Social Media Usage's Effect on Substance Use Expectancies

by

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Abstract

Previous literature studying substance use has found that individuals with higher levels of exposure to substance-use related content engage in higher levels of substance use (Cabrera-Nguyen et al., 2016; Hebert et al., 2017; Davis et al., 2019). Individuals who expect more positive outcomes from substance use have also been shown to engage in higher levels of substance use (Colder et al., 2014; Lac & Brack, 2018; Lisdahl et al., 2018; Montes, Witkiewitz, Pearson, & Leventhal, 2018). This study analyzed the relationship between social media usage and expectancies about the outcomes of substances in youth. Hours of social media usage per day, and substance use expectancies for alcohol, marijuana, and nicotine were measured using self-report questionnaires. Data came from 3,186 participants, aged 9-10, who performed the 1 year follow-up assessment of participants enrolled in the Adolescent Brain and Cognitive Development (ABCD) Study (n=11,878). I tested the hypothesis that hours of social media usage per day would be correlated with positive expectancies about the effects of using alcohol, marijuana, and nicotine. After running a multiple regression model between each expectancy and social media usage, along with various covariates to control for other factors that might influence expectancies of the outcomes of substance use (e.g., impulsivity, race, parent income), I did not find support for my hypothesis. There was not a significant relationship between social media usage and positive expectancies about outcomes from using any of the substances. However, one of the covariates of "no" interest, impulsivity, was found to be correlated with positive expectancies about the effects of alcohol and nicotine. The findings of this study suggest that impulsivity may be associated with holding positive expectancies about the outcomes of substance use. These findings contribute to the growing effort to identify possible risk and protective factors of adolescent substance use.

Social Media Usage's Effect on Substance Use Expectancies

Background

Within the current literature in the field of addiction and substance use research, there are a tremendous number of findings linking substance use in youth to negative outcomes (Mathers et al., 2006; Jacobus et al., 2009; Goriounova & Mansvelder, 2012; Marshall, 2014). Due to this knowledge, subsequent research has emerged that focuses on identifying both risk and protective factors for initiation of substance use in youth. A common focus in this area of research is substance use expectancies, or the various beliefs one has about what substances do to people (Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018). The current study will focus on the early but notable research linking those with higher levels of exposure to substance-related social media, and those with more positive expectancies about the outcomes of substance use, to a risk for higher levels of substance use compared to those with lower levels of social media usage and those holding more negative views about the outcomes of substance use (Stoddard et al., 2012; Boyle et al., 2017; Bergman et al., 2018; Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018).

On social media websites, individuals are exposed to content that not only involves substances but has also been found to generally portray usage in a positive way (Boyle et al., 2017; Bergman et al., 2018). Findings on the effects of this exposure in emerging adults have linked higher levels of exposure to alcohol-related content to higher levels of alcohol use (Stoddard et al., 2012; Boyle et al., 2017; Bergman et al., 2018). This relationship has been interpreted within the framework of the Social Learning Theory and the Theory of Reasoned Action (Stoddard et al., 2012; Davis et al., 2019). Social Learning Theory proposes that young people's behaviors are influenced by their peers through modeling and observational learning

(Bandura, 1977). Peers, in the context of this study, refer to other individuals in a youth's same age group that they interact with ("Peer", n.d.). The Theory of Reasoned Action explains behaviors by the influences of attitudes and perceived norms about the behavior (Ajzen & Fishbein, 1972). Expectancies about the effects of substance use have also been studied in relation to levels of substance use. Results of research on these beliefs point to positive expectancies about the effects of a substance being linked to greater substance use, and negative expectancies about the effects of a substance being linked to less use (Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018). By examining the intersection of these two influences: substance use expectancies and social media usage, we can work towards a better understanding of those factors that might prevent or delay the onset of substance use. This study will assess the relationship between social media usage and youth expectancies of the effects of substances.

Prevalence of Social Media Usage Amongst Youths

Social media refers to online websites and apps that allow users to interact with people, either directly or by viewing the content they share. Examples of these websites or apps include, Facebook, Instagram, Twitter, and Snapchat (Smith & Anderson, 2018). Social media platforms contain online communities in which youth can engage with "posts" from both peers, adults, brands or businesses, and even famous people (Bergman et al., 2018). In 2018, the Pew Research Institute released a review of teen social media use, reporting on the most popular sites used by teens, and the kind of content they are viewing and posting. For teens between the ages of 13 and 17, YouTube was the site used by the most teens, but Snapchat was used most frequently. Instagram and Facebook use followed close behind. For overall frequency of general internet

usage, approximately 45% of teens reported close to constant use, or more than "several times a day" (Anderson & Jiang, 2018).

Although to a lesser extent than for adolescents and emerging adults, children under the age of 13 also seem highly engaged in this kind of media. Naturally, all social media sites have an age requirement to join, which is at a minimum 13 years old. However, these sites have no way of verifying a user's age, so children under 13 can lie about how old they are in order to create accounts (Young, 2019). A 2018 U.K study on children and social media reported that 18% of kids between 8 and 11 have an account on a social media platform, and 77% use YouTube (Ofcom, 2019).

Exposure to Substance Use Content on Social Media

In the last decade, research in the field of adolescent development and in addiction have studied the extent to which youths are exposed to substance use content on social media. Studies focusing on alcohol content have established that it does in fact exist on social media, and that the efforts taken by these websites (specifically Facebook and Twitter) to shield youth from it have been unsuccessful (Winpenny et al., 2014). In regard to the source of this content, it seems that it either comes in the form of marketing promotions, or posts from peers and public figures (Winpenny et al., 2014; Bergman et al., 2018; Davis et al., 2019). Similar conclusions have been drawn for content on social media related to tobacco and marijuana use, also finding that such information exists on social media platforms and that youth users are viewing it (Cabrera-Nguyen et al., 2016; Hebert et al., 2017). The consequences of this exposure have in turn been analyzed in the current literature, showing a general positive link between exposure to the content (specifically Marijuana and Alcohol) and use of the corresponding substance (Cabrera-Nguyen et al., 2016; Davis et al., 2019).

Substance Use Expectancies as Predictors of Substance Use

It's reasonable to assume that one's opinions on the effects of a substance will influence if and how much one uses that substance. The field of addiction research has largely supported this claim. In studies of adolescents and emerging adults, positive substance use expectancies, or favorable beliefs about the substance, have been linked to greater use, while negative expectancies, or unfavorable beliefs about the substance, have been linked to less use (Colder et al., 2014; Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018; Lac & Brack, 2018).

The majority of research on expectancies naturally revolves around alcohol and tobacco, as cannabis research is still a new field due to recent changes in legality. Analysis of changes in alcohol use expectancies over the course of a child/youth's development have suggested that pre-adolescence or older childhood is marked by changes in those expectancies (Copeland et al., 2014). Furthermore, those changes have been found to sway in the direction of positive rather than negative expectancies. In other words, as kids get older and become teens, they tend to see substance use as having more positive outcomes (Colder et al., 2014; Janssen et al., 2017). The concept that individuals see substance usage as more attractive as they age from child to teen is not surprising and speaks to the importance of analyzing factors that could contribute to the changing of these expectancies, such as exposure to content that depicts positive messages about substance use.

