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Income shock increases preferences for smaller immediate rewards and reduces alcohol demand among a sample of crowd-sourced adults

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Abstract

In behavioral economics, income shock manipulations (hypothetical narratives where money is gained or lost) can provide meaningful insight into decision-making related to primary and secondary commodities. To date, few studies have examined the impact of income shock on delay discounting in healthy controls and individuals using substances and no study to date has examined the impact of income shock on alcohol demand. This study examined the effects of income shock on behavioral economic assessments (i.e., delay discounting and alcohol demand) among a sample of adult participants recruited via Amazon Mechanical Turk (N = 140). The sample was predominantly middle-aged, male, and white (mean age = 38.81; 37.1% female; 77.1% White). Participants were randomly assigned to one of three income shock narratives (negative, neutral, positive). They completed two versions of the 5-choice delay discounting task for $100 and $1000 and an alcohol purchase task (APT) before and after the income shock narrative. Following negative income shock, preferences for smaller-immediate rewards increased in the $100 version of the discounting task and decreased the price at which alcohol consumption was suppressed to zero (i.e., Breakpoint). Sensitivity to price changes in the APT decreased following neutral and positive income shock but not the negative condition. Results replicate and extend prior findings examining the impact of income shock on delay discounting. Furthermore,

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All authors have contributed significantly and viewed the manuscript before submission. The authors confirm that findings from the current study have not been disseminated in any form prior to this manuscript submission. Full dataset available from the first author upon request. This study is not pre-registered.

Disclosures

HP and MA have no conflicts of interest to disclose.

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CrediT:

1. Herry Patel: Conceptualization, Data curation, Formal analysis, Methodology, Writing — original draft, Writing — review and editing
2. Michael Amlung: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Project administration, Software, Supervision, Visualization, Writing — review and editing

this is the first study to study income shock effects on alcohol demand. Findings suggest that primary commodity manipulation (i.e., money) can potentially impact decision-making regarding secondary commodities (i.e., alcohol).

Keywords

income shock; behavioral economics; alcohol demand; delay discounting

INTRODUCTION

Behavioral economics combines economics and psychology, allowing one to infer the psychological factors that affect decision-making (Bickel et al., 2014). Common assessments in behavioral economics include delay discounting and behavioral economic demand tasks. Delay discounting (DD) assesses preferences for smaller-sooner vs. larger-later rewards (Baker, Johnson, & Bickel, 2003; Johnson & Bickel, 2006). Behavioral economic demand refers to the relationship between consumption of a commodity and its price, providing an index of relative value of the commodity. Using a hypothetical alcohol purchase task (APT; Murphy & MacKillop, 2006), participants report how many drinks they would consume at varying prices (e.g., Free-$25/drink). Advantages of the APT include the creation of a closed economy stipulating that participants cannot share or save drinks for later and simulations of varied market conditions under controlled but more ethically permissible conditions.

A major consideration for behavioral economic assessments is the relative and objective value of money for participants, dependent on their financial situation. This dependence applies to demand tasks, which use a primary commodity (i.e., money) to obtain their substance of choice. However, not all individuals have the same access to money. Analyzing the impact of an individual's access to money on behavioral economic assessments is crucial. One way to do this is an income shock manipulation in which participants can be told they now have more money than before (positive), the same amount of money as before (neutral), or less money than before (negative). Several studies have examined the impact of income shock on delay discounting rates. Among healthy controls, negative income shock was associated with increased preferences for smaller immediate rewards (Bickel et al., 2016; Blain et al., 2021; Haushofer et al., 2013), with the results replicated among cigarette smokers (Mellis, Snider, et al., 2018) and individuals with alcohol use disorder (Craft et al., 2021). Interestingly, two studies examined the impact of income shock on cross-commodity delay discounting (i.e., money versus food). The first found significant increases in preferences for food now compared to food later and food now compared to money later conditions following an employment loss scenario (Mellis, Athamneh, et al., 2018). The second study found increased preferences for food now versus money later using a natural disaster scenario among a sample of individuals who are obese (Snider et al., 2020). Lastly, there are mixed findings on the impact of income shock on demand for secondary commodities, such as food. Negative income shock increased food demand compared to neutral condition in two studies (Snider et al., 2020; Sze et al., 2017), but null findings have been reported (Stein et al., 2021). To date, no studies to date examined the impact of income shock on alcohol demand.

