Alcohol 82 (2020) 53–61

Contents lists available at ScienceDirect

Alcohol

journal homepage: http://www.alcoholjournal.org/

Disinhibited personality, incentives, disincentives, and drinking-related decisions

Peter R. Finn*, Lindsey Fisher, Haley Mayer, Polly Ingram, Lindy Howe, Emily Atkinson

Department of Psychological and Brain Sciences, Indiana University, 1101 E. 10th Street, Bloomington, IN 47405, United States

ARTICLE INFO

Article history:
Received 11 February 2019
Received in revised form
22 July 2019
Accepted 19 August 2019

Keywords:
Decision-making
Drinking
Disinhibited personality

ABSTRACT

Disinhibited personality traits, such as impulsivity (IMP), excitement seeking (ES), and low harm avoidance (HA), are thought to reflect a basic vulnerability toward alcohol use disorder (AUD). However, the specific vulnerability mechanisms associated with each trait are not well understood and there are no studies of the association between disinhibited personality and drinking-related decisions. This study investigated individual differences in drinking-related decisions associated with each trait using a task that manipulated the effects of incentives and disincentives on decisions to attend and drink at different hypothetical drinking events in a sample of 430 young adults (237 men, 193 women, mean age 21.3 years), over 60% of whom had an AUD of varying severity. The results revealed each personality domain was differentially associated with different aspects of drinking decisions. Both IMP and low HA were associated with being more likely to decide to attend party events with moderate and high goal-related responsibility disincentives. We suggest that low HA is associated with reduced sensitivity to the negative consequences of not meeting a responsibility, while IMP is associated with increased discounting of future rewards (associated with meeting a responsibility) relative to the immediate reward of attending a party event. ES was associated with being more responsive to alcohol party incentives when making decisions about attending party events and deciding to drink more at events, with the highest reward potential suggesting that ES is related to a reward sensitivity decision bias. IMP appears to be associated with stronger approach that results in decisions to consume more alcohol regardless of context. The results suggest specific mechanisms by which different domains of disinhibited personality affect actual drinking-related decisions.

Disinhibited personality traits, such as impulsivity, excitement seeking, and low harm avoidance (Cloninger, Sigvardsson, & Bohman, 1988; de Wit, 2009; Finn, Mazas, Justus, & Steinmetz, 2002; Finn, Sharkansky, Brandt, & Turcotte, 2000; Gunn, Finn, Endres, Gerst, & Spinola, 2013; Mâsse & Tremblay, 1997), as well as risky, impulsive decision-making (Bechara et al., 2001; Bobova, Finn, Rickert, & Lucas, 2009; Endres, Donkin, & Finn, 2014; Finn, Gerst, Lake, & Bogg, 2017; Finn, Gunn, & Gerst, 2015; Mazas, Finn, & Steinmetz, 2000; Petry, 2001, 2002), have been consistently associated with excessive alcohol use and alcohol problems; however, the specific mechanisms underlying these associations have not been well studied.

Studies of decision-making typically employ behavioral economic monetary tasks that do not model well the contexts, incentives, and disincentives that affect actual drinking decisions (Bogg & Finn, 2009; Finn et al., 2017). Recent work, utilizing a more ecologically valid drinking decision task (Finn et al., 2017), illustrates how lifetime alcohol and antisocial problems are associated with different contextual motivationally relevant processes underlying risky, impulsive drinking decisions. However, there are no studies that investigate the association between disinhibited personality and contextual and motivationally relevant processes that influence drinking-related decisions. The purpose of the current study is to investigate the association between three domains of disinhibited personality outlined in Finn's (2002) Cognitive Motivational Theory, and the effects of incentives and disincentives on drinking-related decisions as a means of investigating the motivationally relevant mechanisms by which different domains of disinhibited personality may be associated with problematic drinking.

* Corresponding author. Department of Psychological and Brain Sciences, Indiana University, 1101 E. 10th Street, Bloomington, IN 47405-7007, United States. Fax: +1 812 855 4691.
E-mail address: finnp@indiana.edu (P.R. Finn).

https://doi.org/10.1016/j.alcohol.2019.08.004
0741-8329/

A large literature links alcohol use disorders (AUDs) with impulsive, risky decision-making (Bechara et al., 2001; Bobova et al., 2009; Endres et al., 2014; Finn et al., 2015, 2017; Mazas et al., 2000; Petry, 2001, 2002). These studies consistently suggest that the decisions of those with an AUD are characterized by deficient avoidance (inhibition) processes, reflected in reduced sensitivity to negative consequences (Bechara et al., 2001; Cantrell, Finn, Rickert, & Lucas, 2008; Endres et al., 2014; Finn et al., 2017, 2002; Mazas et al., 2000), and augmented approach system processes, reflected in an increased responsivity to immediate rewards (Bobova et al., 2009; Field, Christiansen, Cole, & Goudie, 2007; Finn et al., 2015; Petry, 2001, 2002). While the results of these studies point to these seemingly relevant mechanisms, the studies employ monetary behavioral economic tasks that have questionable ecological validity because they do not include contextually relevant incentives and disincentives. The current study addresses this gap in the field by investigating the association between the effects of drinking-relevant contextual incentives and disincentives on drinking-related decisions and each of the three domains of disinhibited personality – impulsivity, excitement seeking, and low harm avoidance – that are thought to reflect individual differences in approach-avoidance motivational processes (Finn, 2002; Gunn et al., 2013).

Research on personality risk for alcohol use disorder (AUD) includes a range of traits associated with excessive alcohol use or problems, such as behavioral undercontrol (Sher, Walitzer, Wood, & Brent, 1991), sensation seeking (Castellanos-Ryan, Rubia, & Conrod, 2011; Curcio & George, 2011; Finn, 2002; Magid, Maclean, & Colder, 2007; Smith et al., 2007), impulsivity or urgency (Smith et al., 2007), and low harm avoidance (Cloninger et al., 1988; Finn, 2002). While some of these studies discuss specific personality models of risk (e.g., Cloninger et al., 1988; Smith et al., 2007; Whiteside & Lynam, 2003), models typically do not outline specific motivationally relevant mechanisms of risk for each personality domain. Most studies exclude some important domains, such as low harm avoidance, and some models lump more than one domain under a single trait, such as including sensation seeking as a domain of impulsivity (Smith et al., 2007; Whiteside & Lynam, 2003). This paper specifically tests our cognitive-motivational model of disinhibited personality (Finn, 2002; Gunn et al., 2013) that focuses on three narrowly defined domains of disinhibited personality: impulsivity, excitement seeking, and low harm avoidance, that reflect different approach-avoidance mechanisms considered to be associated with risky, impulsive decision-making, and poor self-regulation (Finn, 2002; Finn et al., 2002, 2015).

