Mental Health, Mindfulness, and Financial Decisions*

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Abstract

Mental health conditions are widespread and can have significant socioeconomic consequences. Mindfulness, the meditative process of focusing on the present, has gained traction as a cognitive behavioral therapy that can improve mental well-being. We examine whether mindfulness affects individuals' time preferences and, consequently, financial decision-making. We experimentally find that mindfulness increases impatience, leading to lower risky-share allocations and increased investment gain realizations, which reduce portfolio performance. Field data analysis supports these findings. Our results indicate that health treatments can have independent effects on financial decision-making, which is likely to be increasingly relevant as households continue to adopt self-help therapeutics.

Keywords: Digital health therapeutics, disposition effect, household finance, time preferences.

JEL classification: G11, G40, G41, G50.

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1 Introduction

Mental health is a growing concern in the United States. Nearly one in five adults reported experiencing mental afflictions in 2018 (SAMHSA 2018). Subpar mental health has financial ramifications for households by affecting their labor market opportunities, economic primitives (i.e., preferences and expectations), and emotions. Intuitively, this has consequences for households' financial decisions. Individuals with mental health afflictions tend to decrease investments in risky assets and are less likely to hold retirement assets (e.g., Bogan and Fertig (2013) and Bogan and Fertig (2018)), suggesting that it could have implications for wealth inequality (e.g., Saez and Zucman (2016)). In light of the consequences of mental illness, interest in accessible and efficacious treatments is mounting.

Mindful meditation, which calls an individual's awareness to the present moment (Kabat-Zinn 2003), is a promising therapeutic that is growing in popularity. Fueling its adoption among households is mounting evidence that mindfulness is effective at influencing cognitive processes and improving behavioral outcomes (Brown and Ryan 2003). Moreover, mindfulness is an easily accessible, self-help therapeutic that can be learned about and practiced through a variety of channels.[1] For instance, anecdotal evidence suggests that, at the end of 2020, the two leading mindfulness apps, Headspace and Calm, had over 65 million users and relations with approximatively 1,300 employers, including Apple, Amazon, Google, Nike, the National Basketball Association (NBA), the Women's National Basketball Association (WNBA), and Major League Soccer (MLS) (Todd 2020; Potkewitz 2020).

We hypothesize that mindfulness is likely to independently affect an individual's financial decision-making. Specifically, since mindfulness draws focus to the present, we expect that mindful people will have higher rates of time preferences. Importantly, preferences over intertemporal tradeoffs influence numerous life choices, including consumption and savings decisions, as well as aggregate economic outcomes (e.g., Castillo et al. (2011), Courtemanche et al. (2015), Bradford et

[1] One of such channel is the digital therapeutic space. Digital therapeutics refer to health technologies which aim to prevent, manage, or treat medical diseases or disorders (Makin 2019). Mounting evidence shows that digital therapeutics, both independently and when combined with conventional treatments, are effective for a growing range of health concerns, such as attention deficit hyperactivity disorder, asthma, cancer, schizophrenia, and insomnia (e.g., Freeman et al. (2017), Barrett et al. (2018), Craig et al. (2018), and Denis et al. (2019).) Fueled by households' digital embracement, the meditation and mindfulness industry is growing rapidly, generating over a billion dollars in 2015 (Wieczner 2016).

al. (2017), and Dohmen et al. (2018)). Impatient individuals are less likely to save for the future, allocate less resources to financial and productive assets, and have a greater propensity to realize stock gains (Romer 1990; Barberis and Xiong 2012; Bogan and Fertig 2018).

We conduct four experiments with a total of 1,164 participants to examine the effects of mindfulness on financial decision-making. We implement our experiments using Amazon's Mechanical Turk (MTurk) website, which is an online platform that facilitates access to a large pool of potential research participants. The platform has been widely adopted by disciplines that leverage experimental techniques, including economics and finance researchers (e.g., Olea and Strzalecki (2014), Kuziemko et al. (2015), D'Acunto (2018), and Meier, Niessen-Ruenzi, and Ruenzi (2018)), and a growing body of studies find that MTurk participants – which offer the advantages of greater socioeconomic heterogeneity compared with traditional laboratory samples, produce similar quality data to that from in-lab studies (Casler, Bickel, and Hackett 2013; Goodman, Cryder, and Cheema 2013).

To isolate the causal effects of a mindful mindset, we randomly assign some individuals to engage in a mindful meditation session. The meditation exercise consists of a digital, guided audio recording developed by the University of California Los Angeles (UCLA) Mindful Awareness Research Center. We then compare the financial choices of participants who complete the mindfulness prime (i.e., treatment condition) to those of individuals who do not complete the meditation (i.e., control condition) to provide causal insights.

First, we examine to what extent mindfulness influences individuals' time preferences using a standard lottery choice task (e.g., Tanaka, Camerer, and Nguyen (2010)). In the task, individuals choose between lotteries wherein the associated financial payouts are either received today or in the future. We find that mindful individuals have higher discount rates. Based on a quasi-hyperbolic discounting model, the average mindful participant is willing to accept \$90.37 today instead of \$150 in two months. The average control participant requires \$93.78 to complete the exchange. The influence of a mindful mindset is not subsumed by myriad elements which are known to affect individuals' financial decisions, including age, education, gender, income, racial identity, marital status, ex ante risk tolerance, political affiliation, objective financial literacy, perceived financial knowledge, numeracy, optimism, economic outlook, trust in financial markets, and investment experience.

Since mindfulness causes individuals to discount future economic benefits more severely, we expect mindful participants to allocate less savings to financial assets. To test our conjecture, we conduct a savings decision experiment following Weber and Camerer (1998) and Bazley, Cronqvist, and Mormann (2020). In the experiment, individuals decide the amount of financial wealth to hold in cash, which provides zero return, and to invest among four risky-assets, i.e., stocks. We find that individuals who complete the mindfulness meditation allocate about 14% more to cash relative to participants in the control group.

In our third experiment, we examine whether mindfulness affects households' investment portfolio choices. We follow Frydman and Rangel (2014) and Bazley, Moore, and Murren Vosse (2019) and construct an experimental market in which participants make a series of stock trading decisions. Prior to trading, some investors are randomly assigned to complete the mindfulness meditation session. The evidence shows that mindfulness impacts investors' portfolio decisions. In particular, treated investors are more disposed towards realizing stock gains, realizing about 18% more than counterfactual investors. The evidence is consistent with the theoretical relation between discount rates and trading behavior proposed by Barberis and Xiong (2012). Moreover, by realizing investment gains, mindful investors generate lower returns and hold more concentrated portfolios. We do not find that mindful participants are significantly more willing to realize investment losses.

The collective evidence shows that mindful meditation influences investment decision-making. Individuals who engage in the therapeutic are likely to apply higher discount rates to future economic payouts, which leads to reduced allocation of savings to investment assets and disposes investors towards realizing investment gains. A potential concern is that mindfulness may affect economic decision-making through known emotional channels. For instance, mindfulness could relate with positive affect and reduced stress (e.g., Dixon and Overall (2016) and Finkelstein-Fox, Park, and Riley (2019)), and visceral factors influence intertemporal choice (Loewenstein 2000). To examine whether emotions are the primary driver of our results, we have participants complete a validated psychological questionnaire, the PANAS-X (e.g., Watson and Clark (1999)), that evaluates several dimensions of emotions. Based on their responses, we construct measures of participants' negative and positive affect. The effects of mindfulness persist when controlling for emotional states.

We investigate several alternative mechanisms through which mindfulness could affect financial

decision-making, including risk preferences, loss aversion, and subjective probability weights. We find no evidence that mindful meditation influences these decision determinants. Beliefs about future economic outcomes also play a role in individuals' portfolio choices (Biais, Bossaerts, and Spatt 2010; Dominitz and Manski 2011; Meeuwis, Parker, Schoar, and Simester 2018; Giglio, Maggiori, Stroebel, and Utkus 2019). In our fourth experiment, we elicit participants' expectations of future stock returns and find no significant differences between mindful and counterfactual individuals' beliefs. Overall, the evidence indicates that mindful meditation's emphasis on the present moment is likely to influence individuals' financial choices through time preferences.

The key advantage of our experimental frameworks is that they enable us to provide causal insights into the effects of mindfulness in the financial domain. However, as with any experiment, external validity concerns arise. As a step towards addressing concerns related to the generalizability of our experimental findings, we use field data from the 2016 wave of the Health and Retirement Survey. The biennial survey, conducted by the National Institute of Aging, is frequently used by researchers to examine households' decisions because it contains detailed demographic, economic, and health information (Bogan and Fertig 2013). We utilize the 2016 wave because it elicits individuals' time preferences, investment allocations, and whether they meditate, which we use as a proxy for mindfulness, since it is a common form of meditation.[2] We find that individuals who meditate regularly report shorter financial planning horizons and allocate 9%–14% less of their liquid wealth to investment assets. While we cannot fully identify whether survey respondents' meditative practices strictly adhere to the mindfulness principles, the empirical evidence is nevertheless consistent with our experimental findings. The field data results also suggest that the effects of meditative practices are durable, likely influencing financial decisions that are made even after time has passed since meditating.

This paper contributes to the health, psychology, and judgment and decision-making literatures. Self-regulation, the ability to govern one's arousal and emotions, underpins decision-making and behavior (Kopp 1982; Damasio 1994; Loewenstein 1996; Posner and Rothbart 2000). Recent studies indicate that mindfulness may support self-regulation. Robins et al. (2012) and Shussler et al.

[2]The disclosure of meditation behavior is only reported in the 2016 survey wave, and, thus, we are unable to examine time-series variation. We acknowledge that the choice to meditate among survey participants is not random. Nevertheless, we explore the link between meditative practices and both time preferences and investment allocations in order to examine whether real-world behavior supports behavior observed in the online lab.

(2020) find that mindfulness helps individuals to govern their emotional processes and to decrease their stress levels. There is also evidence suggesting that mindfulness can be used to effectively treat symptoms of post-traumatic stress disorder (Boyd, Lanius, and McKinnon 2018). Importantly, both stress and extreme traumatic experiences, like terrorist attacks, are known to influence economic choices and information flows in asset markets (Porcelli and Delgado 2009; Voors, Nillesen, Verwimp, Bulte, Lensink, and Van Soest 2012; Wang and Young 2019; Cuculiza, Antoniou, Kumar, and Maligkris 2020). We add to these literatures by showing that this widely promoted and commonly used treatment option for many emotional stressors can create externalities on users' investment choices.

We also complement the time preferences literature by showing that mindfulness influences financial decisions through its effect on individuals' discount rates. Traditional models in the financial economics literature typically take time preferences as given (e.g., Samuelson (1937)). However, emerging evidence suggests that they are endogenously determined (e.g., Becker and Mulligan (1997)), varying across cultures and with circumstances (Fuchs 1982; Loewenstein and Prelec 1992; Shu 2010; Meier and Sprenger 2015; Wang, Rieger, and Hens 2016). For instance, calling attention to one's future self, such as through age-progressed photographs, influences an individual's savings choices (Ersner-Hershfield, Wimmer, and Knutson 2009; Hershfield, Goldstein, Sharpe, Fox, Yeykelis, Carstensen, and Bailenson 2011). Our results indicate that mindfulness, which is both a therapeutic and a dispositional trait that is likely inherent in all people to facilitate adaptive functioning (e.g., Brown and Ryan (2003) and Kabat-Zinn (2003)), may contribute to heterogeneous preferences over intertemporal tradeoffs.

Lastly, we advance the household and behavioral finance literatures. Despite canonical predictions that investors should hold diversified portfolios and limit their trading, empirical evidence suggests that individuals tend to tilt their portfolios towards a few risky assets, trade frequently, and exhibit behavioral biases (Polkovnichenko 2005; Feng and Seasholes 2005; Frazzini 2006; Barber, Lee, Liu, and Odean 2007; Barber, Lee, Liu, and Odean 2009). In particular, the disposition effect, the tendency to retain assets that have fallen in price and sell assets that have risen in value, is a robust behavioral bias that reduces investors' portfolio performance and leads to less efficient asset markets (Shefrin and Statman 1985; Odean 1998; Genesove and Mayer 2001; Shumway and Wu 2005; Frazzini 2006; Goetzmann and Massa 2008; Kaustia 2010; Birru 2015). Examining in-

vestors' financial choices is crucial to understanding financial outcomes, as well as for developing normative implications (Campbell 2006; Gomes, Haliassos, and Ramadorai 2020). For instance, suboptimal investment decisions have wealth consequences (e.g., Fagereng, Guiso, Malacrino, and Pistaferri (2020)) and can distort aggregate growth (e.g., Bhamra and Uppal (2019)). As a result, improving individuals' financial decisions can have significant benefits for households and society. While promoting mental well-being, such as through cognitive behavioral treatments, is likely to support financial decision-making, we show that treatment plans can independently affect economic primitives and have negative financial consequences. Overall, the implications of our findings are likely to be increasingly relevant given households' growing embracement of digitally-facilitated mental health therapeutics.

2 Hypotheses Development

A long standing literature examines the relation between health and socioeconomic status (e.g., Grossman (1972) and Smith (1999)). Poor health may impede the accumulation of financial wealth while variation in economic resources may produce variation in health outcomes (Pritchett and Summers 1996; Engelberg and Parsons 2016). For instance, ill health can constrain labor market opportunities and inhibit an individual's ability to earn income (Bartel and Taubman 1979). While much of the existing literature has focused on physical health, mental health problems are a growing concern that have implications for individuals' financial decisions and economic attainment.

Mental health afflictions are likely to influence households' financial decisions through a variety of channels, including affecting their preferences, expectations of the future, and emotional states. Analogous to physical health shocks, poor mental well-being can induce an individual to take less financial risk since safe financial assets can be used to hedge health risk (Rosen and Wu 2004; Berkowitz and Qiu 2006; Edwards 2010). Rate of time preferences could also be affected by mental health. For instance, mental illness, like physical health issues, may influence one's perceived life span, leading to heavier discounting of future utility (Becker and Mulligan 1997). Mental health can also affect an individual's mood and emotional state. Growing evidence connects sentiment to households' consumption and savings decisions, as well as financial market outcomes (Loewenstein 2000; Baker and Wurgler 2007; Ben-Rephael, Kandel, and Wohl 2012). In addition to affecting

financial primitives and emotions, mental well-being is also likely to influence financial choices through impacting an individual's budget constraint. Several studies link mental health issues to lower labor income and higher medical expenses (Bartel and Taubman 1986; Ettner, Frank, and Kessler 1997; Cseh 2008).

The promotion of mental well-being is likely to support economic and social attainment. Accordingly, there is growing interest in accessible and efficacious treatment plans. The practice of mindful meditation has emerged as a promising option that can be conveyed digitally as a self-help therapeutic (Dimidjian, Beck, Felder, Boggs, Gallop, and Segal 2014; Cavanagh, Strauss, Cicconi, Griffiths, Wyper, and Jones 2013; Mahmood, Hopthrow, and Randsley de Moura 2016). Engagement with mindfulness among American households is expanding. Early survey data, collected in 2012, show that between 2 to 4.3 million adults regularly engaged in mindfulness, with women, Whites, and college educated individuals being prominent practitioners of the technique (Burke, Lam, Stussman, and Yang 2017; Morone, Moore, and Greco 2017). A 2014 Pew Research Center survey of approximately 35,000 Americans indicates that 40% of respondents meditate at least once per week (Masci and Hackett 2018). Supporting the growth are internet-based and mobile phone applications – the two leading mindfulness apps having approximately 65 million users (Todd 2020; Potkewitz 2020). Business enterprises are also increasingly incorporating mindful meditation into employee health initiatives; 52% of the 163 companies jointly surveyed by the National Business Group on Health and Fidelity Investments in 2018 offered mindfulness training (Lau 2020). The tactical benefits of mindfulness are also being explored by the U.S. military (Jha, Morrison, Dainer-Best, Parker, Rostrup, and Stanley 2015).

