4-2018

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HHS Public Access

Author manuscript

Addict Behav. Author manuscript; available in PMC 2019 April 01.

Published in final edited form as:

Addict Behav. 2018 April ; 79: 61–67. doi:10.1016/j.addbeh.2017.12.005.

Examination of Approach and Avoidance Inclinations on the Reinforcing Value of Alcohol

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Abstract

Although behavioral economics tends to focus on environmental factors (i.e., price, availability) that act to influence valuation of alcohol, recent research has begun to address how motivational and cognitive factors influence an individual's demand for alcohol. Motivational states, including craving, are one possible mechanism underlying the value based decision making that demand represents. Using a multidimensional model of craving (Ambivalence Model of Craving), the current study examined the relationships between indices of alcohol demand (i.e., reinforcing value of alcohol) and craving (i.e., approach inclinations), and the ways in which competing desires moderate that relationship (i.e., avoidance inclinations). Individuals who reported consuming alcohol in the past month were recruited for the study using Amazon's Mechanical Turk. A total of 529 participants (mean age = 33.03 years, $SD = 8.85$) completed a series of surveys assessing their drinking behavior and other alcohol-related measures. Multiple regression analyses indicated that while approach significantly predicted intensity (i.e., consumption at zero cost), O_{max} (i.e., the maximum alcohol expenditure) and breakpoint (i.e., the first price that seizes consumption), avoidance moderated the relationship between approach and O_{max} and breakpoint. Specifically, follow up analyses demonstrated that higher avoidance inclinations attenuated the effect of approach inclinations on these demand indices. Finally, despite conceptual overlap between approach, avoidance, and alcohol demand, regression analyses indicated that these constructs account for unique variance in alcohol outcomes. These results illustrate the importance of considering the effects of both approach and avoidance inclinations on an individual's valuation of alcohol.

Keywords

Craving; Behavioral Economics; Approach; Avoidance; Alcohol

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Contributors

Emily T. Noyes and Robert C. Schlauch designed and wrote the protocol for the study, conceptualized the manuscript, conducted all statistical analyses and wrote the first draft of the manuscript.

Conflict of Interest

No conflicts to declare.

1. Introduction

Despite decades of research on the etiology and treatment, Alcohol Use Disorder (AUD) continues to significantly impact society with an estimated 29% of adults meeting criteria in their lifetime (Grant et al., 2015). As such, careful investigations into the processes underlying problematic drinking are needed, including broader evaluation of theoretical components that may explain drinking behavior. Several promising theories attempting to explain problematic drinking have been proposed, including behavioral economics. Behavioral economics focuses on environmental factors such as price and availability that influence the reinforcing value of alcohol (see Bickel, Madden, & Petry, 1998). Research examining the reinforcing value of alcohol (i.e., alcohol demand) has demonstrated consistent relationships between higher alcohol demand, quantity and frequency of drinking, and alcohol-related problems (Murphy & MacKillop, 2006; Murphy, MacKillop, Skidmore, & Pederson, 2009). Although this perspective provides a useful conceptualization of problematic drinking behavior, it often fails to address cognitive and motivational factors associated with demand, and the decision to use more broadly. Research into factors associated with alcohol demand may provide a better understanding of value based decision making, including the identification of treatment targets for changing drinking behaviors. The current study sought to examine the influence of motivational states on the reinforcing value of alcohol.

1.1 Behavioral Economics and Alcohol Demand

Alcohol demand represents the value an individual places on alcohol. As such, those with problematic alcohol use are posited to place higher value on alcohol than other commodities, and are more willing to allocate more resources to obtaining alcohol than non-problematic drinkers (Bickel et al., 2014). More broadly, alcohol demand reflects the level of reinforcement an individual anticipates from consuming alcohol.

Alcohol demand is most widely assessed using the Alcohol Purchase Task (Murphy & MacKillop, 2006), which yields four indices: intensity (reported consumption at zero cost), O_{max} (the maximum alcohol expenditure), P_{max} (price as which consumption starts to be affected in relation to the change in price), and breakpoint (the first price that seizes consumption). In addition, elasticity of demand can also be derived, reflecting how much demand declines with increasing price. While these demand indices are functionally related to one another, theoretically they reflect distinct measures of reinforcement (Bickel, Marsch, & Carroll, 2000). More importantly, in a recent meta-analysis of studies using the APT, while some effect sizes were small, all indices of demand had significant associations with alcohol consumption, alcohol-related problems, and/or AUD symptoms (Kiselica, Webber, & Bornovalova, 2016). Further, intensity and O_{max} tend to exhibit the most robust associations with drinking behavior and alcohol-related problems (MacKillop & Murphy, 2007; Murphy et al., 2009).