Given that no studies exist directly examining the impact of income shock on alcohol demand, the current study sought to examine whether income shock would impact alcohol demand. It is plausible to predict that income shock could impact alcohol demand via stress induction that an income shock would hypothetically create. Here, individuals could have decreased alcohol demand following a negative income shock narrative as the stress of losing money would likely lead individuals to prioritize essentials (e.g., housing, utilities, etc.) compared to alcohol. However, this has yet to be explored. The current study included a general adult sample that included both drinkers and non-drinkers. A heavy drinking or clinical sample including individuals with alcohol use disorder was not recruited as they may show less of an effect from or sensitivity to income shock manipulations because they also show less price sensitive demand (Manning et al., 1995; Nelson, 2013), as such, experimental manipulations of price sensitivity (e.g., income shock) could result in less of a decrease in drinking (or possible an increase due to factors like stress or coping related drinking). Therefore, this study sought to examine the impact of income shock in a general adult sample that included both drinkers and non-drinkers.

The purpose of the current study was to replicate prior findings of negative income shock on delay discounting of monetary rewards among a sample of adults recruited from an online crowdsourcing platform. This is the first study to our knowledge to examine the impact of income shock on alcohol demand. We hypothesized that negative income shock, but not positive income shock, will increase preferences for smaller immediate monetary rewards compared to larger later rewards. Lastly, we hypothesize that a negative income shock will decrease alcohol demand within this general sample containing both drinkers and non-drinkers, whereas a positive income shock will increase alcohol demand.

METHODS

Participants

Participants were recruited via Amazon Mechanical Turk (MTurk) between October 2021-December 2021. Participants were required to: (1) be at least 18 years old; (2) currently reside in a US state; (3) have previously completed at least 1000 HITs with a minimum 99% approval rating; and (4) be participating from a unique IP address (i.e., to prevent individuals participating in the study more than once). This study was approved by the Human Research Protection Program at the University of Kansas (STUDY00146763; Daily Influences on Decision Making). Participants provided informed consent and received $2 for completing the study.

A total of 221 participants completed the study. After reviewing three general attention checks, 23 participants were excluded (N=198). Furthermore, we reviewed embedded task-specific attention checks, excluding 58 participants overall (37 for delay discounting tasks and 21 for the APT), leaving a final sample size of 140 participants.

Procedure

Participants completed baseline measures of demographics, delay discounting ($100 and $1000 versions), an APT, and a baseline valence assessment prior to being randomly

assigned to one of three income shock narrative conditions (negative, neutral, or positive) using identical text as Bickel et al. (2016):

> ***Negative Income Shock:*** "You have just been fired from your job. You will now have to move in with a relative in a part of the country you dislike, and you will have to spend all your savings to move there. You do not qualify for unemployment, so you will not be making any income until you find another job."
>
> ***Neutral Income Shock:*** "At your job, you have just been transferred to a different department in a location across town. It is a similar distance from where you live so you will not have to move. You will be making 2% more than you previously were."
>
> ***Positive Income Shock:*** "At your job you have just been promoted. You will have the opportunity to move to a part of the country you always wanted to live in OR you may choose to stay where you are. Either way, the company gives you a large amount of money to cover moving expenses, and tells you to keep what you don't spend. You will be making 100% more than you previously were."

The narratives were displayed on the screen for 60 seconds and automatically advanced to the post-narrative assessment. After the narrative, participants completed a post-narrative valence assessment to examine the manipulation efficacy. Results of the manipulation check are presented in Supplemental Table 1. Participants then completed the same delay discounting tasks, an APT, and measures assessing substance use. The order of the behavioral economic measures was randomized before and after the narrative manipulation.

Measures

All participants completed a battery of questionnaires and tasks assessing demographics, substance use, and decision-making around money and alcohol.

Delay Discounting.—Monetary discounting was assessed using the 5-trial adjusting delay discounting task (Koffarnus & Bickel, 2014). On each of five trials, participants indicated whether they would rather receive a larger amount of money at a specific point in the future or half that amount immediately. Based on the choices across the five trials, the Effective Delay 50% (ED_{50}) is estimated. The inverse of this value is equivalent to the discount rate (e.g., $k=1/ED_{50}$). All k values were natural logarithm transformed prior to analyses. Participants completed two versions of the 5-trial adjusting amount task pre-income shock and post-income shock, with the larger delayed reward valued at $100 and $1000.