Theory

Substance use related social media exposure's effect on usage can be understood through Social Learning Theory in that individuals, especially youth, base their behavior on what they observe and subsequently learn from their peers and family. Therefore, if a youth is viewing pro-

substance use content posted by their peers or celebrity mentors, they will 'learn' to view substances positively, and be more inclined to use them (Stoddard et al., 2012; Lac & Brack, 2018). In regard to the relationship between use and expectancies about the outcomes of substance use, the Theory of Reasoned Action readily explains that our beliefs and attitudes, such as outcome expectancies, will influence our behaviors. So, if someone holds positive expectancies about the effects of substance use, then they generally expect substances to affect them positively rather than negatively, which understandably would increase their likelihood to use them (Davis et al., 2019).

Other Factors potentially influencing Substance Use Expectancy

Expectancies about the effects of substances have also been studied in relation to differences amongst individuals with regards to impulsivity. This relationship has been conceptualized within the Acquired Preparedness Model. This theoretical model proposes that impulsivity (referred to as 'disinhibition' in the original research) is associated with increased substance use as a function of impulsive individuals holding more positive expectancies of the outcomes of substance use (McCarthy et al., 2001). McCarthy and colleagues' original study assessed this mediating effect with alcohol use, and found support for that relationship (McCarthy et al., 2001), that is the relationship between impulsivity and substance use was mediated in part by an individual's expectancies about the effects of substance use. Since then, these results have been replicated again with alcohol, marijuana, and nicotine usage (Gunn & Smith, 2010; Hayaki et al., 2011; Doran et al., 2013; Dir et al., 2016; Anthenien et al., 2017; Luba et al., 2018). For our purposes, this theory is relevant in that it supports a positive correlation between levels of impulsivity and positive expectancies of substance use.

The Current Study

In this study, I evaluated the relationship between hours spent on social media per day, and substance use expectancies for alcohol, marijuana, and nicotine. My hypothesis is that hours spent on social media per day will be positively correlated with holding positive expectancies about the effects of substance use for each of the three substances. Due to the overwhelming amount of data supporting the claim that substance use in adolescents can lead to adverse effects later on, the effort to decrease adolescent substance usage is a relevant and important effort (Jacobus et al., 2009; Goriounova & Mansvelder, 2012; Marshall, 2014). The results of the current study have the potential to be very useful in this effort, since we've seen that substance use expectancies have predictive power in later substance use (Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018). If social media usage is in fact found to be positively correlated with positive expectancies about the effects of substances, those findings can lead parents and others concerned about youth substance use to take measures to reduce social media usage or at least control the amount of exposure to substances via those platforms.

The theory behind my hypothesis bridges together two empirically observed relationships that both share the same outcome of increased use of various substances. First is the trend of exposure to substance use content being linked to greater use (Stoddard et al., 2012, Boyle et al., 2017, Bergman et al., 2018). Second is the trend of holding positive expectancies about the effects of substances being linked to greater use (Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018). Measuring the effect of these influences by actual substance usage works well when analyzing the behavior of young adults and those who would realistically engage in substance use in their current life. However, the ABCD study is in its early stages, and participants are just either emerging or at the beginning of adolescence, most having no

intentions of or experiences in using substances anytime soon (Lisdahl et al., 2018). For this reason, evaluating the expectancies these youth have about substances could be the best way to assess how exposure to substance-related content will affect their substance use behavior down the road.

It's important when analyzing this relationship that we consider alternative explanations for differences in substance use expectancies among youth. For example, some studies have unsurprisingly linked alcohol use behavior and beliefs in youth to their parents and family's alcohol use behavior (Brown et al., 1987, 1999; Ouelette et al., 1999). This data is valuable as it explains another driving force between the development of our participant's substance use expectancies besides the influence of social media. The ABCD study has such data on parents, and as discussed in the methods section it will be considered in my analysis. Brown and colleagues (1987, 1999) found associations between higher levels of parental alcohol abuse and higher levels of positive expectancies about the effects of alcohol in adolescents. These findings inform an additional hypothesis of this study regarding the size of the correlations between social media usage and expectancies about effects of substance use across the three substances of interest. Specifically, I propose the effect of social media on alcohol use expectancies will be the smallest compared to the effects for marijuana and nicotine use expectancies.

Methods

Participants

The participants from this study are part of the Adolescent Brain and Cognitive Development (ABCD) study, a national multi-site longitudinal study focused on adolescent brain and cognitive development. The ABCD study has over 11,800 participants enrolled. For the current study, data from baseline and the 1 year follow up visits were used. Baseline data was

used for all parent report measures, and for the child reported impulsivity measures. Data from the 1year follow up visit was used for child reported substance use expectancy and social media usage measures. The current study had a final sample size of 3,186 participants, as some were excluded due to incomplete data. First, this was due to less than half of the 1 year follow up visit data being available. Second, in order for the participants to answer each substance use expectancy questionnaire, they first had to endorse knowledge of the substance. This decreased the sample size for each individual expectancy questionnaire (See Table 2). In addition, twin and sibling participants were also excluded from the data set as confounding familial similarities were not controlled for in this study due to data analysis limitations. Participants in this data set were between 9 and 10 when enrolled, and thus were 1 year older for the 1 year follow up. This age range does not include the adult participants from the parent reported control measures. Participants were mainly recruited from elementary schools, and certain sites with twin sub studies also recruited from state twin registries (Garavan et al., 2018; Iacono et al., 2018). Participants, both youth and parent, were monetarily incentivized to participate.

Design

In this study, I utilized a multiple regression design to measure the relationships between the independent and dependent variables, and the control and dependent variables. The independent variable in the design was the average hours of social media use per day for weekdays and weekends. The dependent variables were the sum scores of positive expectancies reported for each of alcohol, marijuana, and nicotine. Due to evidence supporting alternative explanations of substance use expectancies and social media use patterns, I chose to incorporate parent reported alcohol and drug behavior, youth reported impulsivity measures, youth sex, youth race, youth ethnicity, youth age, family income, and parent marital status into the model.