Though the validity of alcohol demand indices has been established, research is only beginning to examine contextual factors influencing demand. For example, stress and symptoms of depression and PTSD (Amlung & MacKillop, 2014; Murphy et al., 2013), impulsivity (Gray & MacKillop, 2014; Kiselica & Borders, 2013; Smith et al., 2010) and

drinking motives (Yurasek et al., 2011) have all been linked to elevated demand. However, despite these findings, there is a lack of research examining broader cognitive and motivational factors. For example, craving and basic motivational states (i.e., to approach a stimulus, to avoid a stimulus) have strong influences on the decision to engage in alcohol use and may be powerful influences on the valuation of alcohol.

1.2 Craving and Demand

Craving, acting as a powerful motivational state, has been theorized to influence the value placed on a commodity (Loewenstein, 1996). Research examining the associations between craving, traditionally defined as an intense desire to use, and alcohol demand suggests that the experience of craving increases the reinforcing value of alcohol (e.g., Ramirez et al., 2016; MacKillop, O'Hagen, et al., 2010; MacKillop, Miranda et al., 2010). For example, MacKillop, Miranda and colleagues (2010) demonstrated that higher demand (intensity) was associated with higher reported alcohol craving. Research has also shown that exposure to alcohol-related cues increases subjective craving along with an increase in intensity, O_{max} and breakpoint (MacKillop, O'Hagen, et al., 2010). Though it is clear that a relationship between craving and indices of demand exists, further research is needed that considers the full spectrum of motivational influences.

1.3 Approach and Avoidance Inclinations

The Ambivalence Model of Craving (AMC; Breiner, Stritzke, & Lang, 1999) offers a broader conceptualization, defining craving in terms of both approach (i.e., desire to use) and avoidance (i.e., desire to avoid using) inclinations. Although a variety of historical and current factors are posited to influence these inclinations (see Breiner et al., 1999), of note, positive and negative consequences of alcohol use largely affects their development. More importantly, considering both approach and avoidance allows for capturing the motivational conflict that arises when an individual simultaneously wants to use alcohol and wants to avoid using alcohol (i.e., ambivalence). Indeed, it has been argued that measuring approach in the absence of avoidance may misrepresent a person's motivational state (Breiner et al., 1999).

The importance of considering both approach and avoidance inclinations in the study of drinking outcomes has been demonstrated in the literature. Specifically, approach and avoidance has been shown to predict drinking behavior and related variables, including quantity and frequency of alcohol consumption, stages of readiness to change, and alcohol-related problems (Schlauch, Breiner, Stasiewicz, Christensen, & Lang, 2013; Schlauch, Rice, Connors, & Lang, 2015; Stritzke, Breiner, Curtin, & Lang, 2004). Importantly, those high on both approach and avoidance consume significantly less alcohol than those high on approach inclinations alone (Schlauch, Levitt, et al., 2013; Schlauch et al., 2015). This suggests that avoidance attenuates the effect of approach inclinations on drinking behavior, highlighting the importance of competing desires in the study of craving.

1.4 Current study

The current study sought to examine the associations between approach and avoidance inclinations and indices of alcohol demand. Based on the basic learning principles used to

explain elevated demand (e.g., MacKillop, 2016) and the development of approach and avoidance inclinations (Breiner et al., 1999), we hypothesized that avoidance would moderate the relationship between approach and demand indices, such that the effect of approach inclinations on alcohol demand indices would be lower among those with higher avoidance when compared to those lower on avoidance inclinations. Further, we explored the extent to which demand indices, approach and avoidance accounted for unique variance in drinking outcomes.

2. Materials and Methods

2.1. Participants

A total of 600 individuals were was recruited using Amazon's Mechanical Turk (MTurk) for participation in a study assessing substance use and alcohol-related attitudes. Participants were required to a) be at least 18 years of age; (b) speak English; (c) report consuming alcohol at least once in the past month; and (d) have a 90% hit approval rate on M-Turk (to aid in ensuring reliability of responses). Data from 63 individuals were excluded from analyses due to failed validity check items (see procedures for more details) and 8 participants were removed due to inconsistent responding (e.g., reversals from zero) on the APT, resulting in a final sample of 529.