Alcohol Demand.—Alcohol demand was assessed using a hypothetical APT (Kaplan et al., 2018; Murphy & MacKillop, 2006). The APT asks participants how much alcohol (in standard drinks) they would consume across 26 prices in ascending order from Free to $25. A standard instructional set was used. All choices were hypothetical, but participants were instructed to make choices as if the rewards were real (Amlung et al., 2012; Amlung & MacKillop, 2015; Owens et al., 2015). Participants completed this task before and after the income shock narrative.

Alcohol Use.—Alcohol use over the last three months was assessed using the Alcohol Use Disorder Identification Test – Consumption (AUDIT-C; Bush et al., 1998). The total score on the AUDIT-C (range 0–12) was used as a continuous measure of alcohol consumption. Scores of zero were assigned to participants who reported not drinking in the past 3 months.

Other Substance Use.—Cannabis use was assessed using item 1 of the revised Cannabis Use Disorder Identification Test (CUDIT-R; Adamson et al., 2010): "In the past 3 months, how often do you use cannabis? Never, Monthly or less, 2–4 times a month, 2–3 times a week, 4 or more times a week." In addition, current smoking status was assessed by self-reported cigarettes smoked per day.

Data Analysis

Responses on the APT were examined for non-systematic data (Stein et al., 2015), excluding zero participants. Four observed demand indices were generated from raw consumption values (Murphy & MacKillop, 2006): *Intensity* is self-reported alcohol consumption at "Free" price; 2) *Breakpoint* is the price that suppresses self-reported consumption to zero; 3) O_{max} is the maximum observed expenditure; and 4) P_{max} is the price point corresponding to O_{max}. In cases where consumption did not reach zero, *Breakpoint* was coded as the highest price interval ($25; 1% of cases). These indices were log-transformed prior to analyses. Changes in *Elasticity* across prices (α), or the proportionate slope of the demand curve, was also derived in GraphPad Prism 9 using an exponentiated demand curve equation (Koffarnus et al., 2015). Group mean consumption values for the pre/post narrative APTs were modeled separately. The Q_0 parameter was fixed to the observed mean *Intensity* and the *k* parameter was calculated as the difference of the logarithms of the maximum and minimum consumption values plus 0.5 (k=3.30 for all curve fits). The model provided an excellent fit (R^2 range .98–.99).

Data analyses were conducted in three parts. First, differences between groups on all variables of interest were evaluated using a one-way analysis of variance (ANOVA) to determine covariates to be included in subsequent analyses (see Table 1). Second, repeated measures ANOVAs were used to determine changes in delay discounting rates (100 ln$k$ and 1000 ln$k$) from pre- to post-income shock across conditions. Third, the same repeated measures ANOVAs were run in the previous step but with observed indices of alcohol demand (*Intensity*, *Breakpoint*, O_{max}, and P_{max}) as the dependent variables. Individuals who reported consuming zero drinks at Free price during their baseline APT and were considered non-drinkers as per their "Never" response on the AUDIT-C were dropped (n = 19). Differences in α between pre/post-narrative APTs were examined separately by condition using an extra sums of squares F test. A significance level of $p < .05$ was used for all analyses. We report how we determined our sample size, all data exclusions, all manipulations, and all measures in the study. Full dataset is available upon request. This study was not pre-registered.

RESULTS

Descriptive Statistics and Differences Across Groups at Baseline

One-way ANOVAs run to assess baseline differences found no differences across conditions (refer to Table 1).

Effect of Income Shock on Delay Discounting

The mixed ANOVA (3 conditions x 2 time points) examining effects of income shock narratives on rates of delay discounting for the $100 version revealed a time × narrative condition interaction, $F(2, 137)=5.45$, $p=.005$, $\eta_p^2=.074$ (see Supplemental Table 2). Pairwise comparisons indicated a significant increase between the pre- and post-narrative in the negative condition (log(k) values pre: M=−5.03, SE=0.29 and post: M=−4.45, SE=0.30). There were no other main effects, interactions, or significant pairwise comparisons. When including AUDIT-C as a covariate, the patterns of results remained identical (refer to Supplemental Table 3).