Fueling the widespread adoption is mounting evidence showing that the use of mindfulness techniques is effective at alleviating physical and mental health afflictions (e.g., Brown and Ryan (2003), Tang et al. (2007), and Morledge et al. (2013)). Recent neuroscientific research provides insights into how the treatment influences individuals' cognitive processes and behaviors. In particular, mindful therapeutics enhance blood flow to the anterior cingulate cortex and insula, as well as reduces activation of the amygdala (e.g., Tang et al. (2015), Creswell et al. (2007), and Kober et al. (2019)).

While mindfulness could affect decision-making through moderating the deleterious effects of poor mental health, elements of the practice itself may influence an individual's financial choices. In

particular, mindfulness' call to focus on the present moment and not to dwell on the past or imagine the future (e.g., Block-Lerner et al. (2007) and Kabat-Zinn and Hanh (2009)), could influence one's time preferences. Importantly, time preferences have implications for individuals' consumption and savings decisions. Impatience encourages current consumption, which could reduce future well-being (Haliassos and Michaelides 2003). Meier and Sprenger (2010) provide empirical support for the relation by linking present bias preferences to households' levels of credit card debt. Higher rates of time preferences also have implications for investment portfolio trading decisions. Barberis and Xiong (2012) develop a theoretical model in which impatience leads investors to realize gains while retaining investments that depreciate in price. Thus, mindful meditation, might increase individuals' tendency to realize gains and retain depreciating assets. However, a recent study by Hafenbrack, Kinias, and Barsade (2014) suggests that mindfulness could decrease susceptibility to the sunk-cost fallacy. By doing so, it may potentially reduce an investor's propensity to hold assets which have declined in value.

Overall, we draw upon the existing psychological, neuroscientific, and financial economic literatures and develop several hypotheses with regards to the role of mindfulness in financial decision-making. First, since mindfulness calls one's attention to focus on the present, we conjecture that it will increase rate of time preferences. By increasing time preferences, mindfulness should also affect households' savings and portfolio choices. We posit that mindful people will retain a greater proportion of their on-hand financial resources for consumption, i.e., allocate less savings to investment assets which provide future economic benefits, such as stocks. We also expect that mindfulness will influence the stock trading decisions of investors. While greater impatience should dispose mindful investors to realize a greater proportion of their gains, mindfulness' effect on the realization of losses is ex-ante ambiguous.

3 Experimental Data and Methodology

We test our hypotheses through several experiments. Experimental research in finance has emerged recently but the methods have a substantial history in economics research (e.g., Smith (1994) and List (2011)). We build upon these well-established procedures to provide causal insights into the effects of mindful meditation on financial decision-making.

3.1 Data

We conduct our experiments on Amazon Mechanical Turk (MTurk). The online platform is being quickly adopted by researchers that utilize experimental techniques (e.g., Olea and Strzalecki (2014), Kuziemko, Norton, Saez, and Stantcheva (2015)), and D'Acunto (2018)) because it provides efficient access to participants.

MTurk has several notable advantages relative to standard laboratory samples. For instance, individuals on MTurk have substantial heterogeneity in terms of socioeconomic characteristics. While standard laboratory samples are frequently constrained to participants between the ages of 18 and 22 with some college education, MTurk participants span the age spectrum and a considerable proportion are college educated and have above-average incomes. Further, MTurk operates as a double-blind platform and facilitates random assignment of individuals into treatment and control conditions. These elements allow people to participate without concern of being identified by the researcher, and vice versa, while also reducing the potential for demand characteristics, which typically arise in traditional classroom-laboratory settings.[3]

Importantly, a growing body of studies compare MTurk participants with standard laboratory samples and find that both the quality of data and the sizes of the estimated effects are similar between the two settings, which reduces concerns related to selection bias (e.g., Goodman, Cryder, and Cheema (2013), Paolacci, Chandler, and Ipeirotis (2010), and Casler, Bickel, and Hackett (2013)). We also implement several pre-established scientific guidelines to ensure the quality of our data (e.g., Goodman and Paolacci (2017)). First, we prohibit individuals who have not satisfactorily completed at least 90% of their prior tasks on the platform from participating in our experiments.[4] Second, we do not allow repeat participation. By precluding individuals from repeating the experiments, we increase the independence of our participants and reduce concerns related to non-naïvité. Additionally, we employ attention checks in our experiments to monitor participants' diligence during the tasks. For example, participants are asked to choose "Asia" from

[3]Demand characteristics refer to when participants decipher the purpose of the experiment and adjust their behavior, even subconsciously, to fit the researchers' expectations (Orne 1962).

[4]In contrast to laboratory studies, the incentive structure of the MTurk platform is conducive to conscientiousness. Upon submitting a completed task, the Requester of the task can opt to reject it. As a result, Workers on the platform are incentivized to follow instructions and pay attention to the task. In addition, Requesters typically require Workers to have high approval rates. This qualification implies that, over time, more rejections will make fewer tasks available to poor performing individuals. Ultimately, sub-par performance affects individuals' immediate as well as future compensation.

a set of choices that included, in random order: "Asia," "North America," "South America," and "Europe." As another diligence measure, we account for participants' time spent performing the task. Finally, we identify and exclude outliers, which may appear more commonly in experimental data, related to participants' forecasts of future economic outcomes.

3.2 Experimental Conditions

Our broad hypothesis is that mindful meditation is likely to influence individuals' financial preferences and financial decisions. To test our conjecture, we prime some experiment participants to be mindful. Priming refers to the effect of environmental context on individuals' cognition and behaviors (Logan 1980). Priming effects arise through the activation of mental representations that influence subsequent decisions or behaviors (Molden 2014). Priming techniques are widely employed by experimental researchers, including cognitive and social psychologists, and have been recently adopted by financial economists to investigate financial decision-making (e.g., Fazio et al. (1986), D'Acunto (2016), and Meier, Niessen-Ruenzi, and Ruenzi (2018)).

To implement the mindfulness prime, we randomly assign individuals, at the start of an experiment, into one of two conditions: (i) the mindfulness (i.e., treatment) condition or (ii) the control condition. We prime individuals to be mindful, prior to conducting the financial decisions tasks, by providing treatment participants with an online audio recording developed by the University of California Los Angeles Mindful Awareness Research Center.[5] Consistent with the hallmarks of mindfulness, the audio recording guides individuals through a meditation process that focuses attention on one's breathing and the present moment. The recording lasts about five minutes. In any experiment, the only difference between the two groups is that individuals in the treatment condition engage in the mindfulness exercise.[6]

[5]The audio guide and its transcript are available at `https://www.uclahealth.org/marc/mindful-meditations`.

[6]One potential concern is that the total time that participants take to complete the experiment may differ between treatment and control groups – since only the treatment group listens to mindfulness recording – and that this difference may influence our findings. As discussed in Sections 4.2 and 6.2.1, and shown in Table IA2, our results are similar when controlling for both raw and squared time spent on the experiment by participants. Thus, it is unlikely that this difference is driving our results.

3.2.1 Manipulation Check

Though digital, short-format mindfulness sessions have been shown to be efficacious (e.g., Mahmood, Hopthrow, and Randsley de Moura (2016)), we assess the effectiveness of our prime by asking all participants two questions related to mindfulness towards the end of each experiment.[7] Specifically, we ask participants "To what extent are you focused on your breathing" and "To what extent are you absorbed in the present moment?" in random order. Subjects respond to each question on a one (i.e., Very slightly or not at all) to five (i.e., Extremely) scale. We calculate each participant's average rating across the questions and compare the mean responses between treatment and control groups. We find, across all our experimental settings, that the mindfulness priming is effective; treated individuals report greater mindfulness, typically rating about 14% higher on the scale, than control group participants.[8]

4 Mindfulness and Time Preferences

Mindful meditation cultivates awareness of the present moment, as opposed to letting one's thoughts ponder the future. We hypothesize that such cognitive focus could elevate households' discount rates applied to future economic payouts.

4.1 Research Design

We estimate participants' time preferences using multiple price lists, which is a standard research methodology that involves choosing among monetary lotteries (e.g., Charness, Gneezy, and Imas (2013)). In particular, we adapt Tanaka, Camerer, and Nguyen's (2010) lottery design. We use this framework because it allows us to elicit two time preference parameters for each participant: (i) a present bias parameter and (ii) a discount rate. Table IA1 shows the lottery series that each participant views in random order. The lotteries involve selecting between smaller, immediate

[7] The questions and response scale are adopted from Hafenbrack, Kinias, and Barsade (2014).

[8] In the financial preferences experiment, the average rating among treatment participants is 3.62 and it is 3.04 for control participants. The difference of 0.58 is statistically significant at the 1% level (p-value < 0.001). In the savings decisions experiment, the difference between the experimental groups is 0.325 (p-value $= 0.004$). In the stock trading experiment, the difference of 0.32 is statistically significant (p-value $= 0.003$). Finally, in the return expectations task, individuals in the treatment condition have an average rating of 3.60 while the average among control participants is 3.12. The difference is statistically significant (p-value < 0.001).

rewards and larger rewards that would be received in the future.[9] Specifically, upon viewing a lottery series, participants choose at which lottery pair they would prefer to switch from lottery A to lottery B. This monotonic switching requirement assumes participants are rational (Tanaka, Camerer, and Nguyen 2010; Liu 2013).[10] Participants may also opt to never switch or switch at row one.

The financial economics literature has developed a variety of time preference models, including exponential, hyperbolic, and quasi-hyperbolic forms (e.g., Ainslie (1992) and Laibson (1997)). To empirically estimate participants' time preferences, we use their lottery choices and utilize a model developed by Benhabib, Bisin, and Schotter (2004). The model allows us to test exponential, hyperbolic, and quasi-hyperbolic preferences, as well as a composite specification. In the model, the value of reward y is assigned as $y\beta(1-(1-\theta)rt)^{1/(1-\theta)}$ for $t > 0$. The value of the reward is y at $t = 0$. The three parameters, r, β, and θ, separate traditional time discounting (r), present-bias (β), and hyperbolicity (θ). The probability that an individual prefers the immediate reward, x, over the delayed reward, y, in t days is denoted by $P(x > (y,t))$. We then estimate the logistic function:

$$P(x > (y,t)) = \frac{1}{1+\exp(-\mu(x - y\beta(1-(1-\theta)rt)^{1/1-\theta}))} \tag{1}$$

using nonlinear least-squares to identify parameters μ, β, θ, and r, where μ is the noise parameter.

Prior to making any lottery choices, each experiment participant is randomly assigned to either the treatment or control condition. That is, all individuals face the same lottery options, but participants in the treatment group engage with the mindfulness therapeutic prior to making their decisions. After completing the experimental task, participants provide demographic information and are compensated for participating. Participants receive fixed compensation of $2.00 and a variable payment that depends on their lottery choices. Specifically, to incentivize participants to reveal their true preferences, one lottery was chosen at random to be played for real money. The payout, which was guaranteed via pre-purchased credit on the MTurk platform, was then based on the participant's choice and the outcome of the lottery. The average total earnings were about

[9] Bradford, Courtemanche, Heutel, McAlvanah, and Ruhm (2017) show that discount factors elicited from choice experiments using multiple price lists predict a variety of real world decisions related to health, energy, and financial outcomes.

[10] The literature is undecided on whether or not to enforce monotonic switching. We opted to adhere to the original protocols of Tanaka, Camerer, and Nguyen (2010) and implemented monotonic switching. We find that 19 participants never switch across the lottery series and omitting these participants does not impact the results.

$5.50, which is equivalent to about $16.50 per hour.

4.2 Evidence on Mindfulness and Time Preferences

Table 1 compares the various discounting models. As with Tanaka, Camerer, and Nguyen (2010), we note that the composite model, in column (4), which does not restrict θ, does not have a higher R-sq. compared with the quasi-hyperbolic form. Therefore, we focus on the quasi-hyperbolic discounting model to examine whether mindfulness influences individuals' time preferences. We estimate the logistic function:

$$P(x > (y,t)) = \frac{1}{1 + \exp(-\mu(x - y\beta\exp[-rt]))} \tag{2}$$

to jointly examine the relation between mindfulness and individuals' present bias (β) and discount rates (r). In the function, $\beta = \beta_0 + \Sigma\beta_i X_i$ and $r = r_0 + \Sigma r_i X_i$, where the *Mindfulness* and socioeconomic measures and their coefficients are denoted by X_i and β_i or r_i, respectively. In particular, *Mindfulness*, our key variable of interest, takes a value of one if the participant is assigned to the treatment condition, and zero otherwise.

In Panel A of Table 2, we find that the coefficients on *Mindfulness* are statistically non-significant across all model specifications. That is, we find no evidence that mindfulness influences an individual's degree of present bias. The lack of relation may be surprising given that mindful meditation calls for individuals to focus on the present. However, our finding is in line with an emerging literature that suggests that present bias is limited to a particular set of decisions, including credit card borrowing (Meier and Sprenger 2010), mortgage decisions with negative equity (Toubia, Johnson, Evgeniou, and Delquié 2013), leaving one's job and smoking (Burks, Carpenter, Götte, and Rustichini 2012), and food consumption (Courtemanche, Heutel, and McAlvanah 2015).

The estimates in Panel B indicate that mindfulness influences participants' patience, i.e., their discount rates. The univariate estimate in column (1) is 0.146 (p-value = 0.027), suggesting that mindful meditation causes individuals to have higher discount rates. In terms of economic magnitude, the typical mindful person would exchange $150 to be received sixty days from now for $90.37 today. In contrast, the average participant in the control condition would trade $150 in sixty days for $93.78 today.

To provide causal insights, our research design randomly allocates each participant into either the treatment or control group. However, if individuals who are assigned to the treatment condition are more impatient for some exogenous reason, the univariate inferences would be biased. We address this possibility using two complementary approaches. First, we examine differences in the means of participants' observable socioeconomic traits.[11] In Table 3, we show that there are no systematic and statistically significant differences between the individuals in the treatment and control conditions. Overall, the random assignment appears to have been successful. In our second approach, we estimate a multivariate regression model in which we control for a variety of characteristics that may impact individuals' preferences.

In column (2) of Table 2 (Panel B), we expand the specification to incorporate traditional drivers of financial preferences, including participants' education, income, age, gender, marital status, race, employment status, and an ex ante measure of risk tolerance. The estimate on *Mindfulness* remains positive and statistically significant (p-value = 0.020). In column (3), we include additional controls, particularly individuals' political affiliation, financial literacy, perceived financial knowledge, numeracy, optimism about the their personal future and economic conditions, stock market participation status, and their trust that the stock market is fair. The controls have limited effect on the *Mindfulness* coefficient. After expanding the specification in column (4) to account for participants' performance on attention checks and the time spent on the experimental task, we continue to find a very similar point estimate for *Mindfulness*.

A potential concern is that mindful meditation may influence a person's time preferences through known emotional mechanisms. Mindfulness could elevate one's happiness or reduce negative affect (Kober, Buhle, Weber, Ochsner, and Wager 2019). Since emotions impact time preferences (e.g., Ifcher and Zarghamee (2011)), a plausible hypothesis is that mindful participants' emotions are driving the identified effects. We, therefore, incorporate measures of negative and positive affect, which are derived from a validated psychological scale, the PANAS-X (Watson and Clark 1999).[12] Including the measures does not absorb the effect of mindfulness on individuals' intertemporal discounting. In column (5), we find that the point estimate on *Mindfulness* is 0.163

[11] We define all variables in Appendix I.

[12] The absence of negative affect does not portend positive engagement (Cohen and Pressman 2006). We, therefore, control for both aspects.

and statistically significant (p-value = 0.011), indicating the it raises participants' discount rates.[13]

The collective evidence suggests that mindfulness influences individuals' time preferences. Specifically, mindful individuals tend to become more impatient, but we find no evidence that mindful meditation increases present bias. Its effect on participants' discount rates is not absorbed by myriad socioeconomic characteristics which are known to affect financial preferences. Moreover, the influence of mindfulness on patience is distinct from that of positive and negative affect, as assessed by a validated psychological questionnaire. Overall, the evidence that mindful meditation increases impatience suggests that engaging in the practice is likely to have financial consequences for households.

