-0.01	0.99				
Zero-Inflated Poisson Regression	0.15	0.15	0.98	0.33	0.49	0.25	2.00	0.05

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.11	0.16	-0.72	0.47				
Zero-Inflated Negative Binomial Regression	0.04	0.15	0.29	0.77	0.69	0.33	2.05	0.04
Poisson Regression	-0.04	0.18	-0.24	0.81				
Zero-Inflated Poisson Regression	0.13	0.14	0.88	0.38	0.52	0.25	2.07	0.04

Appendix E: Supplementary Analyses for Substance Use Problems

Table E1. Predicting Substance Use Problems at Wave 3

	NEGATIVE BINOMIAL			ZERO-INFLATED NEGATIVE BINOMIAL			POISSON			ZERO-INFLATED POISSON		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
	b [CI]	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**	**b [CI]**
Impulsivity Factors												
Negative Urgency	**0.61 [0.11,1.10]**	**0.68 [0.17,1.19]**	**0.68 [0.13,1.23]**	**0.38 [0.11,0.64]**	**0.30 [0.03,0.56]**	0.26 [-0.01,0.54]	**0.71 [0.21,1.20]**	**0.69 [0.22, 1.15]**	**0.74 [0.31,1.16]**	**0.37 [0.11,0.63]**	**0.29 [0.03,0.55]**	**0.35 [0.02, 0.67]**
Positive Urgency	-0.67 [-1.35,0.01]	**-0.74 [-1.46,-0.03]**	**-0.92 [-1.72,0.12]**	-0.36 [-0.74,0.02]	-0.29 [-0.66,0.07]	-0.32 [-0.73,0.09]	**-0.80 [-1.53,-0.07]**	**-0.80 [-1.49,-0.12]**	**-0.99 [-1.65,0.34]**	-0.36 [-0.74,0.03]	-0.289 [-0.65,0.07]	-0.37 [-0.82,0.08]
Lack of Perseverance	0.70 [-0.48,1.87]	0.86 [-0.39,2.11]	1.14 [-0.37,2.65]	0.43 [-0.27,1.13]	0.32 [-0.37,1.00]	0.32 [-0.40,1.05]	0.90 [-0.24,2.05]	0.88 [-0.24,2.01]	**1.18 [0.15,2.21]**	0.44 [-0.25,1.12]	0.32 [-0.36,1.00]	0.47 [-0.36,1.29]
Lack of Premeditation	-0.28 [-1.28,0.71]	-0.38 [-1.44,0.68]	-0.57 [-1.88,0.74]	-0.32 [-0.92,0.28]	-0.21 [-0.81,0.39]	-0.22 [-0.85,0.41]	-0.40 [-1.32,0.52]	-0.41 [-1.33,0.51]	-0.63 [-1.49,0.23]	-0.33 [-0.90,0.25]	-0.21 [-0.80,0.37]	-0.35 [-1.07,0.37]
Sensation Seeking	0.38 [-0.11,0.88]	0.36 [-0.16,0.87]	0.26 [-0.30,0.83	0.16 [-0.10,0.43]	0.09 [-0.20,0.38]	0.08 [-0.20,0.35]	0.46 [-0.03,0.96]	0.44 [-0.05,0.92]	0.38 [-0.06,0.83]	0.17 [-0.09,0.43]	0.09 [-0.19,0.38]	0.10 [-0.18,0.39]
Zero-Inflated Predictors												
Negative Urgency	N/A	N/A	N/A	-0.43 [-1.04,0.17]	-0.44 [-1.05,0.16]	-0.44 [-1.04,0.17]	N/A	N/A	N/A	-0.45 [-1.05,0.15]	-0.45 [-1.05,0.15]	-0.44 [-1.04,0.17]
Positive Urgency	N/A	N/A	N/A	0.57 [-0.26,1.39]	0.58 [-0.25,1.40]	0.55 [-0.27,1.37]	N/A	N/A	N/A	0.58 [-0.24,1.39]	0.58 [-0.24,1.40]	0.57 [-0.26,1.39]
Lack of Perseverance	N/A	N/A	N/A	-0.60 [-1.85,0.65]	-0.62 [-1.87,0.63]	-0.60 [-1.85,0.65]	N/A	N/A	N/A	-0.62 [-1.86,0.63]	-0.62 [-1.87,0.63]	-0.61 [-1.87,0.65]
Lack of Premeditation	N/A	N/A	N/A	0.10 [-0.95,1.15]	0.12 [-0.94,1.17]	0.10 [-0.96,1.15]	N/A	N/A	N/A	0.11 [-0.93,1.16]	0.12 [-0.93,1.17]	0.10 [-0.96,1.16]
Sensation Seeking	N/A	N/A	N/A	-0.40 [-0.96,0.16]	-0.41 [-0.97,0.14]	-0.41 [-0.96,0.15]	N/A	N/A	N/A	-0.41 [-0.96,0.15]	-0.41 [-0.97,0.14]	-0.41 [-0.97,0.14]
Covariates												
Age	N/A	0.10 [-0.09,0.29]	-0.08 [-0.29,0.14]	N/A	-0.01 [-0.10,0.08]	-0.02 [-0.11,0.07]	N/A	0.11 [-0.05,0.28]	-0.01 [-0.18,0.16]	N/A	-0.01 [-0.10,0.08]	-0.02 [-0.11,0.07]
Level of Education	N/A	-0.03 [-0.37,0.31]	-0.08 [-0.52,0.36]	N/A	**-0.23 [-0.40,-0.6]**	**-0.25[-0.45,-0.05]**	N/A	-0.07 [-0.36,0.22]	-0.02 [-0.32,0.28]	N/A	**-0.23 [-0.39,-0.06]**	**-0.25 [-0.43,-0.07]**
Income	N/A	0 [0,0.001]	0 [0,0.001]	N/A	0 [0,0]	0 [0,0]	N/A	0 [0,0.001]	0 [0,0.001]	N/A	0 [0,0]	0 [0,0]
Economic Distress	N/A	-0.05 [-0.11,0.01]	-0.04 [-0.11,0.03]	N/A	-0.03 [-0.06,0.001]	-0.02 [-0.05,0.01]	N/A	-0.04 [-0.11,0.03]	-0.03 [-0.09,0.03]	N/A	-0.03 [-0.06,0.001]	-0.03 [-0.06,0.01]
Cigarette at W1	N/A	N/A	0.08 [-0.10,0.26]	N/A	N/A	0.02 [-0.06,0.10]	N/A	N/A	0.05 [-0.11,0.21]	N/A	N/A	0.004 [-0.01,0.01]
Alcohol at W1	N/A	N/A	**0.08 [0.03,0.12]**	N/A	N/A	0.02 [-0.01,0.04]	N/A	N/A	**0.06 [0.03,0.10]**	N/A	N/A	0.02 [-0.003,0.04]
Marijuana at W1	N/A	N/A	**0.03 [0.01,0.05]**	N/A	N/A	-0.01 [-0.02,0.01]	N/A	N/A	**0.02 [0.01,0.04]**	N/A	N/A	-0.001 [-0.01,0.01]

