An Economic Response to the Substance Use Crisis

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Behavioral economic theories can be applied to substance use in an effort to understand an individual's demand, utility maximization, and consumption over time for addictive goods. These theories can shape public policy in a way that would both reduce the consumption of addictive substances and help people on their road to recovery. This paper examines the current research on behavioral economic theories on substance use as well as the implications of these theories on public policy.

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INTRODUCTION

Over 41 million individuals aged 12 and older needed addiction treatment in 2020, yet only 6.5 percent received it (Substance Abuse and Mental Health Services Administration (SAMHSA) National Survey on Drug Use and Health (NSDUH) 2021, 38). The number of individuals needing addiction treatment is steadily increasing, and overdose deaths have tripled over the past 30 years (Addiction Center 2021). The COVID-19 pandemic has only exacerbated these problems (SAMHSA NSDUH 2021, 51); between physical distancing restrictions and stress from the economic fallouts of the pandemic, behavioral economic theory suggests that now, more than ever, people are at risk of starting or worsening addictions (Acuff, Tucker, & Murphy 2020, 1). This paper utilizes behavioral economics, a branch of economics that uses psychology to understand preferences and consumption behavior, to analyze various policy responses to the substance use crisis in the United States (MacKillop 2012, 2191).

Studying behavior associated with addictive substances separately from other goods is an important distinction as individuals have been shown to behave differently when consuming addictive substances. For example, when someone has a substance use disorder, paying to regularly consume that good often accounts for a large amount of money each month (Office of National Drug Control Policy 2014, 32-33). Additionally, substance use disorder can be further complicated by health inequities and social determinants of health – for example, individuals who smoke tobacco daily are more likely to be in the lower-income bracket and less educated (Van den Brand 2019, 61).

In this paper, the terms ‘substance use’ and ‘substance use disorder’ will be heavily used. For the purposes of this research, substance use refers to the repeated use of addictive substances—such as tobacco, alcohol, opioids, and methamphetamines. Substance use disorder (SUD) describes a condition diagnosed by a healthcare provider in which an individual’s substance use leads to impairment in their ability to function. It is critical to focus on the full spectrum of substance use in the United States. While the country continues to face an opioid crisis, other addictive substances, such as alcohol, lead to an even greater number of annual deaths (Ingoglia 2021). Additionally, polysubstance use is rampant and deadly – more than 90 percent of individuals with an opioid use disorder use more than two other substances, and over a quarter of those individuals have been diagnosed with several SUDs (Hassan and Le Foll 2019, 31).

Through analyzing various behavioral economic theories against possible federal public policy, this research finds that increased contingency management and medication-assisted treatment, as well as a tobacco price floor, are effective, equitable, and politically feasible — and thus form an effective policy strategy to reduce substance use rates.

BEHAVIORAL ECONOMICS OF SUBSTANCE USE

Several behavioral economic theories shed light on how economics can address the substance use crisis. Overall, many theories find that substance use stems from various influences on an individual’s demand for the substance, the availability of the good and its alternative reinforcers (behaviors that increase use of the substance), and its impact on someone’s total satisfaction over time. According to Acuff et al., someone is at the highest risk of substance use

when they prefer immediate rewards, when the costs of using are low, and where there is a dearth of substance-free alternatives (Acuff, Tucker, & Murphy 2020, 3).

THEORY OF RATIONAL ADDICTION

The Theory of Rational Addiction, first defined by Becker and Murphy in 1988, posits that individuals are addicted to a good if an increase in their past consumption raises current consumption (Becker and Murphy 1988, 675). Further, Becker states that individuals behave 'rationally,' meaning that they have stable preferences, consistently maximizing their utility over time (Becker and Murphy 1988, 675). This theory has been somewhat contradicted by various economists since its introduction, with many papers indicating that the underlying assumptions do not hold up (Rogeberg 2004, 263). Two examples of these assumptions included: individuals make detailed, forward-looking plans and people would not want to use addictive goods if they knew they were vulnerable to the harms caused by those goods (Rogeberg 2004, 274). However, Becker and Murphy's theory was one of the first instances of economics studying addictive behavior and has informed nearly every subsequent theory in this paper. Researchers have also numerous attempted to empirically study the Theory of Rational Addiction, yet most studies were either inconclusive or could not corroborate the theory (Skog and Melberg 2006, 1444).