5 Mindfulness and Savings Decisions

Higher discount rates have implications for households' consumption and savings decisions. In particular, impatient individuals are likely to favor current consumption over saving. We, therefore, hypothesize that mindfulness will induce individuals to retain a larger proportion of their financial resources for current consumption, i.e., reduce the allocation of wealth to investment assets that can grow future consumption.

5.1 Research Design

To test our conjecture, we construct an experimental asset market in line with Weber and Camerer (1998) and Bazley, Cronqvist, and Mormann (2020). We use the market to examine whether mindful meditation influences individuals' allocation of financial wealth between risky and cash assets. The market consists of four risky assets (i.e., shares of stocks) and one risk-free asset (i.e., cash), which provides zero return. Prior to the experiment, we set the prices for the risky shares. The prices exhibit variation over the trials but, to facilitate comparison of individuals' investment allocation decisions, the prices are consistent across all participants. We present the prices in Table IA3.

The first three trials of the experiment consist of price updates and participants cannot trade during these trials. We implement this restriction to enable participants to accumulate information

[13] Additionally, in Panel A of Table IA2, we find that controlling for the total experiment time, and its square, does not materially affect the economic or statistical significance of the *Mindfulness* coefficient.

about the prices of the stocks prior to investing. Participants are then endowed with $10,000, which they may allocate across the assets as they prefer. Subsequently, investors have the opportunity to re-allocate their savings three times.[14]

For participating, individuals receive fixed compensation of $2.00 and a variable payment that depends on their task performance, i.e., their final portfolio value and their response to an attention check question. We use this structure to motivate participants to maximize their portfolio value. Given the duration of the task, the average total earnings were equivalent to $16.26 per hour.

To identify the causal impact of mindfulness, we recruit 273 new participants and randomly assign them to either the treatment condition or the control group. Individuals assigned to the treatment condition complete the mindfulness meditation exercise prior to the savings allocation task. We report descriptive statistics for both groups of participants in Table IA4. Across the two conditions, the participants do not substantially differ along observable characteristics.

5.1.1 Evidence on Mindfulness and Cash Holdings

We examine the effects of mindfulness on savings decisions using participants' allocations to the cash asset. To do so, we construct a periodic measure, *Cash Allocation*, which is a participant's total dollar amount invested in the cash asset during each trial. We then compare *Cash Allocation* across the treatment and control conditions in order to identify the effect of mindful meditation. Specifically, we conduct ordinary least squares (OLS) regressions to estimate:

$$Cash\ Allocation_{j,t} = \alpha_0 + \beta_1 Mindfulness_j + \theta X_j + \epsilon_{j,t}, \tag{3}$$

where *Mindfulness* is an indicator variable which equals one if participant j was assigned to the treatment condition, and zero otherwise. The key coefficient of interest, β_1, measures the effect of mindfulness on investors' allocation decisions. We also include a constant, α_0, and a vector of controls, X_j, which account for variation in participants' socioeconomic characteristics.

The estimates in Table 4 show mindful individuals dedicate more financial resources to the cash

[14]The allocation trials are composed of two elements: a price update screen and an allocation screen. In the price update screen, participants view their portfolio details, such as their share holdings, stock price changes, and investment performance. In the allocation screen, participants are provided with the opportunity to adjust their risky and cash holdings. No new information is revealed on the trading display. Figure IA1 provides an example of the savings allocation environment.

asset. The effect of mindfulness is not absorbed by the inclusion of control variables to account for heterogeneous characteristics among participants. For instance, the estimate from the strictest specification, in column (5), is 232.47 (p-value = 0.019), which indicates that mindful meditation leads individuals to allocate \$232.47 more to the cash asset. Since the average control participant holds about \$1,643 in cash, the effect of mindfulness corresponds to about a 14% increase.

Overall, the evidence is consistent with our earlier finding, that mindful meditation increases the rate at which future economic payouts are discounted. In turn, a higher degree of impatience affects savings choices. Mindful individuals allocate less financial resources to assets which can increase future consumption. Consequently, by affecting households' risky share, practicing mindfulness may have long-term wealth implications (e.g., Fagereng, Gottlieb, and Guiso (2017)).

6 Mindfulness and Stock Trading Decisions

Barberis and Xiong (2012) theoretically show that impatience can affect investors' stock trading choices. In particular, as an individual's discount rate rises, his/her propensity to realize gains should increase. Therefore, the evidence that mindful meditation affects individuals' time preferences potentially has implications for investors' portfolio trading decisions. Specifically, we hypothesize that investors who engage in mindfulness will be disposed towards selling investments that have increased in value. Such trading decisions are consistent with a common and persistent behavioral bias among investors, the disposition effect.

6.1 Research Design

We examine our hypothesis by adapting the portfolio choice framework of Frydman et al. (2014) and Frydman and Rangel (2014). In the experiment, all participants trade three stocks, A, B, and C. Participants are initially provided with instructions which characterize the market, describe the process through which the stocks' prices evolve, and explain all other details of the experiment.[15]

Participants are endowed with \$350 of experimental currency and are required to purchase one share of each stock at the start of the experiment. All stocks are initially priced at \$100. The first nine trials consist of only price updates. That is, participants cannot trade during these trials.

[15]The experiment's instructions are available in the Internet Appendix.

We implement this restriction so that participants can gain information about the stocks' price process before they begin trading. Subsequently, investors may trade each stock on three separate occasions. In particular, trials 10 through 18 are composed of two elements: a price update screen and a trading screen. In the price update screen, one of the stocks is randomly selected and the participant observes the price update for that particular stock only. In other words, stock prices evolve only during the price update screens and, thus, participants are aware of the full price paths for the stocks. In the trading screen, the investor may choose to enact a transaction, i.e., buy or sell the stock, at the specified market price. No new information is revealed to the participant in the trading screen. We present an example of the complete portfolio choice environment in Figure IA2.

At any point in time, participants' portfolios may hold one or zero shares of each stock. Accordingly, individuals' trading decisions are to sell a stock if it is already in the portfolio or to purchase a stock if it is not currently owned. Investors may carry negative cash balances to avoid liquidity constraints. This feature allows for participants to purchase a stock even if they do not have the necessary cash during a particular trial.[16]

The prices of the stocks evolve along a two-state Markov chain, which has a good state and a bad state. Specifically, in trial t, stock i is randomly chosen to receive a price update. If the stock is in the good state, it has a 70% probability of receiving a price increase, and a 30% probability of receiving a price decrease. If the stock is in the bad state, the probability that the price declines (increase) is 70% (30%). Each stock's Markov chain is independent of the other stocks' chains. In terms of economic magnitude, the price change is uniformly chosen to be either \$5, \$10, or \$15, and it is independent of the price direction.

The underlying state of a stock evolves independently. At the start of the experiment, each stock is randomly assigned to a state. Over the course of the experiment, a stock's state updates only after it receives a price change. Specifically, if stock i is randomly chosen to receive a price update, then its state in trial t remains the same as in trial $t-1$ with an 80% probability, and switches with a 20% probability. Subjects are not explicitly notified of the stock's state in each trial. Rather, they may infer the state using the stock's price movements. To facilitate comparison

[16] If a participant concludes the trading task with a negative cash balance, it is subtracted from the final portfolio value. The initial endowment and limiting individuals to holding one share of each stock at any point ensures that no participant completes the experiment with a negative portfolio value.

of trading performance, we use the same set of realized prices for all participants.

We use this market structure for two reasons. First, returns on the stocks mimic the return momentum that is commonly observed in equity markets (Jegadeesh and Titman 1993; Fama and French 2012; Asness, Moskowitz, and Pedersen 2013). In the experiment, a stock that experienced a price increase in its prior trial is likely to be in the good state. The stock is also likely, with 80% probability, to remain in the same state for the next price update. Consequently, participants should expect the stock to increase in price in its subsequent trial. Second, the price process suggests the optimal investment strategy for a risk-neutral, Bayesian investor: buy (sell) stocks that have performed well (poorly) in the recent trials.[17]

At the conclusion of the trading task, participants provide demographic information and their stock holdings are liquidated. The proceeds are combined with the participant's cash reserves to calculate a final portfolio value. We motivate individuals to be diligent during the task through the experiment's compensation structure. Participants receive a guaranteed payment of $2.00 and a variable payout. The variable compensation depends on task performance, i.e., performance on an attention check question and the final portfolio value. The typical total earnings were equivalent to about $16.88 per hour.

We identify the causal influence of mindful meditation on portfolio choices by randomly allocating participants into either the mindfulness (treatment) or control (condition). At the start of the experiment, treated individuals participate in the guided mindfulness meditation. Control participants proceed directly to the experiment. The only difference between the two conditions is the participation in the mindfulness training.

We use 306 participants and report descriptive statistics for both groups of participants in Table 5. About 73% of the participants have at least a college degree, 57% are male, and 65% are married. The average participant correctly answers less than two of the three financial literacy questions while claiming to possess more than a moderate amount of financial knowledge. Overestimating financial knowledge is a common behavior among households and consistently found by studies using field data (e.g., Van Rooij, Lusardi, and Alessie (2011) and Bazley, Bonaparte, and Korniotis (2020)). Importantly, the estimates indicate that the random assignment of participants across conditions

[17]The investment strategy also aligns with the trading decisions of attentive investors. Gargano and Rossi (2018) show that attentive investors outperform by holding attention-grabbing stocks with positive return momentum.

was effective; no significant differences along socioeconomic characteristics emerge.

6.2 Evidence on Mindfulness and Investors' Trading Behavior

Each time that a participant has the opportunity to sell a stock, we assign his/her decision into one of four categories: realized gain, paper gain, realized loss, or paper loss. If the individual opts to sell the stock holding and the market price is below (above) the his/her purchase price, we denote the trade as a realized loss (gain). If the participant holds the stock but does not to sell it, and the current market price is below (above) the stock's purchase price, the decision is classified as a paper loss (gain).

We total the number of realized gains, realized losses, paper gains, and paper losses over the course of the experiment for each participant. We then compute the *Proportion of Gains Realized (PGR)* as:

$$PGR = \frac{Number\ of\ Realized\ Gains}{Number\ of\ Realized\ Gains + Number\ of\ Paper\ Gains} \tag{4}$$

and the *Proportion of Losses Realized (PLR)* as:

$$PLR = \frac{Number\ of\ Realized\ Losses}{Number\ of\ Realized\ Losses + Number\ of\ Paper\ Losses} \tag{5}$$

PGR and PLR serve as key measures of interest when examining the relation between mindfulness and trading behavior. We also use PGR and PLR to construct a composite measure of participants' investment decisions. Specifically, we compute *Disposition Effect* which is PGR minus PLR (e.g., Odean (1998) and Frydman and Rangel (2014)).

We compare the disposition of participants in the treatment condition to the disposition of control participants. Figure 1 shows that individuals in the mindfulness condition exhibit higher disposition than those in the control group. In the mindfulness group, the average *Disposition Effect* is about 0.33 while it is 0.20 in the control condition. The difference, 0.13, is statistically significant (p-value = 0.002).

We estimate a parametric model to account for heterogeneity in participants' socioeconomic characteristics. Specifically, we conduct OLS regressions to estimate:

$$Disposition\ Effect_j = \alpha_0 + \beta_1 Mindfulness_j + \theta X_j + \epsilon_j, \tag{6}$$

where *Mindfulness* is an indicator which equals one if the participant is assigned to the treatment condition, and zero otherwise. The coefficient of primary interest, β_1, measures the effect of mindfulness on participants' trading behavior. We also include a constant, α_0, and a vector of controls, X_j, which account for variation in participants' socioeconomic characteristics.

The estimates in Table 6 show that the effect of mindfulness meditation persists after accounting for socioeconomic characteristics that are known to influence individuals' portfolio decisions. Column (1) reports the univariate estimate. Consistent with Figure 1, the estimate is 0.131 (p-value = 0.002). In columns (2) to (5), we include control variables to account for heterogeneous traits among participants. The estimate in column (2) shows that the effect of mindfulness is not absorbed by traditional control variables, including age, education, race, income, gender, marital status, ex ante risk tolerance, and employment status. That is, the estimate of *Mindfulness* is 0.107 and it remains statistically significant (p-value = 0.007). In columns (3) and (4), we find that the impact of the mindfulness therapeutic is robust to accounting for heterogeneity in participants' political affiliation, numeracy, financial literacy, perceived financial knowledge, optimism about their personal future and the economy, stock market participation status, level of trust in the stock market, and diligence during the experimental task.

In column (5), we examine whether emotions explain the effects of mindfulness on trading behavior. In particular, we include measures of positive and negative affect that are based on participants' responses to the PANAS-X questionnaire. We find that including these controls does not subsume the influence of mindfulness. Rather, after accounting for a broad spectrum of known portfolio choice determinants, including both positive and negative affect, the evidence shows that mindfulness increases individuals' disposition by about 58% (p-value = 0.004).

6.2.1 Propensities to Realize Gains and Losses

In Figure 2, we partition individuals' disposition effect into their propensities to realize gains and losses. Individuals randomly assigned to receive the mindfulness therapeutic display higher *PGR* than those in the control group. That is, mindful individuals are prone to selling their winning stock holdings, realizing about 18% more than control investors. In contrast, the *Proportion of Losses Realized (PLR)* by the average mindful investor does not significantly differ from the proportion realized by the average control investor.

We re-estimate Equation 6 with *PGR* and *PLR* as the dependent variables to account for heterogeneity in participants' socioeconomic characteristics and report the results in Panels B and C of Table 6. The estimates in Panel B show that treated investors are prone to realizing their investment gains. Specifically, the coefficient of 0.084 (p-value = 0.015) in column (5), which includes all control variables, suggests that going from the control to the treatment group leads to about a quarter of a standard deviation increase in *PGR*.[18]. Conversely, participants' willingness to realize losses is not significantly affected by mindfulness (Panel C).

The collective evidence shows that mindful meditation influences investment decision-making. Investors who engage in mindfulness are likely to be disposed towards realizing investment gains. This finding is consistent with the theoretical relation between discount rates and trading behavior proposed by Barberis and Xiong (2012). We do not find evidence that mindful participants are more willing to realize investment losses.

6.3 Trading Performance

Realizing winners and holding losing stock investments typically leads to underperformance (Odean 1998; Kaustia 2010). We hypothesize that mindfulness can cause investors to have lower performance since it affects the propensity to realize investment gains. We examine this conjecture by testing whether the individuals in the treatment condition complete the trading experiment with less valuable portfolios than participants in the control group. Specifically, we re-estimate Equation 6 where the dependent variable is *Portfolio Value*, each participant's total cash value (in dollars) at the conclusion of the experiment after liquidating all portfolio holdings.

In Table 7, we find that individuals in the mindfulness group end the experiment with less valuable portfolios. The univariate estimate in column (1) indicates that mindful individuals accumulate, on average, about \$2.58 (p-value = 0.035) less through their trading decisions, which corresponds to about a 4.86% lower return on the portfolio compared with the average control group participant. In columns (2) through (5), the estimates remain stable and statistically significant as the specification is expanded to account for potentially confounding socioeconomic characteristics among the participants. For instance, in column (5), mindful participants generate approximately

[18]In Panel B of Table IA2, we show that results are qualitatively similar when controlling for both raw and squared total experiment time of participants

$2.68 less wealth ($p$-value = 0.029), which, relative to control investors, is about 5.05% lower. Overall, the magnitude of the performance differential suggests that the real world costs to individual investors may be sizable given (i) the rapid adoption of digitally-conveyed mindfulness techniques and (ii) that heterogeneity in returns to wealth contributes to the thick tail of the wealth distribution (e.g., Gomez et al. (2016) and Benhabib and Bisin (2018)).

6.4 Portfolio Concentration

Since mindfulness increases individuals' disposition towards realizing gains but not losses, it may lead investors to hold fewer stocks in their portfolios. Such behavior contrasts with traditional theories of portfolio choice, which imply that investors should hold diversified portfolios. Holding a concentrated portfolio can also have wealth consequences since such portfolios tend to have lower Sharpe ratios and greater total risk (Ivkovic, Sialm, and Weisbenner 2008).