Our overall thesis rests on the idea that one domain of potential mechanisms underlying risk for excessive alcohol use and problems is individual differences in response to specific incentives and disincentives associated with drinking decisions in different contexts. For instance, we propose (Finn, 2002; Gunn et al., 2013) that impulsive personality traits can predispose to problematic alcohol use, due to difficulties inhibiting strong approach tendencies in circumstances where the immediate reward of drinking at a party is preferred more than the delayed reward associated with a next-day achievement-related task, such as passing an important exam. This is a behavioral illustration of increased delay discounting shown to be associated with impulsivity on monetary tasks (Bobova et al., 2009; Finn et al., 2015). Our model holds that **impulsivity (IMP)** reflects a difficulty inhibiting strong approach behavioral tendencies (Finn, 2002; Finn et al., 2002; Gunn et al., 2013), and is associated with an increased attentional focus on immediate reward and a difficulty delaying gratification. Studies show that IMP is associated with higher discounting rates for delayed rewards (Bobova et al., 2009; de Wit, 2009; Kirby, Petry, & Bickel, 1999), poor response inhibition in approach contexts (de Wit, 2009; Finn, 2002; Finn et al., 2002), and high levels of alcohol use and abuse in young adults (de Wit, 2009; Finn, 2002; Gunn et al., 2013). In our model **excitement seeking (ES)** is a subdomain of sensation seeking that excludes risk-taking (Finn, 2002), reflects increased approach tendencies (greater reward responsivity), a reliance on engaging in pleasurable-hedonistic approach behaviors (such as drinking) to experience positive affect, and a tendency to experience boredom and negative affect when not actively engaged in appetitive behavior (Finn, 2002; Finn et al., 2000, 2002). Similar to sensation seeking (e.g., Castellanos-Ryan et al., 2011; Curcio & George, 2011; Finn, 2002; Magid et al., 2007; Smith et al., 2007), ES is associated with increased alcohol use (Finn, 2002; Finn et al., 2000; Finn & Hall, 2004; Gunn et al., 2013) and increased sexual promiscuity (Justus, Finn, & Steinmetz, 2000). Finally, **low harm avoidance (HA)** reflects low levels of aversive motivation system activity (Finn, 2002), manifested in difficulties inhibiting behavior that leads to aversive negative consequences (Finn et al., 2002). Low HA has been associated with fearlessness (Justus & Finn, 2007; Lykken, 1995), a difficulty learning to avoid aversive outcomes (Finn et al., 2002), experiencing dangerous situations as more thrilling than aversive (Finn, 2002; Justus & Finn, 2007), and earlier onset of alcohol use and alcohol problems (Cloninger et al., 1988; Finn, 2002; Mâsse & Tremblay, 1997).

Although AUDs are associated with disinhibited personality traits and decision biases thought to reflect the same or similar motivational mechanisms, there are no studies that carefully examine the association between different domains of disinhibited personality and specific motivational processes that affect drinking-related decisions. This study extends the research on disinhibited personality, decision-making, and alcohol use by examining the association between these domains of disinhibited personality and the effects of incentives and disincentives on decisions to attend and drink at drinking party events in a large sample (Finn et al., 2017) of individuals varying widely in alcohol problems. Finn et al. (2017) showed that alcohol party incentives and next-day responsibility disincentives substantially influenced decisions to attend, and drink at, social events on a hypothetical drinking decision task that, itself, predicted drinking habits. Alcohol-party incentives promoted attendance and drinking decisions, while next-day responsibility disincentives discouraged (inhibited) attendance and drinking amount decisions (Finn et al., 2017). Furthermore, higher lifetime alcohol problems were associated with being more sensitive to the effect of high alcohol-related party incentives on drinking-related decisions (increased reward sensitivity), while lifetime antisocial problems, which were highly correlated with lifetime alcohol problems, were associated with being less sensitive to disincentives (insensitivity to negative consequences) on drinking decisions (Finn et al., 2017).

The current study uses the same sample and decision task data as Finn et al. (2017) and tests the following primary hypotheses:

(i) IMP will be associated with being less deterred from attending party events associated with moderate to high next-day responsibility disincentives and drinking more at such events, reflecting less inhibition of approach behavior.
(ii) ES, which has been associated with drinking more in general (Finn et al., 2000; Gunn et al., 2013) and increased approach/reward responsivity, will be associated with a greater likelihood to decide to attend high versus low party incentive events (i.e., a greater sensitivity to reward) and deciding to drink more at all events (reflecting increased overall approach).
(iii) Low HA, which is thought to reflect lower aversive motivation system activity, will be associated with being less deterred from deciding to attend events by moderate and high

disincentives (i.e., being less sensitive to negative consequences) and deciding to drink more at high disincentive compared with low disincentive events.

Method

Recruitment of participants

Participants were recruited using advertisements placed around the community targeting "*carefree, adventurous individuals who have led exciting and impulsive lives*," "*impulsive individuals*," "*heavy drinkers wanted for psychological research*," persons "*interested in psychological research*," "*quiet, reflective and introspective persons*," and "*social drinkers*." This approach is effective in recruiting a sample varying widely in terms of alcohol use and disinhibited traits (Finn et al., 2015, 2017).

Inclusion criteria were being between 18 and 30 years old, able to read and speak English, at least 6th grade education, consumed alcohol at least once, and no history of major head trauma, cognitive impairments, or severe psychological problems. The sample was recruited to represent a range of severity of lifetime alcohol problems: 25% with low lifetime alcohol (no diagnosable SUD or childhood conduct disorder, and no binge drinking), 50% with moderate levels of alcohol problems (mild to moderate AUDs), and 25% with very high levels of alcohol problems (severe AUDs). On the day of testing, all participants had a breath alcohol level of 0.0%, at least 6 h of sleep, and had not taken any recreational drugs in the past 12 h (assessed via self-report).

Sample characteristics

Participants (n = 430; 237 men, 193 women) were primarily college students (81.8%) with a mean age of 21.3 years (SD = 2.5) and mostly Caucasian (78.0%). The remaining participants were African American (12%), Asian (6%), Native American (1%), or other (3%). Table 1 displays the sample characteristics including Lifetime DSM-IV (American Psychiatric Association, 1994) diagnostic status for Alcohol Abuse and Alcohol Dependence. The Semi-Structured Assessment for the Genetics of Alcoholism (SSAGA; Bucholz et al., 1994) was used to ascertain these diagnoses using DSM-IV criteria.

Table 1
Sample characteristics.

	Men	Women
Sample Characteristics		
N	237	193
Age	21.6 (2.6)	21.0 (2.4)
Years education	14.0 (1.7)	14.2 (1.7)
Lifetime alcohol problems	18.2 (15.1)	15.6 (12.7)
Drinking Habits, M (SD)		
Two-week drinking		
Occasions per week	2.25 (1.62)	1.99 (1.51)
Amount per occasion	6.22 (4.57)	4.85 (3.98)
Three-month drinking		
Occasions per week	2.64 (1.75)	2.58 (1.66)
Amount per occasion	6.34 (5.07)	5.07 (3.68)
Diagnostic Status, % (n)		
Lifetime alcohol abuse (no dependence)	28% (68)	23% (44)
Lifetime alcohol dependence	40% (97)	42% (82)
No lifetime AUD	31% (75)	35% (68)
Disinhibited Personality, M (SD)		
Impulsivity	8.67 (4.9)	7.97 (5.1)
Harm Avoidance	13.2 (6.0)	16.7 (5.8)
Excitement Seeking	8.77 (3.2)	7.68 (3.3)

Diagnoses based on SSAGA (Bucholz et al., 1994) interview responses using DSM-IV criteria (American Psychiatric Association, 1994). AUD = alcohol use disorder.