Measures

Substance Use Expectancies

A part of the ABCD study aims to assess usage patterns, attitudes, expectancies, and peer influences in regard to childhood and adolescent substance use. The current study focused on three questionnaires in the substance use instrument: the Alcohol Expectancy Questionnaire-Adolescent - Brief, the Marijuana Effect Expectancy Questionnaire-Brief, and the Adolescent Smoking Consequences Questionnaire (Stein et al., 2007; Torrealday et al., 2008, Lewis-Esquerre et al., 2005). This data was collected at the 1 year follow up. In order for the participants to answer these questionnaires, they had to endorse prior knowledge of each substance. The Alcohol Expectancy Questionnaire-Adolescent - Brief is a seven-question self-report survey containing various statements about the effects of alcohol. 3,180 participants answered this questionnaire. Many of the statements oppose each other, such as: "Alcohol can help how well a person gets along with others", versus, "Alcohol can hurt how well a person gets along with others" (Stein et al., 2007). Each statement is rated using a Likert-type scale ranging from "disagree strongly" to "agree strongly". The Marijuana Effect Expectancy Questionnaire-Brief is similar to its alcohol counterpart, as a six-question self-report survey with the same Likert-type scale. 493 participants answered this questionnaire. Statements in the questionnaire also display both positive and negative expectancies, such as: "Marijuana helps people get along better with others", and "Marijuana generally has bad effects on a person" (Torrealday et al., 2008). Finally, the Adolescent Smoking Consequences Questionnaire is a seven-question self-report survey with various positive and negative statements about smoking and cigarettes. 2,449 participants answered this questionnaire. Participants rated how often they think each statement is true, using a Likert-type scale ranging from "never" to "always", with an option to put

"uncertain." Statements in this questionnaire ranged from things such as: "the look and feel of a cigarette in the mouth is good", to "smoking makes people look ridiculous or silly." Statements pertaining to negative expectancies were reverse coded for all three substance use expectancy questionnaires.

Social Media Usage

Social media data was collected as part of a comprehensive screen time questionnaire, that assessed hours spent on different kinds of media sources (social networking, video games, TV and movie watching, video streaming) for weekends and weekdays. This data was collected at the 1 year follow up, and 3,185 participants answered this questionnaire. For the purposes of this study, only two questions in the instrument were analyzed: "On a typical weekday, how many hours do you: Visit social networking sites like Facebook, Twitter, Instagram, etc.?", and "On a typical weekend day, how many hours do you: Visit social networking sites like Facebook, Twitter, Instagram, etc.?" (Paulus et al., 2019). Scores for each of the two questions were averaged to quantify social media use for each participant.

Impulsivity

To control for impulsivity, I used 2 sum scores from the UPPS-P child version Impulsive Behavior Scale (Zapolski et al., 2011). This data was collected at baseline, and 3,182 participants answered this questionnaire. UPPS-P child version is rated using a Likert scale, with 1 being "not at all like me", and 4 being "very much like me". This questionnaire asks questions pertaining to the following aspects of impulsivity, separated into subscales: lack of premeditation, negative urgency, sensation seeking, lack of perseverance, and positive urgency. The following are some examples of questions pertaining to each subscale, respectively. "I like to stop and think about something before I do it" (reverse coded), "When I feel bad, I often do

things I later regret in order to make myself feel better now", "I like new, thrilling things, even if they are a little scary", "I finish what I start" (reverse coded), and "When I am in a great mood, I tend to do things that could cause me problems" (Zapolski et al., 2011). Lack of premeditation refers to acting before adequately thinking things through. Negative urgency refers to acting reckless or hasty as a result of experiencing negative feelings. Sensation seeking refers to pursuing new or exciting things. Lack of perseverance refers to a lack of attentiveness or ability to follow through with something (Whiteside & Lynam, 2001). Finally, positive urgency refers to acting reckless or hasty as a result of experiencing high levels of positive feelings (Cyders et al., 2007). To simplify the UPPS-P, I searched for possible correlations between each scale, and found that positive urgency, negative urgency, and sensation seeking were highly correlated; and that lack of premeditation and lack of perseverance were highly correlated (See Table 1 for these correlations). This informed the methodological choice to create two new variables for the model using sum scores from the two sets of correlated UPPS scales: an urgency/sensation seeking sum score, and a lack of premeditation/lack of perseverance sum score so that highly co-linear scales (e.g., positive urgency, negative urgency) were not each entered into the model. The purpose of using these two measures in the regression model is to study whether the social media use has an effect on substance use expectancies while controlling for relevant confounds like impulsivity.

Demographics

Social media usage's effect on substance use expectancies was also assessed while controlling for parent drug and alcohol problems. Specifically, I included scores from the following questions from the parent interviews at baseline. For potential alcohol abuse history: "Has ANY blood relative of your child ever had any problems due to alcohol, such as: Marital

separation or divorce; Laid off or fired from work; Arrests or DUIs; Alcohol harmed their health; In an alcohol treatment program; Suspended or expelled from school 2 or more times; Isolated self from family, caused arguments or were drunk a lot." For potential drug abuse history: "Has ANY blood relative of your child ever had any problems due to drugs, such as: Marital separation or divorce; Laid off or fired from work; Arrests or DUIs; Drugs harmed their health; In a drug treatment program; Suspended or expelled from school 2 or more times; Isolated self from family, caused arguments or were high a lot" (Barch et al., 2018). Participant data for this measure was coded as having problems or not having problems with alcohol or drugs. Finally, sex, race, ethnicity, parent marital status, socioeconomic status, and child age were controlled for using parent assessment questions pertaining to each topic. Socioeconomic status was measured using parent income (Barch et al., 2018). All demographic and parent substance use data was collected at baseline.

Procedures

The ABCD study has 21 research sites throughout the U.S, where behavioral visits are conducted annually, and neuroimaging visits are conducted biennially. Data for this study came from behavioral assessments at baseline and at the 1 year follow up. Assessment data was collected almost exclusively on site in behavioral testing rooms, proctored by undergraduate or professional research assistants. Youth questionnaires were answered on an iPad, using a process by which the research staff member reads all directions and each question, and the youth participant hits their rating or answer for each statement or question using the iPad's touch screen. Parent assessments were conducted in the same manor, except that parents read through and answered each questionnaire on their own.

Results

Table 2 includes participant characteristics. Three multiple regressions were run with each of the three substance use expectancies as dependent variables and social media usage and the other covariates of interest as the independent variables. The results of these analyses indicated that social media usage was not significantly correlated with positive expectancies about the effects of alcohol (β = -0.026 (standard error (SE) = 0.145), standardized β = -.004, p = .856), marijuana (β = .074 (SE = .349), standardized β = .011, p = .832), and nicotine (β = 0.016 (SE = 0.103), standardized β = .004, p = .874). While one cannot prove the null hypotheses, these results indicate that there is no significant relationship between the outcome expectancies for these substances and social media usage.

However, the full multiple regression model was significant (F(13, 2717) = 2.381, p = .004, R^2 = .011) and able to explain 1.1% of the variance in alcohol expectancies. This effect appears to be driven by relationships between alcohol expectancies and each of the two impulsivity measures. Higher scores on the lack of premeditation/lack of perseverance scale were associated with more positive expectancies about the effects of alcohol (β = .075 (SE = .021), standardized β = .069, p = .000) (See Figure 1). For lack of premeditation/perseverance, an increase in one standard deviation was associated with a .069 standard deviation increase in holding positive expectancies about the outcomes of using alcohol. Similarly, higher scores on the urgency/sensation seeking scale were associated with more positive expectancies about the effects of alcohol (β = .034 (SE = .014), standardized β = .048, p = .017) (See Figure 2). An increase of one standard deviation on the urgency/sensation seeking measure was associated with an .048 standard deviation increase in holding positive alcohol expectancies. Surprisingly, none of the parent alcohol and drug problem measures were significantly correlated with holding

positive expectancies about the effects of alcohol, nor was any of our demographic or SES

measures.