Becker and Murphy theorized that "anxiety and tension," as well as "divorce, unemployment, death of a loved one, and other stressful events" could lead to addiction (Becker and Murphy 1988, 690). In this case, an increase in stress temporarily lowers an individual's utility (or satisfaction) while simultaneously raising an addictive good's marginal utility — the additional utility someone receives from one more unit of that good. This theory also stresses the importance of the future because current consumption is partially motivated by the effect consuming that good will have on the future (Becker and Murphy 1998, 682). For example, the Theory of Rational Addiction assumes that an individual will rationally consider both the delayed and immediate risks and benefits to using heroin. If a future where an individual still uses is better than one without, they will choose to continue using heroin. As their tolerance grows over time, an individual would meet that higher demand with increased use (Rogeberg 2004, 271). The thought behind this is that using heroin today may cause withdrawal tomorrow, but an increased amount of heroin tomorrow will make the individual happier and eliminate the worry for withdrawal. Heavy users, according to Becker and Murphy, experience an especially strong effect of their past consumption on current consumption, causing their future consumption to be unstable and prone to binges (Becker and Murphy 1988, 693).

Recovery, according to the Theory of Rational Addiction, is only possible through quitting "cold turkey." If external events lower an individual's demand for the addictive good, they exchange a short-term loss in utility — i.e., they quit using — for the longer-term gain of sobriety (Becker and Murphy 1988, 692). The authors argue that part of the reason that many individuals often relapse is that, while short-term, it is a sizable loss in utility to stop consuming addictive substances (Becker and Murphy 1988, 692). Someone with a SUD would likely consider the cost-benefit analysis and determine that they prefer the utility from consuming their preferred good over any possible costs. A rational individual may attempt another way to alter their tastes to find another, more effective way to quit using substances (Becker and Murphy 1988, 693). However, in practice, quitting completely — especially without medical supervision—cannot only be

incredibly difficult and less sustainable, but depending on the substance, it could also be dangerous (Hartney 2021).

LAW OF DEMAND

Other significant behavioral economic theories focused on substance use analyze the effects of addiction on an individual's demand. Caulkins and Nicosia theorized that substance use obeys the 'Law of Demand' as other non-addictive substances do (Caulkins and Nicosia 2010, 1156). As price rises, people will consume less of the good. Initial assumptions about individuals who live with SUD might indicate that they are not price-sensitive — and that their addiction overrides the need to consume less as price rises. However, this has not been shown to be the case. Even heavy users decrease their consumption with an increase in prices, although price elasticity has been shown to change depending on the individual and substance (Caulkins and Nicosia 2010, 1157). A possible explanation for this price sensitivity is that the addictive good is often a large portion of a heavy user's budget, and someone may not have the option to be price insensitive (Caulkins and Nicosia 2010, 1156).

DISCOUNTING

Another key behavioral economic theory analyzing substance use is discounting — specifically delayed, hyperbolic, and probability discounting. Delayed discounting is a concept of decision-making and impulsivity wherein individuals prefer a more immediate, smaller reward over a larger reward later (Acuff, Tucker, & Murphy 2020, 1). Various events can lead to increased delayed discounting, including uncertainty or stress. Several behavioral economists have listed delayed discounting as a risk factor for substance use (Murphy and Dennhardt 2015, 28). When considering using an addictive substance, Vuchinich suggests that individuals may value their local utility (short-term decisions) over their global utility (values over the long term), leading to a pattern of use (Vuchinich 1995). Individuals discount their health outcomes more frequently in "hot" states — such as being in withdrawal or feeling particularly stressed — which could be another explanation for relapse during withdrawal (Loewenstein 2005, S50).