Assessments

Current drinking

Current drinking was assessed for the past 2 weeks using a timeline follow-back (TLFB) procedure, as well as the average amount consumed (average quantity) on each day (days per week = frequency) in a typical week over the past 3 months. TLFB measures were the mean frequency of drinking occasions (per week), and mean quantity consumed per occasion over the past 2 weeks was assessed for each day in the past 2 weeks.

Personality measures

Impulsivity (IMP) was assessed with the Impulsivity scale from the Eysenck Impulsivity I_6 Questionnaire (Eysenck, Pearson, Easting, & Allsop, 1985). This scale broadly assesses impulsivity in terms of a lack of self-control, acting quickly, being carried away by impulses or exciting ideas, not thinking about the consequences of actions, and experiencing regretful negative consequences of behavior. The Eysenck IMP scale has been associated with poor response inhibition in approach contexts (Finn et al., 2002), increased discounting of delayed rewards (Bobova et al., 2009), and increased alcohol problems (Bobova et al., 2009; Finn, 2002; Gunn et al., 2013).

The *Excitement Seeking (ES)* measure was derived from the Sensation Seeking Scale (Zuckerman, 1979), and was the total score of the 10-item Boredom Susceptibility (Bore) and a 7-item version of the Disinhibition scale, where three questions relating to alcohol and drug use and partying were dropped from the scale to avoid criterion contamination (Finn, 2002; Gunn et al., 2013). This scale assesses preferences for disinhibition, seeking fun, new, exciting, and hedonistic experiences, and experiencing boredom or aversion with familiar or unstimulating experiences. This measure of ES has been consistently associated with increased alcohol use (Finn et al., 2000; Finn & Hall, 2004; Gunn et al., 2013), higher positive alcohol expectancies (Finn et al., 2000), and sexual promiscuity (Justus et al., 2000).

Harm Avoidance (HA) was assessed with the HA scale from the Multidimensional Personality Questionnaire (MPQ; Tellegen, 1982; Tellegen & Waller, 1992). The HA scale assesses the tendency to avoid dangerous and threatening experiences. Low harm avoidance, which is associated with increased disinhibition, reflects tendencies to prefer engaging in dangerous activities or experiencing aversive sensations, to find dangerous events as enjoyable and exciting, to prefer danger as opposed to monotony, and to not inhibiting behavior to avoid potential harm. The HA scale has been associated with antisocial behavior (Finn, 2002), engaging in risky behaviors (Finn, 2002; Tellegen & Waller, 1992; Waller, Lilienfeld, Tellegen, & Lykken, 1991), difficulties inhibiting behavior to avoid aversive consequences, such as electric shock (Finn et al., 2002), and decreased potentiation of startle in the presence of aversive stimuli (Justus & Finn, 2007).

Drinking decision task

Participants were presented with 6 different hypothetical drinking context scenarios (2 levels of incentives crossed with 3 levels of disincentives) that described upcoming drinking events on a computer screen (sentence by sentence) with a simultaneous prerecorded narration of the text presented on the screen. After each scenario was described, participants were prompted to decide whether they would attend the event (*Are you going to attend the gathering Yes __ No ___*) and, if they would attend, how much they would drink (*How many drinks would you have at the gathering?* ____). Prior to the task, participants were told that a drink

constitutes a beer, a glass of wine, a mixed drink (1.5 oz. alcohol), or a single shot. Incentives were presented as "party" incentives that vary as a function of the presence/availability of alcohol and party fun. Disincentives were presented in terms of variations in next-day responsibility disincentives. Disincentives varied by participant role (student, homemaker, nonstudent unemployed, or nonstudent employed). The student role scenarios are outlined below. The scenarios are identical for all roles except for the disincentives. The Supplementary Materials include a description of the disincentives for the other roles.

The scenarios were organized first with an invitation to attend the event (*"It's Thursday and a friend calls and tells you that there is a get-together or party going on right now.")*. Then, information was provided about the participant's current context in terms of what responsibilities, if any, occur the next morning (see below). The scenario finishes with information about alcohol-related incentives to attend (see below).

Student role scenarios (post invitation)

Disincentives

High: *"You have a test the first thing in the morning after the get-together. You will have to wake up around 7:30 am to start the day. You need to get a good grade in your class, which you must attend tomorrow, otherwise you will not get into an academic program you want, or you may not get off academic probation."*

Moderate: *"You have a test the first thing in the morning after the get-together. You will have to wake up around 7:30 am to start the day. However, you can drop one of the tests in that course and you could drop this test."*

Low: *"You do not really have anything to do during the day after the get-together. You can sleep in and don't have any major responsibilities early in the day. You are doing well in school and are not worried about your grades."*

Alcohol party incentives

High: *"The get-together is sure to be fun. It will be a major party event. There will be people there who you really like and other party activities that you really enjoy. There will be lots of alcohol and you do not have to pay anything for your drinks."*

Low: *"There will be a few people there, some of whom you know. There will be enough alcohol, so that you can drink what you'd like, but there's a possibility it will run out eventually."*

Data analyses

The results are organized into two broad sections for the type of decision, decisions to attend, and decisions about the amount of alcohol consumed. Then, results are reported in terms of relevant main effects and testing specific hypotheses.

Predictors of decisions to attend a party event were analyzed with a repeated-measures logistic regression model (SPSS Generalized Linear Model – binomial distribution and logit link function). The model was a Sex × Incentive Level × Disincentive Level × IMP × ES × HA, where Incentive level and Disincentive level were repeated measures, and IMP, ES, and HA were treated as covariates. The models included the main effects of sex, incentives, disincentives, IMP, ES, and HA. Each personality measure also was crossed (2-way interactions) with sex, incentives, and disincentives. Significant 2-way interactions were probed using simple main effect analyses broken down within each level of each factor.

Predictors of drinking amount decisions were analyzed with a repeated-measures regression model (SPSS Generalized Linear Mode). Measures of the amount the participant decided to drink were obtained only from those who decided to attend. This value was set to zero for those who said they would not attend. The model was a Sex × Incentive Level × Disincentive Level × IMP × ES × HA, and included the same main and interaction effects noted for the attendance decision analyses.