The full multiple regression model was not significant ($F(13,412) = 1.604$, $p = .081$, $R^2 =$

.048), and was able to explain 4.8% of the variance in marijuana expectancies. Impulsivity was

not found to be significantly associated with marijuana expectancies. The association with lack

of premeditation/lack of perseverance scale approached significance ($\beta = .104$ (SE = .058),

standardized $\beta = .092$, $p = .072$) (See Figure 3), while the association with urgency/sensation

seeking did not ($\beta = -.001$ (SE = .038), standardized $\beta = -.001$, $p = .987$) (See Figure 4).

However, participant ethnicity ($\beta = -1.38$ (SE = .530), standardized $\beta = -.136$, $p = .009$) and race

($\beta = 1.20$ (SE = .467), standardized $\beta = .131$, $p = .010$) were found to be significantly correlated

with positive expectancies about marijuana use. Non-Hispanic participants reported more

positive expectancies about the effects of marijuana than Hispanic participants. Non-white

participants reported more positive expectancies about the effects of marijuana than white

participants.

The full multiple regression model was significant ($F(13,2099) = 3.091$, $p = .000$, $R^2 =$

.019) and able to explain 1.9% of the variance in nicotine expectancies. For nicotine

expectancies, higher scores on the premeditation/lack of perseverance measure of impulsivity

was found to be significantly associated with increased positive expectancies about the use of

nicotine ($\beta = .064$ (SE = .016), standardized $\beta = .088$, $p = .000$) (See Figure 5). This means that

one standard deviation increase on the lack of premeditation/lack of perseverance scale was

associated with a .088 standard deviation increase in holding positive expectancies about the

effects of nicotine. No significant association was found between positive expectancies and

urgency/sensation seeking ($\beta = -.007$ (SE = .011), standardized $\beta = -.014$, $p = .538$) (See Figure

6). Interestingly, endorsement of maternal alcohol problems (β = .964 (SE = .359), standardized β = .066, p = .007) was significantly correlated with more positive expectancies about nicotine use. Participant sex (β = -.251 (SE = .126), standardized β = -.044, p = .046) was significantly correlated with nicotine expectancies, showing that male participants reported more positive expectancies about nicotine use than female participants. Older age at the time of the assessment (β = -.016 (SE = .009), standardized β = -.042, p = .054) approached a significant negative correlation with positive expectancies about nicotine use.

Discussion

In this study, I hypothesized that hours spent on social media per day would be positively correlated with positive expectancies about the effects of alcohol, marijuana, and nicotine in youth. In addition, I hypothesized that this relationship would be the smallest for alcohol expectancies. However, I did not find support for either of these hypotheses, as the results of the study showed that social media usage is not significantly correlated with alcohol, marijuana, or nicotine expectancies. Yet, many other factors were controlled for in this study, some of which yielded significant associations with positive expectancies. Notably, higher degrees of impulsivity were significantly associated with higher positive expectancies about the use of alcohol and nicotine.

Null effects for Social Media

Although supported by various studies linking positive expectancies about the effects of substance use to increased substance usage, and exposure to substance use-related social media content to increased substance usage (Stoddard et al., 2012, Boyle et al., 2017, Bergman et al., 2018; Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018), social media usage was not significantly associated with any of the substance use expectancies in the current study.

The inconsistency between the results of the current study and these previous studies may partly

be explained by the age range of the sample. Most pre-adolescents are simply not yet engaging in

substantial substance use, if any at all (Lisdahl et al., 2018). Furthermore, most of the

participants in the study were not endorsing positive expectancies, likely because of their young

age, making the ability to discover significant associations with social media usage difficult. This

speculation is complicated, because the results of this study showed a *negative* correlation that

approached significance between interview age and positive expectancies about the effects of

nicotine, meaning that participants were *less* likely to endorse positive expectancies if they were

older at the time of the assessment. This refutes various findings that as children age, there is an

increase in positive substance use expectancies (Colder et al., 2014; Janssen et al., 2017). A

potential reason for this inconsistency could be that in this age range, the youngest children were

so young that their limited knowledge of nicotine outcomes lead them to hold more positive

expectancies arbitrarily, whereas older children knew enough about nicotine and smoking to hold

negative expectancies.

   Alcohol Expectancies

   Significant positive associations were found between both lack of premeditation/lack of

perseverance and urgency/sensation seeking and alcohol expectancies. These results are

consistent with the existing research on impulsivity and alcohol use, which have found positive

correlations between impulsivity and alcohol expectancies as mediating effects outlined by the

Acquired Preparedness Model (McCarthy et al., 2001; Anthenien et al., 2017; Gunn & Smith,

2010). Notably, Gunn and Smith (2010) conducted a study on the relationship between UPPS-P

Child version measures of impulsivity and alcohol use, analyzing various mediating effects,

including alcohol expectancies. Unlike the current study, this study chose to analyze each of the

5 subscales from the UPPS-P child version individually. In their 5th grade sample, an age group included in the current study, they found negative urgency to be correlated with positive expectancies about the effects of alcohol, but they did not find this relationship with lack of premeditation/lack of perseverance (Gunn & Smith, 2010). The finding of impulsive urgency being correlated with positive expectancies about the effects of alcohol is consistent with the current study's findings. However, unlike their study in which no relationship was observed between lack of premeditation/lack of perseverance and positive expectancies about alcohol use, I did observe an association. Perhaps this inconsistency is due to differences in power between the two studies. The current study's sample size for alcohol expectancies was 3,180, while Gunn and Smith's (2010) study had a sample size of 1,843.The larger sample size of the current study relative to Gunn and Smith's (2010) means it has more statistical power, making it more likely to detect a significant relationship between lack of premeditation/perseverance and positive expectancies about the effects of alcohol.

Nicotine Expectancies

For nicotine expectancies, results were consistent with the framework of the Acquired Preparedness Model, which proposes a correlation between impulsivity and positive expectancies about substance use outcomes (Doran et al., 2013; Dir et al., 2016). Lack of premeditation/lack of perseverance was the only impulsivity measure found to be correlated with positive expectancies in the current study. Like the research on impulsivity and alcohol use, findings primarily point to negative urgency, rather than lack of premeditation/lack of perseverance, as being shown to be correlated with positive expectancies about nicotine usage (Doran et al., 2013; Dir et al., 2016). It's possible that for this sample, negative urgency is not related to positive expectancies about the effects of nicotine because the participants are being

exposed to discouraging campaigns about smoking tobacco or using nicotine, so they don't see these behaviors as a way to decrease negative feelings. This assertion is supported by a 2009 study assessing the success of these campaigns, finding an increase in negative beliefs about smoking tobacco in teens after exposure to these campaigns compared to before (Farrelly et al., 2009). In contrast, alcohol use is not considered an unhealthy behavior when moderated, and parents may often drink in front of their children. A study from Voogt and colleagues (2020) suggests that even children aged 4-8 have some knowledge of situations in which adults drink alcohol. It could be the case that the children in this sample have observed the ways in which alcohol can alleviate the experience of negative feelings, and that this was not observed for nicotine use (Voogt et al., 2020).