Note. Significant findings ($p < .05$) are **bolded**. N/A- Not Applicable; b = Unstandardized Beta; *CI* = Confidence Interval.

Table E2. Negative Urgency Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.61	0.25	2.41	0.02				
Zero-Inflated Negative Binomial Regression	0.38	0.14	2.78	0.01	-0.43	0.31	-1.41	0.16
Poisson Regression	0.71	0.25	2.79	0.01				
Zero-Inflated Poisson Regression	0.37	0.13	2.82	0.01	-0.45	0.31	-1.47	0.14

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.68	0.26	2.61	0.01				
Zero-Inflated Negative Binomial Regression	0.30	0.14	2.16	0.03	-0.44	0.31	-1.44	0.15
Poisson Regression	0.69	0.24	2.89	0.00				
Zero-Inflated Poisson Regression	0.29	0.13	2.17	0.03	-0.45	0.31	-1.47	0.14

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.68	0.28	2.41	0.02				
Zero-Inflated Negative Binomial Regression	0.26	0.14	1.88	0.06	-0.44	0.31	-1.42	0.16
Poisson Regression	0.74	0.22	3.38	0.00				
Zero-Inflated Poisson Regression	0.35	0.16	2.10	0.04	-0.44	0.31	-1.42	0.16

Table E3. Positive Urgency Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.67	0.35	-1.92	0.06				
Zero-Inflated Negative Binomial Regression	-0.36	0.20	-1.84	0.07	0.57	0.42	1.35	0.18
Poisson Regression	-0.80	0.37	-2.14	0.03				
Zero-Inflated Poisson Regression	-0.36	0.20	-1.82	0.07	0.58	0.42	1.39	0.17