Temporal discounting changes when an action's rewards are more near or distant in the future. An example of this is hyperbolic discounting, an intention-incongruent action where people change their preferences over time. If a reward will happen soon, that is preferred over a reward that will happen in the far future (Bickel et al 2014, 647; Story et al 2014, 1). For example, an individual may, at first, have the intention and desire to become sober, but as the week progresses — and they are invited to a party or offered the opportunity to use drugs — this may result in them reversing that preference for sobriety to more highly value consuming that drug. This theory, in contrast with the Theory on Rational Addiction, may have different implications for government intervention. If individuals are acting rationally, government intervention to reduce internalities, or long-term costs and/or benefits that someone may not consider, may lead to increased social welfare (Caulkins and Nicosia 2010, 1157). Temporal discounting has been studied empirically as well. One study found that individuals currently using opioids had a higher discounting rate for both money and heroin than individuals who were abstinent from heroin (Petry 2003, 138).

Theories on discounting also address probability discounting, where an individual's uncertainty leads them to devalue future rewards (Bickel et al 2014, 649). There have been mixed findings on probability discounting as it relates to substance use, but the theory indicates that uncertain future rewards, such as better health or a strengthened relationship with family, might be undervalued when compared to the certain reward that comes with substance use (Bickel et al 2014, 649).

REINFORCEMENT PATHOLOGY

Temporal discounting can subsequently influence several other behavioral economic forces that may lead to addiction, including alternative reinforcers. Other, non-substance use-related activities — such as exercise, time spent with friends, or work — can be considered alternatives to substance use. The relative availability and price of those activities, in comparison, have been shown to lead someone to either increase or decrease their use (Murphy and Dennhardt 2016, 24). Rewards from non-substance use activities are often more delayed than rewards from substance use, so there is a temporal factor to consider as well. Substance use can also lead to a self-perpetuating pattern, as other activities can often be at direct odds with being able to regularly consume addictive substances. When the availability of alternative behaviors decreases with increased substance use, their frequency of use will subsequently increase as well (Rachlin 1997, 464). These patterns can also be reversed—regularly engaging in alternative reinforcing activities offers less opportunity for substance use (Acuff, Tucker, & Murphy 2020, 4).

Alternative reinforcing activities become especially important when considering addiction to readily available substances, such as alcohol and tobacco. Studies have found that withdrawal from certain substances has led to increased demand for substitutable drugs, and occasionally those will be easier to access (Wade-Galuska et al 2011, 1). This aspect of the theory may also partially explain why substance use increased significantly during the COVID-19 pandemic; the social distancing restrictions decreased individuals' opportunity costs of substance use (such as needing to wake up early and commute to work) and created barriers to alternative reinforcers and substance use care (Acuff, Tucker, & Murphy 2020, 3).

ENVIRONMENTAL CUES

Peter Landry recently presented a theory of relapse wherein consumption of an unwanted good (i.e., consuming alcohol when you have intentions to quit) would remove short-run urges, but ultimately increase the long-run frequency of use (Landry 2019, 785). Environmental cues, such as a beer advertisement or walking past someone smoking, can trigger these urges significantly. Being near someone else smoking has been found to increase an individual's propensity to smoke — a rate tripled if one is an occasional smoker versus a daily smoker (Shiffman et al 2014, 6).

IMPLICATIONS FOR PUBLIC POLICY

Each of the preceding behavioral economic theories lend insights into best practices for addiction prevention, treatment, and harm reduction public policy. For the purposes of this paper,

only federal policy options will be considered, but there are implications for policymaking at all levels of government.

FEDERAL BAN ON ADDICITIVE GOODS

One of the most drastic policies to address addiction would be to ban certain legal addictive substances, such as alcohol or tobacco. This ban can range from the banning of sales to restricting use in certain settings, such as on public lands. Studies have shown that light substance and non-substance users may benefit the most from these types of bans (Landry 2019, 788). Indoor smoking restrictions led to decreased use for light smokers and a higher utility for non-smokers, but heavy users found other locations to smoke and had a decreased utility (Brooks and Mucci 2001, 302). This behavior can be partially explained by the Theory of Rational Addiction in that the non-monetary cost of smoking for light users was increased to the point that it outweighed the benefits from smoking — leading to a change in behavior (Becker and Murphy 1988, 687).