Marijuana Expectancies

For marijuana, impulsivity was not associated with positive expectancies, which is inconsistent with the findings supporting the Acquired Preparedness Model as applied to this topic (Vangsness, et al., 2005; Hayaki et al., 2011; Luba et al., 2018). Once again, this lack of a relationship may be explained by the participants' ages at the time of the study. In order for the child participants to even respond to the Marijuana Effect Expectancy Questionnaire-Brief, they had to endorse that they knew what marijuana was, for the purpose of limiting exposure to substance information they didn't already know. Due to this stipulation, the final sample size of participants who answered the Marijuana Effect Expectancy Questionnaire-Brief was only 493, versus the 3,180 who answered the Alcohol Expectancy Questionnaire-Adolescent-Brief. This disparity in sample sizes likely made it easier to detect a relationship between impulsivity and alcohol expectancies than between impulsivity and marijuana expectancies. Furthermore, given

that only 493 participants knew what marijuana was, it's likely many of them were very uneducated on the subjective effects of the substance.

Limitations and Future Directions

The limitations of the current study stem from the method of data collection and the age group of the participants. Although the measures used to assess impulsivity and substance use expectancies in this study were established, valid, and reliable questionnaires, they still contain flaws characteristic of self-report (Stein et al., 2007; Torrealday et al., 2008; Lewis-Esquerre et al., 2005; Zapolski et al., 2011). A potential way to account for this limitation in the future would be to conduct a structured interview when assessing personality traits such as impulsivity. The young age of the participants in this sample is a difficult limitation to mitigate in a longitudinal study, but a way to conduct this specific study in a more meaningful way would be to conduct it once participants are old enough to start reporting substantial substance use. This way substance usage could also be measured as an outcome variable to be predicted by social media usage, creating a more informed look at the relationship between substance use-related content exposure, substance use expectancies, and substance usage.

Another limitation of the current study worth mentioning is the large sample size. With sample sizes as large as these, the statistical power is increased, making it easier to detect a significant correlation between the variables. Although significant correlations do lead to valuable conclusions about a relationship, the effect size must also be considered. In this study, significant correlations were found between certain impulsivity measures and positive expectancies about the outcomes for alcohol and nicotine. However, the amount of the variance that they account for isn't very large. This means that when interpreting the overall results of this

study, one cannot overstate the effect of impulsivity on expectancies about alcohol and nicotine use.

Implications

The current study is unique in that it is the first study to analyze the relationship between social media usage and substance use expectancies without analyzing actual substance usage and is the first to measure these two factors in this age group. This study found that frequency of social media usage was not significantly associated with holding positive expectancies about alcohol, marijuana, and nicotine use. However, the findings did suggest a significant positive correlation between impulsivity and holding positive expectancies about alcohol and nicotine. Specifically, urgency/sensation seeking was associated with positive expectancies about alcohol use, while lack of premeditation/lack of perseverance was associated with positive expectancies about alcohol use and nicotine use. For alcohol expectancies, the relationship with impulsivity was strongest for lack of premeditation/lack of perseverance.

The implication of this study for the field of substance use research and public health is that impulsivity is related to positive expectancies about highly abused substances like alcohol and nicotine. Since positive expectancies have been linked to higher levels of substance use, it's important to consider how impulsive individuals may be at higher risk for substance use or abuse (Colder et al., 2014; Montes, Witkiewitz, Pearson, & Leventhal, 2018; Lisdahl et al., 2018; Lac & Brack, 2018). Findings in such a young age group suggest that personality traits influencing the risk for addictive behavior may develop in childhood. It's well-agreed upon that substance use in adolescents is a risky behavior that should be prevented, and identifying impulsivity as a potential risk factor, especially before onset of use, can protect individuals from negative

outcomes (Mathers et al., 2006; Jacobus et al., 2009; Goriounova & Mansvelder, 2012; Marshall, 2014).

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Table 1. Correlations of UPPS-P Child Version Subscales

		UPPS-P Child Version Negative Urgency Subscale	UPPS-P Child Version Lack of Premeditation Subscale	UPPS-P Child Version Sensation Seeking Subscale	UPPS-P Child Version Positive Urgency Subscale	UPPS-P Child Version Lack of Perseverance Subscale
UPPS-P Child Version Negative Urgency Subscale	Pearson Correlation	1	.184**	.135**	.492**	.166**
	Sig. (2-tailed)	-	.000	.000	.000	.000
	N	3182	3182	3182	3182	3182
UPPS-P Child Version Lack of Premeditation Subscale	Pearson Correlation	.184**	1	.086**	.226**	.456**
	Sig. (2-tailed)	.000	-	.000	.000	.000
	N	3182	3182	3182	3182	3182
UPPS-P Child Version Sensation Seeking Subscale	Pearson Correlation	.135**	.086**	1	.185**	-.085**
	Sig. (2-tailed)	.000	.000	-	.000	.000
	N	3182	3182	3182	3182	3182
UPPS-P Child Version Positive Urgency Subscale	Pearson Correlation	.492**	.226**	.185**	1	.199**
	Sig. (2-tailed)	.000	.000	.000	-	.000
	N	3182	3182	3182	3182	3182
UPPS-P Child Version Lack of Perseverance Subscale	Pearson Correlation	.166**	.456**	-.085**	.199**	1
	Sig. (2-tailed)	.000	.000	.000	.000	-
	N	3182	3182	3182	3182	3182

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2. Participant characteristics

	Sample Size	Mean	Standard Deviation	Frequency	Percentage
Youth Age	3,186	9.91	7.18	-	-
Parent Marital Status	3,172	-	-	-	-
Married/Partner	-	-	-	2,524	79.2
Not Married/No Partner	-	-	-	648	20.3
Missing Data	-	-	-	14	0.4
Parent Income	2,936	-	-	-	-
<$75,000	-	-	-	1,190	37.4
>$75,000	-	-	-	1,746	54.8
Missing Data	-	-	-	250	7.8
Race	3,186	-	-	-	-
White	-	-	-	2,216	69.6
Not White	-	-	-	970	30.4
Ethnicity	3,147	-	-	-	-
Hispanic	-	-	-	704	22.1
Not Hispanic	-	-	-	2,443	76.7
Missing Data	-	-	-	39	1.2
Sex	3,185	-	-	-	-
Male	-	-	-	1,707	53.6
Female	-	-	-	1,478	46.4
Missing Data	-	-	-	1	0.0
Maternal Drug Problems	3,133	-	-	-	-
Problems	-	-	-	120	3.8
No Problems				3,013	94.6
Missing Data	-	-	-	53	1.7
Maternal Alcohol Problems	3,081	-	-	-	-
Problems	-	-	-	122	3.8
No Problems	-	-	-	2,959	92.9
Missing Data	-	-	-	105	3.3
Paternal Drug Problems	3,054	-	-	-	-
Problems	-	-	-	272	8.5
No Problems	-	-	-	2,782	87.3
Missing Data	-	-	-	132	4.1
Paternal Alcohol Problems	3,061	-	-	-	-
Problems	-	-	-	354	11.1
No Problems	-	-	-	2,707	85.0
Missing Data	-	-	-	125	3.9
Alcohol Expectancies	3,180	13.19	4.24	-	-
Marijuana Expectancies	493	12.56	4.27	-	-
Nicotine Expectancies	2,449	9.03	2.81	-	-
Impulsivity	3,182	-	-	-	-
Lack of Premeditation/Perseverance	3,182	14.65	3.89	-	-