Results

Decisions to attend the party event

Main effects of incentives, disincentives, and harm avoidance

The repeated-measures logistic regression revealed significant main effects (reported as Wald χ^2 statistics) of Incentive level, $\chi^2(1) = 5.44$, $p = .020$, Disincentive level, $\chi^2(2) = 25.6$, $p < .00001$, and HA, $\chi^2(1) = 12.2$, $p < .0001$. Attendance decisions were highest in the high party incentive level (59%) compared with low party incentive level (49%). Attendance decisions were the lowest in the high disincentive level (17%), followed by the moderate disincentive level (47%) and the low disincentive level (97%). HA was associated with lower overall attendance decisions. Attendance decisions were higher for those low in HA (59%) than in those high in HA (49% overall attendance). There were no significant effects involving sex. Table 2 illustrates the percent deciding to attend as a function of incentive and disincentive level, as well as the mean score on each dimension of disinhibited personality. As one can see, as disincentive level increases, the attendance rates decrease and the mean HA score dramatically decreases as a function of increasing levels of disincentives.

Harm avoidance, impulsivity, and disincentives to attend events

We hypothesized that individuals with low harm avoidance and high impulsivity would be less deterred from attending moderate and high disincentive events. As hypothesized, there was a significant interaction between HA and disincentive level, $\chi^2(2) = 7.9$, $p = .02$. Those with low levels of HA were less deterred from deciding to attend by both the moderate, $\chi^2(1) = 16.5$, $p < .0001$, and high disincentive levels, $\chi^2(1) = 30.0$, $p < .00001$, but not by low disincentive levels, $\chi^2(1) = 0.35$, $p = .56$. Fig. 1a displays these results. In addition, an IMP by disincentive level interaction, $\chi^2(2) = 14.6$, $p = .001$, revealed that those with high levels of IMP were less deterred from deciding to attend by both the moderate, $\chi^2(1) = 35.4$, $p < .00001$, and high disincentive levels, $\chi^2(1) = 30.4$,

Table 2
Percent deciding to attend and mean scores on personality measures for those deciding to attend.

	Low Incentive Level	High Incentive Level
Low Disincentive Level	95.6%	98.4%
Mean impulsivity score	8.34 ± 5.0	8.34 ± 5.0
Mean harm avoidance score	14.8 ± 6.2	14.7 ± 6.1
Mean excitement seeking score	8.27 ± 3.3	8.31 ± 3.3
Moderate Disincentive Level	38.4%	56.3%
Mean impulsivity score	9.98 ± 5.0	9.43 ± 5.0
Mean harm avoidance score	13.1 ± 6.1	13.8 ± 5.9
Mean excitement seeking score	8.98 ± 2.7	8.77 ± 3.1
High Disincentive Level	12.1%	22.3%
Mean impulsivity score	11.9 ± 4.5	10.4 ± 4.8
Mean harm avoidance score	10.7 ± 5.8	11.8 ± 6.1
Mean excitement seeking score	9.23 ± 2.9	9.29 ± 2.7

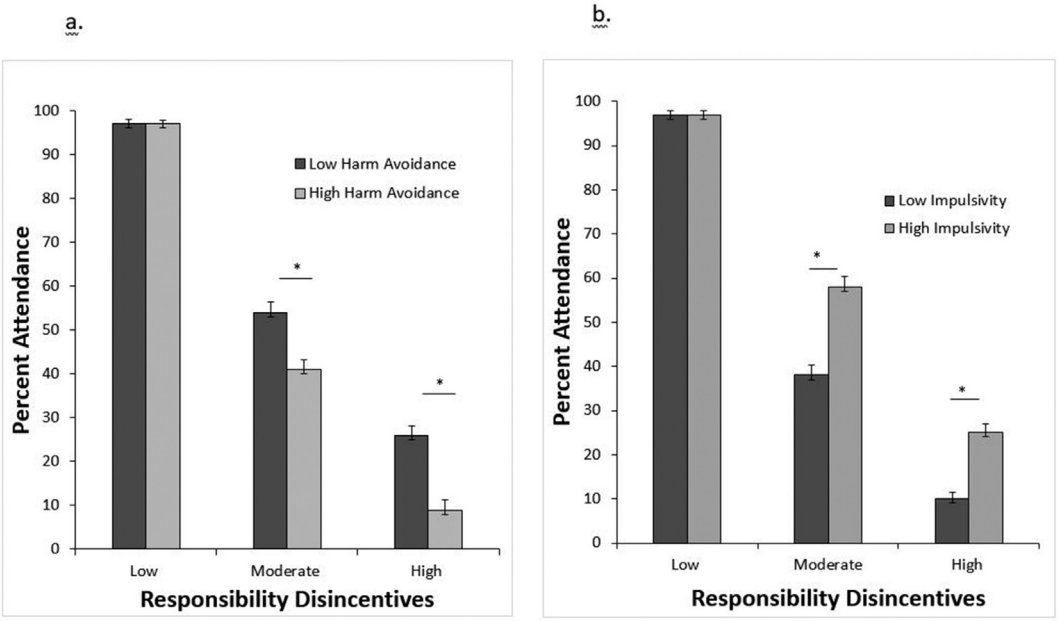

Fig. 1. (a) Attendance decisions by disincentive level and harm avoidance; (b) attendance decisions by disincentive incentive level and impulsivity. Error bars are standard errors of the mean.

$p < .00001$, but not by low disincentive levels, $\chi^2(1) = 0.51$, $p = .48$. Fig. 1b displays these results.

Excitement seeking, incentives, and attendance decisions

We hypothesized that ES will be associated with a greater likelihood to decide to attend high versus low party incentive events. In support of this hypothesis, the analyses revealed a significant interaction between incentive level and ES, $\chi^2(1) = 6.8$, $p = .009$. As hypothesized, high levels of excitement seeking were associated with being more likely to decide to attend the high incentive level scenarios, $\chi^2(1) = 17.3$, $p < .0001$, but not the low incentive level scenarios, $\chi^2(1) = 1.3$, $p = .25$, suggesting that excitement seeking was associated with being more responsive to the alcohol party incentives when deciding whether to attend party events. Fig. 2 displays these results.

Decisions about amount consumed

Main effects of incentives and disincentives on drinking amount decisions

The repeated-measures analysis revealed a significant main effect (reported as Wald χ^2 statistics) of disincentive level, $\chi^2(2) = 11.23$, $p = .004$, and a marginal effect of incentive level, $\chi^2(1) = 6.82$, $p = .09$. Subjects who attended decided to drink more, 4.33 ± 2.6 drinks in the low disincentive condition compared with the moderate condition (3.1 ± 2.6 drinks), and compared with the high disincentive condition (1.74 ± 2.3 drinks). A significant incentive $\times$ disincentive interaction revealed that there was an effect of alcohol party incentives only in the moderate disincentive condition, $\chi^2(1) = 22.95$, $p < .0001$, and not in the low, $\chi^2(1) = 2.2$, $p = .14$, or the high disincentive contexts, $\chi^2(1) = 0.35$, $p = .55$.