However, when considering efficiency, a policy that does not change the behaviors of the heaviest users would need to be paired with another policy to support them. Additionally, any ban on the sale or use of a good would likely face strong pushback from that industry or lead to illicit use of the substance, reducing the policy's feasibility. There are also alternative behavior consequences for this policy. Many people use addictive substances to self-medicate, sometimes for negative emotions, for weight loss, or pain management to name a few. Some substances, such as tobacco, also serve as substitutes for other, more damaging substances. Removing a good completely from the market might lead to individuals seeking out more dangerous alternatives or engaging in other self-destructive behavior in the absence of that product. Individuals might also turn to the black market, creating a new problem, as exemplified during the United States' Prohibition, which increased supply costs and often decreased the quality and safety of the product (Miron and Zwiebel 1991, 6-7). A decision of this magnitude would be a severely paternalistic decision from the federal government.

CONTINGENCY MANAGEMENT

An alternative policy to support addiction treatment is contingency management, which is an evidence-based therapy where small, immediate rewards are used to promote abstinence (Caulkins and Nicosia 2010, 1157-1558). Contingency management rewards are usually monetary in nature but can be anything from social events to bus passes. These rewards create opportunity costs to substance use and regularly reinforce abstinence (Acuff, Tucker, & Murphy 2020, 5). Contingency management addresses temporal discounting and impulsiveness, which would otherwise increase the probability of substance use. By creating immediate positive rewards for not using addictive substances, individuals are more likely to choose that behavior (at least in the short-run), as using comes with immediate monetary costs (Gneezy, Meier, & Rey-Biel 2011, 204). Many contingency management programs also increase the opportunity cost of substance use over time by gradually increasing the monetary reward with each additional day or week of abstinence (Bickel et al 2014, 658).

However, despite having significant evidentiary claims and reports of cost-effectiveness in certain settings, contingency management programs have both equity and feasibility concerns

(Petry 2010, 1508). There are concerns that contingency management programs may only be effective for those in a lower socioeconomic status, given that monetary rewards or job opportunities would not mean as much to a financially stable individual. Additionally, this policy has faced criticism from politicians and researchers that it is "unethical to pay people for what they should be doing anyway" (Petry 2010, 1507). One way to address this concern is to require contingency management programs to provide a paid employment opportunity, rather than a direct monetary reward (DeFulio and Silverman 2011, 964). While contingency management programs aim to support an individual's autonomy, some argue that this policy encompasses asymmetric paternalism, in that an individual is being nudged toward a decision by an outside force (Acuff, Tucker, & Murphy 2020, 8; Caulkins and Nicosia 2010, 1157-1158). However, the decision is ultimately with the patient deciding whether to remain abstinent.

BANNING ALCOHOL ADS

Several behavioral economic theories of substance use address cue-elicited cravings, where an individual experiences a cue — such as a television advertisement or walking past a bar — which can be a complement for the addictive good, increasing its marginal utility and consumption (MacKillop et al 2010, 1600). A way to combat this phenomenon is to bar alcohol companies from advertising. By decreasing the cue-arrival rate, overall welfare can increase, and theoretically, consumption will decrease (Landry 2019, 795). Light users are estimated to benefit most from this policy — heavy users would not likely need cues to drink, as their regular consumption would be a close pattern of behavior (Landry 2019, 796-797). However, the empirical evidence behind this theory is somewhat mixed. Individuals dependent on substances do report experiencing cravings, but it is unclear in practice whether those cravings lead to increased consumption or a relapse (MacKillop et al 2010, 1599). One study found that alcohol cues led to increased consumption of alcohol, increased intensity of demand, and a willingness to purchase alcohol at a higher price point (MacKillop et al 2010, 1602).

As was seen with contingency management, this policy calls into question the paternalistic nature of the federal government. While individuals may believe this policy constraints their freedom of choice, it does not take away their autonomy to choose to drink, nor is it restricting their ability to do so (Acuff, Tucker, & Murphy 2020, 8). Another possible concern is political feasibility — removing the opportunity to advertise would likely face strong resistance from alcohol companies.