An identical mixed ANOVA was run for rates of delay discounting for the $1000 version (Supplemental Table 2). A significant main effect of time was observed [$F(1, 137)=8.26$, $p=.005$, $\eta_p^2=.057$] and a trend was noted for the time × narrative condition interaction [$F(2, 137)=2.62$, $p=.077$, $\eta_p^2=.037$]. Pairwise comparisons indicated a significant increase between pre and post-delay discounting rates across all conditions (log(k) values pre: M=−5.56, SE=0.16 and post: M=−5.26, SE=0.16). There were no other significant pairwise comparisons observed. When including AUDIT-C as a covariate, the patterns of results remained relatively the same (refer to Supplemental Table 3).

Effect of Income Shock on Alcohol Demand

Alcohol demand curves by condition are provided in Figure 1. Mixed ANCOVAs (3 conditions x 2-time points) were run for the observed indices of alcohol demand—*Intensity*, *Breakpoint*, O_{max}, and P_{max}—among drinkers only (Supplemental Table 6). Only *Breakpoint* showed significant results with P_{max} trending towards significance, whereas there were no significant main effects, interactions, or pairwise comparisons for *Intensity* and O_{max}. There was a significant time × narrative condition interaction [$F(2, 117)=4.45$, $p=.014$, $\eta_p^2=.070$] and a trending main effect of time [$F(1, 117)=3.23$, $p=.075$, $\eta_p^2=.027$] for *Breakpoint*. Pairwise comparisons revealed a significant decrease in *Breakpoint* (log-transformed) for the negative condition group pre (M=0.91, SE=0.06) to post (M=0.74, SE=0.08). For P_{max}, there was a trending main effect of time [$F(1, 117)=3.42$, $p=.067$, $\eta_p^2=.028$] and a time x narrative condition interaction [$F(2, 117)=2.74$, $p=.069$, $\eta_p^2=.044$]. When AUDIT-C was included as a covariate in models, the pattern of results remained relatively the same (refer to Supplemental Table 7). Extra sums of squares F tests for α revealed significant pre/post differences in α for the neutral [pre=0.0059, post=0.0048; $F(1,58)=12.32$, $p<.001$] and positive [pre=0.0089, post=0.0080; $F(1,58)=5.90$, $p=.019$] conditions, indicating less price sensitivity following the narrative manipulation. There was no significant difference for the negative condition [pre=0.0061, post=0.0064; $F(1,58)=1.21$, $p=.276$].

DISCUSSION

This study examined the effects of negative income shock on delay discounting and alcohol demand among drinkers and non-drinkers. For delay discounting, we observed a significant increase in preferences for smaller immediate rewards following the negative income shock narrative for the $100 task. However, only a significant main effect of time was observed for the $1000 task where preferences for smaller immediate rewards increased across all three narrative conditions. This partially supports our hypothesis, where we see an increase in preferences for smaller-immediate rewards following negative income shock at the smaller magnitude, but not the larger magnitude. The novel aspect of this study was to analyze the impact of negative income shock on alcohol demand. Here, our hypotheses were partially supported, as the current results indicate decreases in *Breakpoint* following negative income shock. Additionally, reduced price sensitivity was observed for neutral and positive conditions but not negative ones. As such, the current results partially support our hypothesis that income shock reduces alcohol demand but positive income shock does not increase alcohol demand.

The delay discounting results replicate and build upon prior findings (Bickel et al., 2016; Blain et al., 2021; Craft et al., 2021; Haushofer et al., 2013; Mellis, Snider, et al., 2018). Most relevant to the current study are the results presented by Craft and colleagues (2021). The impact of negative income shock was examined on delay discounting among individuals with alcohol use disorder. Preferences for smaller immediate rewards increased following narratives depicting a job loss and a major hurricane compared to neutral conditions (Craft et al., 2021). In addition, negative narratives increased the preferences for smaller immediate rewards, like the pattern seen currently. However, it is essential to note that Craft and colleagues (2021) used an adjusting amount delay discounting task with an immediate reward of $500 and a delayed reward of $1000. As such, direct comparisons of these results should be made with caution. In the current study, significant increases in delay discounting rates were seen for the $100 magnitude but not the $1000 magnitude. One potential reason may be due to the conditions of scarcity created through income shock manipulation. With a loss of income, the $1000 reward magnitude may be unreasonable for participants compared to a $100 magnitude. Future studies should explore the effects of income shock at a range of magnitudes instead of just two levels that are quite disparate from one another.