We examine our conjecture by estimating OLS and Tobit regressions where *Stock Holdings*, i.e., each participant's number of unique stock holdings at the end of the experiment, is the dependent variable.[19] In Panel A of Table 8, we find that mindful investors conclude the trading task with fewer stock holdings. Across all specifications, the estimates on *Mindfulness* are consistently negative, are statistically significant, and vary only slightly. In column (5), the estimate of -0.233 (p-value = 0.016) implies that mindful participants hold about 14% fewer stocks relative to the control participants. The coefficient of -0.306 (p-value = 0.012) from a Tobit regression, in column (6), suggests that mindful individuals hold 18% fewer stocks. Overall, we find that mindfulness leads to holding less-diversified portfolios, which has implications for economic attainment since the benefits of investing are linked to efficient portfolio construction (Campbell, Ramadorai, and Ranish 2014).

6.5 Total Trading Activity

It is unclear whether mindfulness affects total trading activity. For instance, since mindful meditation is typically associated with a sense of calm and peacefulness, it may reduce the propensity to trade. We, therefore, create a variable, *Total Trades*, which is the total number of buys and sells that each participant executes. Investors have the opportunity to trade each share three times,

[19] Each participant may hold a minimum of zero stocks and a maximum of three stocks in his/her portfolio. Accordingly, *Stock Holdings* is censored at zero and three.

resulting in a maximum of nine of potential transactions. We find that, on average, participants trade about 4.50 times (standard deviation = 2.40).

We re-estimate Equation 6 with *Total Trades* as the dependent variable and report the estimates in Panel B of Table 8. We find that mindfulness does not affect total trading activity. In column (1), we find no significant difference in the unconditional means between the treatment and control conditions (p-value = 0.306). In column (5), we include all controls and the estimate on *Mindfulness* remains non-significant. As an alternative test, in column (6), we estimate a Tobit regression where *Total Trades* is censored at zero and nine. We again find that mindfulness does not significantly affect investors' total trading activity (p-value = 0.529). Overall, the collective evidence in Tables 6 and 8 suggest that mindfulness influences which shares investors opt to trade, but does not impact investors' overall propensity to trade.

6.5.1 Alternative Specification: Linear Probability Model

An alternative approach to examining the influence of mindfulness on the disposition effect is to conduct a linear probability model (e.g., Birru (2015)). Specifically, we estimate:

$$\begin{aligned} Sale_{i,j,t} = \alpha_0 + \beta_1 Gain_{i,j,t} + \beta_2 Mindfulness_j \\ + \beta_3 Gain_{i,j,t} \times Mindfulness_j + \theta X_j + \epsilon_{i,j,t}, \end{aligned} \tag{7}$$

In the OLS regression, $Sale_{i,j,t}$ equals one in trial t if participant j sells share i, and zero otherwise. The independent variable, $Gain$, is an indicator that equals one if the stock's current price is above the participant's purchase price, and equals zero otherwise. A positive estimate on β_1 connotes that individuals are more likely to sell holdings that are at a gain compared with those at a loss (i.e., the disposition effect). $Mindfulness_j$ is an indicator which equals one if the participant is assigned to the treatment condition, and zero otherwise. A positive estimate on β_2 implies that mindful participants are more likely to sell stocks relative to control group participants. The key coefficient of interest, β_3, is on the interaction term between $Gain$ and $Mindfulness$. It captures the change in the disposition effect as a result of participating in the mindful meditation. We also include the vector of controls, X_j, to account for heterogeneity in participants' socioeconomic characteristics and we cluster the standard errors at the participant-level. We report the estimation results in

Table 9.

As in the Table 6, the evidence from the alternative model indicates that mindful investors have higher disposition. For instance, the estimate on *Gain* from the fully-specified model, in column (5), shows that participants are about 38% (p-value < 0.001) more likely to sell stocks which have increased in value. The negative coefficient on *Mindfulness* indicates that individuals in the treatment condition are slightly less likely to sell stocks compared with control group investors. Importantly, the estimate on the interaction term is positive and statistically significant, which connotes that participating in mindfulness meditation raises investors' disposition. Specifically, the estimates correspond to about a 31% (p-value $= 0.009$) increase in the disposition effect. Overall, the evidence reinforces the primary findings, that mindful individuals are disposed towards realizing stock gains.

7 Alternative Mechanisms

Our evidence shows that exposure to mindfulness increases subjective discount rates, implying that this meditative process that helps individuals alleviate stress, anxiety, and other mental healthy afflictions also causes individuals to discount future economic outcomes (e.g., cash flows) more heavily. This increase in subjective discount rates leads to lower risky-share allocation and less efficient investment decisions. In this section, we examine whether there are additional changes in individuals' preference parameters that might also contribute to the effect of mindfulness on financial decision-making.

7.1 Alternative Preferences

We again use the Tanaka et al. (2010) lottery framework because, in addition to time discounting, it allows us to elicit several preference parameters for each participant: (i) a coefficient of risk preferences, (ii) loss aversion, and (iii) nonlinear probability weighting. We implement the tests by assuming utility of the form:

$$U(x,p;y,q) = \begin{cases} v(y) + w(p)(v(x) - v(y)) & xy > 0 \text{ or } |x| > |y| \\ v(y) + w(p)v(x) + w(q)v(y) & \text{otherwise} \end{cases} \tag{8}$$

where

$$v(x) = \begin{cases} x^{\sigma} & \text{for } x > 0 \\ -\lambda(-x)^{\sigma} & \text{for } x < 0 \end{cases} \tag{9}$$

and $w(p) = 1/\exp[\ln(1/p)]^{\alpha}$. The monetary payouts are x and y, while p and q are the probabilities associated with the payouts. The curvature of the value function, i.e., risk preference, is represented by σ. The curvature of the function below zero relative to the curvature above zero is characterized by λ. A kink in the indifference curve around zero is implied if $\lambda \neq 1$. As λ increases, individuals' aversion to losses increases. The nonlinear probability weighting measure, α, is extended from Prelec (1998) and Gonzalez and Wu (1999). The function, $w(p)$, describes how probabilities are weighted. In particular, $w(p)$ takes an inverted S shape if α is below one. This connotes an underweighting of large probabilities and an overweighting of small probabilities. If estimates from the experiment show that $\alpha = 1$ and $\lambda = 1$, the model simplifies to expected utility theory.[20]

Participants' choices among lotteries in Series 1 and 2 (Table IA5) are used to estimate the utility function's curvature. For any participant who switches from Lottery A to Lottery B at row n, we infer that he/she prefers Lottery A over Lottery B in row $n-1$. Using this inference and individuals' switching points, we develop a set of inequalities which provide ranges for σ and α.[21] For instance, the parameters are $0.27 < \sigma < 0.35$ and $0.67 < \alpha < 0.75$ for a participant who prefers Lottery B to Lottery A at row 7 in both Series 1 and Series 2. We approximate σ and α by the midpoint of the intervals. After calculating an estimate of σ, we can develop inequalities to estimate λ using a participant's switching point among the lotteries in Series 3. We use the midpoints for the λ intervals as well. We find that the unconditional averages for σ, α, and λ are 0.36, 0.53, 2.50, respectively. These averages are similar to the estimates found by Tanaka, Camerer, and Nguyen (2010) and Liu (2013).[22] The mean of 0.36 for σ connotes that participants

[20] We assume the Prospect Theoretic (e.g., Kahneman and Tversky (1979) and Tversky and Kahneman (1992)) functional form in Equation 8 because growing evidence indicates that individuals are risk tolerant with regards to losses and risk averse with respect to gains (Hershey and Schoemaker 1980; Camerer 1989; Battalio, Kagel, and Jiranyakul 1990).

[21] Following Tanaka, Camerer, and Nguyen (2010) and Liu (2013), we rely on income from the lotteries, rather than income plus participants' existing wealth, to estimate the utility functional form. This is a standard approach in the experimental economics literature (e.g., Holt and Laury (2002)) and in accord with Rabin (2013), who notes that individual utility is driven by changes in wealth rather than absolute wealth.

[22] For instance, Liu (2013) estimates, among a sample of Chinese participants, means of 0.48 for σ, 0.69 for α, and 3.47 for λ, which is higher than the typical value of about two (e.g., Tversky and Kahneman (1992)). Among Vietnamese participants, Tanaka, Camerer, and Nguyen (2010) find means of 0.61 for σ, 0.74 for α, and 2.63 for λ.

are, on average, risk averse. The mean of 0.53 for α indicates that individuals in our sample have a tendency to overweight low probabilities and underweight large probabilities, which is in accord with existing evidence (e.g., Tversky and Kahneman (1992)).

7.1.1 Risk Preferences

Figure 3 shows that mindfulness does not cause a shift in individuals' risk preferences. In particular, we present the mean coefficient of risk preferences, σ, for individuals in the treatment and control groups. The mean level of σ is 0.33 for the treatment group, and 0.39 for the control group. The difference is not statistically significant (p-value = 0.446) and indicates that mindfulness does not influence individuals' financial risk preferences.[23]

7.1.2 Loss Aversion

Individuals tend to exhibit loss aversion, which is a greater sensitivity to financial losses compared with gains (Kahneman and Tversky 1979; Kahneman, Knetsch, and Thaler 1991; Barberis and Huang 2001; Abdellaoui, Bleichrodt, and Paraschiv 2007). Loss aversion has been linked to a variety of financial economic decisions and market outcomes, including the equity premium puzzle (Benartzi and Thaler 1995) and the supply of labor (Dunn 1996). A greater sensitivity to losses may be connected to increased activity in brain structures, particularly in the amygdala or anterior insula, which are involved in processing emotions in decision-making (e.g., Kahn et al. (2002) and Kuhnen and Knutson (2005)). Consequently, since mindfulness influences cognitive processing, including the regulation of emotions, it may reduce loss aversion.

We use participants' choices among the lotteries in Series 3 (Table IA5) to estimate their degree of loss aversion, λ. We then examine whether treated (i.e., mindful) individuals are less averse to losses than control participants. The results from OLS regressions, in Panel A of Table 10, indicate that mindfulness does not significantly influence individuals' loss aversion. Across all specifications, we find that participants in the treatment condition do not display significantly different preferences over lotteries which incorporate financial losses than individuals in the control group.

[23] In untabulated results, we find that accounting for heterogeneous socioeconomic elements and emotions has minimal influence on the estimate.

7.1.3 Probability Weighting

When making risky decisions, people tend to apply subjective probability weights to the potential outcomes (Kahneman and Tversky 1979; Tversky and Kahneman 1992; Prelec 1998). The psychological weight assigned to the outcome can be influenced by extraneous elements, such as emotions (Brandstätter, Kühberger, and Schneider 2002; Charupat, Deaves, Derouin, Klotzle, and Miu 2013). We test whether mindful meditation affects the weights assigned to risky financial payouts by imputing participants' probability weighting parameter, α, from their lottery choices. We then estimate OLS regressions to identify the causal effect of mindfulness on α. The estimates in Panel B of Table 10 show that mindful meditation does not significantly affect individuals' subjective probability weighting schemes.

7.2 Stock Return Expectations

Expectations of future financial outcomes are also important determinants of households' savings and investment decisions. For instance, Dominitz and Manski (2011) and Biais, Bossaerts, and Spatt (2010) connect investors' portfolio decisions to beliefs about future stock returns. Moreover, since mindfulness can increase optimism in non-finance domains (e.g., Kiken and Shook (2011) and Malinowski and Lim (2015)), it could have a similar impact on economic expectations.

To test our hypothesis, we follow Bazley, Cronqvist, and Mormann (2020) and have individuals forecast future prices for three stocks that trade in the stock market.[24] For each stock, we identify separate one-year periods over which a negative and a positive cumulative return was experienced. We use the historical prices to construct charts that display the stocks' price paths. Figures IA3 and IA4 present the price charts, which were displayed one by one, in random order, to each participant. While viewing a chart, the participant forecasts what the stock's most-likely price will be six months in the future. We impute returns from participants' price forecasts. Specifically, for each participant, we create *Stock Return Beliefs*, which is the average expected stock return across the three positive or negative stocks.[25] As in the preferences experiment, we employ a between-individuals research design so that all participants view the same stock price information while

[24]The identities of the stocks were not provided to the experiment participants.

[25]To ensure appropriate quality of our data, we exclude eight individuals who provide stock return estimates two standard deviations away from the mean.

only individuals who are randomly assigned to the treatment condition perform the mindfulness training exercise prior to forecasting the stock prices.

We recruit 284 individuals to partake in the experiment and report their characteristics in Table IA6. Participants in the treatment group appear similar along most socioeconomic dimensions to participants assigned to the control condition. The one exception is that the control group oversampled individuals who participate in the stock market. Consequently, we estimate the influence of the mindfulness therapeutic on return expectations by conducting OLS regressions where *Stock Return Beliefs* is the dependent variable and account for participants' socioeconomic traits. We report the estimation results in Table 11.

In Panel A, we examine individuals' return expectations for stocks with declining historical prices. The estimates on *Mindfulness* are statistically non-significant across all the regression specifications. That is, individuals in the treatment group do not have different return beliefs, compared with control group participants, with respect to stocks with declining prices. For stocks with rising prices, we find, in Panel B, that mindful individuals have expectations that are similar to those of participants in the control condition. Overall, the evidence shows that financial expectations, particularly stock return beliefs, are not significantly influenced by mindful meditation.

8 Evidence from the Field

The primary advantage of our experimental paradigms is that the controlled settings allow us to isolate the causal effects of the mindfulness therapeutic on individuals' financial primitives and investment decisions. Yet, as with any experimental study, external validity concerns arise. As a step toward addressing such concerns, we use field data to further examine, in a naturalistic setting, whether households' financial decisions are affected by meditative practices. Additionally, this setting allows us to shed light on whether the effects of meditation persist even when likely to be temporally detached from investment decisions, as survey respondents are less likely to have systematically practiced meditation directly before engaging in portfolio allocation choices.

8.1 The Health and Retirement Survey

We utilize data from the 2016 wave of the Health and Retirement Survey (HRS). Though the survey focuses on older Americans, it is the best available data set that includes data on individuals' financial circumstances, including investment asset allocations, as well as information about respondents' time preferences, and meditative practices. In particular, survey takers are asked "In planning your family's saving and spending, which time period is most important to you?" We create *Time Horizon* based on participants' responses, which range from 1 (Next few months) to 5 (Longer than ten years). In Table IA7, we find that the average of *Time Horizon* is 3.31, which indicates that the typical individual has a planning horizon of about the next few years.

Survey participants are also asked "How often do you meditate or take time for personal contemplation?" We use this survey question to create our main independent variable, *Meditation*, which is an indicator variable equal to one if the respondent meditates at least once a day, and zero otherwise. We interpret the *Meditation* measure as a proxy for mindfulness since mindfulness is a commonly practiced form of meditation. About 2.3% of the survey participants engage in meditation at least once per day.

We measure each household's financial investment holdings using *Risky Asset Share*, which is a respondent's ratio of risky financial assets to total liquid wealth. We find that the average individual holds about 35.5% of their liquid wealth in stocks, government and corporate bonds, mutual funds, and individual retirement accounts.

To examine the relations between households' time preferences, savings choices, and meditation, we conduct cross-sectional ordinary least squares regressions. The empirical results, presented in Table 12, are consistent with the experimental evidence. In Panel A, we find that *Meditation* is negatively and significantly associated with *Time Horizon*, which implies that individuals who meditate tend to have shorter planning horizons. Including a variety of controls to account for traditional determinants of financial decisions and emotions, as well as region of residence fixed effects, does not materially affect the coefficient.[26]

Meditation is also negatively correlated with individuals' *Risky Asset Share*. In column (1) of

[26]In untabulated results, we find consistent results when estimating ordered logit and probit models.

Panel B, the coefficient on *Meditation* is -0.136 (p-value = 0.011), which suggests that people who meditate at least once per day invest about 13.6% less of their liquid wealth in financial assets that are likely to provide future economic benefits. In column (5), we find that including controls to account for heterogeneity in respondents' socioeconomic characteristics, emotions, and fixed effects does not subsume the relation (p-value = 0.057). Moreover, the implied economic magnitude of the impact of meditating varies little across the specifications, fluctuating between -13.6% and -8.6%. Overall, we interpret the empirical evidence to be in line with our experimental findings.

