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The Conceptual Foundations of Self-Control and its Link to Impulsivity and Attention

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Abstract

Self-control, attention, and impulsivity jointly support goal-directed behavior yet are often examined in isolation with heterogeneous measures. We integrate validated self-reported scales with a hybrid, incentivized behavioral task that synthesizes two canonical experimental designs and adds novel extensions to measure these constructs in a typical work context. Using data from a preregistered four-session online study (N = 443 adults), we characterize the cross-relationships and the relationships between different measures of self-control, attention, and impulsivity and evaluate their contributions to effort allocation over time. More broadly, the study advances an emerging research program that leverages laboratory settings with well-structured economic incentives to examine the role of personality traits and cognitive limitations in economic decision making.

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self-control, impulsivity, attention, measurement

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1 Introduction

Self-control is at the heart of the cognitive processes that assist us in regulating behavior to achieve our long-term goals. Attentional control (concentration), cognitive inhibition (focus), and inhibitory control (impulse control) are among the set of core neurocognitive skills—collectively referred to as executive function—that allow our brains to prioritize tasks and filter distractions so that behavior can be cognitively chosen, regulated, and monitored in support of our chosen goals (see Carlson et al., 2013; Diamond, 2013; Goldstein et al., 2013). Executive function is central to everything we do and self-control limitations are often associated with failure. Vohs and Baumeister (2004), for example, argue that "nearly every major personal and social problem affecting large numbers of modern citizens involves some kind of failure of self-regulation" (p. 3). Targeted interventions can improve self-control, as well as executive function more generally, (see Diamond, 2013; Heckman et al., 2023) making it a potential policy lever.

Economists are increasingly focused on the role of self-control and attention in economic choice. Self-control is characterized by "the ability to override or change one's inner responses, as well as to interrupt undesired behavioral tendencies and refrain from action on them" (Tangney et al., 2004, p. 274). Attention is defined similarly as "the selective allocation of a scarce, rivalrous mental resource to some information-processing tasks to the exclusion of others" (Loewenstein & Wojtowicz, 2023, p. 2). Self-control and attention are conceptually linked since the allocation of mental resources can only be considered "attentional" if there is the potential to exert control over them (Loewenstein & Wojtowicz, 2023). Impulse control, in contrast, is largely absent from economic models of decision making. Impulsivity is the tendency to act without adequate forethought or consideration of the consequences and it has been referred to as the "quintessential form of self-regulation failure" (DeYoung & Reuter, 2016, p. 345). Psychologists have debated the best way to conceptualize and measure impulsivity for decades (see Huang et al., 2024). Consensus remains elusive, however, impulsivity is seen as both multi-dimensional (e.g., Caswell et al., 2015; Cyders et al., 2014; Huang et al., 2024) and predictive of many adverse outcomes, including substance abuse, crime, and poor mental health (see Creswell et al., 2019; Sharma et al., 2014).

Our research is motivated by a desire to develop a better understanding of the role of self-control in economic choice. There are two starting premises. First, self-control is best understood (and studied) as a multi-dimensional construct with disciplinary roots in cognitive science, psychology, and economics. Second, building a bridge across disciplinary and methodological boundaries in the way self-control is conceptualized requires that we consider measurement very carefully. We unpack the conceptual foundations of self-control using an online, incentive-compatible experiment in which participants recruited from the general population allocate attentional effort over four weekly sessions. We then collect an unusually rich set of self-reported and behavioral measures, allowing us to not only directly compare different self-control concepts, but also empirically examine the way that self-control is linked to impulsivity and attention.

Our main contribution is to advance the literature by using a unified framework to assess the two dominant models—the cost of temptation (Gul & Pesendorfer, 2001) and present bias (Laibson, 1997)—that economists use to explain why people fail to stick to their plans. Gul and Pesendorfer (2001) assume that experiencing temptation is costly. Their temptation model predicts that self-control failures will be more likely if people are faced with stronger (or longer-lasting) temptation. Moreover, people who are aware of temptation costs are expected to try to commit to decision scenarios in which they can avoid temptation. Experiments are typically used to measure the cost of temptation and the demand for commitment, providing insights into people's self-control limitations (e.g. Raio & Glimcher, 2021; Toussaert, 2018). More commonly, economists model self-control as present bias. In the context of a quasi-hyperbolic discounting model, present bias is elicited by asking people to repeatedly choose between smaller, sooner and larger, later payoffs. Those with present bias overweigh immediate rewards (see Cheung et al., 2026), implying that they are more patient in the long- than in the short-run. They end up making plans that they are not able to execute. These two economic frameworks capture the essence of self-control failures via two different mechanisms, i.e. costly temptation vs. time-varying preferences. Researchers typically begin by adopting one model or the other, leaving each to be studied in isolation. In contrast, we provide empirical evidence about the way they are related to each other and to notions of self-control developed outside of economics.

We consistently find that behavioral measures of present bias are unrelated to behavioral measures of self-control that reflect the demand for commitment. This holds irrespective of the demand-for-commitment measure we consider and whether we measure present bias in the monetary or effort domain. Present bias and the demand for commitment seem to capture different dimensions of self-control that may independently support the achievement of long-term goals.

Our second contribution is to explicitly establish the correspondence between behavioral and self-reported measures of self-control. There is power in harnessing both. Laboratory settings with carefully designed decision contexts and well-structured incentives are useful in ensuring that research results are internally valid; survey data can be helpful in assessing whether experimental evidence can be generalized beyond the lab. Consequently, the use of self-reported measures of risk, time and social preferences, beliefs about the return to effort, and many other important personality traits is becoming common in applied economic research (Almås et al., 2024). Survey evidence, particularly using measures validated with experimental tasks, is increasingly relevant, in part, because self-reported measures often capture heterogeneity that is important for understanding outcomes more broadly (Falk et al., 2018, 2025). Our research approach is aligned with the recent push in behavioral economics to increase the information content of self-reported measures of personality traits and economic preferences using methods that account for people's limited self-knowledge and lack of effort when responding to survey questions (Dohmen & Jagelka, 2024; Falk et al., 2025). These studies, like ours, seek to validate self-reported measures by establishing their correspondence to traditional laboratory-based, incentive-compatible measures of economic

preferences.[1] This approach is helpful in identifying causal relationships, with less restrictive assumptions, using large population samples (Almås et al., 2024). What distinguishes us from prior work is that we relate a richer set of behavioral measures (self-control, impulsivity, and attention) to well-established, self-reported measures of the same and related behavioral concepts. Our contribution to the measurement of self-control, and related executive functions, extends economists' ability to empirically answer pressing questions and enriches the theoretical models one can bring to the data, advancing economics as a behavioral science.

We find a significant relationship between people's self-assessed capacity for self-control—as captured by the Brief Self-Control Scale (Tangney et al., 2004)—and their behavioral demand for commitment in a setting in which they must focus their attention on a tedious task. Participants who self-report a greater capacity for self-control are also more likely to anticipate and preempt temptation. Present bias, in contrast, is unrelated to their beliefs about their own self-control. Evaluating one's capacity for self-control and demanding commitment both rely on a degree of self-awareness, whereas present bias does not, providing a potential explanation for the empirical relationships we find.