Regarding alcohol demand, no studies to date have examined the impact of negative income shock on an alcohol purchase task. Studies examining demand for secondary commodities such as food (Snider et al., 2020; Stein et al., 2021; Sze et al., 2017) have indicated mixed findings. Inconsistencies in the previous studies could be attributed to the differences in study design (within- vs. between-subjects) or the income shock manipulations used (monetary vs. natural disaster). While two previous studies (Snider et al., 2020; Sze et al., 2017) found income shock increased demand for food, our results indicated a decrease in demand for alcohol, as reflected by *Breakpoint*. One potential reason for discrepancy could be due to the scenario of the income shock narrative where a hurricane would reduce access to food in the immediate aftermath resulting in higher demand for food. In contrast, an employment loss scenario is monetarily adverse, where individuals would spend less on alcohol, given that they would still have other costs to bear. Furthermore, individuals in the

current sample were recruited during the COVID-19 pandemic compared to individuals in the Snider et al. (2020) study who were likely recruited before the start of the pandemic. The other significant result observed was a decrease in price sensitivity to the neutral and positive narratives, which were not observed in prior literature (Snider et al., 2020; Stein et al., 2021; Sze et al., 2017). Overall, within the current study, any significant changes related to alcohol demand were related to the monetary values accompanying the purchase and consumption of the secondary commodity, alcohol. These results provide preliminary evidence that income shock narratives focused on manipulating access to the primary commodity, money, may influence decision-making regarding secondary commodities (i.e., alcohol, cigarettes, food, etc.).

The results of the present study should be contextualized within its limitations. First, validated measures of alcohol consumption, alcohol demand, and delay discounting were used. However, these measures relied upon participant self-report and may have been subject to demand characteristics. However, no evidence of participants figuring out the experimental manipulation was seen in the valence manipulation check—the only evaluation for the validity of the manipulation. Therefore, while possible, the limited data collected evaluating demand characteristics indicates it did not impact results. Second, the income shock manipulation and the APT were hypothetical. As such, responses in this hypothetical income shock manipulation may not reflect real-life choices. However, established literature indicates that hypothetical alcohol demand is closely related to actual consumption (Amlung et al., 2012; Amlung & MacKillop, 2015). Third, the current sample consisted of adults who both reported drinking alcohol and not drinking alcohol. These findings cannot be generalized to heavy drinkers or a sample with alcohol use disorder. Fourth, data were collected via MTurk. Prior research has supported the validity and reliability of MTurk data (Hauser & Schwarz, 2016), especially in addiction variables (Kim & Hodgins, 2017). In addition, numerous checks were implemented to mitigate data quality concerns (see Methods). Last, although the 5-choice discounting task is an efficient method of estimating discounting rate across multiple reward magnitudes and commodities, this measure does not allow for calculating consistency of behavioral responses. This may be especially important in MTurk settings, given concerns about participant effort, although it is worth noting that the task has been used in multiple prior MTurk studies (Mellis et al., 2017; Stein et al., 2016; Strickland et al., 2017). Future research would benefit from discounting tasks that permit the calculation of multiple indifference points and measures of response consistency.

In conclusion, this study replicated and built upon prior literature assessing the impact of negative income shock on delay discounting among drinkers and non-drinkers. Furthermore, this study is the first to examine the impact of income shock on alcohol demand. This study lays the foundation for future research to explore how recent changes in income may influence delay discounting and alcohol demand among a general community sample and a sample of heavy drinking adults or individuals with alcohol use disorder. Finally, this study establishes the importance and essential need to examine income shock on secondary commodities (i.e., alcohol) to inform potential behavioral economic demand-based treatment targets for individuals seeking treatment for their addictive disorder.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

Adamson SJ, Kay-Lambkin FJ, Baker AL, Lewin TJ, Thornton L, Kelly BJ, & Sellman JD (2010). An improved brief measure of cannabis misuse: The Cannabis Use Disorders Identification Test-Revised (CUDIT-R). Drug and Alcohol Dependence, 110(1–2), 137–143. 10.1016/j.drugalcdep.2010.02.017 [PubMed: 20347232]

Amlung M, Acker J, Stojek M, Murphy J, & Mackillop J (2012). Is Talk "Cheap"? An Initial Investigation of the Equivalence of Alcohol Purchase Task Performance for Hypothetical and Actual Rewards. Alcoholism: Clinical and Experimental Research, 36(4), 716–724. 10.1111/j.1530-0277.2011.01656.x [PubMed: 22017303]