Personality and the effects of disincentives effects on comsumption decisions

We hypothesized that IMP and HA would be associated with deciding to drink more at high and moderate disincentive party events, compared with low disincentive events. The analyses did not support these hypotheses. The IMP $\times$ disincentive interaction was close to statistical significance, but not statistically significant, $\chi^2(2) = 5.11$, $p = .078$. However, there was a significant main effect of IMP, $\chi^2(1) = 16.56$, $p < .0001$, indicating that IMP was associated with deciding to drink more at all events. The HA $\times$ disincentive interaction was not significant, $\chi^2(2) = 1.1$, $p = .58$, nor was the main effect of HA, $\chi^2(1) = 0.42$, $p = .52$. However, there was a significant main effect of ES, $\chi^2(1) = 15.42$, $p < .0001$, and a significant ES $\times$ disincentive interaction, $\chi^2(1) = 8.1$, $p = .017$. ES was associated with deciding to drink more at low, $\chi^2(1) = 12.3$,

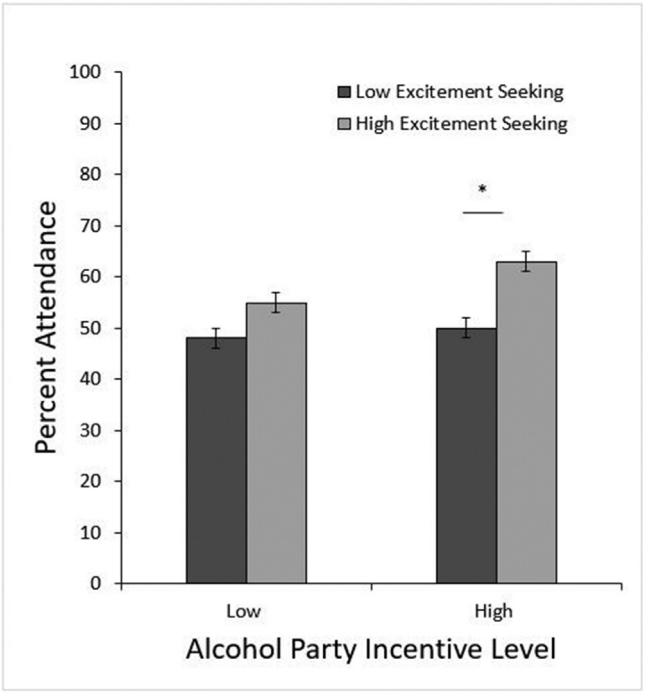

Fig. 2. Attendance decisions by party incentive level and excitement seeking. Error bars are standard errors of the mean.

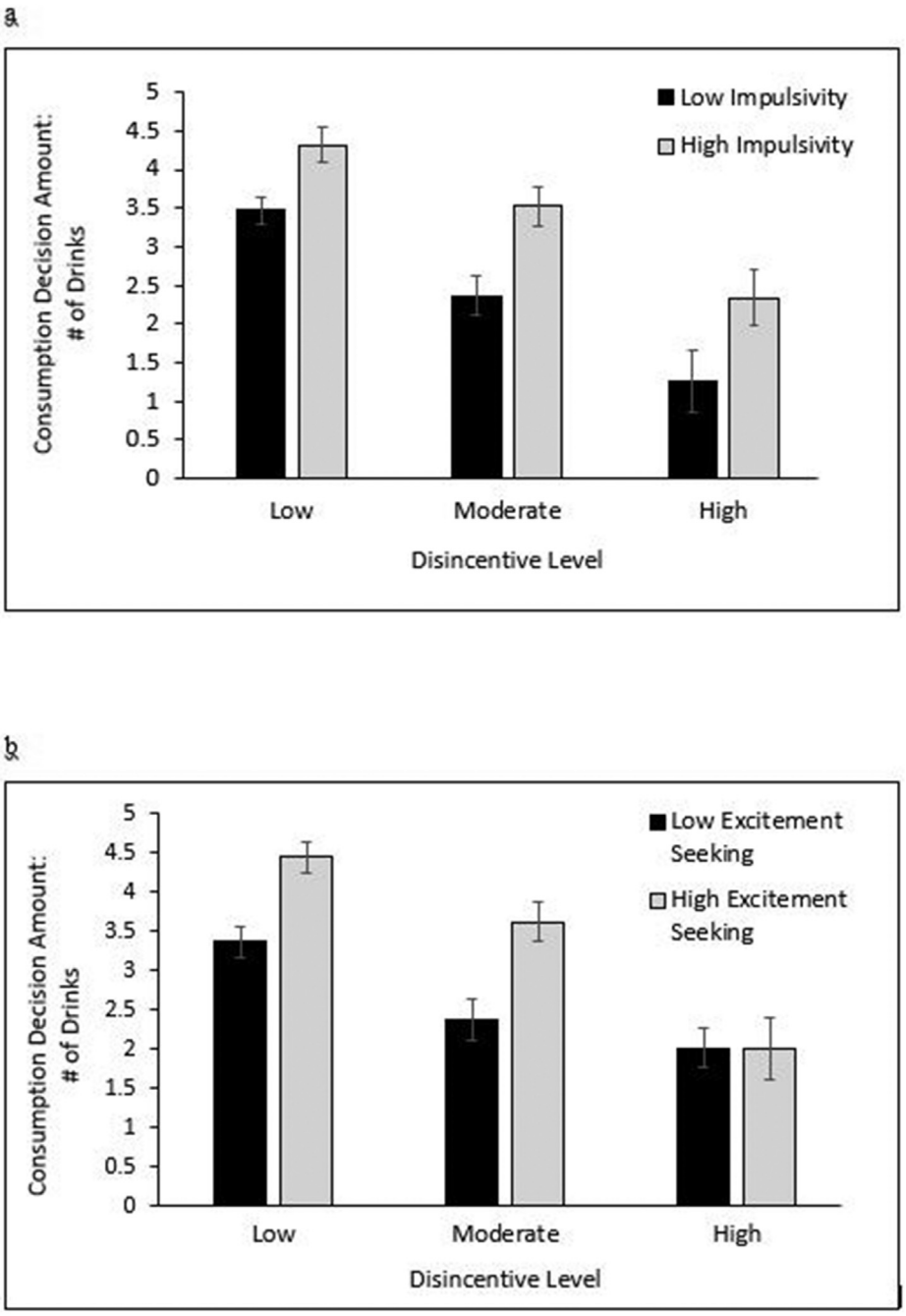

Fig. 3. (a) Consumption amount decisions by impulsivity across disincentive conditions; (b) consumption amount decisions by excitement seeking across disincentive conditions. Error bars are standard errors of the mean.

$p < .0001$, and moderate disincentive events, $\chi^2(1) = 9.16$, $p = .002$, but not at high disincentive events, $\chi^2(1) = 0.53$, $p = .464$. Fig. 3 illustrates the effects of IMP and ES on drinking across disincentive conditions.