Participants had a mean age of 33 (*SD* = 8.85) years, with a range of 19 to 64 years. There were approximately equal numbers of males and females (53.3% and 46.6%, respectively), and the sample was predominately Caucasian (78.4%; 6.9% African American, 7.3% Asian; 7.4% Other or Multi-racial). Approximately half of participants (53.8%) reported an income below $40,000, 22.2% reported an income between $40,000 and $60,000, and 24% reported an income above $60,000. A majority of participants reported full-time employment (65.4%; 14.5% part-time; 12.3% unemployed; 7.8% other). With regard to drinking behaviors, participants reported consuming alcohol approximately twice per week (M = 2.09, *SD* = 2.64) and 3.57 (*SD* = 2.28) drinks per drinking occasion. Approximately 57% of participants indicated drinking at least once per week, with 37% (or 21% of the total sample) reporting binge levels (i.e., ≥4 drinks for women, ≥5 for men in one occasion). Finally, participants on average experienced a low number of alcohol-related negative consequences (DrINC: mean = 11.81, SD = 16.98), and had an average AUDIT score of 8.61 (SD = 6.76; range = 1–36), with 42.9% scoring 8 or greater.

2.2 Measures

The 19-item *Approach and Avoidance of Alcohol Questionnaire* (AAAQ; Schlauch, Levitt et al., 2013; McEvoy et al., 2004) was used to assess approach (e.g., "I would have liked to have a drink or two", "My desire to drink seemed overwhelming") and avoidance inclinations (e.g., "I avoided people who were likely to offer me a drink", "The bad things that could happen if I drank alcohol were fresh in my mind"). Participants rated how much they agree with each item on a scale of 0 (Not at All) to 8 (Very Strongly) over the past week. Internal consistencies were .87 and .89 for approach (10 items) and avoidance (9 items), respectively (see Klein et al., 2007; 2013; McEvoy et al., 2004 for more information on psychometrics).

The *Alcohol Purchase Task* (APT; Murphy & MacKillop, 2006) measures an individual's demand for alcohol by assessing how many standard drinks they would consume across a range of 14 different prices ($0 to $9). Guidelines for standard drink sizes were provided. The APT has recently been validated in a community sample recruited using MTurk (Morris et al., 2017).

Drinking history and alcohol use severity and problems were assessed using three measures. Quantity and frequency of alcohol use was assessed using the 10-item *Drinking History Questionnaire* (DHQ) based on the work of Cahalan, Cisin, and Crossley (1969). The *Alcohol Use Disorders Identification* (AUDIT; Saunders et al., 1993) was used to assess severity, and the *Drinker Inventory of Consequences* (DrInC; Miller, Tonigan, & Longabaugh, 1995) was used to assess negative consequences associated with use.

2.3 Procedure

Participants were recruited from Amazon's Mechanical Turk (MTurk) to complete a series of online surveys. Participants provided electronic informed consent after reading a description of the study procedures. The surveys took approximately 30 minutes to complete, and participants were compensated $2.00. Finally, to protect against random responding, four validity check items were inserted at each quarter of the survey (e.g., "Select strongly agree if you are paying attention to this survey"). Participants were required to answer all items correctly to be included in the current study.

2.4 Data Analytic Strategy

Prior to conducting analyses, all data were screened for normality and outliers. Measures of intensity, O_{max}, P_{max}, and breakpoint were obtained from the observed values on the APT. Elasticity of demand was calculated using the exponential demand equation from Hursh and Silberberg (2008). Previous work with the Alcohol Purchase Task suggests examining the demand indices for outliers greater than 3.29 SD from the mean (MacKillop, Miranda, et al., 2010; Murphy & MacKillop, 2006; Tabachnick & Fidell; 2001), and recoding such scores as one value greater than the next highest nonoutlier (4 values were recoded). Consistent with previous research, all indices of demand were positively skewed and thus square-root transformations were conducted. The data were then examined with Hursh and Silberberg's demand equation fit, and all values suggested exceptional fit (i.e., $R^2 = .95$), demonstrating that these data are consistent with a decrease in alcohol consumption in response to an increase in price. Distributions for approach and avoidance were in acceptable ranges.