Amlung M, & MacKillop J (2015). Further evidence of close correspondence for alcohol demand decision making for hypothetical and incentivized rewards. Behavioural Processes, 113, 187–191. 10.1016/j.beproc.2015.02.012 [PubMed: 25712039]

Baker F, Johnson M, & Bickel W (2003). Delay discounting in current and never-before cigarette smokers: Similarities and differences across commodity, sign, and magnitude. Journal of Abnormal Psychology, 112(3), 382–392. 10.1037/0021-843X.112.3.382 [PubMed: 12943017]

Bickel WK, George Wilson A, Chen C, Koffarnus MN, & Franck CT (2016). Stuck in Time: Negative income shock constricts the temporal window of valuation spanning the future and the past. PLoS ONE, 11(9), 1–11. 10.1371/journal.pone.0163051

Bickel WK, Johnson MW, Koffarnus MN, MacKillop J, & Murphy JG (2014). The Behavioral Economics of Substance Use Disorders: Reinforcement Pathologies and Their Repair. Annual Review of Clinical Psychology, 10(1), 641–677. 10.1146/annurev-clinpsy-032813-153724

Blain B, Globig L, & Sharot T (2021). Income shock increases delay discounting independently of emotion. PsyArXiv 10.31234/osf.io/yhm3b

Bush K, Kivlahan DR, McDonell MB, Fihn SD, & Bradley KA (1998). The AUDIT alcohol consumption questions (AUDIT-C): An effective brief screening test for problem drinking. Archives of Internal Medicine, 158(16), 1789–1795. 10.1001/archinte.158.16.1789 [PubMed: 9738608]

Craft WH, Tegge AN, & Bickel WK (2021). Narrative theory IV: Within-subject effects of active and control scarcity narratives on delay discounting in alcohol use disorder. Experimental and Clinical Psychopharmacology 10.1037/pha0000478

Hauser DJ, & Schwarz N (2016). Attentive Turkers: MTurk participants perform better on online attention checks than do subject pool participants. Behavior Research Methods, 48(1), 400–407. 10.3758/s13428-015-0578-z [PubMed: 25761395]

Haushofer J, Schunk D, & Fehr E (2013). Negative Income Shocks Increase Discount Rates. University of Zurich Working Paper

Johnson M, & Bickel W (2006). Within-subject comparison of real and hypothetical money rewards in delay discounting. Journal of the Experimental Analysis of Behavior, 77(2), 129–146. 10.1901/jeab.2002.77-129

Kaplan BA, Foster RNS, Reed DD, Amlung M, Murphy JG, & MacKillop J (2018). Understanding alcohol motivation using the alcohol purchase task: A methodological systematic review. Drug and Alcohol Dependence, 191, 117–140. 10.1016/j.drugalcdep.2018.06.029 [PubMed: 30099174]

Kim HS, & Hodgins DC (2017). Reliability and validity of data obtained from alcohol, cannabis, and gambling populations on Amazon's Mechanical Turk. Psychology of Addictive Behaviors, 31(1), 85–94. 10.1037/adb0000219 [PubMed: 27893213]

Koffarnus MN, & Bickel W (2014). A 5-trial adjusting delay discounting task: Accurate discount rates in less than one minute. Experimental and Clinical Psychopharmacology, 22(3), 222–228. 10.1037/a0035973 [PubMed: 24708144]

Koffarnus MN, Franck CT, Stein JS, & Bickel WK (2015). A modified exponential behavioral economic demand model to better describe consumption data. Experimental and Clinical Psychopharmacology, 23(6), 504–512. 10.1037/pha0000045 [PubMed: 26280591]

Manning WG, Blumberg L, & Moulton LH (1995). The demand for alcohol: The differential response to price. Journal of Health Economics, 14(2), 123–148. 10.1016/0167-6296(94)00042-3 [PubMed: 10154654]

Mellis AM, Athamneh LN, Stein JS, Sze YY, Epstein LH, & Bickel WK (2018). Less is more: Negative income shock increases immediate preference in cross commodity discounting and food demand. Appetite, 129(March), 155–161. 10.1016/j.appet.2018.06.032 [PubMed: 29959952]

Mellis AM, Snider SE, & Bickel WK (2018). Narrative Theory: II. Self-Generated and Experimenter-Provided Negative Income Shock Narratives Increase Delay Discounting. Experimental and Clinical Psychopharmacology, 26(2), 113–118. 10.1037/pha0000168.supp [PubMed: 29337585]