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.74	0.37	-2.04	0.04				
Zero-Inflated Negative Binomial Regression	-0.29	0.19	-1.57	0.12	0.58	0.42	1.37	0.17
Poisson Regression	-0.80	0.35	-2.30	0.02				
Zero-Inflated Poisson Regression	-0.29	0.18	-1.57	0.12	0.58	0.42	1.39	0.17

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.92	0.41	-2.25	0.03				
Zero-Inflated Negative Binomial Regression	-0.32	0.21	-1.53	0.13	0.55	0.42	1.32	0.19
Poisson Regression	-0.99	0.34	-2.96	0.00				
Zero-Inflated Poisson Regression	-0.37	0.23	-1.63	0.10	0.57	0.42	1.35	0.18

Table E4. Lack of Perseverance Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.70	0.60	1.17	0.24				
Zero-Inflated Negative Binomial Regression	0.43	0.36	1.21	0.23	-0.60	0.64	-0.94	0.35
Poisson Regression	0.90	0.58	1.55	0.12				
Zero-Inflated Poisson Regression	0.44	0.35	1.25	0.21	-0.62	0.63	-0.97	0.33

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.86	0.64	1.34	0.18				
Zero-Inflated Negative Binomial Regression	0.32	0.35	0.90	0.37	-0.62	0.64	-0.97	0.33
Poisson Regression	0.88	0.57	1.54	0.12				
Zero-Inflated Poisson Regression	0.32	0.35	0.91	0.36	-0.62	0.64	-0.98	0.33

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	1.14	0.77	1.48	0.14				
Zero-Inflated Negative Binomial Regression	0.32	0.37	0.88	0.38	-0.60	0.64	-0.94	0.35
Poisson Regression	1.18	0.53	2.24	0.03				
Zero-Inflated Poisson Regression	0.47	0.42	1.10	0.27	-0.61	0.64	-0.95	0.35

Table E5. Lack of Premeditation Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.28	0.51	-0.56	0.58				
Zero-Inflated Negative Binomial Regression	-0.32	0.31	-1.05	0.29	0.10	0.54	0.19	0.85
Poisson Regression	-0.40	0.47	-0.85	0.40				
Zero-Inflated Poisson Regression	-0.33	0.30	-1.11	0.27	0.11	0.53	0.21	0.83

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.38	0.54	-0.70	0.49				
Zero-Inflated Negative Binomial Regression	-0.21	0.30	-0.69	0.49	0.12	0.54	0.22	0.83
Poisson Regression	-0.41	0.47	-0.87	0.39				
Zero-Inflated Poisson Regression	-0.21	0.30	-0.71	0.48	0.12	0.54	0.22	0.83

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	-0.57	0.67	-0.86	0.39				
Zero-Inflated Negative Binomial Regression	-0.22	0.32	-0.69	0.49	0.10	0.54	0.18	0.86
Poisson Regression	-0.63	0.44	-1.44	0.15				
Zero-Inflated Poisson Regression	-0.35	0.37	-0.96	0.34	0.10	0.54	0.19	0.85

Table E6. Sensation Seeking Predicting Alcohol Use at Wave 3 (Estimates, Standard Errors and P-Values)

Unadjusted	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.38	0.25	1.52	0.13				
Zero-Inflated Negative Binomial Regression	0.16	0.13	1.21	0.23	-0.40	0.28	-1.41	0.16
Poisson Regression	0.46	0.25	1.83	0.07				
Zero-Inflated Poisson Regression	0.17	0.13	1.25	0.21	-0.41	0.28	-1.44	0.15

Adjusted Dem Covariates	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.36	0.26	1.36	0.17				
Zero-Inflated Negative Binomial Regression	0.09	0.15	0.62	0.53	-0.41	0.28	-1.46	0.14
Poisson Regression	0.44	0.25	1.76	0.08				
Zero-Inflated Poisson Regression	0.09	0.15	0.64	0.53	-0.41	0.28	-1.46	0.14

Adjusted Dem Covariates and SU at W1	Count Estimate (b)	SE	Estimate/SE	P	ZI Estimate (b)	SE	Estimate/SE	P
Negative Binomial Regression	0.26	0.29	0.91	0.36				
Zero-Inflated Negative Binomial Regression	0.08	0.14	0.55	0.58	-0.41	0.28	-1.44	0.15
Poisson Regression	0.38	0.23	1.69	0.09				
Zero-Inflated Poisson Regression	0.10	0.15	0.71	0.48	-0.41	0.28	-1.45	0.15