Multiple linear regression analyses were used to examine the effect of approach and avoidance (including their interaction) on indices of demand. Approach and avoidance were centered at the mean prior to creating the interaction term. For each demand index, approach, avoidance and their interaction were then entered as predictors controlling for income level. Though research with college student samples does not typically control for income level, with a community sample of older adults exhibiting a large range of income it was hypothesized that income would have significant associations with demand indices. Bonferroni corrections were applied to determine significance ($p<.01$; .05/5 planned analyses). For significant interactions, simple slope analyses for approach inclinations were

conducted at low (15th percentile) and high (85th percentile) values of avoidance inclinations.

To examine the unique associations between indices of demand, approach, and avoidance on drinking outcomes, two hierarchical regression analyses were conducted for drinking quantity and alcohol use severity (i.e., AUDIT) controlling for income (all predictors were mean centered). Means, standard deviations, and correlations among the variables of interest are presented in Table 1.

3. Results

3.1. Demand Indices

Five hierarchical regressions were conducted with each demand index treated as the outcome variable. Step 1 examined the main effects of income, approach and avoidance. Step 2 added the interaction between approach and avoidance. Results of these analyses are reported below and in Table 2.[1]

Intensity—Results indicated that approach was positively associated with intensity (b=.17, SE=.02, β=.36, p<.001), but that neither income nor avoidance were significant (Step 1). Further, approach and avoidance did not significantly interact to predict.

O_{max}—Results indicated main effects for income, approach, and avoidance. Specifically, greater income (b=.08, SE=.02, β=.16, p<.001), greater approach (b =.25, SE=.04, β=.30, p<.001), and lower avoidance (b=−.10, SE=.04, β=−.12, p<.01) were all associated with higher O_{max}. This was further qualified by a significant Approach × Avoidance interaction (b=−.06, SE=.02, β=−.12, p<.01; see Figure 1 top panel). Follow-up analyses indicated a significant simple slope for approach on O_{max} among those lower on avoidance (b=.351, SE=.05, β=.41, p<.001), and a marginally significant (i.e., threshold p<.01) simple slope of approach for those higher on avoidance (b=.14, SE=.06, β=.16, p=.012).

Breakpoint—Main effects for income and approach were also observed for breakpoint, such that higher income (b=.02, SE=.001, β=.14, p<.01) and greater approach (b=.04, SE=.01, β=.16, p<.001) were associated with a higher breakpoint. The interaction between approach and avoidance was significant (b=−.02, SE=.01, β=−.13, p<.01; see Figure 1 bottom panel). Follow-up analyses revealed a significant simple slope for approach on breakpoint among those lower on avoidance (b=.07, SE=.02, β=.29, p<.001), but not those higher on avoidance (b=.003, SE=.02, β=.01, p=.882).

P_{max}—Results indicated a significant main effect for income on P_{max} (b=.03, SE=.01, β=.13, p<.01) such that higher income was associated with high P_{max} scores. However, approach and avoidance were not significant predictors of P_{max}, nor was the interaction.

[1]Due to theoretical considerations pertaining to relationships among alcohol-related consequences, approach/avoidance inclinations and alcohol demand, regression analyses were also examined controlling for negative consequences related to use (i.e., DrINC). Results remained unchanged, thus we chose to remove negative consequences and retain the most parsimonious model in the final manuscript. Further, DrINC scores were only significantly associated with Intensity (b=.010, SE=.002, *p*<.001, β=.218), while no other significant associations with demand indices were noted.

Elasticity—Finally, main effects were observed for income and approach on elasticity, such that higher income (b=−.002, SE=.001, β=−.17, p<.001) and higher approach (b=−.005, SE=.001, β=−.24, p<.001) were associated with lower elasticity. Avoidance was approaching significance (i.e., p<.01), such that higher avoidance was associated with higher elasticity (b=.002, SE=.001, β=.102, p=.017) Approach and avoidance did not interact to predict elasticity.