INCREASED ACCESS TO SUBSTITUTE MEDICATIONS

Medication-assisted treatment (MAT) is a comprehensive, evidence-based policy solution to the addiction crisis. Physicians who provide MAT utilize medications, such as buprenorphine and methadone, in combination with therapy to treat SUD (SAMHSA MAT 2021). This treatment utilizes the behavioral economic theory of providing alternative reinforcers. Providing a safely administered alternative to smoking, such as a nicotine patch, can reduce the reinforcing value of tobacco while achieving the short-term need for nicotine (Goelz 2014, 70). Additionally, these medications are often covered by insurance, making them a lower-cost substitute for substance use for people with health insurance. A study out of the United Kingdom showed that mentioning a lower-cost medication to smokers was positively associated with using smoking cessation

medication (Van den Brand et al 2019, 61). A policy that led to increased access to MAT nationwide would likely have a significantly positive effect for individuals across various socioeconomic statuses, as well as those with varying frequencies of use.

This type of therapy already has fairly strong support in federal policy — numerous bills currently support increased access to MAT, such as the Mainstreaming Addiction Treatment Act (S. 445/H.R. 1384) (United States, 117th Congress, 2021). A possible concern is that this policy type only addresses SUD treatment, not prevention, and a comprehensive solution to the substance use crisis would need to address both issues. Additionally, any individual without regular access to healthcare, transportation, or health insurance would have difficulty maintaining the treatment course needed for sustained success.

TOBACCO PRICE FLOOR

A final alternative policy to consider in addressing the substance use crisis is instituting a national tobacco price floor. This policy would create minimum prices for tobacco products. For example, a pack of cigarettes would likely be between $8-13, depending on further research (Boettiger and White 2021, 1). A tobacco price floor would utilize several behavioral economic theories, as well as a foundational element to economics, the importance of price on demand. An increase in cost would likely result in decreased consumption as it would outweigh the benefit of substance use (Bickel et al 2014, 645). This policy would be cost-effective in that an increase in the price of substances has been negatively correlated with hospital admissions and treatment needs (Caulkins and Nicosia 2010, 1156).

Another study found that increasing tobacco prices per pack by $3.64 led up to a 9 percent decrease in consumption, with the greatest reduction being for Black youth and those living below the federal poverty line (Boettiger 2021, 4). Additionally, a tobacco price floor is expected to lead to further decreased consumption than a tobacco tax policy. Golden et al. found a 2 percent difference in consumption between price floor laws and tax laws when comparing similar increases in price (Golden et al 2016, 62).

This policy, however, encompasses some equity concerns. A tobacco price floor would likely have a disproportionate effect on the cheaper brands of tobacco, and some premium brands may be already above the price floor (Golden et al 2016, 64). As such, this policy may primarily impact individuals who smoke those cheaper brands — and likely be in a lower income bracket — and only serve to further strain those individuals' finances (Golden 2016, 64). Additionally, it could create an issue of paternalistic decision-making from the government only on those who cannot afford the higher-priced products. A further complicating factor is that lower-income individuals may not have access to insurance or other resources that would support a healthy cessation transition. This concern can be mitigated by pairing this policy with another that increased access to free tobacco cessation services for low-income or uninsured individuals (Golden 2016, 64). Interestingly, a study by MacKillop et al. found that, when individuals of different income brackets bought the same pack of cigarettes, there was no difference in price sensitivity between the two groups (MacKillop et al 2014, 505).

In terms of feasibility, this policy is likely to face less backlash from the tobacco industry than a policy such as a tax. Revenue from the tobacco price floor, in this case, would remain with the producer — although this could lead to companies reinvesting that profit into marketing and other methods of increasing consumption (Boettiger 2021, 5; Golden 2016, 64). Interestingly, making the price floor a whole number could be key to the efficacy of this policy. MacKillop et al. found that price increases that were 'left-digit effects,' meaning the increase moved to the nearest whole number, led to a decrease in consumption by five times the initial amount (MacKillop et al 2012, 2194).

CONCLUSION

While more research is needed to empirically understand much of the connection between economic theory and practice, behavioral economics provides a strong foundation for examining the decision-making that precedes and follows addictive behavior. Contingency management, medication-assisted treatment, and a tobacco price floor present the strongest possible combinations of efficacy, equity, and political feasibility—though other policies that support mental health, education, economic stability, and strengthened communities would all likely have positive impacts on individuals living with substance use by providing reinforcing alternative behaviors.

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