9 Conclusion

Mental well-being is a growing health, economic, and social concern. Spurred by technological innovations, mindful meditation is emerging as an accessible and effective treatment option that influences an individual's cognitive processes and behavior. Moreover, mindfulness is not only a therapy but also an inherent dispositional trait within individuals. Since mindfulness calls attention to the present moment, we conjecture that it is likely to affect financial decision-making by influencing individuals' subjective discount rates.

Through a series of experiments with heterogeneous participants, we show that mindful individuals apply higher discount rates to future financial payouts. Greater impatience has savings and portfolio choice implications for households. We find that mindful individuals allocate less to risky assets that typically provide future economic gains and make less efficient investment portfolio trading decisions. In particular, mindful investors hold less-diversified portfolios and are disposed towards realizing investment gains, which leads to lower portfolio performance. While our experiments rely on a one-time mindfulness session, evidence from field data – that contain information on individuals' repeated engagement with meditative practices, time preferences, and financial circumstances – coincides with our experimental findings.

While health therapies, such as mindfulness, may assist with ameliorating the deleterious effects of mental health afflictions, our study highlights that they can have independent financial consequences. We do not claim that the tradeoff that seems to exist between the use of an effective mental health treatment option and efficient financial decision-making is a net negative for users or society as we are unable to capture holistic measures of utility. It is quite possible that mindfulness

allows individuals to be more productive and, as a result, increases gains from labor. It is also possible that more mindful individuals have more positive spillovers on the attitude and productivity of their colleagues and neighbors.

Our research provides an initial assessment of how mindfulness affects financial decision-making. Future research may aim to estimate the net benefits of this growing treatment option, as well as assess mechanisms that could ameliorate its effect on investment decisions. Moreover, while our experiments rely on a single mindfulness exercise, mounting evidence shows that repeated engagement has enduring effects on cognitive functioning and behavioral outcomes. This suggests that mindfulness could have long-run consumption and savings implications for households. Overall, as health therapeutics continue to proliferate via technological innovations, the implications of our results and need for future research are likely to be increasingly important.

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Figure 1: Evidence on Mindfulness and Investors' Disposition

The figure reports estimates of the effects of mindfulness on participants' disposition by experiment condition. The bars show the mean *Disposition Effect* for the treatment (Mindfulness) and control conditions. *Disposition Effect* is calculated as the proportion of gains realized (PGR) less the proportion of losses realized (PLR). Error bars show the mean ± one standard error.

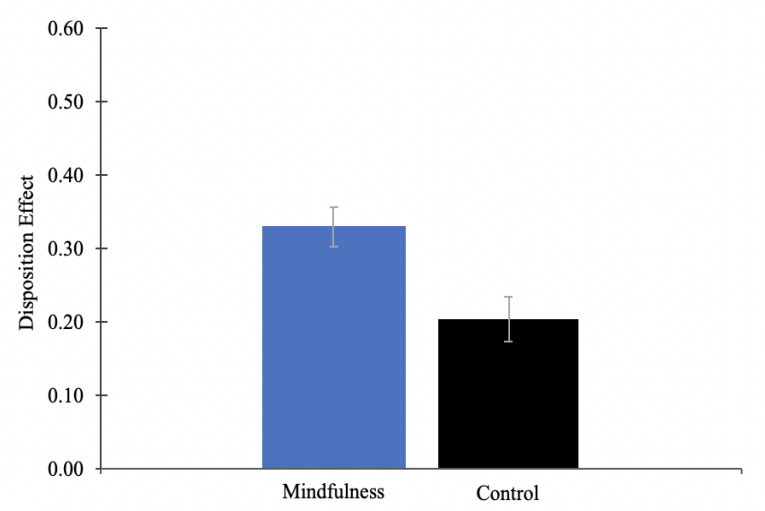


Figure 2: Effects of Mindfulness on the Proportions of Gains and Losses Realized

The figure reports estimates of the effect of mindfulness on individual investors' propensity to realize gains and losses. The bars show the mean *Proportion of Gains Realized* and *Proportion of Losses Realized* for the treatment (Mindfulness) and control conditions. Error bars show the mean ± one standard error.

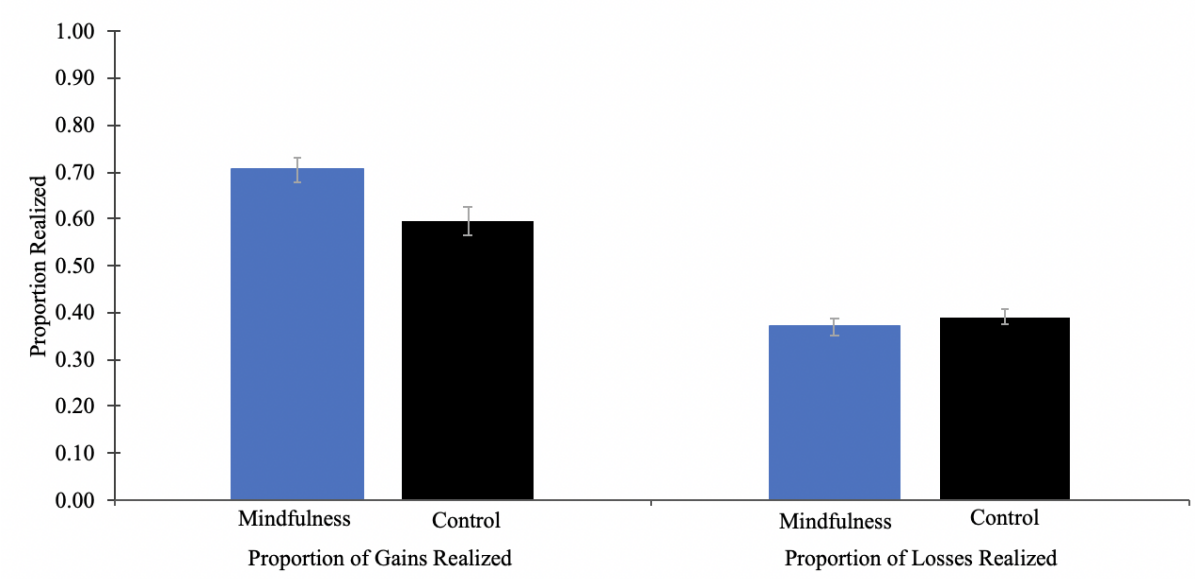


Figure 3: Evidence on Mindfulness and Financial Risk Preferences

The figure reports estimates of the effects of mindfulness on financial risk preferences by experiment condition. The bars show the mean σ, the coefficient of risk preferences derived from participants' lottery choices, for the mindfulness (treatment) and control conditions. Error bars show the mean $\pm$ one standard error.

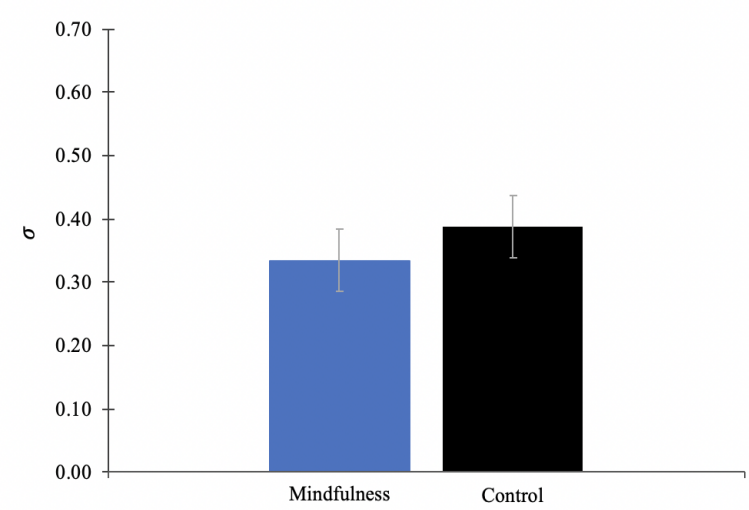


Table 1: Comparison of Time Preference Models

The table reports estimates of participants' time discounting preferences from nonlinear least-squares regressions. All variables are defined in Appendix I. Standard errors are clustered at the participant-level and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

	(1) Exponential	(2) Hyperbolic	(3) Quasi-hyperbolic	(4) Full Model
μ	0.131***	0.139***	0.168***	0.169***
	(18.36)	(19.30)	(18.76)	(18.63)
r	0.010***	0.015***	0.003***	0.014
	(20.27)	(15.49)	(8.12)	(1.21)
β			0.720***	0.764***
			(50.17)	(25.05)
θ				10.058***
				(3.10)
N	9,030	9,030	9,030	9,030
Adj. R-sq.	0.517	0.518	0.523	0.523

Table 2: Evidence on Mindfulness and Time Preferences

The table reports estimates from nonlinear least squares regression models of the effects of mindfulness on participants' time preferences, estimated from each experiment participant's choices among lotteries in Table IA1. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. In each panel, column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from the fully-specified model which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are clustered at the participant-level and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

	Panel A: Present Bias					Panel B: Discount Rate				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
μ	0.169***	0.196***	0.209***	0.211***	0.212***					
	(18.76)	(17.30)	(16.55)	(16.49)	(16.44)					
Constant (β_0, r_0)	0.704***	1.210***	0.736***	0.743***	0.800***	0.002***	0.009***	0.007**	0.007**	0.007**
	(34.02)	(15.09)	(6.90)	(6.88)	(7.20)	(4.53)	(4.03)	(2.22)	(2.49)	(2.01)
Mindfulness	0.033	0.014	0.017	0.016	0.014	0.146**	0.151**	0.140**	0.161**	0.163**
	(1.19)	(0.61)	(0.80)	(0.73)	(0.67)	(2.22)	(2.35)	(2.25)	(2.52)	(2.56)
Traditional Controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes	No	No	No	No	Yes
N	9,030	9,030	9,030	9,030	9,030					
Adj. R-sq.	0.523	0.527	0.528	0.528	0.528					

Table 3: Participant Statistics: Financial Preferences Task

The table reports participant summary statistics, means and standard deviations, across the treatment (Mindfulness) and control conditions for individuals who participated in the financial preferences experiment. Panel A reports estimates for individuals who were randomly assigned to the treatment condition. Panel B shows estimates for individuals who were assigned to the control condition. The final column reports p-values from two-sample t-tests which compare the means for each variable across the treatment and control conditions. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively. All variables are defined in Appendix I.

	Mindfulness			Control			
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	p-value
Age	4.960	2.222	150	5.126	2.359	151	(0.531)
Education	4.873	1.538	150	4.980	1.467	151	(0.538)
Income	75.553	63.620	150	81.166	60.736	151	(0.434)
Male	0.633	0.484	150	0.636	0.483	151	(0.965)
Married	0.513	0.501	150	0.603	0.491	151	(0.120)
White	0.833	0.374	150	0.848	0.361	151	(0.735)
Risk Tolerance	2.684	0.752	150	2.815	0.716	151	(0.125)
Employment Status	2.733	0.833	150	2.556	1.030	151	(0.102)
Democrat	0.440	0.498	150	0.497	0.502	151	(0.326)
Numeracy	6.647	3.581	150	6.311	3.661	151	(0.422)
Financial Literacy	1.927	1.124	150	1.828	1.136	151	(0.448)
Perceived Financial Know.	2.240	1.008	150	2.384	0.923	151	(0.197)
Stock Market Investor	0.607	0.490	150	0.656	0.477	151	(0.380)
Trust Stock Market	0.660	1.567	150	0.834	1.349	151	(0.302)
Optimism	1.300	1.418	150	1.358	1.387	151	(0.722)
Economic Outlook	1.233	1.089	150	1.126	1.191	151	(0.414)
Attention Incorrect	0.167	0.374	150	0.152	0.361	151	(0.735)
Task Duration	1,123.641	894.661	150	997.404	516.591	151	(0.135)
Negative Affect	1.128	1.101	150	1.332	1.190	151	(0.123)
Positive Affect	2.237	0.952	150	2.377	0.840	151	(0.179)

Table 4: Evidence on Mindfulness and Individuals' Savings Decisions

The table reports estimates from OLS models of the effects of mindfulness on participants' savings allocation decisions. The dependent variable is *Cash Allocation*, which is a participant's total dollar amount invested in the cash asset during each trial. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. Column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are clustered at the participant-level and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)
Mindfulness	215.199**	224.846**	220.087**	259.883***	232.471**
	(2.213)	(2.256)	(2.331)	(2.706)	(2.357)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	1,092	1,088	1,088	1,088	1,088
Adj. R-sq.	0.004	0.019	0.034	0.057	0.060

Table 5: Participant Statistics: Stock Trading Task

The table reports experiment participant summary statistics, means and standard deviations, across the treatment (Mindfulness) and control conditions for individuals who participated in the stock trading task. Panel A reports estimates for individuals who were randomly assigned to the treatment condition. Panel B shows estimates for individuals who were assigned to the control condition. The final column reports p-values from two-sample t-tests which compare the means for each variable across the treatment and control conditions. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively. All variables are defined in Appendix I.

	Panel A: Mindfulness			Panel B: Control			
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	p-value
Age	4.757	2.302	152	4.516	2.219	153	(0.354)
Education	5.132	1.346	152	4.928	1.456	153	(0.206)
Income	90.575	66.654	153	84.458	64.491	153	(0.415)
Male	0.566	0.497	152	0.575	0.496	153	(0.869)
Married	0.651	0.478	149	0.654	0.477	153	(0.962)
White	0.789	0.409	152	0.732	0.444	153	(0.241)
Risk Tolerance	2.993	0.692	153	2.907	0.766	153	(0.305)
Employment Status	2.712	0.879	153	2.712	0.848	153	(1.000)
Democrat	0.404	0.492	151	0.437	0.498	151	(0.562)
Numeracy	5.235	3.679	153	5.712	3.675	153	(0.257)
Financial Literacy	1.595	1.085	153	1.647	1.144	153	(0.682)
Perceived Financial Know.	2.595	0.983	153	2.451	0.939	153	(0.192)
Stock Market Investor	0.686	0.466	153	0.654	0.477	153	(0.545)
Trust Stock Market	1.255	1.393	153	0.993	1.476	153	(0.112)
Future Optimism	1.549	1.147	153	1.516	1.288	153	(0.815)
Economic Outlook	1.464	0.994	153	1.458	1.094	153	(0.956)
Attention Incorrect	0.183	0.388	153	0.157	0.365	153	(0.544)
Task Duration	1,126.275	953.238	153	1,142.654	799.121	153	(0.871)
Negative Affect	1.584	1.243	153	1.471	1.217	153	(0.424)
Positive Affect	2.461	0.910	153	2.402	0.819	153	(0.553)

Table 6: Evidence on Mindfulness and Investors' Disposition

The table reports estimates from OLS models of the effects of loneliness on participants' disposition. In Panel A, *Disposition Effect* is the dependent variable and is calculated as the proportion of gains realized less the proportion of losses realized. In Panel B, the dependent variable is *PGR*, as measured in Equation 4. In Panel C, the dependent variable is *PLR*, as measured in Equation 5. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. In each panel, column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are White (1980) heteroskedasticity-robust and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

Panel A: Disposition Effect					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	0.131***	0.107***	0.116***	0.117***	0.116***
	(3.18)	(2.74)	(2.91)	(2.92)	(2.90)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	306	302	298	298	298
Adj. R-sq.	0.029	0.124	0.112	0.109	0.105
Panel B: Proportion of Gains Realized					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	0.111***	0.079**	0.082**	0.082**	0.084**
	(2.88)	(2.36)	(2.38)	(2.41)	(2.45)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	306	302	298	298	298
Adj. R-sq.	0.023	0.284	0.292	0.296	0.301
Panel C: Proportion of Losses Realized					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	-0.020	-0.028	-0.034	-0.035	-0.033
	(-0.81)	(-1.20)	(-1.50)	(-1.51)	(-1.48)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	306	302	298	298	298
Adj. R-sq.	-0.001	0.098	0.126	0.130	0.187