Our third key contribution is the introduction and validation of an innovative behavioral task to measure impulsivity. In our experiment, participants make decisions about how to allocate real effort across time. The effort task requires continuous attention, and participants have multiple opportunities to take breaks which may reduce their payoffs. We allow impulsivity to be expressed in two ways: (i) the speed with which participants decide to take a break; and (ii) the amount of information they seek before deciding to take a break. Embedding this task in a precisely controlled experiment and exploiting numerous psychometric scales allows us to separately identify the effects of impulsivity, attention, and trait self-control in shaping people's allocation of effort across time.

Our results show that participants' behavior in our impulsivity task correlates with their self-reported impulsivity using the measure recently developed by Huang et al. (2024). There are very few other behavioral measures that explicitly quantify the tendency to make deliberate decisions, and researchers, particularly outside economics, often instead rely on tasks designed to measure risk or time preferences to approximate impulsivity (see Huang et al., 2024). Our results demonstrate that time preferences are not a good proxy for impulsive behaviors, reinforcing that impulsivity needs to be independently measured using dedicated tasks such as the one we have designed.

Fourth, we are the first to link self-reported measures of attention to how people allocate attention within an economic behavioral task. Shaped by economic incentives and policy, attention is increasingly viewed as a core productive factor in economic behaviour(e.g., see Altmann et al., 2022; Loewenstein & Wojtowicz, 2023; Maćkowiak et al., 2023). Standard choice data provide

[1]This approach has previously been taken in the context of risk, time, and social preferences as well as attitudes towards competition. For risk preferences, see Becker et al. (2012), Ding et al. (2010), Dohmen et al. (2011), Falk et al. (2023), Hardeweg et al. (2013), Lönnqvist et al. (2015), and Vieider et al. (2015). For time preferences, see Becker et al. (2012), Breitkopf et al. (2025), Burks et al. (2012), and Falk et al. (2023). For social preferences, see Kosse et al. (2020). For attitudes towards competition, see Fallucchi et al. (2020).

only limited insight into attention, because observed choices typically conflate preferences, beliefs, information acquisition, and the allocation of cognitive resources (Caplin, 2016). Complementary evidence from neuroeconomics reinforced the importance of attention by showing that attentional focus and visual attention shape the construction of value during choice (Hare et al., 2009, 2011; Lim et al., 2011). Economics has also made substantial progress in modelling a related concept, salience, and documenting its effects on choice, especially in complex, risky, or multidimensional decisions (see, for example, Bordalo et al., 2013, 2022; Dertwinkel-Kalt & Köster, 2020, 2025). Salience and attention are related but distinct. Salience refers to the features of options, attributes, or events that lead them to stand out to people and thus receive disproportionate weight in choice. Attention is the cognitive process by which some information sources prioritized over others (Parr & Friston, 2019). Our research explores one potential option for advancing the empirical study of attention. Specifically, we investigate whether comprehensive, self-reported measures of people's capacity to maintain and shift their attention predict their actual behavior in an effortful attention task. If true, these measures become useful tools for studying attention and economic choice. However, we find no evidence of a relationship between self-reported and behavioral measures of attention in our economic-choice task. This is consistent with meta-analytic evidence showing little compelling evidence that responding to such surveys reflects genuine attention control abilities (Clarke & Todd, 2021). Moreover, participants' attention in our work task is unrelated to both their degree of present bias and demand for commitment. Thus, our results point to an important gap in the measurement of attention.

Finally, our research constitutes an important extension of the emerging literature that uses laboratory settings to examine the role of personality traits in economic decision-making (see Bruttel & Fischbacher, 2013; Caliendo et al., 2024; McGee & McGee, 2016). Finding empirical counterparts to theoretical constructs can be challenging (see Heckman et al., 2023). Traits and behavior usually cannot be separately identified using observational data because the incentives inherent in the decision context matter, but often cannot be observed. This is particularly true when traits are multi-faceted or when several traits combine to produce a specific behavior. Combining lab- and survey-based self-reported measures is a methodological advance that allows us to help create "an empirical basis for an underlying structure of more comprehensive theories of behavioral decision-making" (Chapman et al., 2023, p. 154).

2 Key Concepts

2.1 Self-Control

Self-control is characterized by the ability to regulate one's emotions, thoughts, and behavior in the face of temptations and impulses (Diamond, 2013) and is one of the most widely studied constructs in social sciences (Duckworth & Kern, 2011). Self-control early in life predicts a wide range of consequential life outcomes, often to the same degree as conventional cognitive skills

(Almlund et al., 2011; Duckworth & Seligman, 2005; Heckman et al., 2021; Moffitt et al., 2011). Below, we review the common conceptualizations and empirical measures of self-control.

2.1.1 Self-Control as an Individual Characteristic

Conceptual Foundations: The capacity for self-control is often seen to be a person-specific characteristic. Psychologists subscribing to the strength model of self-control, for example, argue that the exertion of self-control is dependent on a limited resource (i.e. willpower) which—like a muscle—can become temporarily depleted, but also strengthened over time with consistent use (see Baumeister et al., 2007). Other psychologists view self-control as a stable personality trait (see Tangney et al., 2004), while economists are more likely to consider it to be a skill (see Heckman et al., 2023).

Measurement: The Self-Control Scale developed by Tangney et al. (2004) is a well-established and widely used measure of self-control in psychological research. The brief version of the scale—the Brief Self-Control Scale (BSCS)—includes 13 items out of the 36 items included in the full scale and has both high internal consistency and predictive power (Tangney et al., 2004). The BSCS has been included in large representative population surveys, including the German Socio-Economic Panel (SOEP) Innovation Sample and the Household and Income and Labour Dynamics in Australia (HILDA) Survey. Researchers have found that the BSCS score is predictive of life outcomes across diverse domains, including health, education, labor market, financial and social outcomes (Cobb-Clark et al., 2022; De Ridder et al., 2012).

2.1.2 Self-Control Limitations as Present Bias

Conceptual Foundations: Economists view self-control issues through the lens of people's preferences. The present bias model proposed by Phelps and Pollak (1968), and later formalized by Laibson (1997), is the most common conceptualization of self-control in economics (Ericson & Laibson, 2019). It posits that many people have self-control limitations, and are naively unaware of them, leading to dynamically inconsistent decisions that reveal present bias, i.e. self-control failures. People make present-biased decisions when they engage in actions that generate immediate pleasure, but interfere with personal long-term goals, and when they repeatedly postpone unpleasant actions aligned with their goals. The utility function of a present-biased decision-maker is quasi-hyperbolic and defined as follows:

$$U_t \;=\; u_t + \beta\,[\delta u_{t+1} + \delta^2 u_{t+2} + \delta^3 u_{t+3} + \dots\,] \tag{1}$$

where U_t is total of all future utility streams (as valued in period t); u_t is the utility flow in period t; and δ $(0 < \delta \leq 1)$ is the standard exponential discount factor. Present bias is is captured by the parameter β $(0 < \beta \leq 1)$. When $\beta < 1$, all future utility flows are discounted by the constant β,

consistent with a preference for pleasurable activities in the present rather than the future. The smaller the parameter β is, the larger is the present bias.