3.2. Drinking Outcomes

Significant approach × avoidance interactions were observed both drinking quantity (b=−.079, SE =.034, β=−.093, p=.012) and total AUDIT scores (b=.198, SE=.076, β=.079, p=.009), suggesting that approach and avoidance account for unique variance in outcomes above and beyond demand indices (see Table 3 for Summary). Follow-up analyses revealed significant simple slopes for approach on AUDIT scores among those higher on avoidance (b=2.395, SE=.190, β=.576, p<.001), and to a lesser degree among those with lower avoidance (b=1.70, SE=.18, β=.409, p<.001). There was also a significant simple slope for approach on quantity of drinking among those low on avoidance (b =.359, SE=.074, β=.255, p<.001), but not for those high on avoidance (b=.084, SE=.078, β=.060, p=.282).

4. Discussion

The current study examined the relationships among differing motivational states (i.e., approach and avoidance) and demand. Results support previous research such that approach inclinations were positively associated with all indices of demand except P_{max} . The lack of association with P_{max} was not a surprise, given that P_{max} tends to exhibit non-significant relationships with drinking behavior (Kiselica et al., 2016). Importantly results also suggest that avoidance inclinations account for significant variance above and beyond approach inclinations on several indices of alcohol demand (O_{max}, breakpoint, elasticity), and that avoidance moderates the effect of approach motivation for both O_{max} and breakpoint. Specifically, while approach was significantly related to O_{max} for those both higher and lower on avoidance, those higher on avoidance spend less money in total on alcohol when compared to those lower on avoidance. Further, approach was significantly related to breakpoint among those lower on avoidance only, suggesting that those higher on avoidance are able to stop drinking at lower prices compared to those lower on avoidance.

The moderating effect of avoidance was not present for intensity or elasticity. In the case of intensity, it may be that the number of drinks an individual would consume at 0 cost is only a reflection of a strong, initial desire to use (i.e., pure approach). The moderating effect of avoidance may only begin to influence demand when resources need to be allocated toward alcohol consumption (spending money), as reflected by its significant effect on O_{max}. In other words, consistent with the AMC, competing motivations may only arise when the individual is faced with a cost (i.e., money, time spent, other activities) and must reach a balanced decision. This is in line with behavior economic research in which opportunity cost has an important role in the decision to use substances (Bickel et al., 2014).

It is less clear, however, why avoidance did not attenuate the effect of approach on elasticity since breakpoint and elasticity are conceptually similar, although some differences are

evident. Most important is that all indices in the current study were generated from observed values from the APT except elasticity. Elasticity is calculated from an exponential demand equation. It could be that the observed value of breakpoint is a reflection of the decision to stop consuming alcohol, whereas elasticity reflects the general pattern of the demand curve generated from the data and was not influenced by avoidance. Nevertheless, these inconsistent findings support the notion that these indices are heterogeneous in nature (Bickel et al., 2000).

More generally, the results of this study may aid in uncovering the motivational processes underlying an individual's valuation of alcohol, demonstrating that measuring craving (approach inclinations) in the absence of competing desires (avoidance inclinations) may misrepresent an individual's motivational state and limit the utility of information obtained (i.e., Breiner et al., 1999). This is important as both craving and demand have been conceptualized as motivational constructs and as such, these may be part of a broader decisional process associated with alcohol use. Although the purpose of the current study was to emphasize the importance of considering competing motivations in craving and behavioral economic research, future research may seek to better establish whether a common underlying processes influences these variables, and determine the extent to which they contribute to a broader decisional process. Indeed, preliminary evidence for this study suggests that while related, alcohol approach and avoidance inclinations and alcohol demand account for unique variance in alcohol use outcomes.

The results of the current study have several potential clinical implications. Research has demonstrated that indices of demand are useful predictors of intervention response in a college student samples (Dennhardt, Yurasek, & Murphy, 2015; MacKillop & Murphy, 2007; Murphy et al., 2015). Assessing avoidance pre- and post-intervention may compliment the assessment of demand and aid in identifying those who may need more intensive intervention. Further, behavioral economics posits that problematic drinking occurs from a combination of over valuation of alcohol and lower availability/valuation of alternative reinforcers. As such, successful interventions have been designed to enhance engagement in alternative reinforcers (Dennhardt et al., 2015; Murphy et al., 2012), which theoretically may be directly strengthening avoidance inclinations. Thus, additional strategies that enhance avoidance inclinations directly, including strategies that target states of ambivalence such as motivational interviewing (Miller & Rollnick, 2012), may also have an indirect effect on alcohol demand.