Table 7: Evidence on Mindfulness and Investors' Trading Performance

The table reports estimates from OLS models of the effects of mindfulness on participants' trading performance. The dependent variable is *Portfolio Value*, which is the participant's total cash value, in dollars, at the conclusion of the experiment after liquidating all portfolio holdings. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. Column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are White (1980) heteroskedasticity-robust and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)
Mindfulness	-2.582**	-2.517**	-2.645**	-2.740**	-2.684**
	(-2.12)	(-2.07)	(-2.13)	(-2.22)	(-2.19)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	306	302	298	298	298
Adj. R-sq.	0.011	0.007	0.016	0.014	0.030

Table 8: Mindfulness, Portfolio Concentration, and Trading Activity

The table reports estimates from OLS (columns 1 - 5) and Tobit (column 6) models of the effects of mindfulness on participants' stock holdings and trading activity. In Panel A, *Stock Holdings* is the dependent variable, which is a participant's number of unique stock holdings at the conclusion of the experiment. In Panel B, the dependent variable is *Total Trades*, the total number of buys and sells each participant implemented during the experiment. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. In each panel, column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are White (1980) heteroskedasticity-robust and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

Panel A: Stock Holdings						
	(1)	(2)	(3)	(4)	(5)	(6) Tobit
Mindfulness	-0.229**	-0.237**	-0.223**	-0.231**	-0.233**	-0.306**
	(-2.38)	(-2.49)	(-2.30)	(-2.41)	(-2.43)	(-2.52)
Traditional Controls	No	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes	Yes
Emotion Controls	No	No	No	No	Yes	Yes
N	306	302	298	298	298	298
Adj./Pseudo R-sq	0.015	0.079	0.085	0.106	0.104	0.064
Panel B: Total Trades						
	(1)	(2)	(3)	(4)	(5)	(6) Tobit
Mindfulness	0.281	0.098	0.124	0.116	0.132	0.159
	(1.02)	(0.41)	(0.51)	(0.48)	(0.56)	(0.63)
Traditional Controls	No	Yes	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes	Yes
Emotion Controls	No	No	No	No	Yes	Yes
N	306	302	298	298	298	298
Adj./Pseudo R-sq	0.000	0.228	0.243	0.252	0.281	0.084

Table 9: Evidence on Mindfulness and Investors' Disposition: Linear Probability Model

The table reports OLS estimates on the relationship between mindfulness and the disposition effect using the linear probability model in Equation 7. The dependent variable, *Sale*, equals one in trial t if participant j sells the share, and zero otherwise. The independent variable *Gain* is an indicator which equals one if the stock's current price is above the participant's purchase price, and zero otherwise. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. The key explanatory variable is *Gain* × *Mindfulness* and it measures the change in the disposition effect as a result of the mindfulness training. Column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are clustered at the participant-level and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

	(1)	(2)	(3)	(4)	(5)
Gain	0.348***	0.376***	0.383***	0.382***	0.381***
	(10.32)	(11.74)	(11.89)	(11.80)	(11.76)
Mindfulness	-0.023**	-0.029**	-0.028*	-0.028*	-0.029*
	(-2.06)	(-2.00)	(-1.85)	(-1.88)	(-1.94)
Gain × Mindfulness	0.150***	0.128***	0.114**	0.115***	0.117***
	(3.28)	(2.95)	(2.57)	(2.60)	(2.63)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	2,754	2,718	2,574	2,574	2,574
Adj. R-sq.	0.201	0.241	0.240	0.242	0.245

Table 10: Evidence on Mindfulness, Loss Aversion, and Probability Weighting

The table reports estimates from OLS models of the effects of mindfulness on loss aversion and probability weighting. In Panel A, λ is the dependent variable and is the loss aversion parameter derived from each experiment participant's lottery choices. In Panel B, α is the dependent variable and is the nonlinear probability weighting parameter derived from each experiment participant's lottery choices. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. In each panel, column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are White (1980) heteroskedasticity-robust and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

Panel A: Loss Aversion					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	-0.237	-0.325	-0.610	-0.603	-0.496
	(-0.23)	(-0.32)	(-0.60)	(-0.58)	(-0.47)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	301	301	301	301	301
Adj. R-sq.	-0.003	0.033	0.066	0.059	0.060
Panel B: Probability Weighting					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	0.039	0.028	0.026	0.028	0.023
	(0.80)	(0.59)	(0.54)	(0.57)	(0.48)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	301	301	301	301	301
Adj. R-sq.	-0.001	0.021	0.013	0.019	0.017

Table 11: Evidence on Mindfulness and Stock Return Expectations

The table reports estimates from OLS models of the effects of mindfulness on stock return expectations. The dependent variable is *Stock Return Belief*, which is the average six month expected stock return based on each participant's price estimates. Panel A reports estimates related to stocks which had negative historical price trends while Panel B reports estimates for stocks which had positive historical price trends. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. In each panel, column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, Education, Income, Male, Married, White, Risk Tolerance, and Employed. Column (3) reports an estimate from an expanded model which includes traditional controls as well as additional controls: Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, and Economic Outlook. Column (4) reports the estimate from a specification which includes the traditional and additional controls as well as variables to measure participants' task diligence: Attention Incorrect and Task Duration. In column (5), we expand the model to incorporate controls for participants' emotions: Negative Affect and Positive Affect. All variables are defined in Appendix I. Standard errors are White (1980) heteroskedasticity-robust and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

Panel A: Negative Stock Charts					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	0.043	0.031	0.038	0.031	0.036
	(0.57)	(0.47)	(0.56)	(0.45)	(0.53)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	284	279	262	262	262
Adj. R-sq.	-0.002	0.264	0.307	0.309	0.313
Panel B: Positive Stock Charts					
	(1)	(2)	(3)	(4)	(5)
Mindfulness	-0.027	-0.027	-0.023	-0.024	-0.026
	(-0.82)	(-0.90)	(-0.79)	(-0.83)	(-0.89)
Traditional Controls	No	Yes	Yes	Yes	Yes
Additional Controls	No	No	Yes	Yes	Yes
Task Diligence Controls	No	No	No	Yes	Yes
Emotion Controls	No	No	No	No	Yes
N	284	279	262	262	262
Adj. R-sq.	-0.001	0.200	0.274	0.270	0.269

Table 12: Evidence From the Field

The table reports estimates from OLS models of the effects of meditation on survey respondents' time horizons and asset allocations. In Panel A, the dependent variable is *Time Horizon*, which is a respondent's most important time period when planning savings and spending. In Panel B, the dependent variable is *Risky Asset Share*, which is a respondent's ratio of risky financial assets to total liquid wealth. Risky assets includes stocks, government and corporate bonds, mutual funds, and individual retirement accounts. Total liquid wealth is defined as the total value of risky and risk-free assets. Risk-free assets include savings and checking accounts, money market funds, certificates of deposit, U.S. savings bonds, and personal loans to others. *Meditation* is an indicator variable that is one if the individual reports meditating at least once per day, and zero otherwise. In each panel, column (1) reports a univariate estimate while column (2) reports an estimate from the model which includes traditional control variables: Age, College Degree, Homeowner, Financial Decision Maker, Income, Male, Married, Number of Children, Risk Tolerance, Wealth, and White. Column (3) incorporates fixed effects for the respondents' regions of residence in the United States. In column (4), we expand the model to incorporate controls for participants' positive emotions: Happiness and Life Enjoyment. Column (5) includes negative emotion controls: Depression, Sadness, and Lack of Motivation. All variables are defined in Appendix I. Standard errors are clustered at the individual-level and t-statistics are presented in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively.

Panel A: Time Horizon					
	(1)	(2)	(3)	(4)	(5)
Meditation	-0.416*	-0.422**	-0.481**	-0.492**	-0.481**
	(-1.81)	(-1.97)	(-2.16)	(-2.19)	(-2.13)
Traditional Controls	No	Yes	Yes	Yes	Yes
Positive Emotion Controls	No	No	No	Yes	Yes
Negative Emotion Controls	No	No	No	No	Yes
Region FE	No	No	Yes	Yes	Yes
N	1,306	1,306	1,302	1,300	1,299
Adj. R-sq.	0.003	0.045	0.050	0.050	0.050
Panel B: Risky Asset Share					
	(1)	(2)	(3)	(4)	(5)
Meditation	-0.136**	-0.086*	-0.093*	-0.095**	-0.092*
	(-2.54)	(-1.81)	(-1.93)	(-1.97)	(-1.91)
Traditional Controls	No	Yes	Yes	Yes	Yes
Positive Emotion Controls	No	No	No	Yes	Yes
Negative Emotion Controls	No	No	No	No	Yes
Region FE	No	No	Yes	Yes	Yes
N	1,718	1,718	1,711	1,709	1,707
Adj. R-sq.	0.003	0.198	0.197	0.197	0.198

Appendix I: Variable Definitions

This table describes the variables used in the experimental and empirical analyses.

Panel A: Experimental Variables	
Key Variables	Definition
α	Participant's nonlinear probability weighting parameter.
β	Participant's present bias parameter.
λ	Participant's loss aversion parameter.
σ	Participant's risk preference parameter.
r	Participant's discount rate parameter.
Cash Allocation	Participant's dollar amount invested in the cash asset during each trial.
Disposition Effect	The propensity to realize gains versus losses. Calculated as the proportion of gains realized less the proportion of losses realized.
Gain	Equal to one if the stock had a gain in the trial, zero otherwise.
Mindfulness	One if the participant is randomly assigned to the mindfulness (treatment) condition, zero otherwise.
Portfolio Value	Participant's final portfolio value in dollars.
Sale	Equal to one if the participant sold the stock during the trial, zero otherwise.
Stock Holdings	Number of unique stock holdings at the end of the experiment.
Stock Return Belief	Participant's mean six month expected stock return.
Total Trades	Participant's total number of buys and sells during the experiment.
Explanatory Variables	Definition
Age	Categorical age group of the participant: 1. 18 - 20; 2. 21 - 25; 3. 26 - 30; 4. 31 - 35; 5. 36 - 40; 6. 41 - 45; 7. 46 - 50; 8. 51 - 55; 9. 56 - 60; 10. 61 - 65; 11. Above 65 years old.
Attention Incorrect	Indicator equal to one if the individual correctly answered the attention check question "Please select Asia from the list," and zero otherwise.
Democrat	One if the participant aligns with the Democratic party, zero otherwise.
Economic Outlook	Response on a one (much worse) to seven (much better) Likert scale to "Five years from now, my household's economic status will be:"
Education	The level of highest education attained. Categorical variable: 1. Some high school; 2. High school graduate; 3. Some college; 4. Undergraduate degree; 5. Professional degree; 6. Master's degree; 7. Doctoral degree.
Employment Status	Equal to 1 if participant is a student, 2 if a homemaker, 3 if employed part-time or full-time, zero otherwise.
Experiment Duration	Time, in seconds, taken to complete an experiment.
Financial Literacy	Zero (low literacy) to three (high literacy) index based on the three literacy questions in Lusardi and Mitchell (2008, 2011).
Income	Participant's income in thousands of dollars.
Male	Equal to one if male, zero otherwise.
Married	Equal to one if the participant is married, zero otherwise.
Negative Affect	Participant's score from zero (Very slightly or not at all) to four (Extremely) on the PANAS-X Negative Affect Scale.
Numeracy	Number of correct answers, from zero to eleven, on a numeracy questionnaire adapted from Lipkus, Samsa, and Rimer (2001).
Optimism	Response on a one (strongly disagree) to seven (strongly agree) Likert scale to "I am optimistic about my future."
Perceived Financial Knowledge	Rating from zero (No knowledge at all) to four (A great deal of knowledge) to "How would you rate your level of knowledge about personal finance?"

Variable Definitions – *Continued*

Explanatory Variables	Definition
Positive Affect	Participant's score from zero (Very slightly or not at all) to four (Extremely) on the PANAS-X Positive Affect Scale.
Risk Tolerance	Index composed of the gambling and investing risk assessment questions from Weber, Blais, and Betz (2002).
Sadness	Participant's score from zero (Very slightly or not at all) to four (Extremely) on the PANAS-X Basic Negative Emotion Scale.
Stock Market Investor	One if the participant invests in the stock market, and zero otherwise.
Task Duration	Time, in seconds, taken to complete an experimental task.
Trust Stock Market	Response on a one (strongly disagree) to seven (strongly agree) Likert scale to the question "Are you confident that the stock market is fair and that you will not be cheated when investing?"
White	Equal to one if the participant is White, zero otherwise.
	Panel B: Health and Retirement Survey Variables
Key Variables	Definition
Meditation	Equal to one if the respondent reports meditating at least once per day, zero otherwise.
Risky Asset Share	Respondent's ratio of risky financial assets to total liquid wealth. Risky assets includes stocks, government and corporate bonds, mutual funds, and individual retirement accounts. Total liquid wealth is defined as the total value of risky and risk-free assets. Risk-free assets include savings and checking accounts, money market funds, certificates of deposit, U.S. savings bonds, and personal loans to others
Time Horizon	Response to "In planning your (family's) saving and spending, which of the following time periods is most important to you, the next few months, the next year, the next few years, the next 5-10 years, or longer than 10 years?" Coded as: 1. Next few months; 2. Next year; 3. Next few years; 4. Next 5-10 years; 5. Longer than 10 years.
Explanatory Variables	Definition
Age	Natural log of pespondent's age in years.
College Degree	Equal to one if the individual has at least a college degree, zero otherwise.
Depression	One if the person reports being depressed much of the last week, and zero otherwise.
Financial Decision Maker	One if respondent is the households' financial decision maker.
Happiness	One if the person reports being happy much of the last week, zero otherwise.
Homeowner	One if the respondent owns a home, zero otherwise.
Income	Natural log of the households' total income.
Lack of Motivation	One if the respondent reports lacking motivation much of the last week, zero otherwise.
Life Enjoyment	One if the person reports enjoying life much of the last week, zero otherwise.
Male	One if respondent is male, zero otherwise.
Married	Equal to one if the individual is married, zero otherwise.
Number of Children	Natural log of the number of children in the household.
Risk Tolerance	Response on a 0 (Not at all willing) to 10 (Very willing to take risks) scale to: "Are you generally a person who tries to avoid taking risks or one who is fully prepared to take risks?"
Sadness	One if the person reports being sad much of the last week, zero otherwise.
Wealth	Natural log of the household's total wealth.
White	One if respondent is White, zero otherwise.

Internet Appendix

Table IA1: Estimating Time Preferences

The table shows the series of lottery pairs used to elicit participants' time preferences.

Pair #	Lottery A	Lottery B
1-1	Receive $6.00 in 1 week	Receive $1.00 today
1-2	Receive $6.00 in 1 week	Receive $2.00 today
1-3	Receive $6.00 in 1 week	Receive $3.00 today
1-4	Receive $6.00 in 1 week	Receive $4.00 today
1-5	Receive $6.00 in 1 week	Receive $5.00 today
2-1	Receive $6.00 in 1 month	Receive $1.00 today
2-2	Receive $6.00 in 1 month	Receive $2.00 today
2-3	Receive $6.00 in 1 month	Receive $3.00 today
2-4	Receive $6.00 in 1 month	Receive $4.00 today
2-5	Receive $6.00 in 1 month	Receive $5.00 today
3-1	Receive $6.00 in 3 months	Receive $1.00 today
3-2	Receive $6.00 in 3 months	Receive $2.00 today
3-3	Receive $6.00 in 3 months	Receive $3.00 today
3-4	Receive $6.00 in 3 months	Receive $4.00 today
3-5	Receive $6.00 in 3 months	Receive $5.00 today
4-1	Receive $15.00 in 1 week	Receive $2.50 today
4-2	Receive $15.00 in 1 week	Receive $5.00 today
4-3	Receive $15.00 in 1 week	Receive $7.50 today
4-4	Receive $15.00 in 1 week	Receive $10.00 today
4-5	Receive $15.00 in 1 week	Receive $12.50 today
5-1	Receive $15.00 in 1 month	Receive $2.50 today
5-2	Receive $15.00 in 1 month	Receive $5.00 today
5-3	Receive $15.00 in 1 month	Receive $7.50 today
5-4	Receive $15.00 in 1 month	Receive $10.00 today
5-5	Receive $15.00 in 1 month	Receive $12.50 today
6-1	Receive $15.00 in 3 months	Receive $2.50 today
6-2	Receive $15.00 in 3 months	Receive $5.00 today
6-3	Receive $15.00 in 3 months	Receive $7.50 today
6-4	Receive $15.00 in 3 months	Receive $10.00 today
6-5	Receive $15.00 in 3 months	Receive $12.50 today
7-1	Receive $1.50 in 1 week	Receive $0.25 today
7-2	Receive $1.50 in 1 week	Receive $0.50 today
7-3	Receive $1.50 in 1 week	Receive $0.75 today
7-4	Receive $1.50 in 1 week	Receive $1.00 today
7-5	Receive $1.50 in 1 week	Receive $1.25 today
8-1	Receive $1.50 in 1 month	Receive $0.25 today
8-2	Receive $1.50 in 1 month	Receive $0.50 today
8-3	Receive $1.50 in 1 month	Receive $0.75 today
8-4	Receive $1.50 in 1 month	Receive $1.00 today
8-5	Receive $1.50 in 1 month	Receive $1.25 today

Table IA1: Estimating Time Preferences – Continued

The table shows the series of lottery pairs used to elicit participants' time preferences.