Measurement: The classic experimental measure of present bias is the extent to which people trade off smaller, sooner monetary rewards for larger, later ones (Ericson & Laibson, 2019; Frederick et al., 2002). Numerous studies have also measured present bias and dynamic inconsistency using the convex time budget (CTB) experimental protocol introduced by Andreoni and Sprenger (2012) (see, for example, Augenblick et al., 2015). In the CTB task, people make incentivized decisions about the allocation of money or effort over two dates, t_1 and t_2. These allocations are made twice. An initial allocation is made in advance of the first reward date (t_0) and a subsequent allocation is made on the first reward date (t_1). Allocating more money (or less effort) to t_1 when the decision is made in t_1 compared to the decision made in t_0 is dynamically inconsistent and reveals present bias. Differences between initial and subsequent allocations allow for the precise measurement of the extent of dynamic inconsistency and present bias. Recent meta-analyses reviewing present bias estimates conclude that people often systematically deviate from time-consistent preferences, especially for non-monetary rewards ($\beta \in [0.64, 0.86]$ for non-monetary rewards and $\beta \in [0.91, 0.97]$ for money) (Cheung et al., 2026; Imai et al., 2021).

2.1.3 Self-Control Limitations as a Demand for Commitment

Conceptual Foundations: The temptation model of self-control introduced by Gul and Pesendorfer (2001) conceptualizes self-control as a preference to remove options that are tempting when their presence interferes with long-run goals and imposes psychological costs associated with resisting temptation (Ericson & Laibson, 2019). The key assumption—referred to as the *set betweenness axiom*—is that given two options A and B, where option A is the costly action aligned with long-term goals (e.g., working on a productive task) and option B is the tempting action (e.g., relaxing):

$$A \succeq B \text{ implies } A \succeq A \cup B \succeq B \tag{2}$$

Someone who prefers A (working) to B (relaxing) is referred to as a "*self-control type*". They bear a psychological cost of exerting self-control and sticking to option A and, therefore, demand commitment (e.g., using web- or phone-blockers) to eliminate the costs of exerting self-control and preventing self-control failures ($A \succeq A \cup B$). In situations where they face temptation, they nonetheless expect to resist it ($A \cup B \succeq B$).

Gul and Pesendorfer (2001) demonstrate that the preference for self-control can be represented by the following utility function:

$$U(A) := \max_{x \in A} u(x) + v(x) - \max_{y \in A} v(y) \tag{3}$$

where u represents the utility from working on a productive task (option x in choice set A) in the absence of temptation, i.e., facing a choice set with the single option of working. Further, $v(x)$ represents the utility from working while facing temptation, and $v(y)$ represents the utility from relaxing (option y) while also facing the option to work. Finally, $\max_{y \in A} v(y) - v(x)$ represents the utility cost of self-control, which reduces utility U.

The primary implication of this model is that firm commitment strategies can eliminate the cost of exerting self-control, thereby preventing self-control failures. It is also important to note that the model relies on two critical assumptions: first, that irreversible commitment devices are available; and second, that decision-makers are aware of their self-control limitations.

Measurement: Measuring people's self-control through their demand for commitment requires that we empirically capture their willingness to give up access to tempting options so that they can focus on more productive ones. In a typical experiment, participants are asked to perform productive tasks that generate income, but which are tedious and require sustained attention. As in most work environments, participants face distractions that reduce their productivity and interfere with their goal of maximizing income.[2] Participants can decide to commit to work, either by paying (in money or effort) to remove the option to engage in distracting activities (Houser et al., 2018; Toussaert, 2018), or by self-imposing discouraging penalties in advance for failing to achieve a set performance goal (Bonein & Denant-Boèmont, 2015). In this context, the willingness to take up commitment becomes a measure of self-control. Experiments such as these often find that a substantial proportion (12 to 43 percent) of participants demand commitment (Bonein & Denant-Boèmont, 2015; Ek & Samahita, 2023; Houser et al., 2018; Toussaert, 2018).[3]

2.2 Impulsivity

Conceptual Foundations: Psychologists have a long tradition of distinguishing between impulsivity and restraint (see Carver, 2005; Huang et al., 2024), arguing that "there is predictive and explanatory benefit to be gained from measuring capacity for each form of self-control" (Hoyle & Davisson, 2016, p. 399). Impulsivity refers to a tendency toward rapid, unplanned reactions to stimuli, without regard to the consequences (DeYoung & Reuter, 2016); while restraint refers to the tendency to reflect and deliberate before acting (Carver, 2005). Impulsivity leads people to pay too little attention to the information processing task (or decision) at hand; make fast decisions; and overlook important details. Given this, it is not surprising that impulsivity has been linked to a variety of detrimental behaviors (e.g. violence, binge eating) and is a diagnostic for several psychological disorders (e.g. bipolar disorder, substance use disorder) (see Huang et al.,

[2]Houser et al. (2018) and Bonein and Denant-Boèmont (2015), for example, allow participants to browse the web, while Toussaert (2018) tempt participants with reading sensational stories.

[3]Others have measured the demand for commitment in domains other than work, e.g., tempting food (e.g., Alan & Ertac, 2015; Raio & Glimcher, 2021; Toussaert, 2019); money (e.g. Ashraf et al., 2006; Augenblick et al., 2015); exercise (e.g., Royer et al., 2015); and alcohol (Schilbach, 2019) and cigarette consumption (Giné et al., 2010).

2024, for details). Although impulse control is a core component of self-control more generally, impulsive behavior is not necessarily a 'self-control failure' if it does not actually undermine people's long-term objectives (see Ghoniem & Hofmann, 2021).

Measurement: Psychologists have developed self-reported measures of impulsivity and shown that they predict important life outcomes. The Adjustable Impulsivity Scale (AIMS) survey, developed by Huang et al. (2024), is the most recent and comprehensive measure of impulsivity. The full AIMS includes 50 survey items and is adjustable to include only the first 24 items, without significant loss in internal and external validity. While recognizing that impulsivity is intimately connected with criminal and deviant behavior (Van Winden & Ash, 2012), economists have given little consideration to the role of impulsivity in decision-making more broadly. Some researchers have linked decision time to the amount of deliberation before a decision (see, for example, Alós-Ferrer & Buckenmaier, 2021; Imas et al., 2022). However, there is no utility-based model of impulsivity; the empirical evidence is scarce; and we lack a validated behavioral measure of impulsivity.

2.3 Attention

Conceptual Foundations: Attention is the mental process of focusing on specific stimuli, information, or tasks while ignoring others. Self-control is at the heart of selective attention since the decision to allocate one's attention to one thing, rather than another, requires the ability to exercise cognitive control over it (Loewenstein & Wojtowicz, 2023).

Psychologists have studied attention through its role in supporting good mental health. Over the past four decades, research has established that impaired attentional control is associated with psychological conditions such as: depression, anxiety, obsessive compulsive disorder, personality disorder, and attention deficit hyper-activity disorder (see Townshend & Bornschlegl, 2025, for a review). Attentional control is both an executive function (Carlson et al., 2013; Diamond, 2013) and an effective strategy for emotional regulation (Wadlinger & Isaacowitz, 2011). Psychologists distinguish between two key theoretical constructs that underpin attentional control: (i) attention focusing (the ability to focus on a single task or stimulus); and (ii) attentional shifting (the ability to switch focus between different tasks or stimuli).