Mellis AM, Woodford AE, Stein JS, & Bickel WK (2017). A second type of magnitude effect: Reinforcer magnitude differentiates delay discounting between substance users and controls. Journal of the Experimental Analysis of Behavior, 107(1), 151–160. 10.1002/jeab.235 [PubMed: 28101922]

Murphy JG, & MacKillop J (2006). Relative reinforcing efficacy of alcohol among college student drinkers. Experimental and Clinical Psychopharmacology, 14(2), 219–227. 10.1037/1064-1297.14.2.219 [PubMed: 16756426]

Nelson JP (2013). Does Heavy Drinking by Adults Respond to Higher Alcohol Prices and Taxes? A Survey and Assessment. Economic Analysis and Policy, 43(3), 265–291. 10.1016/S0313-5926(13)50032-4

Owens MM, Murphy CM, & MacKillop J (2015). Initial development of a brief behavioral economic assessment of alcohol demand. Psychology of Consciousness: Theory, Research, and Practice, 2(2), 144–152. 10.1037/cns0000056 [PubMed: 27135038]

Snider SE, Mellis AM, Poe LM, Kocher MA, Turner JK, & Bickel WK (2020). Reinforcer Pathology: Narrative of Hurricane-Associated Loss Increases Delay Discounting, Demand, and Consumption of Highly Palatable Snacks in the Obese. Psychology of Addictive Behaviors, 34(1), 136–146. 10.1037/adb0000498 [PubMed: 31478704]

Stein JS, Craft WH, Paluch RA, Gatchalian KM, Greenawald MH, Quattrin T, Mastrandrea LD, Epstein LH, & Bickel WK (2021). Bleak present, bright future: II. Combined effects of episodic future thinking and scarcity on delay discounting in adults at risk for type 2 diabetes. Journal of Behavioral Medicine, 44(2), 222–230. 10.1007/s10865-020-00178-7 [PubMed: 32989616]

Stein JS, Koffarnus MN, Snider SE, Quisenberry AJ, & Bickel W (2015). Identification and management of nonsystematic purchase task data: Toward best practice. Experimental and Clinical Psychopharmacology, 23(5), 377–386. 10.1037/pha0000020 [PubMed: 26147181]

Stein JS, Wilson AG, Koffarnus MN, Daniel TO, Epstein LH, & Bickel WK (2016). Unstuck in time: episodic future thinking reduces delay discounting and cigarette smoking. Psychopharmacology, 233(21–22), 3771–3778. 10.1007/s00213-016-4410-y [PubMed: 27553824]

Strickland JC, Lile JA, & Stoops WW (2017). Unique prediction of cannabis use severity and behaviors by delay discounting and behavioral economic demand. Behavioural Processes, 140(February), 33–40. 10.1016/j.beproc.2017.03.017 [PubMed: 28347716]

Sze YY, Stein JS, Bickel WK, Paluch RA, & Epstein LH (2017). Bleak Present, Bright Future: Online Episodic Future Thinking, Scarcity, Delay Discounting, and Food Demand. Clinical Psychological Science, 5(4), 683–697. 10.1177/2167702617696511 [PubMed: 28966885]

Public Significance Statement:

Income shock manipulations are when participants are presented with a hypothetical scenario where they may lose money, gain money, or have their income remain the same. When losing money, a general sample of adults prefer smaller-immediate rewards over larger-later rewards. They also will suppress their consumption of alcohol at a lower price compared to before losing money. These results indicate that manipulating the amount of accessible money for a participant can influence their decision-making around their preferences for money and how much they are willing to spend on alcohol.