Discussion

The primary purpose of the current study was to further the literature on disinhibited personality and alcohol use by investigating the specific mechanisms underlying the association between three domains of disinhibited personality (impulsivity, excitement seeking, and low harm avoidance) and drinking-related decisions. Specifically, we examined the association between these domains of disinhibited personality and the effects of incentives and disincentives on drinking-related decisions. Both incentives and disincentives had substantial effects on decisions to attend party events. High incentives were associated with being more likely to decide to attend, while the different levels of disincentives reflected increasing reluctance to decide to attend events. Overall, the results suggest that the different domains of disinhibited personality are associated with different motivationally relevant mechanisms in risky drinking-related decisions that are consistent with our model of disinhibited personality (Finn, 2002; Gunn et al., 2013). High levels of impulsivity were associated with decisions to consume more alcohol in all contexts, regardless of disincentives or incentives and being less deterred from attending events with

significant disincentives. Lower scores in the harm avoidance trait measure also were associated with being less deterred by significant disincentives from attending drinking events. Excitement seeking was associated with being more likely to decide to attend events with high versus low alcohol-related party incentives and deciding to drink more alcohol in all contexts except high disincentive contexts. Finally, the results clearly show that contextual incentives and disincentives affect drinking-related decisions, with incentives promoting decisions to attend and drink and disincentives discouraging decisions to attend and drink at social events. Thus, incentives promoted approach-related decisions, and disincentives promoted avoidance-related decisions.

Impulsivity and harm avoidance: the effects of disincentives on drinking decisions

High levels of impulsivity and low levels of harm avoidance were associated with being less deterred from deciding to attend events with significant disincentives, which suggests that both traits are associated with failure to take into account the possibility that attending a party event might interfere with goals, or lead to negative consequences, when making such decisions. On the surface, this suggests that both traits are associated with a decreased sensitivity to aversive outcomes, or a tendency not to weigh potential negative outcomes as strongly as those with low impulsivity or high harm avoidance. This is consistent with research showing that both impulsivity and harm avoidance are associated with problems inhibiting behavior (de Wit, 2009; Finn et al., 2002). The disincentives signal an increased possibility that negative consequences could occur if one did not fully meet the next-day responsibility (i.e., did not do well on the exam). Thus, not being deterred by the disincentive may reflect a decision bias characterized by a relative insensitivity to negative consequences.

However, the disincentives also signal a possibility for not achieving a long-term goal, such as doing well on the exam. A failure to account for the disincentive could be the result of discounting the long-term reward associated with achieving that goal (such as the reward associated with doing well on the exam) in favor of the more immediate reward associated with attending a party. Thus, not being deterred by the disincentive also could reflect increased delay discounting of rewards, where the choice to attend the event and obtain the immediate reward of the party and drinking is chosen over obtaining the delayed reward of doing well on an important exam.

The evidence suggests that the problems with behavior inhibition associated with impulsivity and low harm avoidance differ depending on the context. Impulsivity is associated with difficulties inhibiting approach behavior (de Wit, 2009; Finn et al., 2002) and increased delay discounting (Bobova et al., 2009; de Wit, Flory, Acheson, McCloskey, & Manuck, 2007; Kirby et al., 1999), while low harm avoidance is associated with difficulties inhibiting behavior that leads to aversive negative outcomes (Finn et al., 2002), but not with delay discounting rate (Bobova et al., 2009). Given that studies suggest harm avoidance is associated with failure to inhibit behavior that leads to an aversive outcome (Finn et al., 2002) but not with increased delay discounting rate (e.g., Bobova et al., 2009), while impulsivity is associated with increased delay discounting (Bobova et al., 2009; de Wit et al., 2007; Kirby et al., 1999) and problems inhibiting approach behavior, we speculate that the association between impulsivity is associated with increased discounting of the next-day reward, while low harm avoidance is associated with being less sensitive to the negative consequences of not doing well on the exam. However, our interpretation remains speculative. The disincentive levels used in this study entail both a component of discounting a delayed reward (long-term goal achievement) and a component involving the possibility of negative outcomes associated with failure to meet responsibilities. Future studies could more clearly separate the avoidance of harm from increased discounting by including both kinds of disincentives, such as ones specifically associated with negative consequences (such as varying levels of next-day physical, legal, or financial consequences) and disincentives that clearly emphasize a trade-off, e.g., attending a party event versus the possibility of achieving a longer term goal (relationship, career, or financial goal) the next day.

Alcohol-party incentives and excitement seeking

Excitement seeking was associated with being more likely to decide to attend events with high versus low alcohol-related party incentives. This suggests that excitement seeking is associated with increased sensitivity to reward when deciding to attend party events. This result is consistent with our conceptualization of excitement seeking as reflecting strong approach tendencies associated with increased sensitivity to rewards, especially those that are considered pleasurable, such as partying and sexual promiscuity (Finn, 2002; Gunn et al., 2013; Justus et al., 2000).

Drinking amount decisions and impulsivity and excitement seeking

Impulsivity was associated with deciding to drink more in all contexts, regardless of disincentive level. This is consistent with our theory that impulsivity is associated with strong approach tendencies and weaker inhibition (Finn, 2002; Gunn et al., 2013). The results (Fig. 3a) also clearly indicate that the drinking decisions in those high in impulsivity were influenced by disincentives to the same degree as those low in impulsivity. High levels of impulsivity were associated with deciding to drink more than those low in impulsivity in all contexts. Thus, the results suggest that impulsivity is associated with a strong approach tendency when deciding to drink; one that perhaps reflects a “more is better” bias. On the other hand, the drinking decisions associated with excitement seeking were clearly different from those associated with impulsivity. It was hypothesized that increased reward sensitivity would lead to excitement seeking being associated with deciding to drink more in all contexts. However, the results indicated that excitement seeking was associated with deciding to drink more in the low and moderate disincentive contexts, but not the high disincentive contexts. The lack of an effect of excitement seeking in the high disincentive contexts may result from the high disincentive condition being associated with the lowest overall level of potential reward. The association between the drinking amount decisions and both excitement seeking and impulsivity is consistent with studies showing that alcohol use and problems are associated with both excitement seeking (Finn et al., 2000; Finn & Hall, 2004; Gunn et al., 2013; Justus et al., 2000) and impulsivity (Coskunpinar, Dir, & Cyders, 2013; McCarty, Morris, Hatz, & McCarthy, 2017; Stamates & Lau-Barraco, 2017; Whiteside & Lynam, 2003).

Implications

This study is the first to report evidence for specific mechanisms underlying the association between drinking-related decisions and different domains of disinhibited personality. Studies of decision-making in AUD or substance use disorders (SUDs) in general typically use behavioral economic monetary tasks, such as delay discounting or gambling tasks, that do not model the kinds of incentives, disincentives, and contexts associated with drinking-related decisions. In addition, these studies have not adequately investigated the personality processes associated with decisions on

these tasks. Because disinhibited personality is such a strong and consistent correlate of AUDs/SUDs that is supposed to reflect important cognitive and motivational processes, knowledge about the association between different domains of disinhibited personality and drinking decisions can point to important processes that may be a target for prevention or intervention. The results also support the value of distinguishing among different domains of disinhibited personality and defining impulsivity in a more narrow fashion. Overall, the results lend some support to the validity of our theoretical distinctions between impulsivity, excitement seeking, and low harm avoidance that are articulated above. The results also highlight the importance of examining factors that affect decisions to attend drinking events in addition to decisions about the amount one might drink at an event. If one does not attend a risky event, then one is not exposed to the risks inherent in that event. Furthermore, the results suggest that increasing attention paid to the delayed potential consequences and missed opportunities (associated with low harm avoidance and impulsivity) related to decisions to attend and drink at party events may be a useful approach to prevention.