Although to our knowledge the current findings are the first to demonstrate the importance of competing desires in the relationship between craving and alcohol demand, it is not without limitations. First, these data were cross-sectional and conclusions cannot be drawn about the causal relationships between approach/avoidance and demand indices. Additionally, the study utilized a community sample with a range of drinking levels, and it is possible that alcohol demand and approach and avoidance may function differentially based on drinking status (e.g. social versus problematic drinking, non-treatment- versus treatment-seeking). For example, the results of the current study may not be generalizable to clinical and treatment-seeking samples where higher levels of avoidance are expected. Indeed, this sample had relatively low levels of avoidance on average, suggesting that findings may even

be more robust in samples demonstrating greater avoidance. Finally, the current study relied on self-report methods to assess demand and approach and avoidance. With regard to alcohol demand, participants were posed with hypothetical rewards (alcohol) which may not be reflective of actual behaviors. Mitigating this concern is research demonstrating close concordance of APT performance using hypothetical and actual rewards (Amlung, Acker, Stojek, Murphy, & MacKillop, 2012; Amlung & MacKillop, 2015). Further, approach and avoidance were also assessed via self-report and future research in this area could use a cue-reactivity paradigm to assess in the moment approach and avoidance inclinations.

Notwithstanding these limitations, results of the current study demonstrated the utility of considering the effects of both approach and avoidance on an individual's valuation of alcohol. Additionally, results of this study add to recent literature exploring possible mechanisms underlying alcohol demand beyond behavioral economic models of use.

Acknowledgments

None

Role of Funding Sources

The development of this report was supported in part by NIAAA Grant K23-AA021768 (Schlauch). NIAAA had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

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Highlights

- Effects of craving and competing desires on alcohol demand are examined.
- Results illustrate the importance of both approach and avoidance on alcohol demand.
- Avoidance improves the prediction of the craving-alcohol demand relationship.
- Strategies enhancing avoidance may have indirect effects on alcohol demand.