Attention is the fundamental mechanism that affects perception, learning, and decision-making in modern neuroeconomic models of choice. These models recognize that precise value representations are costly (Glimcher, 2011) and thus attention is allocated via rational cost–benefit trade-offs reflecting limited control capacity (Glimcher et al., 2025; Shenhav et al., 2017). Similarly, economists conceptualize and study attention as a core productive factor that—like other economic resources—is limited, can be put to a multitude of productive uses, and gives rise to opportunity costs (see Loewenstein & Wojtowicz, 2023). Incentives systematically affect the way

that people allocate attention (Altmann et al., 2022), and, unsurprisingly, consumers' limited attention has implications for economic competition (Falkinger, 2008).[4] The scarce and selective nature of attention makes it one of the core cognitive constraints underpinning bounded rationality (Glimcher, 2022). Understanding the source of those cognitive constraints is at the heart of efforts to develop a comprehensive theory of attention (Loewenstein & Wojtowicz, 2023).

Currently, economists studying attention are especially focused on three key questions. The first is how people's selective allocation of attention to gathering and processing information affects their learning, and whether it leads to biased beliefs (Schwartzstein, 2014). The second is whether people prioritize the allocation of attention to information sources with the highest instrumental value when making choices (Altmann et al., 2022; Maćkowiak et al., 2023). The third is whether scarcity taxes people's attention, leading them to focus on their immediate needs and allocate less cognitive bandwidth to other issues (Mullainathan & Shafir, 2013). In addressing these questions, economists often turn to models of rational inattention which assume that people have full control over their attentional focus. Interestingly, there is empirical evidence that incentives can affect the attention people pay to challenging tasks, suggesting that they have at least partial control over their attention focus (Altmann et al., 2022; Dean & Neligh, 2023).

Measurement: The measurement of selective attention was pioneered by psychologists who used laboratory experiments to identify its sources (cognitive limitations) (e.g., Stroop, 1935). In economics, the most common measures of selective attention are eye-tracking (Lahey & Oxley, 2016) and the recall of specific information (Hartzmark et al., 2021) when making decisions. Other researchers have used decision time as a measure of attention, with longer decision times assumed to reflect greater attention to the details of the decision problem at hand (Caplin, 2016). There is, however, no standard, validated behavioral measure of people's ability to sustain their attention (focus) on a productive task which is a key component of selective attention.

The most comprehensive self-reported measure of attention is the Attentional Control Scale (ACS) survey which was developed to study the link between attentional control and anxiety (Derryberry & Reed, 2002). The ACS includes two factors: (i) attention focus, as the ability to sustain attention or concentration on effortful tasks, and (ii) attention shift, as the ability to shift attention between different tasks (Townshend & Bornschlegl, 2025). The original ACS includes 20 survey items, while the short version reduces the number of items to 12, and yields measurements that are strongly correlated with those of the original ACS. The ACS has high internal validity, but the evidence on its predictive power is mixed (Townshend & Bornschlegl, 2025).

[4]For an excellent history of thought perspectives on attention in psychology and economics see Festré and Garrouste (2015), Loewenstein and Wojtowicz (2023), and Styles (2006).

3 Experimental Design

Our experiment spans four sessions, each one week apart. In week 1, participants complete a series of surveys that include psychometric scales measuring self-control, impulsivity, and attention control. The remaining sessions involve tasks designed to elicit measures of these same concepts through incentivized decisions. Appendix Figure A.1 illustrates the experimental timeline.

3.1 Week 1: Self-Reported Measures

In week 1, participants provided detailed information about themselves. In particular, we administered the (13-item) BSCS (Tangney et al., 2004); the (28-item) AIMS (Huang et al., 2024)[5]; and the (12-item) ACS (Townshend & Bornschlegl, 2025). See Appendix Table C.1 for details.

In addition, we constructed standard measures of participants' risk and time preferences (Falk et al., 2018); locus of control (Pearlin & Schooler, 1978); big-five personality traits (McCrae & Costa, 1987); IQ (Condon & Revelle, 2014); socio-demographic characteristics (gender, age, education, income, employment status, marital status, ethnicity, residential location, income satisfaction, perceived socioeconomic status); and sleep habits. Details are available in Appendix C.

Our week 1 session was designed to last 30 minutes on average and the actual median completion time was 28 minutes. Participants received a $15 flat fee upon completion.

3.2 Weeks 2-4: Behavioral Measures

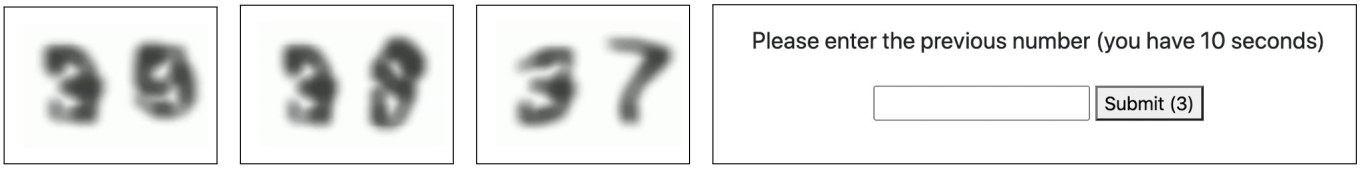
3.2.1 The Attention Task

We use an attention task, inspired by Toussaert (2018), to measure self-control and attention independent of prior knowledge or intelligence. A major advantage of this task is that, with a simple and novel modification, it enables us to measure participants' impulsivity in addition to their self-control and attention. It is an ideal task for behaviorally capturing—and relating—these three aspects of executive function within a single incentive structure.

In the task, participants see a computer screen with slightly blurry 2-digit numbers that gradually decrease at irregular time intervals (every 1 to 3 seconds) preventing them from accurately predicting when the next number will appear. At random times, participants are prompted to recall and enter the last number displayed on their screen. Figure 1 shows an example sequence.

[5]Our impulsivity measure utilizes the first 24 items in AIMS. Huang et al. (2024) show that this subset of items has a 0.9 correlation with the full 50-item scale. We included four additional items (26, 32, 34 and 48). To maintain consistency, we used the modal response format in the original scale (a 5-point Likert scale) for all items. Huang et al. (2024) show that using the same response format across all items produces a reliable measure. Our data has very high internal consistency (alpha Cronbach of 0.94).

Figure 1: Example of a Number Sequence. A countdown from 10 to 0 seconds appears on the 'Submit' button (shown at 3 seconds in the figure).



(a) Screen 1 (b) Screen 2 (c) Screen 3 (d) Screen 4

Participants are incentivized to pay attention to the task. At the end of the experiment, an 8-minute "payment window" is randomly selected and participants receive \$0.70 for each correct recall within this payment window. In addition, they lose a \$25 completion payment (paid in week 4) if they give more than five incorrect answers.

The key feature of the design is that, during the task, at random times, participants are asked if they wish to take a break. During breaks, they leave the task and watch funny short videos.[6] There is a trade-off between taking a break and continuing to work. Taking a break allows participants to engage in an alternative enjoyable activity, but it lowers their expected payment because the payment window can fall at any time during the task, including while they are on a break.[7] Participants are offered a break ten times within a 45-minute work period on average. While in principle, participants could take "unofficial" breaks at any time, that is even when a break was not offered, we encouraged them to only take breaks when offered. During official breaks, incorrect answers do not accumulate, implying that taking these breaks does not reduce their chances of receiving the \$25 completion payment. Our data confirm we are able to accurately observe break-taking behavior. Participants' recall accuracy is 96 percent (median 99 percent) in week 3 and 97 percent (100 percent) in week 4 which is inconsistent with them taking large numbers of unofficial breaks.

At the start of each session in weeks 2-4, participants go through practice rounds to experience the attention task. Practice lasts five minutes, is not incentivized and there is no option to take breaks.