Limitations

This study has a number of limitations. First, the decisions assessed in this task are all hypothetical. While Finn et al. (2017) reported results that provided good support for the validity of the task as a model of real world decisions to attend and drink at drinking events, we cannot determine the limits of the validity of the task as a model of real world decisions. This may be particularly true for consumption amount decisions. For instance, an important symptom of problem drinking is drinking more alcohol at an event than was originally planned. Because drinking can further disinhibit individuals, it may be that consumption decision amounts may underestimate what the individual actually drinks, especially for those with significant alcohol problems. However, because it is very difficult to systematically study these kinds of decisions '*in vivo*', the results suggest that the use of tasks such as our drinking decision task is an important step in learning more about the factors that affect drinking decisions. George and colleagues' (e.g., George et al., 2009; Purdie et al., 2011) use of a similar approach to study sexual decision-making supports the potential utility of using hypothetical scenario approaches to studying decision-making about behaviors that are difficult to study '*in vivo*.' Additional research on the validity of this kind of approach is needed, such as assessing the associations between decisions regarding attendance and drinking using event sampling methodologies (Bolger, Davis, & Rafaeli, 2003) and decisions obtained on our drinking decision task. Second, we focused on the effects of responsibility-based disincentives on decisions to attend and drink, rather than including a more extensive set of disincentives. Future work should examine the effects of other disincentives, such as interpersonal, health, and legal disincentives, on drinking-related decisions.

Summary

In summary, we investigated the relationships between three domains of disinhibited personality (impulsivity, excitement seeking, and low harm avoidance) and the effects of incentives and disincentives on decisions to attend and drink at hypothetical party events in young adults. Impulsivity and low harm avoidance were associated with being less deterred by disincentives from deciding to attend party events. We speculate that, when deciding to attend potentially risky party events, impulsivity is associated with a delay discounting decision bias, and low harm avoidance is associated with a bias associated with a relative insensitivity to negative consequences. The data suggest that excitement seeking is associated with being more responsive to alcohol reward when making drinking-related decisions. Excitement seeking was associated with being more responsive to the alcohol party incentives when making decisions about attendance. Impulsivity was associated with deciding to drink more regardless of the context and may reflect strong alcohol approach biases characterized by a "more is better" attitude. On the other hand, excitement seeking was associated with deciding to drink more at low and moderate disincentive events, but not at the high disincentive events, which are associated with lower overall reward potential. Further research that investigates attentional processes in drinking decision-making contexts may further elucidate the drinking decision biases associated with each domain of disinhibited personality.

Acknowledgments

This research was supported by National Institute on Alcohol Abuse and Alcoholism (NIAAA) grant R01 AA13650 to Peter R. Finn.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.alcohol.2019.08.004.

References

American Psychiatric Association. (1994). DSM-IV. In *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

Bechara, A., Dolan, S., Denburg, N., Hindes, A., Anderson, S. W., & Nathan, P. E. (2001). Decision-making deficits, linked to a dysfunctional ventromedial prefrontal cortex, revealed in alcohol and stimulant abusers. *Neuropsychology, 39*, 376–389. https://doi.org/10.1016/s0028-3932(00)00136-6.

Bobova, L., Finn, P. R., Rickert, M. E., & Lucas, J. (2009). Disinhibitory psychopathology and delay discounting in alcohol dependence: Personality and cognitive correlates. *Experimental and Clinical Psychopharmacology, 17*, 51–61. https://doi.org/10.1037/a0014503.

Bogg, T., & Finn, P. R. (2009). An ecologically-based model of alcohol consumption decision-making: Evidence for the discriminative and predictive role of contextual reward and punishment information. *Journal of Studies on Alcohol and Drugs, 70*, 446–457. https://doi.org/10.15288/jsad.2009.70.446.

Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54*, 579–616. https://doi.org/10.1146/annurev.psych.54.101601.145030.

Bucholz, K. K., Cadoret, R., Cloninger, C. R., Dinwiddie, S. H., Hesselbrock, V. M., Nurnberger, J. I., Jr., et al. (1994). A new, semi-structured psychiatric interview for use in genetic linkage studies: A report on the reliability of the SSAGA. *Journal of Studies on Alcohol, 55*, 149–158. https://doi.org/10.15288/jsa.1994.55.149.

Cantrell, H., Finn, P. R., Rickert, M. E., & Lucas, J. (2008). Decision making in alcohol dependence: Insensitivity to future consequences and comorbid disinhibitory psychopathology. *Alcoholism: Clinical and Experimental Research, 32*, 1398–1407. https://doi.org/10.1111/j.1530-0277.2008.00714.x.

Castellanos-Ryan, N., Rubia, K., & Conrod, P. J. (2011). Response inhibition and reward response bias mediate the predictive relationships between impulsivity and sensation seeking and the common and unique variance in conduct disorder and substance misuse. *Alcoholism: Clinical and Experimental Research, 35*, 140–155. https://doi.org/10.1111/j.1530-0277.2010.01331.x.

Cloninger, C. R., Sigvardsson, S., & Bohman, M. (1988). Childhood personality predicts alcohol abuse in young adults. *Alcoholism: Clinical and Experimental Research, 12*, 494–505. https://doi.org/10.1111/j.1530-0277.1988.tb00232.x.

Coskunpinar, A., Dir, A. L., & Cyders, M. A. (2013). Multidimensionality in impulsivity and alcohol use: A meta-analysis using the UPPS model of impulsivity. *Alcoholism: Clinical and Experimental Research, 37*, 1441–1450. https://doi.org/10.1111/acer.12131.

Curcio, A. L., & George, A. M. (2011). Selected impulsivity facets with alcohol use/problems: The mediating role of drinking motives. *Addictive Behaviors, 36*, 959–964. https://doi.org/10.1016/j.addbeh.2011.05.007.

Endres, M., Donkin, C., & Finn, P. R. (2014). An information processing/associative learning account of behavioral disinhibition in externalizing psychopathology. *Experimental and Clinical Psychopharmacology, 22*, 122–132. https://doi.org/10.1037/a0035166.

