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Further Validation of an Alcohol Purchase Task: Equivalence of Versions for Hypothetical and Actual Rewards

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Background

Behavioral economics integrates the principles of psychology and economics and has been profitably applied to understanding alcohol use disorders (AUDs). Specifically, behavioral economics has contributed to understanding of how environmental factors, such as changes in cost of alcohol or the presence of alternative reinforcers, affect alcohol use. A consistent finding from this literature is that individuals with AUDs persistently over-value alcohol relative to alternative rewards

In the laboratory, one method of assessing the relative value of alcohol is an alcohol purchase task (APT) which assesses alcohol consumption at escalating price levels. However, all studies to date have examined hypothetical alcohol consumption, making it unclear how decisions on a hypothetical purchase task would correspond to choices when actual money and alcohol were available.

To address this question, we directly examined the relationship between responses on an APT that was entirely hypothetical and those from a different version from which alcohol and monetary rewards were made available during a self-administration period.

Method

Sample

18 regular drinkers (38% female; 67% white, 22% African American; 11% Asian) participated in this study. Participants consumed an average of 28.5 drinks / week (range 9.3-84.4) and had a mean AUDIT score of 8.4 (range 1-21).

Alcohol Purchase Task (APT)

Participants completed a computerized APT (Figure 1) in which they decided how much of a \$15.00 "bar tab" they would allocate to purchasing drinks at 24 prices ranging from free to \$15.00. Participants could request a maximum of 8 drinks that were about half the size of standard drinks (i.e. mini-drinks). On the hypothetical version, participants were instructed to estimate how much they would drink in the consumption period. On the actual-reward version, participants were told that they would receive the alcohol and money associated with one randomly-selected choice during a one-hour self-administration period (See Figure 1).

Demand Curve Analysis

Demand curves and indices of demand were generated using an observed values approach (Murphy & MacKillop, 2006). Specifically, the indices of demand were: intensity of demand, O_{max} , P_{max} , and breakpoint (see Figure 2).

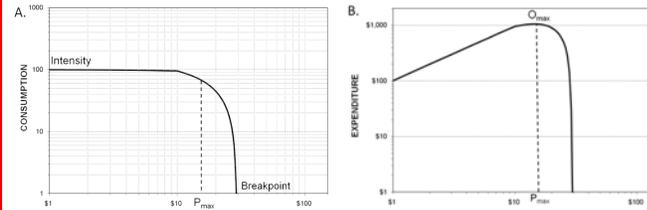


Figure 2. Prototypic demand and expenditure curves and the associated indices of demand. Panel A depicts the demand curve and Panel B depicts the associated expenditure curve. The targeted indices are 1) intensity (i.e., consumption at zero price); 2) O_{max} (i.e. maximum expenditure); 3) P_{max} (i.e., price at which demand becomes elastic); and 3) breakpoint (i.e., price that suppresses consumption to zero). Conventional log-log coordinates are used for proportionality, with zero values replaced by trivial nonzero values (.001).

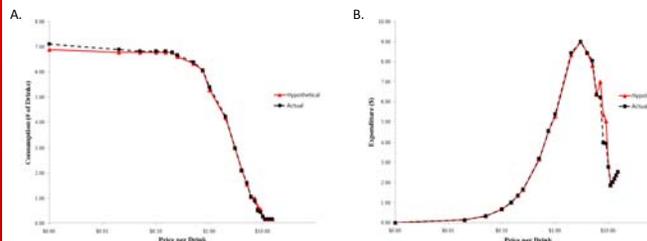


Figure 3. Demand and expenditure curves for hypothetical (red lines) and actual (black lines) rewards. Panel A depicts the demand curve and Panel B depicts the associated expenditure curve. Conventional log coordinates are used on the x-axes to accommodate large inter-price intervals, with zero values replaced by trivial nonzero values (.001).

Results

Table 1. Item-wise Comparison between Consumption for Hypothetical and Actual Rewards

Price per Drink	r	t
\$0.00	0.89**	-1.29 ^{ns}
\$0.02	0.98**	-1.46 ^{ns}
\$0.05	0.99**	-1.00 ^{ns}
\$0.10	0.98**	-1.00 ^{ns}
\$0.15	0.98**	-1.00 ^{ns}
\$0.20	0.94**	0.00
\$0.25	0.92**	-0.44 ^{ns}
\$0.50	0.84**	-0.29 ^{ns}
\$0.75	0.78**	0.00
\$1.00	0.84**	-0.81 ^{ns}
\$2.00	0.89**	-0.57 ^{ns}
\$3.00	0.77**	0.00
\$4.00	0.69*	0.00
\$5.00	0.64*	-0.32 ^{ns}
\$6.00	0.9**	0.00
\$7.00	0.81**	1.00 ^{ns}
\$8.00	0.73**	1.84 ^{ns}
\$9.00	0.60*	1.00 ^{ns}
\$10.00	0.73**	0.00
\$11.00	1.00	0.00
\$12.00	1.00	0.00
\$13.00	1.00	0.00
\$14.00	1.00	0.00
\$15.00	1.00	0.00

Note: **p<.01, *p<.05

Table 2. Correlation between Observed Demand Indices between Hypothetical and Actual Reward Versions

	r
1. Intensity	.89**
2. Breakpoint	.95**
3. O_{max}	.94**
4. P_{max}	.98**

Note: **p<.01

Table 3a. Hypothetical Rewards: Correlations Among Observed Demand Indices

	1.	2.	3.	4.
1. Intensity	---			
2. Breakpoint	-.27	---		
3. O_{max}	-.07	.78**	---	
4. P_{max}	-.24	.85**	.61**	---

Note: **p<.01

Table 3b. Actual Rewards: Correlations Among Observed Demand Indices

	1.	2.	3.	4.
1. Intensity	---			
2. Breakpoint	-.25	---		
3. O_{max}	.16	.74**	---	
4. P_{max}	-.25	.87**	.57*	---

Note: **p<.01, *p<.05

Discussion

Main Findings:

Pairwise comparisons by price and demand index revealed that performance did not significantly differ between the hypothetical and actual reward conditions, and performance was highly correlated across conditions. These data suggest a close correspondence between choices for hypothetical and actual alcohol and money outcomes.

Implications:

These data provide initial validation for using hypothetical purchase tasks in alcohol research and provide initial support for the utility of a purchase task for actual alcohol and money.

Limitations and Future Directions:

This study used a within-subjects design with a relatively brief interval between assessments. An appropriate focus for future studies would be comparisons using a between-subject design.

As a multidimensional assessment of motivation for alcohol, alcohol demand may be a useful intermediate phenotype for understanding genetic contributions to alcohol misuse.

Figure 1. Alcohol Purchase Task (actual-reward version) with example participant responses.