3.2.2 Self-Control as Demand for Commitment

One way to measure self-control is through participants' willingness to commit to limiting their choice set as a way of avoiding future temptation (Toussaert, 2018). In week 2, after practice, participants rank three working conditions. The ***"only one break"*** condition restricts participants to taking only one break, providing a commitment device that removes the temptation of

[6]We pre-selected a set of short funny videos from YouTube and TikTok, each lasting around one minute. Videos are shown consecutively in random order to each participant during their break. Watching the videos is not enforced, participants can browse the internet or do other things while on a break.

[7]Using our data, we estimate that spending an additional minute on a break reduces the payment by \$0.08 on average ($p = 0.001$), see Appendix Table A.1.

additional breaks. The ***"all breaks"*** condition requires participants to take all scheduled breaks, without being asked. Each time a break is offered, participants are automatically moved to a break. Finally, in the ***"decide while working"*** condition, participants decide, during the task, whether to take a break each time one is offered, leaving them to work under possible temptation.[8] Participants rank each of these three working conditions, with indifference allowed. We incentivize them to reveal their preferences truthfully in the following way. For one in six participants, the odds of getting a specific working condition increases with the rank they have assigned it.[9] The remaining five out of six participants are assigned to the "decide while working" condition, regardless of their ranking. This design feature allows us to observe participants' true preferences for commitment, while still allowing plenty of scope for self-control failures since most participants work under possible temptation.

We expect participants who expect temptation to be costly and/or foresee having self-control problems to rank the "only one break" condition highest. The greater their anticipated self-control problem, the stronger their preference for restricting themselves to only one break will be. We measure this by asking participants how much they would pay, in extra week 4 work time (0-10 minutes), to work under their preferred condition in the event they are assigned to their second best option. We then ask a parallel question about their third best option. Participants' decisions are incentivized using the Becker–DeGroot–Marschak (BDM) procedure (Becker et al., 1964).

To verify whether participants demand commitment because they expect self-control failures, we elicit their beliefs about their future work behavior. Specifically, we tell participants to imagine they are working under the "decide while working" condition, and that they are asked 10 times if they would like to take a break. We then ask them to indicate (1) how many breaks they would like to take, and (2) how many breaks they think they will actually take.[10]Answers to these questions allow us to measure the gap between ideal, anticipated, and actual break choices. This innovative aspect of our experimental design allows us to explore the heterogeneity in self-control among those who demand commitment devices.

Specifically, we identify three different groups (with increasing self-control) that demand commitment (see Figure 2). Among the 443 participants in our sample, 200 demand commitment and are willing to pay for it (the **"Commitment"** group). These participants rank the ***"only one break"*** working condition, which removes temptation by committing them to a single break during the attention task, as their most preferred option. They are also willing to pay (in additional work time) to increase the probability of working in this condition. In doing so, they reveal that

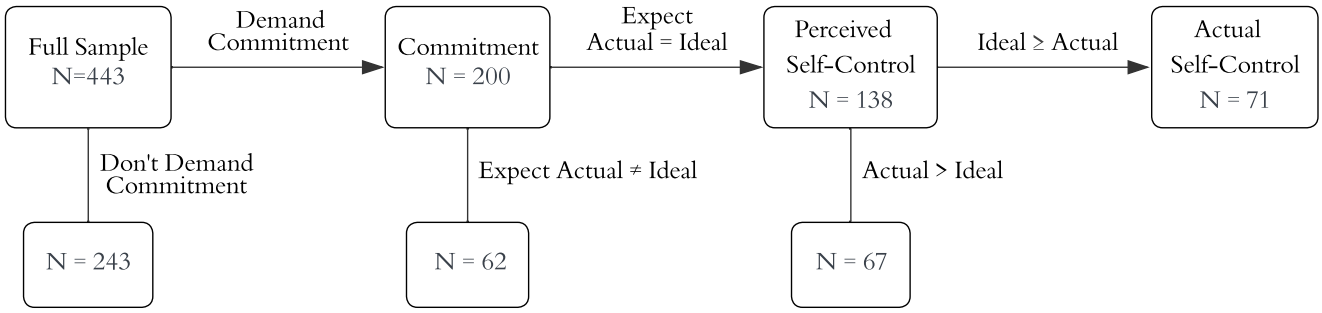
[8]Participants know that if they do not take a break before the last 10 minutes of the task, they will be automatically directed to the next scheduled break, without being asked.

[9]Specifically, with 1/2 chance they get their first preference, with 1/3 chance they get their second preference, and with 1/6 chance they get their third preference. These percentages are adjusted if participants give the same rank to more than one option. For simplicity, we did not provide the exact probabilities to participants.

[10]The exact questions are: Imagine you were assigned the working condition "Decide while working" and that, while you work in the task, you are asked 10 times if you would like to take a break. 1) How many breaks **would you like to take**? 2) How many breaks do you think **you will actually take**?

they either: (i) expect to feel tempted by the breaks, and wish to avoid any psychological costs of repeatedly exerting the self-control necessary to decline them; and/or (ii) anticipate a self-control failure that results from taking more breaks than is ideal. The remaining 243 participants do not demand commitment, consistent with not foreseeing any problems with temptation or self-control.

Figure 2: Self-Control Classification based on the Demand for Commitment Approach



Of those demanding commitment, 138 participants expect to take their ideal number of breaks in the event they are assigned to work under temptation. We refer to these participants as the the **"Perceived Self-Control"** group because, although they demand commitment (as defined above), they nonetheless expect to exert self-control by taking the same number of breaks they believe is ideal even if they face temptation. The remaining 62 participants who demand commitment expect that their break choice will deviate from what they consider to be ideal.

Finally, there are 71 participants who not only demand commitment and believe they have self-control, but also actually exert self-control by taking the same (or fewer) breaks than they deem ideal. We refer to these individuals as the **"Actual Self-Control"** group. The remaining 67 participants who believe they have self-control, in the end, take more breaks than they consider to be ideal.