Urgency/Sensation Seeking	3,182	26.08	5.90	-	-
Social Media Usage	3,185	0.21	0.57	-	-

Figure 1. Simple scatter plot of alcohol expectancy standardized residuals by UPPS lack of premeditation/perseverance standardized residuals
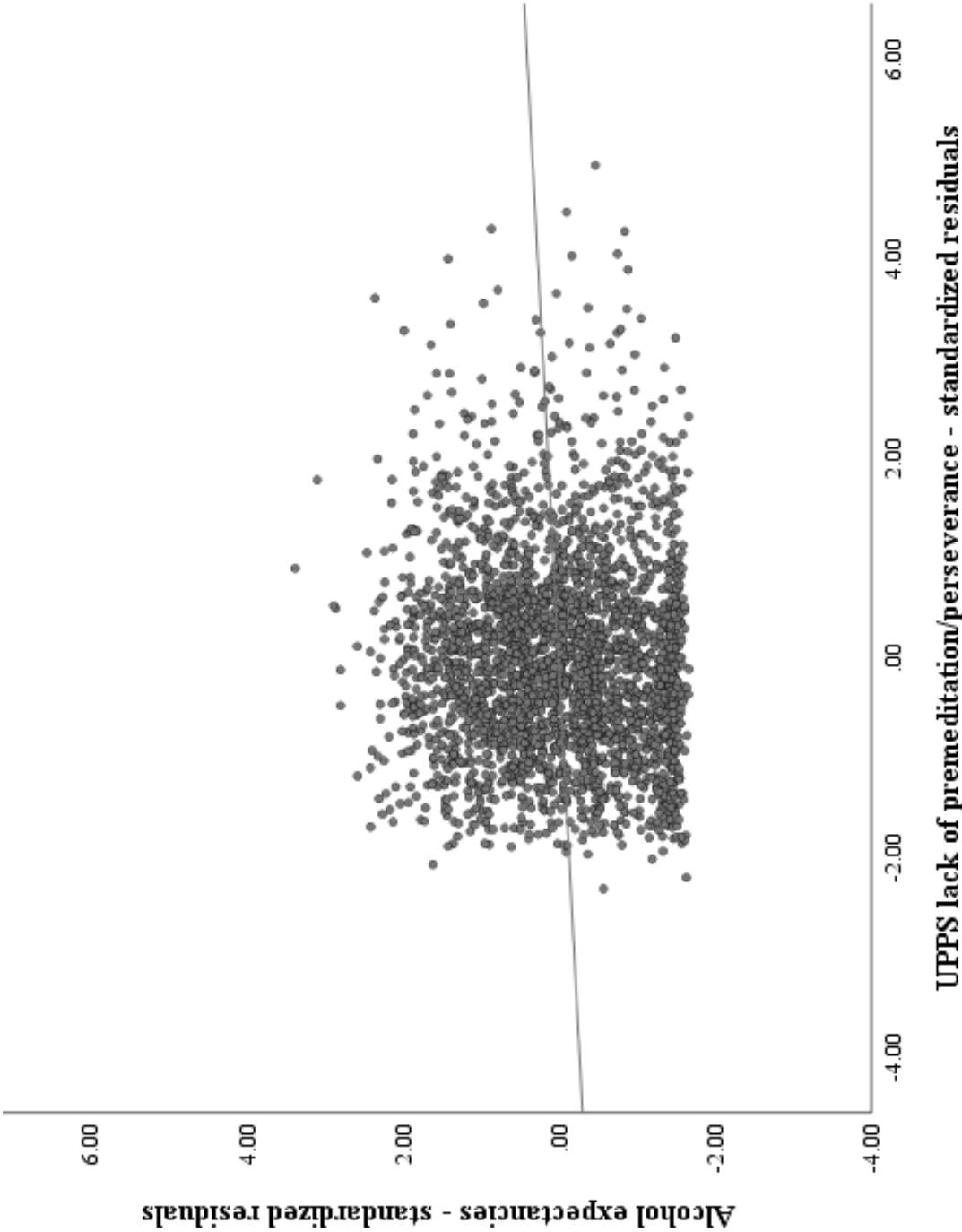
Figure 2. Simple scatter plot of alcohol expectancy standardized residuals by UPPS urgency/sensation seeking standardized residuals