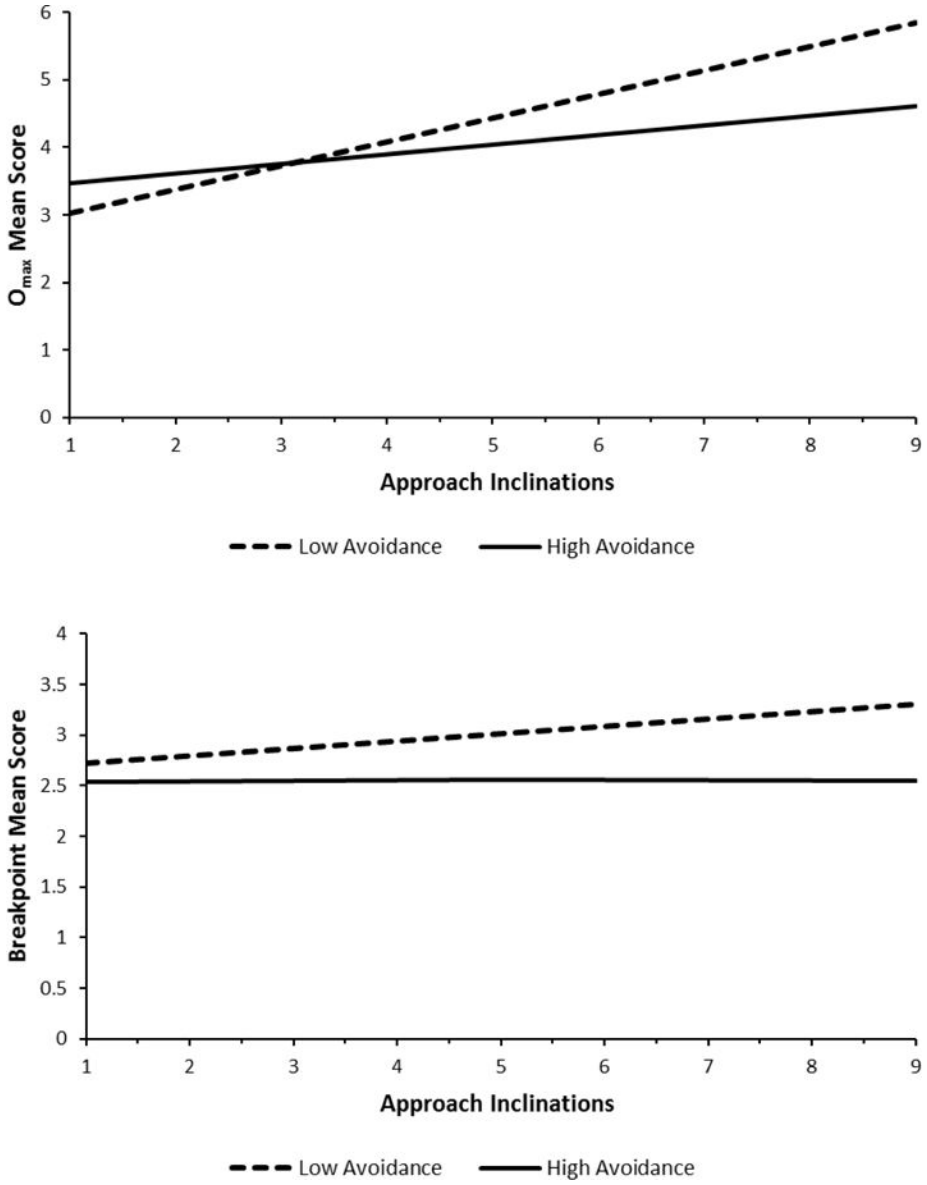

Figure 1.

Approach X Avoidance Interaction for O_{max} (top panel) and breakpoint (bottom panel). High and low values were graphed at the 85th and 15th percentiles which are roughly equivalent to one standard deviation above and below the mean.

Table 1

Means, Standard Deviations, and Bivariate Correlations among Constructs of Interest

	M	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Approach	4.28	1.62	–											
2. Avoidance	2.74	1.61	.21***	–										
3. Intensity	6.56	4.11	.35***	.04	–									
4. O_{max}	18.26	12.19	.27***	−.07	.52***	–								
5. Breakpoint	7.82	1.94	.14**	−.07	.22***	.61***	–							
6. P_{max}	5.66	2.37	.05	−.01	−.03***	.49***	.63***	–						
7. Elasticity	.003	.004	−.22***	.06	−.36***	−.72***	−.78***	−.58***	–					
8. Quantity	3.57	2.28	.36***	.07	.58***	.37***	.11*	−.07	−.23***	–				
9. Frequency	2.09	2.64	.40***	.08	.19***	.22***	.08	.04	−.16***	.13**	–			
10. AUDIT	18.06	6.03	.66***	.40***	.47***	.32***	.06	.01	−.20***	.54***	.48***	–		
11. DrINC	11.81	16.98	.55***	.50***	.29***	.14**	.01	−.00	−.08	.33***	.39***	.80***	–	
12. Income	4.67	2.71	.01	−.06	.02	.17***	.14**	.13**	−.17***	−.08	.13**	−.01	−.07	–

Note:

* $p < .05$

** $p < .01$

*** $p < .001$.

Income was coded on a 1=0-$10,000 to 11= over $100,000, with each value representing $10,000 increments.

Addict Behav. Author manuscript; available in PMC 2019 April 01.

Table 2

Summary of Regression Analyses: Approach, Avoidance, and Approach × Avoidance Associations with Alcohol Demand Indices

	Intensity				**O_{max}**				**Breakpoint**			
	b	**SE**	**p**	**β**	**b**	**SE**	**p**	**β**	**b**	**SE**	**p**	**β**
Step 1												
Intercept	2.451	.030	.000	—	4.041	0.057	.000	—	2.766	.018	.000	—
Income	.004	.011	.708	.015	0.082	0.021	.000	.160	.021	.007	.002	.135
AP	.165	.019	.000	.360	0.254	0.036	.000	.297	.041	.011	.000	.161
AV	−.017	.019	.366	−.038	−0.103	0.036	.005	−.119	−.023	.011	.039	−.090
Step 2												
Intercept	2.462	.031	.000	—	4.074	0.058	.000	—	2.777	.018	.000	—
Income	.003	.011	.809	.010	0.078	0.021	.000	.150	.019	.007	.003	.125
AP	.166	.019	.000	.363	0.258	0.036	.000	.301	.042	.011	.000	.165
AV	−.006	.020	.779	−.012	−0.069	0.038	.070	−.080	−.120	.012	.322	−.046
AP × AV	−.021	.012	.086	−.075	−.060	0.023	.008	−.116	−.020	.007	.004	−.132