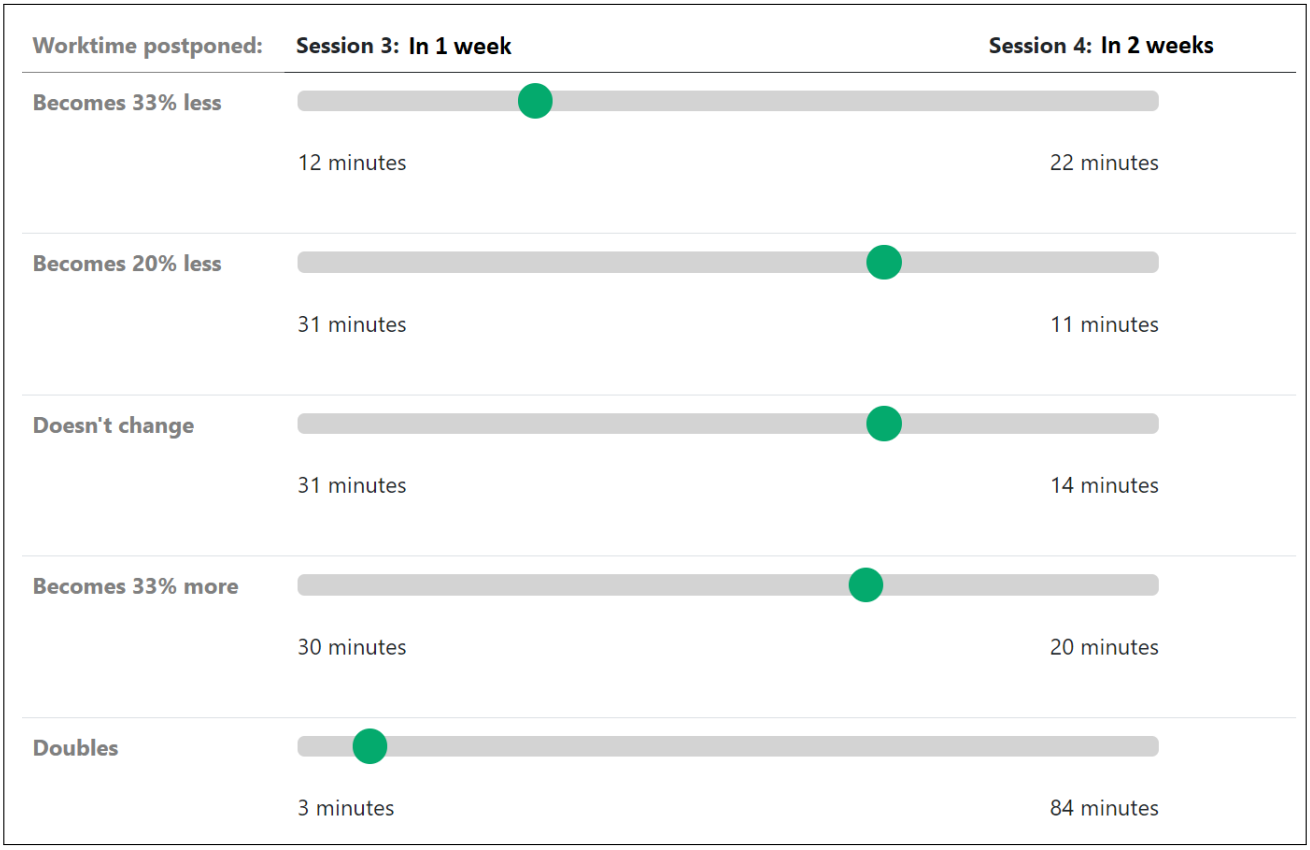
3.2.3 Self-Control as Present Bias

We capture the extent of participants' present bias by eliciting their inter-temporal allocation of additional work time in the attention task, using the CTB framework, similar to Augenblick et al. (2015). We use the term "additional work time" because we are measuring the allocation of work time over and above the minimum 45 minute work period required in week 3. The gist of our present bias measure is to compare participants' effort allocations when there is no immediate temptation to take a break and when the immediate temptation exists.

In week 2, participants decide how to distribute their future work time (i.e. in weeks 3 and 4) under five different exchange rates that govern the trade-off between the weeks (0.5, 0.75, 1, 1.25, and 1.5). Figure 3 shows a sample allocation screen. For example, when the exchange rate is 0.5 (the last slider in Figure 3), decreasing work time in week 3 by one minute, increases work time in

week 4 by two minutes.[11] Depending on their choices, participants' additional work time in week 3 varies between 0 minutes (if they allocate all additional work to week 4) and 45 minutes (if they allocate all additional work time to week 3). In week 4, participants' work time varies between 0 and 90 minutes.

Figure 3: Work Time Allocation Decisions



The crucial step in measuring present bias is that we ask the participants to make exactly the same five choices again in week 3 when those choices *immediately* affect how much time they work on the day.[12] We expect those who are present-biased to allocate less work time to week 3 when making decisions in week 3 (since the consequences are immediately felt) than in week 2 (when there are only future consequences). The degree of present bias is captured by the difference in the total work time assigned to the earlier date (week 3) in week 2 relative to week 3.

In addition to investigating present bias in the effort domain, we also consider present bias in the monetary domain. Specifically, in weeks 2 and 3, we ask participants to allocate monetary payments between weeks 3 and 4, using a procedure that exactly mimics our time allocation

[11] The decision can be formulated as allocated work time e between week 3 (e_{week3}) and week 4 (e_{week4}), subject to the present-value budget constraint: $e_{week3} + R \cdot e_{week4} = 45$.

[12] Before making any decisions participants are informed that one of their choices, randomly selected out of all their week 2 and week 3 decisions, will be implemented.

decisions.[13]

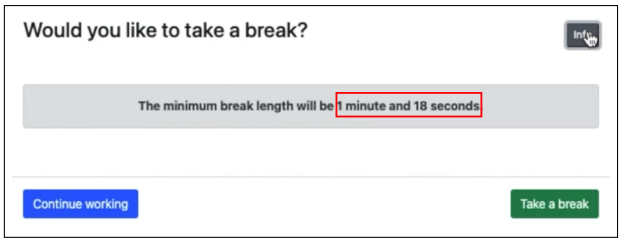
3.2.4 Impulsivity

We introduce a novel feature to the attention task, allowing us to measure impulsivity through participants' revealed propensities to make well-informed, thought-through decisions about taking breaks. When asked if they want to take a break, participants have 20 seconds to decide. If they do not decide within 20 seconds, they are automatically redirected to the task. The key to our innovation is that when a participant accepts a break, they must remain on the break for a minimum time that varied from 15 to 180 seconds, randomly determined for each break. Longer breaks imply bigger trade-offs between earnings and leisure. Importantly, the break duration is not displayed on the screen. Instead, participants know that to learn the minimum duration of the offered break, they need to click an "Info" button (see Figure 4).

Impulsivity is revealed by (i) whether participants' click on the "Info" button prior to taking a break (i.e. their propensity to make an informed decision by considering the minimum duration of each break); and (ii) the time it takes participants to accept a break. If participants accept a break, after the minimum break time has passed, they can return to work at any time—there is no maximum break length. Since it is possible that impulsivity is influenced by how long participants work in the task and work time is endogenous (determined by participants' decisions, see Section 3.2.3), we measure impulsivity during the first 45 minutes of work in the task in week 3, which all participants had to complete. As a robustness check, we additionally report impulsivity during (individual-specific) total work time in week 3.

Figure 4: Example of Break Decision

(a) Screen 1



(b) Screen 2

3.2.5 Attention

Finally, we measure participants' capacity for attention control in three ways: (i) the time spent on breaks; (ii) the number of breaks taken; and (iii) how long they are able to sustain attention on

[13]Specifically, participants choose the amount of money c they will receive in week 3 (c_{week3}) and week 4 (c_{week4}), subject to the intertemporal constraint $c_{week3} + R \cdot c_{week4} = 15$, where the total budget is fixed at \$15. To mimic the minimum required week 3 work period, there was a guaranteed minimum payment of \$15 in week 3.

the task prior to taking a break.[14] Like for impulsivity, we examine participants' attention during the first 45 minutes of the task, as well as during the total work time in week 3.

3.3 Experimental Procedures and Sample

We recruited participants from the general Australian population through a large Sydney-based market research company that provides research participant recruitment services to private sector and academic institutions. The company communicated with the participants on our behalf by inviting their consumer panel to our research study, sharing the experiment weblinks, and managing payments.