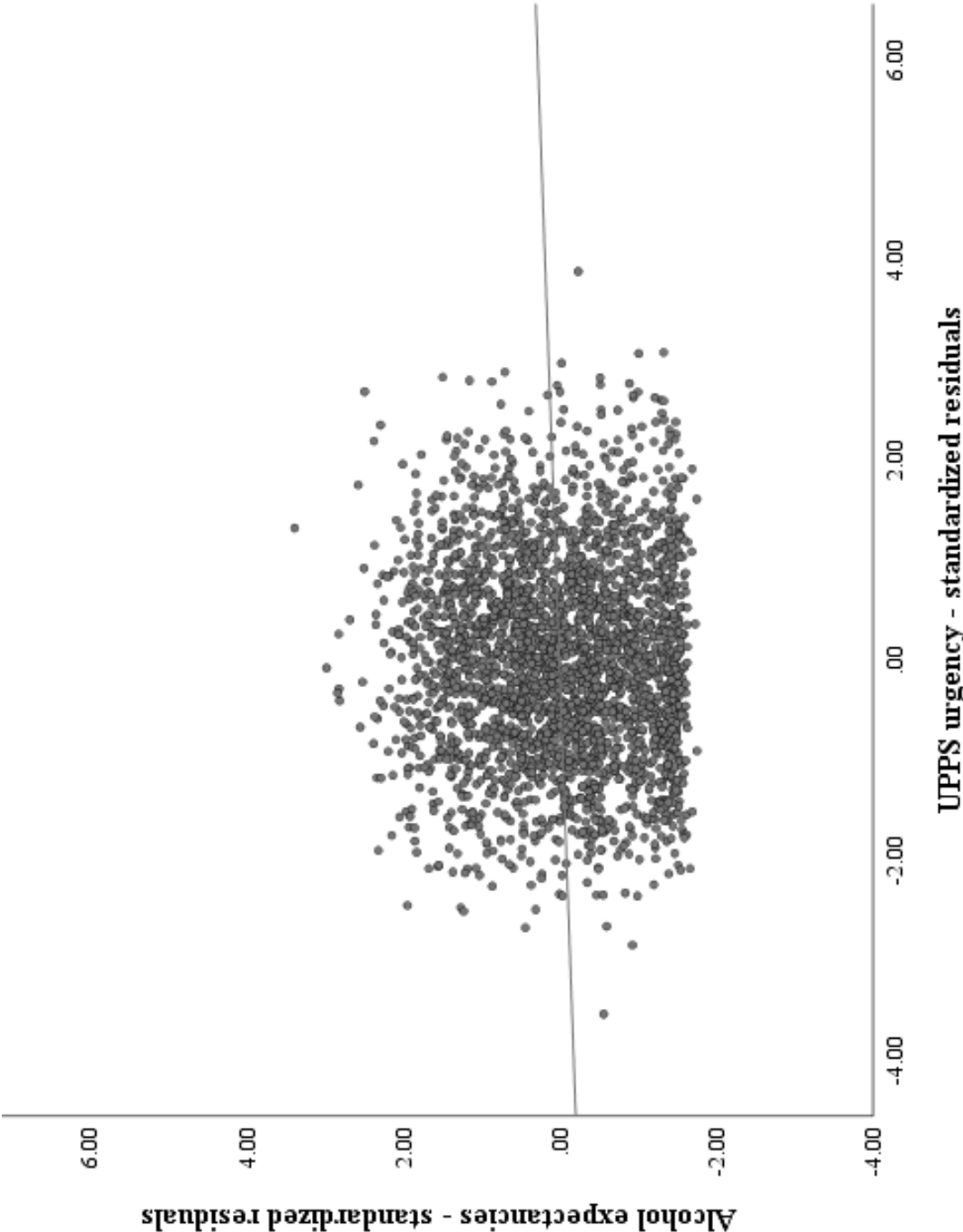
Figure 3. Simple scatter plot of marijuana expectancy standardized residuals by UPPS lack of premeditation/perseverance standardized residuals
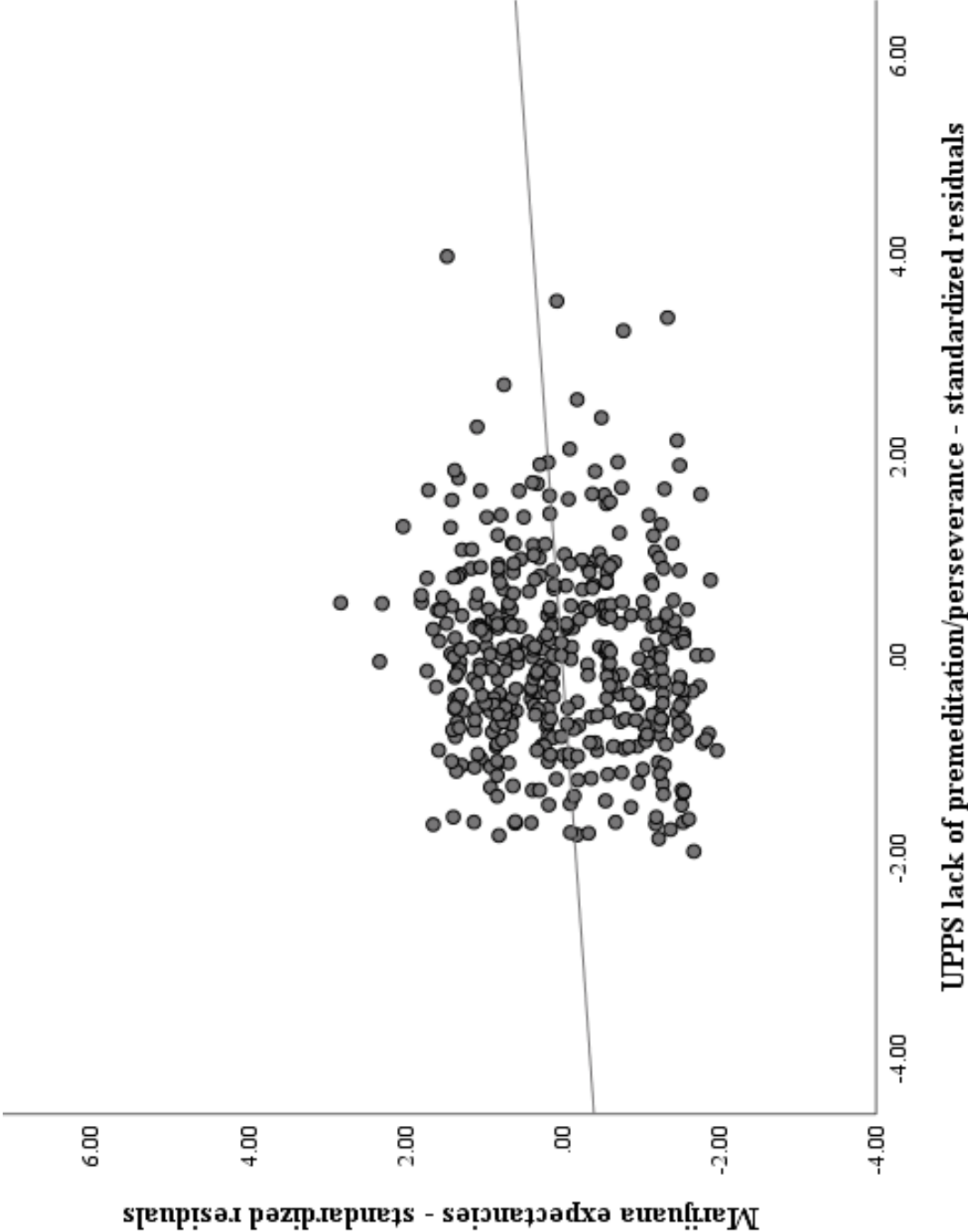
Figure 4. Simple scatter plot of marijuana expectancy standardized residuals by UPPS urgency/sensation seeking standardized residuals