Pair #	Lottery A	Lottery B
9-1	Receive $1.50 in 3 months	Receive $0.25 today
9-2	Receive $1.50 in 3 months	Receive $0.50 today
9-3	Receive $1.50 in 3 months	Receive $0.75 today
9-4	Receive $1.50 in 3 months	Receive $1.00 today
9-5	Receive $1.50 in 3 months	Receive $1.25 today
10-1	Receive $12.00 in 3 days	Receive $2.00 today
10-2	Receive $12.00 in 3 days	Receive $4.00 today
10-3	Receive $12.00 in 3 days	Receive $6.00 today
10-4	Receive $12.00 in 3 days	Receive $8.00 today
10-5	Receive $12.00 in 3 days	Receive $10.00 today
11-1	Receive $12.00 in 2 weeks	Receive $2.00 today
11-2	Receive $12.00 in 2 weeks	Receive $4.00 today
11-3	Receive $12.00 in 2 weeks	Receive $6.00 today
11-4	Receive $12.00 in 2 weeks	Receive $8.00 today
11-5	Receive $12.00 in 2 weeks	Receive $10.00 today
12-1	Receive $12.00 in 2 months	Receive $2.00 today
12-2	Receive $12.00 in 2 months	Receive $4.00 today
12-3	Receive $12.00 in 2 months	Receive $6.00 today
12-4	Receive $12.00 in 2 months	Receive $8.00 today
12-5	Receive $12.00 in 2 months	Receive $10.00 today
13-1	Receive $3.00 in 3 days	Receive $0.50 today
13-2	Receive $3.00 in 3 days	Receive $1.00 today
13-3	Receive $3.00 in 3 days	Receive $1.50 today
13-4	Receive $3.00 in 3 days	Receive $2.00 today
13-5	Receive $3.00 in 3 days	Receive $2.50 today
14-1	Receive $3.00 in 2 weeks	Receive $0.50 today
14-2	Receive $3.00 in 2 weeks	Receive $1.00 today
14-3	Receive $3.00 in 2 weeks	Receive $1.50 today
14-4	Receive $3.00 in 2 weeks	Receive $2.00 today
14-5	Receive $3.00 in 2 weeks	Receive $2.50 today
15-1	Receive $3.00 in 2 months	Receive $0.50 today
15-2	Receive $3.00 in 2 months	Receive $1.00 today
15-3	Receive $3.00 in 2 months	Receive $1.50 today
15-4	Receive $3.00 in 2 months	Receive $2.00 today
15-5	Receive $3.00 in 2 months	Receive $2.50 today

Table IA2: Evidence on Mindfulness, Time Preferences, and Trading Behavior Using Experiment Duration Controls

The table reports estimates of the effects of mindfulness on individuals' time preferences and portfolio decisions. *Mindfulness* is an indicator variable that is one if the individual was randomly assigned to the treatment condition, and zero otherwise. *Experiment Duration* is the total amount of time, in seconds, a participant takes to complete the entire experiment. *Experiment Duration Sq.* is the square of *Experiment Duration*. Additional control variables included in the regression model are: Age, Education, Income, Male, Married, White, Risk Tolerance, Employed, Democrat, Numeracy, Financial Literacy, Perceived Financial Knowledge, Stock Market Investor, Trust Stock Market, Optimism, Economic Outlook, Attention Incorrect, Negative Affect, and Positive Affect. All variables are defined in Appendix I. In Panel A, the dependent variables are measures of individuals' time preferences: β (present bias) and r (discount rate). Standard errors are clustered at the participant-level. In Panel B, the dependent variables are measures of individuals' portfolio decisions: *Disposition Effect* and *PGR*. Standard errors are White (1980) heteroskedasticity-robust. We report t-statistics in parentheses. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively. The estimates for *Experiment Duration* and *Experiment Duration Sq.* have been multiplied by 100,000.

Panel A: Time Preferences				
	Present Bias		Discount Rate	
	(1)	(2)	(3)	(4)
μ	0.212***	0.212***		
	(16.44)	(16.42)		
Constant (β_0, r_0)	0.800***	0.792***	0.007**	0.007**
	(7.20)	(7.06)	(2.01)	(2.03)
Mindfulness	0.010	0.005	0.177**	0.180**
	(0.46)	(0.22)	(2.59)	(2.43)
Experiment Duration	1.190	3.390	-4.190	-4.350
	(0.86)	(1.09)	(-1.28)	(-0.42)
Experiment Duration Sq.		-0.000		-0.000
		(-1.06)		(-0.09)
Controls	Yes	Yes	Yes	Yes
N	9,030	9,030		
Adj. R-sq.	0.528	0.528		
Panel B: Portfolio Decisions				
	Disposition Effect		PGR	
	(1)	(2)	(3)	(4)
Mindfulness	0.109***	0.094**	0.072**	0.062*
	(2.67)	(2.23)	(2.07)	(1.72)
Experiment Duration	2.070	12.220**	3.360*	10.231**
	(0.77)	(2.03)	(1.78)	(2.14)
Experiment Duration Sq.		-0.002**		-0.001**
		(-2.43)		(-2.01)
Controls	Yes	Yes	Yes	Yes
N	298	298	298	298
Adj. R-sq.	0.105	0.114	0.301	0.305

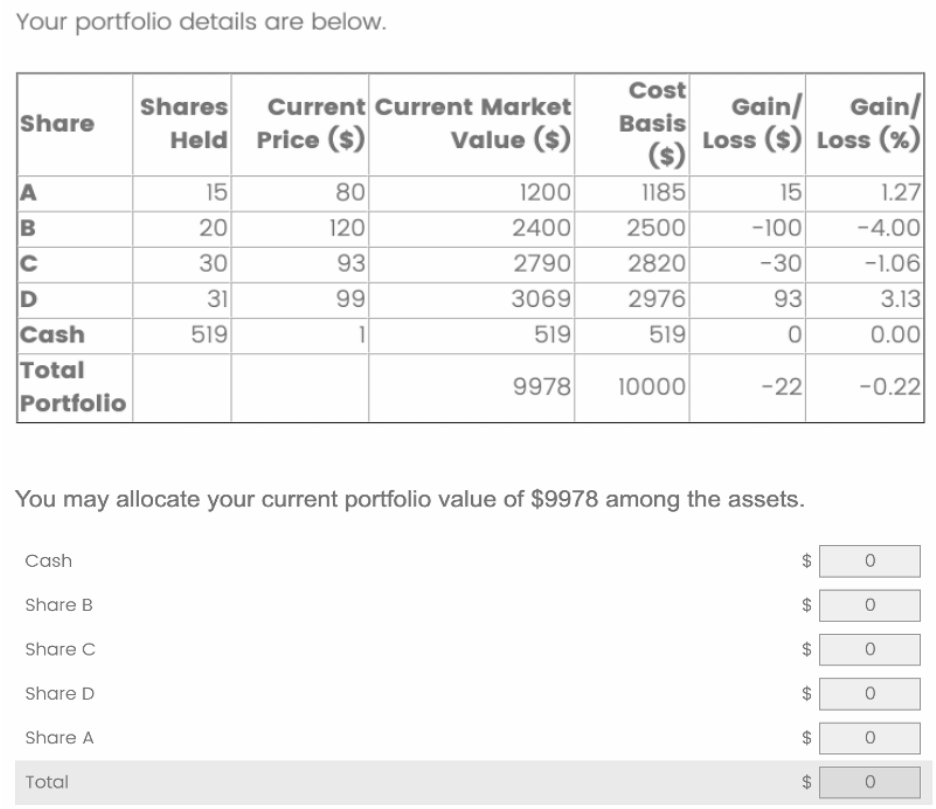
Table IA3: Share Prices for the Investment Allocation Experiment

The table presents the share prices, in dollars, each period in the investment portfolio allocation experiment.

	Time Period							
Share	-3	-2	-1	0	1	2	3	4
A	75	72	74	79	80	81	86	91
B	129	126	127	125	120	119	114	109
C	87	86	89	94	93	90	89	85
D	91	92	97	96	99	104	105	106

Figure IA1: Savings Decisions Environment

The figure illustrates the environment used in the savings decisions experiment. The price update screen provides each participant with his/her savings information. The allocation component provides investors with the opportunity to adjust their allocations between the risky and risk-free assets.



Your portfolio details are below.

Share	Shares Held	Current Price ($)	Current Market Value ($)	Cost Basis ($)	Gain/ Loss ($)	Gain/ Loss (%)
A	15	80	1200	1185	15	1.27
B	20	120	2400	2500	-100	-4.00
C	30	93	2790	2820	-30	-1.06
D	31	99	3069	2976	93	3.13
Cash	519	1	519	519	0	0.00
Total Portfolio			9978	10000	-22	-0.22

You may allocate your current portfolio value of $9978 among the assets.

Cash	$ 0
Share B	$ 0
Share C	$ 0
Share D	$ 0
Share A	$ 0
Total	$ 0

Table IA4: Participant Statistics: Savings Decisions Experiment

The table reports experiment participant summary statistics, means and standard deviations, across the treatment (mindfulness) and control conditions for individuals who participated in the stock return forecasting task. Panel A reports estimates for individuals who were randomly assigned to the treatment condition. Panel B shows estimates for individuals who were assigned to the control condition. The final column reports p-values from two-sample t-tests which compare the means for each variable across the treatment and control conditions. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively. All variables are defined in Appendix I.

	Panel A: Mindfulness			Panel B: Control			
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	p-value
Age	4.566	1.995	136	4.883	2.083	137	(0.200)
Education	5.309	1.214	136	5.474	1.345	137	(0.286)
Income	98.104	63.512	135	86.175	60.380	137	(0.113)
Male	0.706	0.457	136	0.635	0.483	137	(0.214)
Married	0.772	0.421	136	0.796	0.405	137	(0.637)
White	0.699	0.461	136	0.620	0.487	137	(0.174)
Risk Tolerance	3.050	0.718	136	3.151	0.635	137	(0.215)
Employment Status	2.875	0.564	136	2.883	0.570	137	(0.905)
Democrat	0.397	0.491	136	0.387	0.489	137	(0.863)
Numeracy	2.007	2.632	136	1.584	1.752	137	(0.119)
Financial Literacy	1.493	1.068	136	1.336	0.995	137	(0.210)
Perceived Financial Know.	2.596	0.930	136	2.635	0.882	137	(0.719)
Stock Market Investor	0.743	0.439	136	0.766	0.425	137	(0.649)
Trust Stock Market	1.272	1.319	136	1.445	1.144	137	(0.247)
Future Optimism	1.640	1.052	136	1.781	1.048	137	(0.267)
Economic Outlook	1.529	1.061	136	1.577	0.913	137	(0.693)
Attention Incorrect	0.206	0.406	136	0.197	0.399	137	(0.857)
Task Duration	1,042.493	406.299	136	980.489	423.735	137	(0.218)
Negative Affect	1.787	1.235	136	1.693	1.137	137	(0.513)
Positive Affect	2.696	0.794	136	2.740	0.786	137	(0.647)

Stock Trading Experiment: Participant Instructions

You will be given 350 experimental dollars to invest in three different stocks. Your job is to choose when to buy and sell each stock, so that you earn the most after-tax money by the end of the experiment. Throughout the experiment, you will see the stock prices change and you can use this information to decide when to buy and sell.

You will start the experiment with 1 share of Stock A, 1 share of Stock B, and 1 share of Stock C. Each share is worth $100. You will also start with $50 in cash. For the remainder of the experiment, you are only allowed to hold either 1 share or 0 shares of each stock, and the rest of your portfolio is held in cash. The cash balance can be positive or negative. Either way, the cash balance earns a 0% return.

Structure of the Market

The experiment will begin by showing you information about the price history for Stock A, Stock B, and Stock C over the past nine periods. Then, you will have nine trading sessions where you decide whether to buy or sell one of the three stocks.

In each trading session, you will be given a price update for either Stock A, Stock B, or Stock C. One of the three stocks will be randomly selected and you will see if the selected stock price has gone up or down, and by how much.

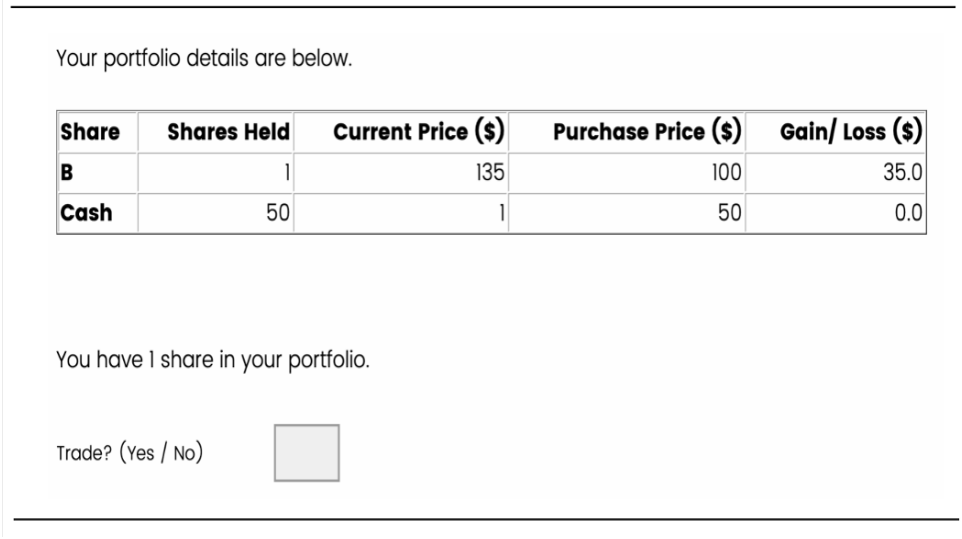
Then, you will be asked whether you would like to trade the stock and you have to answer "yes" or "no." You will see whether you currently own 1 or 0 shares of the stock. If you choose "yes" and you own 1 share, you will sell it. If you choose "yes" and you own 0 shares, you will buy 1 share. If you choose "no," then you will keep your current position of 0 or 1 shares.

How Stock Prices Change

The prices of Stock A, Stock B, and Stock C all change over time according to the same rule. At any time, each stock is either in a "good state" or a "bad state." A stock in the good state has a 70% chance of going up and a 30% chance of going down in the next period. A stock in the bad state has a 30% chance of going up and a 70% chance of going down in the next period. In either state, the size of the stock price change is equally likely to be $5, $10, or $15. After each time period, there is a 20% chance that the stock switches state.

Figure IA2: Stock Trading Environment

The figure illustrates the trading environment used in portfolio choice experiment. The price update screen provides each participant with their stock holding information as well as their contemporaneous cash holding. The trading component allows participants to buy or sell their share.



Your portfolio details are below.

Share	Shares Held	Current Price ($)	Purchase Price ($)	Gain/ Loss ($)
B	1	135	100	35.0
Cash	50	1	50	0.0

You have 1 share in your portfolio.