Our experiment was conducted online across four consecutive calendar weeks (last week of November to the third week of December 2024). Prospective participants were informed that taking part in the study involved completing four sessions, following a specific, 4-week-long schedule. Invited participants had a week to complete the week 1 session. All participants who completed week 1, had the next calendar week to complete the week 2 session. The completion of the sessions in weeks 3 and 4 was due on a specific day of the corresponding calendar week, determined by the day each participant completed the week 2 session. For example, a participant who completed the session in week 2 on Tuesday was invited to complete the week 3 session on Tuesday of the following calendar week, and the week 4 session on Tuesday two calendar weeks later. This schedule is a requirement for the elicitation of present bias using the CTB task. In week 1, participants were informed of this schedule and asked to choose the same day of the week to complete week 2, week 3, and week 4 sessions. The majority completed sessions on their due date. In week 3, 82 percent of our analysis sample completed their session on time, 12 percent did so the next day, and 6 percent later. In week 4, 86 percent completed their session on time, 9 percent did so the next day, and 5 percent later.

To encourage completion of all four sessions, participants received a bonus of $25 in week 4 after completing all sessions. The $25 bonus payment was conditional on completing all four study sessions as well as giving less than a total of six incorrect answers across weeks 3 and 4 (see Section 3.2.1). Payments for weeks 1 and 2 are identical for all participants ($15 and $20, respectively). Payments for weeks 3 and 4 vary across participants (with average payments of $22 and $41, respectively), depending on their decisions and performance in the attention task. On average, a participant who completed the four experimental sessions earned about $100 (AUD).

All instructions were delivered through animated videos to improve comprehension. Participants were also provided with examples, answered practice questions, and saw brief explanations of the correct answers to those questions. The instructions script is in Appendix B and videos are available on request. Our experiment was programmed using oTree (Chen et al., 2016).

[14] There is some overlap between our measures of actual self-control and attention. The key difference is that our measure of actual self-control takes into account participants' level of temptation, as revealed by their demand for commitment.

Week 1 of the study was completed by 819 participants. Of these, 179, 142 and 55 participants dropped out of the study after week 1, 2 and 3 respectively, leaving us with an analysis sample of 443 participants who completed all four sessions.[15]

To understand any potential self-selection into the study, we compare the sociodemographic and personality characteristics of our analysis sample to the initial week 1 sample as well as to a population-representative sample from HILDA. The sociodemographic characteristics of our analysis sample ($N = 443$) and those who dropped out of the study after week 1 ($N = 376$) are provided in Table 1. The analysis sample does not differ from the drop-out sample in terms of gender composition, residential location, educational attainment, household income, and income satisfaction. Participants in the analysis sample are less likely to be employed which is consistent with the possibility that it was harder to complete our 4-week-long study while holding a job. They are also less likely to have completed school in Australia and are older. Compared to the population-representative HILDA sample (Appendix Table A.2), we see differences in education, income, and employment. Compared to an average Australian, those in our analysis sample are more educated but more likely to be at the bottom of the household income distribution (<$40,000). Overall, 16 percent of our sample is in the lowest income bracket (relative to 7 percent in HILDA). They are also less likely to be at the top of the household income distribution (>$200,000), with 9 percent of our sample in the highest income bracket (relative to 27 percent in HILDA). Thus, despite having more education, our sample over-represents those who are unemployed (6 percent in our sample versus 2 percent in HILDA) and retirees (27 percent in our sample versus 9 percent in HILDA). The sociodemographic differences between our sample and the general population are expected, given the features of our study which attract people with above average cognitive ability, yet low opportunity cost of time.

We also observe small differences in the personality traits of our analysis and drop-out samples (Table 2). Participants in our analysis sample are slightly less impulsive, risk-taking, and neurotic, and more agreeable on average than those in the drop-out sample. More importantly, we see few differences between our analysis sample and average Australians in terms of personality traits (self-control, risk attitudes, locus of control and big five) (Appendix Table A.3).[16] These similarities strengthen the external validity of our results.

[15]Substantial attrition was expected given the longitudinal design and substantial time commitment, both different from the short and one-off consumer surveys this consumer panel is used to.

[16]HILDA does not include the ACS and AIMS measures.

Table 1: Sociodemographic Characteristics by Study Completion Status

	Sample		
	Analysis (W1-W4) [N=443]	**Non-Completion** [N=376]	
Sociodemographics	Mean (SD)		*p*-value
Age	52.67 (15.95)	48.24 (18.41)	0.00
	Percent of Sample		
Female	53.95	51.86	0.55
Reside in Capital City	64.56	67.29	0.41
Attended School in Australia	78.33	83.78	0.05
Education			
Less than Year 12	10.84	7.71	0.13
Year 12	12.42	12.50	0.97
Vocational Education	30.25	27.39	0.37
Higher Education	46.50	51.86	0.13
Occupation			
Employed	56.43	64.63	0.02
Unemployed	6.09	4.26	0.24
Retired	26.64	23.94	0.38
Other	10.84	7.18	0.07
Marital Status			
Married or De Facto	56.88	57.18	0.93
Never Married	26.19	29.52	0.29
Divorced	12.19	10.11	0.35
Widowed	4.06	3.19	0.51
Household Income (in $1,000)			
<40	16.48	12.50	0.11
40-60	14.22	12.23	0.40
60-80	11.96	12.50	0.82
80-100	10.84	10.37	0.83
100-125	9.93	10.90	0.65
125-150	9.71	9.57	0.95
150-200	15.35	17.29	0.45
>200	8.58	8.51	0.97
No Response	2.93	6.12	0.03
Income Satisfaction			
Live Comfortably	23.70	28.99	0.09
Coping	50.56	47.34	0.36
Difficult	19.19	17.29	0.48
Very Difficult	6.55	6.38	-
Socio-Economic Status (SEIFA)			
Low SES	25.06	22.61	0.41
Middle SES	39.28	39.10	0.96
High SES	35.67	38.30	0.44

Notes: The analysis sample includes all participants who completed all 4 sessions of our study. The non-completion sample includes all participants who dropped out of the study between weeks 2 and 4. SEIFA is a residential area (postcode) based indicator of socio-economic advantage created by the Australian Bureau of Statistics.

Table 2: Self-Reported-Based Measures of Personality Traits by Study Completion Status

	Sample		
	Analysis (W1-W4) [N=443]	**Non-Completion** [N=376]	
Measures [possible min,max]	Mean (SD)		p-value
BSCS Score [0,52]	31.17 (8.16)	30.15 (8.06)	0.07
AIMS Score [0,112]	43.84 (17.60)	47.16 (17.52)	0.01
Attention Control Focus [0,21]	13.25 (4.34)	12.73 (4.61)	0.10
Attention Control Shift [0,15]	7.90 (2.74)	7.93 (3.01)	0.87
Patience Question [0,10]	7.11 (1.82)	7.06 (1.84)	0.70
Risk Question [0,10]	4.81 (2.59)	5.36 (2.37)	0.00
Locus of Control [0,42]	26.30 (8.67)	25.93 (8.39)	0.53
Extroversion [0,48]	23.88 (8.63)	24.70 (8.34)	0.17
Agreeableness [0,42]	30.49 (6.49)	29.31 (6.92)	0.01
Neuroticism [0,36]	11.53 (7.25)	13.11 (7.23)	0.01
Conscientiousness [0,42]	30.32 (6.93)	29.42 (7.12)	0.07
Openness [0,36]	20.74 (6.22)	20.81 (6.34)	0.88

Notes: The analysis sample includes all participants who completed all 4 sessions of our study. The non-completion sample includes all participants who dropped out of the study between weeks 2 and 4.