Eysenck, S. B. G., Pearson, P. R., Easting, G., & Allsop, J. F. (1985). Age norms for impulsiveness, venturesomeness and empathy scales in adults. *Personality and Individual Differences, 6*, 613–619.
Field, M., Christiansen, P., Cole, J., & Goudie, A. (2007). Delay discounting and the alcohol Stroop in heavy drinking adolescents. *Addiction, 102*, 579–586. https://doi.org/10.1111/j.1360-0443.2007.01743.x.
Finn, P. R. (2002). Motivation, working memory, and decision making: A cognitive-motivational theory of personality vulnerability to alcoholism. *Behavioral and Cognitive Neuroscience Reviews, 1*, 183–205. https://doi.org/10.1177/1534582302001003001.
Finn, P. R., Gerst, K., Lake, A., & Bogg, T. (2017). Decisions to attend and drink at party events: The effects of incentives and disincentives and lifetime alcohol and antisocial problems. *Alcoholism: Clinical and Experimental Research, 41*, 1622–1629. https://doi.org/10.1111/acer.13443.
Finn, P. R., Gunn, R. L., & Gerst, K. R. (2015). The effects of a working memory load on delay discounting in those with externalizing psychopathology. *Clinical Psychological Science, 3*, 202–214. https://doi.org/10.1177/2167702614542279.
Finn, P. R., & Hall, J. (2004). Cognitive ability and risk for alcoholism: Short-term memory capacity and intelligence moderate personality-risk for alcohol abuse. *Journal of Abnormal Psychology, 113*, 569–581. https://doi.org/10.1037/0021-843X.113.4.569.
Finn, P. R., Mazas, C. A., Justus, A. N., & Steinmetz, J. (2002). Early-onset alcoholism with conduct disorder: Go/no go learning deficits, working memory capacity, and personality. *Alcoholism: Clinical and Experimental Research, 36*, 186–206.
Finn, P. R., Sharkansky, E. J., Brandt, K. M., & Turcotte, N. (2000). The effects of familial risk, personality, and expectancies on Alcohol Use and Abuse. *Journal of Abnormal Psychology, 109*, 122–133. https://doi.org/10.1037//0021-843x.109.1.122.
George, W. H., Davis, K. C., Norris, J., Heiman, J. R., Stoner, S. A., Schacht, R. L., et al. (2009). Indirect effects of acute alcohol intoxication on sexual risk-taking: The roles of subjective and physiological sexual arousal. *Archives of Sexual Behavior, 38*, 488–513. https://doi.org/10.1007/s10508-008-9346-9.
Gunn, R. L., Finn, P. R., Endres, M. J., Gerst, K., & Spinola, S. (2013). Dimensions of disinhibited personality and their relation with alcohol use and problems. *Addictive Behaviors, 38*, 2352–2360. https://doi.org/10.1016/j.addbeh.2013.02.009.
Justus, A. N., & Finn, P. R. (2007). Startle modulation in non-incarcerated men and women with psychopathic traits. *Personality and Individual Differences, 43*, 2057–2071. https://doi.org/10.1016/j.paid.2007.06.020.
Justus, A. N., Finn, P. R., & Steinmetz, J. E. (2000). The influence of disinhibition on the association between alcohol use and risky sexual behavior. *Alcoholism: Clinical and Experimental Research, 24*, 1028–1035.
Kirby, K. N., Petry, N. M., & Bickel, W. K. (1999). Heroin addicts have higher discount rates for delayed rewards than non-drug using controls. *Journal of Experimental Psychology: General, 128*, 78–87. https://doi.org/10.1037//0096-3445.128.1.78.
Lykken, D. (1995). *The antisocial personalities*. New York: Psychology Press –Taylor & Francis.
Magid, V., Maclean, M. G., & Colder, C. R. (2007). Differentiating between sensation seeking and impulsivity through their mediated relations with alcohol use and problems. *Addictive Behaviors, 32*, 2046–2061. https://doi.org/10.1016/j.addbeh.2007.01.015.
Mâsse, L. C., & Tremblay, R. E. (1997). Behavior of boys in kindergarten and the onset of substance use during adolescence. *Archives of General Psychiatry, 54*, 62–68. https://doi.org/10.1001/archpsyc.1997.01830130068014.
Mazas, C. A., Finn, P. R., & Steinmetz, J. E. (2000). Decision-making biases, antisocial personality, and early-onset alcoholism. *Alcoholism: Clinical and Experimental Research, 24*, 1036–1040.
McCarty, K. N., Morris, D. H., Hatz, L. E., & McCarthy, D. M. (2017). Differential associations of UPPS-P impulsivity traits with alcohol problems. *Journal of Studies on Alcohol and Drugs, 78*, 617–622. https://doi.org/10.15288/jsad.2017.78.617.
Petry, N. M. (2001). Delay discounting of money and alcohol in actively using alcoholics, currently abstaining alcoholics, and controls. *Psychopharmacology, 154*, 243–250. https://doi.org/10.1007/s002130000638.
Petry, N. M. (2002). Discounting of delayed rewards in substance abusers: Relationship to antisocial personality disorder. *Psychopharmacology, 162*, 425–432. https://doi.org/10.1007/s00213-002-1115-1.
Purdie, M. P., Norris, J., Davis, K. C., Zawacki, T., Morrison, D. M., George, W. H., et al. (2011). The effects of acute alcohol intoxication, partner risk level, and general intention to have unprotected sex on women's sexual decision making with a new partner. *Experimental and Clinical Psychopharmacology, 19*, 378–388. https://doi.org/10.1037/a0024792.
Sher, K. J., Walitzer, K. S., Wood, P. K., & Brent, E. E. (1991). Characteristics of children of alcoholics: Putative risk factors, substance use and abuse and psychopathology. *Journal of Abnormal Psychology, 100*, 427–448. https://doi.org/10.1037//0021-843x.100.4.427.
Smith, G. T., Fischer, S., Cyders, M. A., Annus, A. M., Spillane, N. S., & McCarthy, D. M. (2007). On the validity and utility of discriminating among impulsivity-like traits. *Assessment, 14*, 155–170. https://doi.org/10.1177/1073191106295527.
Stamates, A. L., & Lau-Barraco, C. (2017). Impulsivity and risk-taking as predictors of alcohol use patterns and alcohol related-problems. *Addiction Research and Theory, 25*, 390–396.
Tellegen, A. (1982). *Brief manual of the multi-dimensional personality Questionnaire*. Unpublished Manuscript: University of Minnesota.
Tellegen, A., & Waller, N. (1992). *Exploring personality through test construction: Development of the multidimensional personality Questionnaire (MPQ)*. Department of Psychology, University of Minnesota. Unpublished manuscript.
Waller, N. G., Lilienfeld, S. O., Tellegen, A., & Lykken, D. T. (1991). The tridimensional personality Questionnaire: Structural validity and comparison with the multidimensional personality Questionnaire. *Multivariate Behavioral Research, 26*, 1–23. https://doi.org/10.1207/s15327906mbr2601_1.
Whiteside, S. P., & Lynam, D. R. (2003). Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: Application of the UPPS impulsive behavior scale. *Experimental and Clinical Psychopharmacology, 11*, 210–217. https://doi.org/10.1037/1064-1297.11.3.210.
de Wit, H. (2009). Impulsivity as a determinant and consequence of drug use: A review of underlying processes. *Addiction Biology, 14*, 22–31. https://doi.org/10.1111/j.1369-1600.2008.00129.x.
de Wit, H., Flory, J. D., Acheson, A., McCloskey, M., & Manuck, S. B. (2007). IQ and nonplanning impulsivity are independently associated with delay discounting in middle-aged adults. *Personality and Individual Differences, 42*, 111–121.
Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. Hillsdale, NJ: Lawrence Erlbaum.