Trade? (Yes / No)

Table IA5: Estimating Financial Risk Preferences

This table shows the series of lottery pairs used to elicit participants' financial preferences.

Panel A: Series 1		
Pair #	Lottery A	Lottery B
1	30% chance of $2.00; 70% chance of $0.50	10% chance of $3.40; 90% chance of $0.25
2	30% chance of $2.00; 70% chance of $0.50	10% chance of $3.75; 90% chance of $0.25
3	30% chance of $2.00; 70% chance of $0.50	10% chance of $4.15; 90% chance of $0.25
4	30% chance of $2.00; 70% chance of $0.50	10% chance of $4.65; 90% chance of $0.25
5	30% chance of $2.00; 70% chance of $0.50	10% chance of $5.30; 90% chance of $0.25
6	30% chance of $2.00; 70% chance of $0.50	10% chance of $6.25; 90% chance of $0.25
7	30% chance of $2.00; 70% chance of $0.50	10% chance of $7.50; 90% chance of $0.25
8	30% chance of $2.00; 70% chance of $0.50	10% chance of $9.25; 90% chance of $0.25
9	30% chance of $2.00; 70% chance of $0.50	10% chance of $11.00; 90% chance of $0.25
10	30% chance of $2.00; 70% chance of $0.50	10% chance of $15.00; 90% chance of $0.25
11	30% chance of $2.00; 70% chance of $0.50	10% chance of $20.00; 90% chance of $0.25
12	30% chance of $2.00; 70% chance of $0.50	10% chance of $30.00; 90% chance of $0.25
13	30% chance of $2.00; 70% chance of $0.50	10% chance of $50.00; 90% chance of $0.25
14	30% chance of $2.00; 70% chance of $0.50	10% chance of $85.00; 90% chance of $0.25
Panel B: Series 2		
Pair #	Lottery A	Lottery B
1	90% chance of $2.00; 10% chance of $1.50	70% chance of $2.70; 30% chance of $0.25
2	90% chance of $2.00; 10% chance of $1.50	70% chance of $2.80; 30% chance of $0.25
3	90% chance of $2.00; 10% chance of $1.50	70% chance of $2.90; 30% chance of $0.25
4	90% chance of $2.00; 10% chance of $1.50	70% chance of $3.00; 30% chance of $0.25
5	90% chance of $2.00; 10% chance of $1.50	70% chance of $3.10; 30% chance of $0.25
6	90% chance of $2.00; 10% chance of $1.50	70% chance of $3.25; 30% chance of $0.25
7	90% chance of $2.00; 10% chance of $1.50	70% chance of $3.40; 30% chance of $0.25
8	90% chance of $2.00; 10% chance of $1.50	70% chance of $3.60; 30% chance of $0.25
9	90% chance of $2.00; 10% chance of $1.50	70% chance of $3.85; 30% chance of $0.25
10	90% chance of $2.00; 10% chance of $1.50	70% chance of $4.15; 30% chance of $0.25
11	90% chance of $2.00; 10% chance of $1.50	70% chance of $4.50; 30% chance of $0.25
12	90% chance of $2.00; 10% chance of $1.50	70% chance of $5.00; 30% chance of $0.25
13	90% chance of $2.00; 10% chance of $1.50	70% chance of $5.50; 30% chance of $0.25
14	90% chance of $2.00; 10% chance of $1.50	70% chance of $6.50; 30% chance of $0.25
Panel C: Series 3		
Pair #	Lottery A	Lottery B
1	50% chance of $1.25; 50% chance of -$0.20	50% chance of $1.50; 50% chance of -$1.00
2	50% chance of $0.20; 50% chance of -$0.20	50% chance of $1.50; 50% chance of -$1.00
3	50% chance of $0.05; 50% chance of -$0.20	50% chance of $1.50; 50% chance of -$1.00
4	50% chance of $0.05; 50% chance of -$0.20	50% chance of $1.50; 50% chance of -$0.80
5	50% chance of $0.05; 50% chance of -$0.40	50% chance of $1.50; 50% chance of -$0.80
6	50% chance of $0.05; 50% chance of -$0.40	50% chance of $1.50; 50% chance of -$0.70
7	50% chance of $0.05; 50% chance of -$0.40	50% chance of $1.50; 50% chance of -$0.55

Figure IA3: Estimating Stock Return Beliefs: Negative Price Trend Stocks

Individuals' beliefs about future stock returns were estimated from their estimates of future stock prices. Specifically, we randomly selected three stocks from the set of S&P 500 constituents and identified separate 12-month periods over which a negative cumulative return was experienced for each stock. Panels A, B, and C shows the stock price paths that were displayed one by one to each individual in random order. Each individual estimated the most-likely price of each stock half a year into the future. As a measure of an individual's *Stock Return Belief*, we compute the average estimated stock return across the stocks.

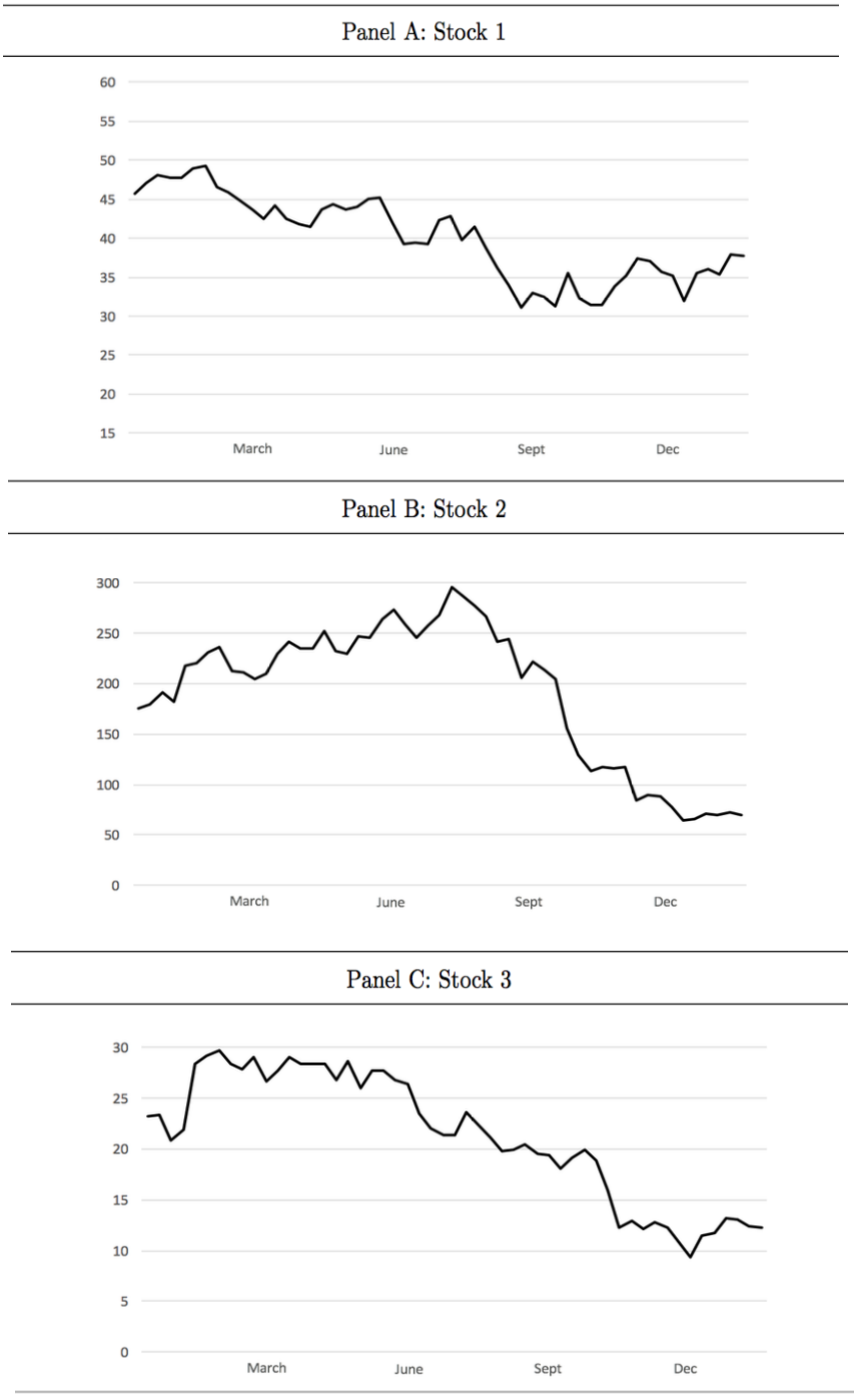


Figure IA4: Estimating Stock Return Beliefs: Positive Price Trend Stocks

Individuals' beliefs about future stock returns were estimated from their estimates of future stock prices. Specifically, we randomly selected three stocks from the set of S&P 500 constituents and identified separate 12-month periods over which a negative cumulative return was experienced for each stock. Panels A, B, and C shows the stock price paths that were displayed one by one to each individual in random order. Each individual estimated the most-likely price of each stock half a year into the future. As a measure of an individual's *Stock Return Belief*, we compute the average estimated stock return across the stocks.

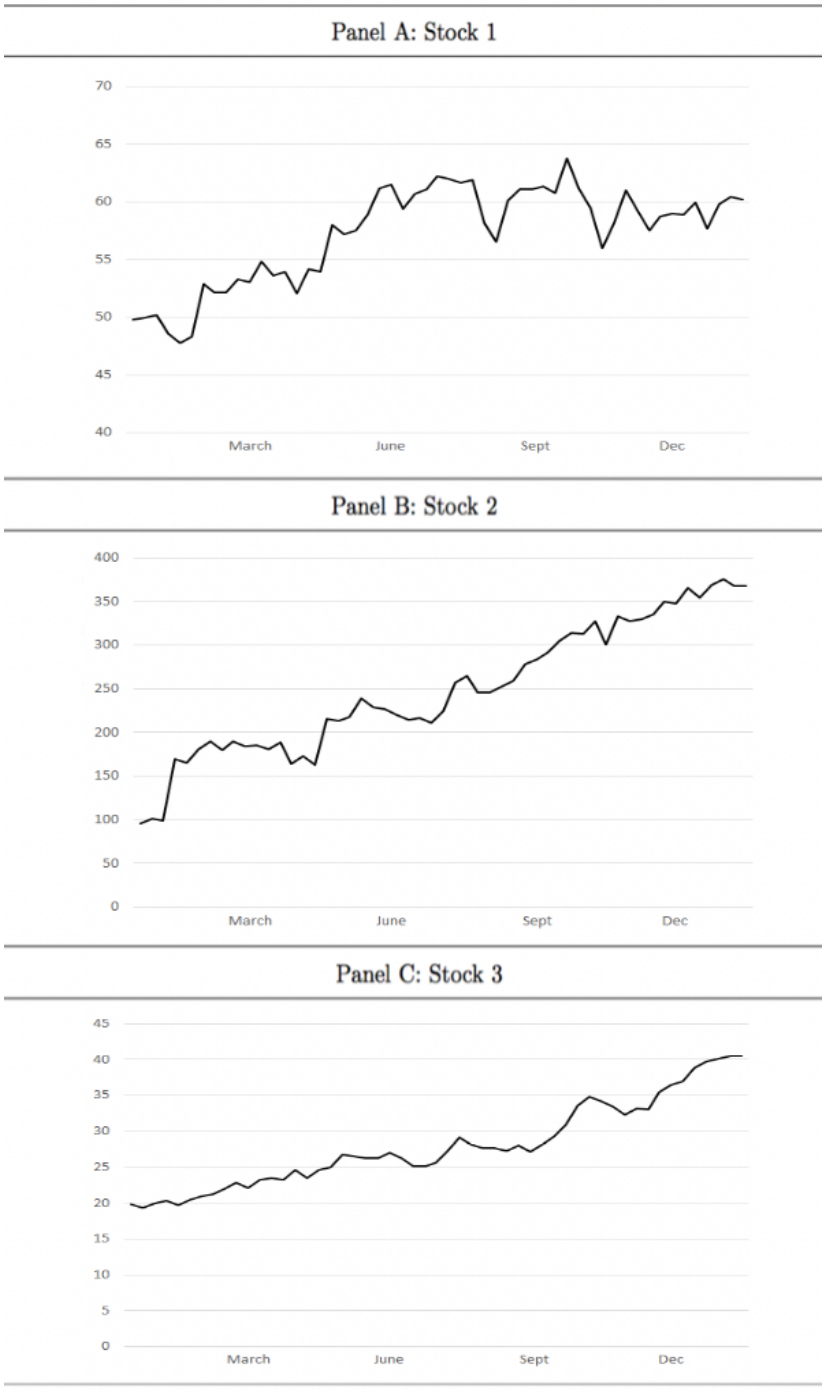


Table IA6: Participant Statistics: Stock Return Expectations Experiment

The table reports experiment participant summary statistics, means and standard deviations, across the treatment (mindfulness) and control conditions for individuals who participated in the stock return forecasting task. Panel A reports estimates for individuals who were randomly assigned to the treatment condition. Panel B shows estimates for individuals who were assigned to the control condition. The final column reports p-values from two-sample t-tests which compare the means for each variable across the treatment and control conditions. Significance at the 10%, 5%, and 1% levels are denoted by *, **, and ***, respectively. All variables are defined in Appendix I.

	Panel A: Mindfulness			Panel B: Control			
	Mean	Std. Dev.	N	Mean	Std. Dev.	N	p-value
Age	4.695	2.336	141	4.951	2.290	143	(0.352)
Education	5.036	1.375	140	5.119	1.499	143	(0.627)
Income	85.085	63.622	141	82.426	60.140	141	(0.719)
Male	0.600	0.492	140	0.692	0.463	143	(0.105)
Married	0.614	0.489	140	0.613	0.489	142	(0.978)
White	0.736	0.443	140	0.706	0.457	143	(0.583)
Risk Tolerance	2.839	0.695	141	2.858	0.722	143	(0.823)
Employment Status	2.773	0.750	141	2.692	0.882	143	(0.406)
Democrat	0.343	0.476	137	0.357	0.481	143	(0.813)
Numeracy	6.085	3.530	141	6.538	3.621	143	(0.286)
Financial Literacy	1.794	1.039	141	1.832	1.100	143	(0.766)
Perceived Financial Know.	2.404	1.082	141	2.462	0.918	143	(0.631)
Stock Market Investor	0.586	0.494	133	0.704	0.458	135	(0.045)**
Trust Stock Market	0.794	1.500	141	1.021	1.391	143	(0.188)
Future Optimism	1.489	1.144	141	1.545	1.112	143	(0.676)
Economic Outlook	1.376	0.982	141	1.399	1.036	143	(0.850)
Attention Incorrect	0.135	0.343	141	0.133	0.341	143	(0.963)
Task Duration	1,107.043	743.551	141	1,060.587	500.036	143	(0.538)
Negative Affect	1.319	1.162	141	1.358	1.284	143	(0.791)
Positive Affect	2.417	0.928	141	2.480	0.837	143	(0.551)

Table IA7: Participant Statistics: Health and Retirement Survey

The table reports summary statistics, means and standard deviations, for the Health and Retirement Survey data. All variables are defined in Appendix I.

	Mean	Std. Dev.	N
Time Horizon	3.312	1.262	1,306
Risky Asset Share	0.355	0.411	1,718
Meditation	0.026	0.160	1,718
Age	3.969	0.079	1,718
College Degree	0.689	0.463	1,718
Homeowner	0.749	0.434	1,718
Financial Decision Maker	0.726	0.446	1,718
Income	8.371	4.660	1,718
Male	0.435	0.496	1,718
Married	0.589	0.492	1,718
Number of Children	0.884	0.560	1,718
Risk Tolerance	6.312	2.188	1,718
Wealth	10.843	4.660	1,718
White	0.676	0.468	1,718
Happiness	0.851	0.356	1,717
Life Enjoyment	0.906	0.292	1,717
Depression	0.095	0.293	1,716
Sadness	0.188	0.391	1,718
Lack of Motivation	0.138	0.345	1,718