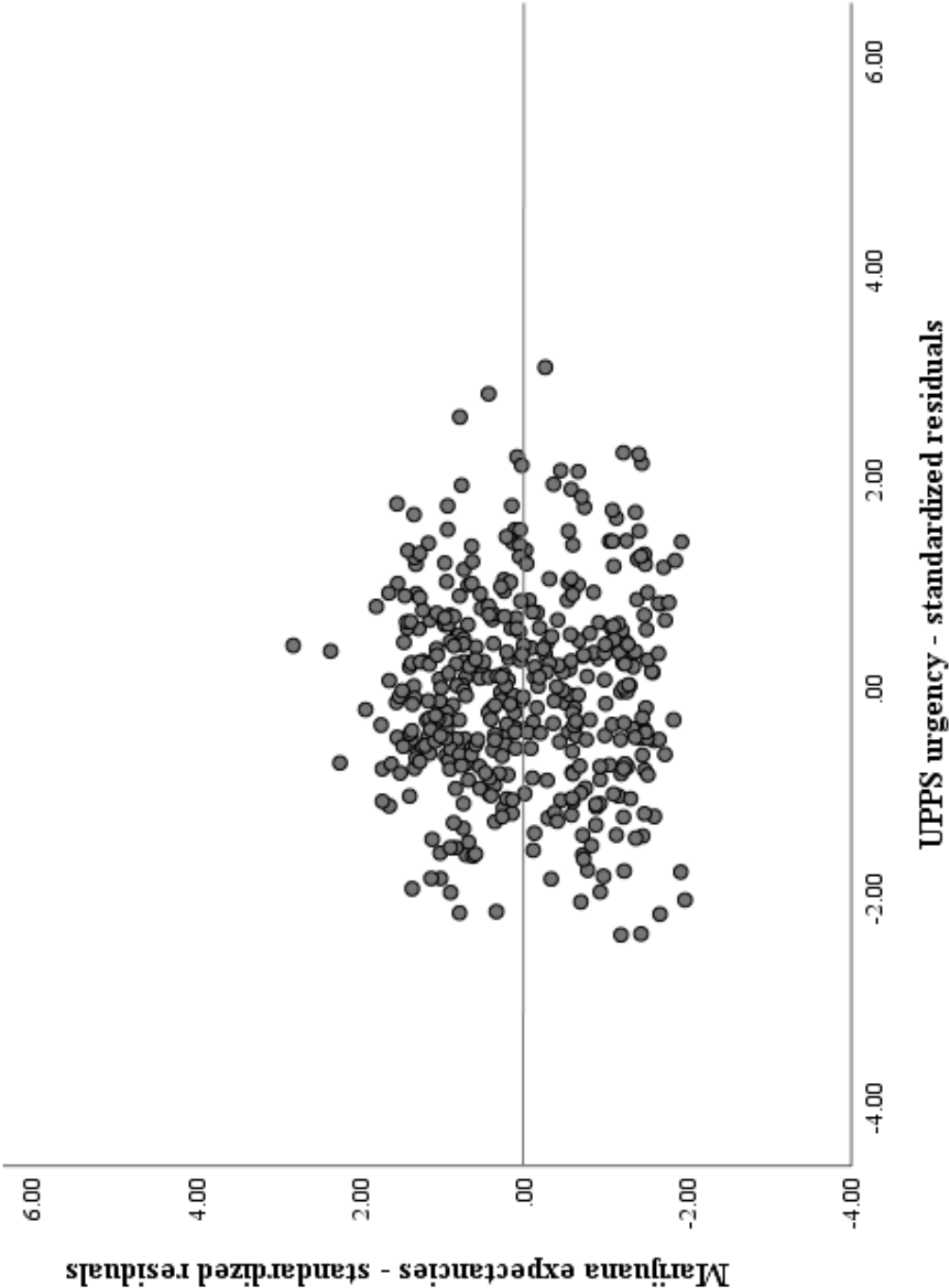
Figure 5. Simple scatter plot of nicotine expectancy standardized residuals by UPPS lack of premeditation/perseverance standardized residuals
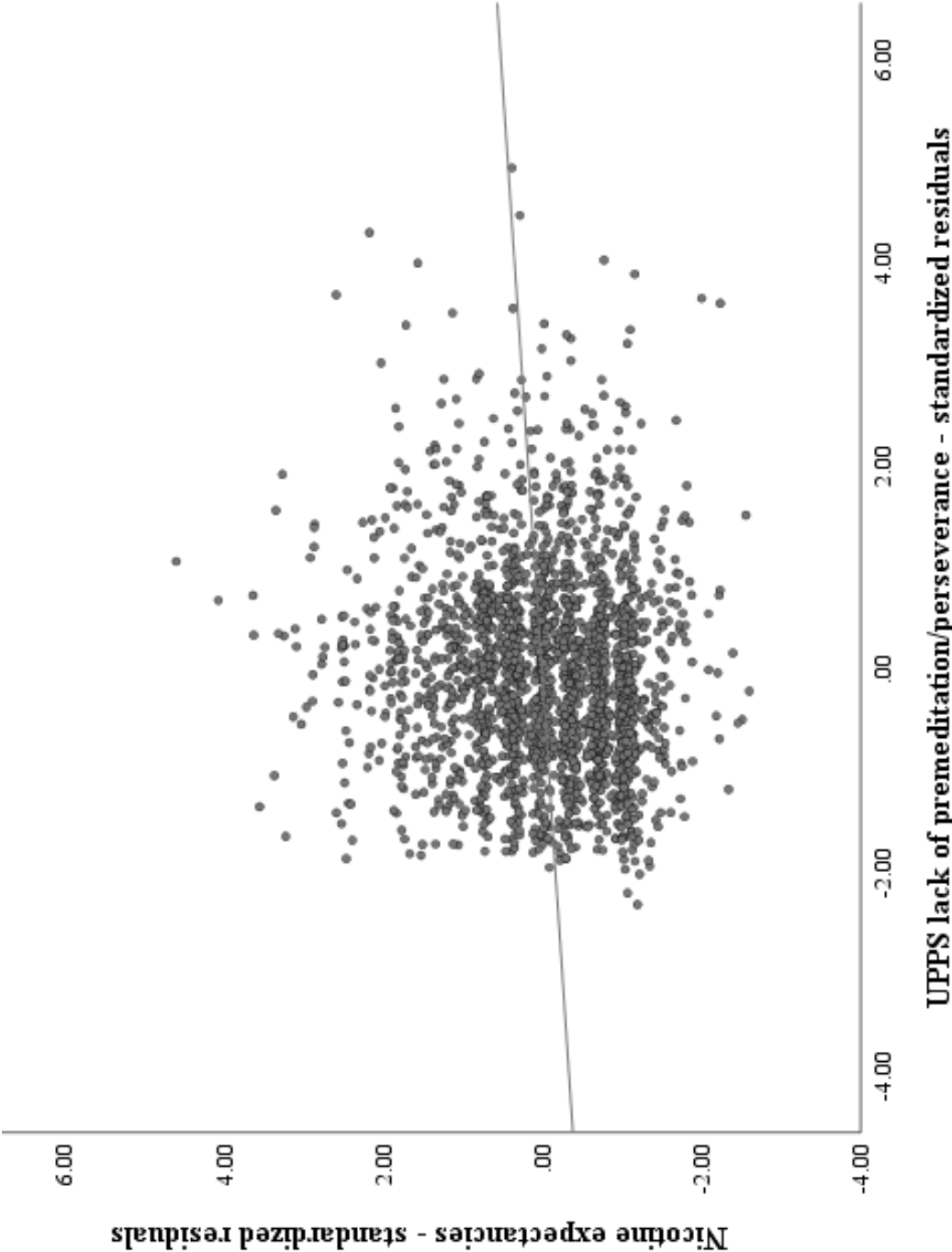
Figure 6. Simple scatter plot of nicotine expectancy standardized residuals by UPPS urgency/sensation seeking standardized residuals