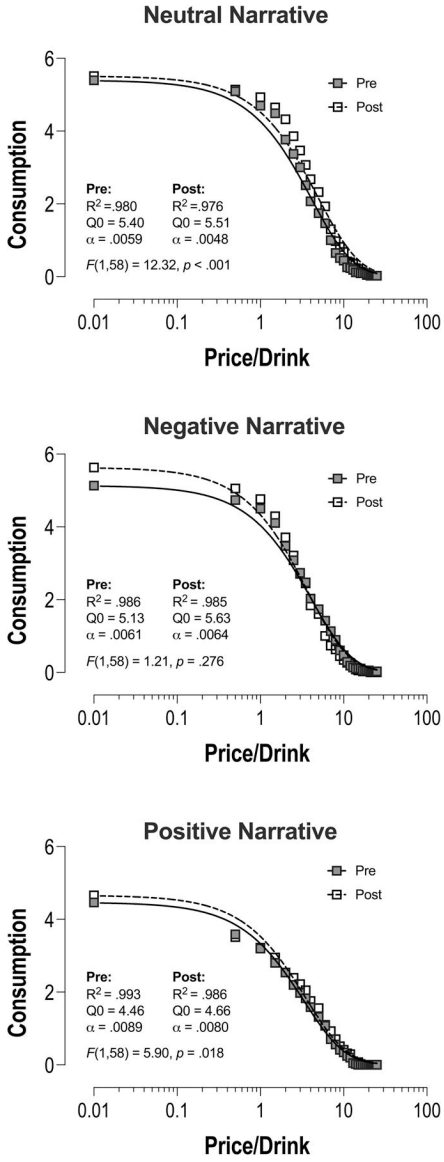

Figure 1. Pre and Post Income Shock Narrative Demand Curves for APT by Condition.
Self-reported consumption of alcohol (in standard drinks) across price per drink on the hypothetical alcohol purchase task. Filled markers reflect the pre-narrative data; unfilled markers reflect post-income shock narrative data. Individual data points reflect the mean at each price point.

Table 1.

Participant Characteristics

	Entire Sample (N = 140)	Negative (N = 42)	Neutral (N = 51)	Positive (N = 47)	X^2/F	*p*
Demographics						
Age	38.81 (11.34)	39.00 (11.66)	38.87 (11.12)	39.13 (11.52)	.061	.940
Sex	37.1% Female	38.1% Female	37.3% Female	36.2% Female	2.43	.658
Gender	37.1% Women	38.1% Women	37.3% Women	36.2% Women	2.43	.658
Race	77.1% White	76.2% White	78.4% White	76.6% White	8.65	.566
	7.1% Black/AA	9.5% Black/AA	2.0% Black/AA	10.6% Black/AA		
	7.1% Hispanic/Latino	9.5% Hispanic/Latino	9.8% Hispanic/Latino	2.1% Hispanic/Latino		
Education	40% Bachelor's Degree	47.6% Bachelor's Degree	39.2% Bachelor's Degree	34% Bachelor's Degree	2.86	.943
	25% Some College	26.2% Some College	23.5% Some College	25.5% Some College		
Drinking Status	80.7% Drinkers	83.3% Drinkers	76.5% Drinkers	83% Drinkers	.930	.628
	19.3% Non-Drinkers	16.7% Non-Drinkers	23.5% Non-Drinkers	17% Non-Drinkers		
Substance Use						
AUDIT-C	2.68 (2.51)	2.48 (2.11)	3.12 (2.88)	2.38 (2.38)	1.25	.289
Cannabis Use Frequency	75.7% Never	78.6% Never	70.6% Never	78.7% Never	7.79	.454
	10.0% Monthly or Less	14.3% Monthly or Less	11.8% Monthly or Less	4.3% Monthly or Less		
	2.9% 2–4 / month	0% 2–4 / month	2.0% 2–4 / month	6.4% 2–4 / month		
	2.9% 2–3 / week	2.4% 2–3 / week	3.9% 2–3 / week	2.1% 2–3 / week		
	8.6% Daily	4.8% daily	11.8% Daily	8.5% Daily		
Cigarettes / Day (N = 16)	15.31 (9.78)	12.17 (7.36)	18.00 (13.16)	16.00 (8.00)	.512	.611
E-Cig Use Frequency (N = 43)	27.9% Daily or Almost Daily	26.7% Daily or Almost Daily	25% Daily or Almost Daily	33.3% Daily or Almost Daily	6.49	.370
	7.0% Once a week	13.3% Once a week	6.3% Once a week	0% Once a week		
	20.9% less than monthly	13.3% less than monthly	37.5% less than monthly	8.3% less than monthly		
	44.2% Not at all	46.7% Not at all	31.3% Not at all	58.3% Not at all		

Note: age, sex, gender, race, education, drinking status, cannabis use frequency, and e-cig use frequency are percentages. All other values presented are means and standard deviations. Age, AUDIT-C, and Cigs / Day report F-statistics; all other variables report Chi-Square statistics.