	P_{max}				Elasticity			
	b	SE	p	β	b	SE	p	β
Step 1								
Intercept	2.318	.023	.000	—	0.047	.001	.000	—
Income	0.025	.009	.003	.128**	−0.002	.001	.000	−.165
AP	0.019	.015	.197	.057	−0.005	.001	.000	−.239
AV	−0.006	.015	.701	−.017	0.002	.001	.017	.102
Step 2								
Intercept	2.324	.024	.000	—	0.046	.001	.000	—
Income	0.025	.009	.004	.124	−0.002	.001	.000	−.161
AP	0.019	.015	.184	.059	−0.005	.001	.000	−.242
AV	0.000	.016	.989	.001	0.002	.001	.080	.079
AP × AV	−0.010	.009	.261	−.052	0.001	.001	.135	.067

Note: AP = approach inclinations; AV = avoidance inclinations; b = unstandardized estimate; SE = standard error; p = p-value; β = standardized estimate.

Table 3

Summary of Regression Analyses: Demand Indices, Approach, Avoidance, and Approach × Avoidance Associations Drinking Outcomes

	Drinks Per Occasion (Quantity)					AUDIT				
	b	SE	p	β	R^2	b	SE	p	β	R^2
Step 1	—	—	—	—	.372	—	—	—	—	.241
Intercept	3.570	.079	.000	—	—	8.601	.257	.000	—	—
Income	−.089	.030	.003	−.106	—	−.092	.097	.346	−.037	—
Intensity	1.413	.135	.000	.462	—	3.613	.439	.000	.400	—
O_{max}	.349	.094	.000	.211	—	.821	.306	.007	.168	—
P_{max}	−.582	.208	.005	−.137	—	.238	.675	.724	.019	—
Breakpoint	−.446	.329	.176	−.081	—	−3.076	1.069	.004	−.190	—
Elasticity	−4.980	4.294	.247	−.076	—	−13.386	13.943	.337	−.069	—
Step 2	—	—	—	—	.398	—	—	—	—	.591
Intercept	3.572	.078	.000	—		8.623	.189	.000	—	—
Income	−.085	.029	.004	−.101	—	−.033	.071	.645	−.013	—
Intensity	1.264	.136	.000	.413	—	2.051	.332	.000	.227	—
O_{max}	.330	.093	.000	.200	—	.784	.226	.001	.161	—
P_{max}	−.586	.205	.004	−.138	—	−.073	.498	.883	−.006	—
Breakpoint	−.404	.323	.212	−.074	—	−2.512	.787	.002	−.155	—
Elasticity	−4.005	4.223	.343	−.061	—	−5.977	10.279	.561	−.031	—
AP	.228	.053	.000	.162	—	2.030	.129	.000	.489	—
AV	.040	.050	.427	.028	—	1.231	.121	.000	.295	—
Step 3	—	—	—	—	.405	—	—	—	—	.596
Intercept	3.614	.079	.000	—	—	8.517	.192	.000	—	—
Income	−.090	.029	.002	−.107	—	−.022	.071	.763	−.009	—
Intensity	1.254	.136	.000	.410	—	2.076	.330	.000	.230	—
O_{max}	.314	.093	.001	.190	—	.824	.225	.000	.169	—
P_{max}	−.573	.204	.005	−.135	—	−.106	.495	.831	−.008	—
Breakpoint	−.498	.324	.125	−.091	—	−2.274	.788	.004	−.140	—
Elasticity	−4.885	4.216	.247	−.074	—	−3.754	10.258	.715	−.019	—

	Drinks Per Occasion (Quantity)					AUDIT				
	b	SE	p	β	R^2	b	SE	p	β	R^2
AP	.237	.053	.000	.169	—	2.008	.128	.000	.483	—
AV	.082	.052	.119	.058	—	1.124	.127	.000	.269	—
AP × AV	−.079	.034	.012	−.093	—	.198	.076	.009	.079	—

Note. AP = approach inclinations; AV = avoidance inclinations; b = unstandardized estimate; SE = standard error; p = p-value; β = standardized estimate. Due to concerns of possible multicollinearity, Varience Inflation Factors (VIF) and Tolerance Statistics were assessed. All variables had a VIF of less than 4 and a tolerance of above .20.