4 Results

One of the strengths of our study design is that we can relate self-reported and behavioral measures of self-control, impulsivity and attention, not only within a single concept, but also across concepts. This is important because self-control is inherently linked to impulsivity and attention, in part because of their common biological and environmental origins.

We structure our results as follows. We begin by examining the relationship between our behavioral measures of self-control—reflecting both present bias and the demand for commitment—and respondents' own self-assessed capacity for self-control (Section 4.1). Next, we examine the link between behavioral and self-reported measures of impulsivity and consider how they relate to self-control (Section 4.2). We then examine the relationship between behavioral and self-reported measurements of attention and investigate their association with self-control (Section 4.3). Finally, we report additional results on the joint association between our measures, patience, and individual heterogeneity (Section 4.4).

Following previous researchers (Falk et al., 2018; Huang et al., 2024), we use Pearson's pairwise correlation coefficients to analyze the strength of the association between pairs of measures. Inverse

probability weighting (IPW) is used to account for selective attrition (Wooldridge, 2002).[17] In addition, statistical significance levels are adjusted for multiple inference, based on the sharpened false discovery rate (FDR) q-values procedure (Anderson, 2008; Benjamini et al., 2006).[18] Finally, our results are based on the analysis sample (i.e. participants who completed all four study sessions, $N = 443$), except when we analyze behavior in the attention task where results are based on 400 participants. The reduction in sample size is the result of excluding 39 participants who did not work under the "decide while working condition" as they did not work under possible temptation because they were not offered breaks, and four additional participants who experienced database connectivity issues that resulted in the loss of data.

4.1 Self-Control

We begin by investigating the relationship between the two main behavioral measures of self-control in economics—present bias (Augenblick et al., 2015; Laibson, 1997) and demand for commitment (Gul & Pesendorfer, 2001; Toussaert, 2018). All measures of self-control are summarized in Table 3 and descriptive statistics are provided in Appendix Table A.4.

We consistently find that present bias and demand for commitment are unrelated measures of self-control (Table 4). This result holds across all three measures based on the demand for commitment as well as for present bias in both the effort and monetary domains. Participants with lower present bias do not take preemptive steps to avoid self-control failures. They also do not hold more optimistic beliefs about their ability to exert self-control when tempted, or indeed have better self-control in the attention task.

Next, we investigate whether the BSCS score relates to behavioral measures of self-control (Table 5). We find a consistent, positive relationship between participants' BSCS scores and their

[17] Table 2 indicates that participants who dropped out of the study have lower self-control (as reflected in their BSCS scores) and higher impulsivity (as capture by the AIMS scores) compared to those who completed the study. This attrition pattern implies that our analysis sample may under-represent individuals with low self-control and high impulsivity. If these individuals would also have displayed lower self-control or higher impulsivity in behavioral tasks, our correlation coefficients may be biased downward. To address this issue, we apply Inverse Probability Weighting (IPW), which adjusts for missing data using observable characteristics. Specifically, we estimate the probability of completing the study using a probit model based on responses to the socio-demographic and personality questions from week 1 (gender, age, occupation, education, household income, income satisfaction, whether lived in capital city and whether attend school in Australia, BSCS, AIMS, ACS, and Patience), compute fitted probabilities for each participant, and use the inverse of these probabilities as weights in calculating the correlation coefficients. Predicted completion probabilities for stayers (mean: 56.65 percent) and dropouts (mean: 50.49 percent) are reported in Appendix Figure A.2. The p-values reported for the correlation coefficients are based on two-sided tests of the null hypothesis that the true correlation equals zero. When using IPW, we calculate the test statistic using the Kish effective sample size $n_{\text{eff}} = (\sum_i w_i)^2 / \sum_i w_i^2$, which accounts for the precision loss due to unequal weights. This adjusted n_{eff} is then used in place of the raw sample size in the standard t-test formula $t = \frac{r\sqrt{n_{\text{eff}}-2}}{\sqrt{1-r^2}}$, ensuring valid inference under weighting.

[18] The procedure involves three stages: (1) apply the Benjamini–Hochberg (BH) procedure at a reduced level $q' = \frac{q}{1+q}$; (2) estimate the number of true null hypotheses as $\hat{m}_0 = M - c$, where M is the total number of tests and c be the number of hypotheses rejected; (3) apply the BH procedure again at level $q^* = q' \cdot M/\hat{m}_0$. This approach controls the FDR at level q for independent or positively dependent p-values and generally achieves better power than the standard BH method.

demand for commitment (columns 1-3). The Pearson correlation coefficients between BSCS scores and the demand for commitment measures are approximately 0.1 and are consistently statistically significant at the 10 percent level (based on the adjusted q-value). These results hold and become stronger (in magnitude and statistical significance) for the subsample of participants with a high willingness to pay for commitment (i.e. those willing to work more than 5 additional minutes in the task in order to retain their ranking of working conditions), but not for those with low willingness to pay for commitment. We do not find a meaningful relationship between BSCS scores and present bias in effort or monetary domain. While the Pearson correlation coefficient is negative as expected (suggesting that people with greater present bias (i.e. greater self-control problems) score lower on the BSCS), the coefficient is very small, -0.05 to -0.04, and statistically insignificant for both the effort and money domain.

Our findings lead to two important insights. First, people who self-report greater self-control on the BSCS are better at anticipating the costs of self-control, take action to minimize them, and have more correct expectations about their ability to successfully exert self-control. Second, while the BSCS scores are linked to the demand for commitment—which involves self-awareness and taking action to minimize the future cost of temptation—they are not related to present bias.

Table 3: Summary of Self-Control (SC) Measures

Measure	Description	Reference
	Self-Reported	
Brief SC Scale (BSCS)	General trait capturing individual differences in the ability to override one's inner responses and to interrupt undesired behavioral tendencies and refrain from acting on them.	Tangney et al., 2004
	Behavioral	
Present Bias		
Effort	Preference change: average reduction in *work time* allocated to the sooner date when the **sooner** date is now.	Laibson, 1997; Augenblick et al., 2015
Money	Preference change: average increase in *money* allocated to the sooner date when the **sooner** date is now.	
Demand for Commitment		
Commitment	Preference to commit to *only one break* during the task. Revealed by working conditions ranking: *only one break* $\succ$ other options	Gul and Pesendorfer, 2001; Toussaert, 2018
Perceived SC	Preference to commit to *only one break* during the task but expecting to take the same number of breaks as ideal under temptation.	
Actual SC	*Perceived SC* and actually taking the same number of breaks as (or fewer than) ideal when under temptation.	Toussaert, 2018

Table 4: The Relationship between Behavioral Measures of Self-Control using Pairwise Pearson Correlations

	Demand for Commitment		
	Commitment (1)	Perceived SC (2)	Actual SC (3)
Present Bias (Effort)			
r: Full Sample	-0.0396	-0.0044	0.0396
p-value	(0.4146)	(0.9273)	(0.4394)
q-value	[1.0000]	[1.0000]	[1.0000]
N	443	443	400
r: High WTP	-0.0508	-0.0113	0.0116
p-value	(0.3585)	(0.8384)	(0.8416)
q-value	[1.0000]	[1.0000]	[1.0000]
N	342	342	312
r: Low WTP	-0.0226	-0.0081	0.0458
p-value	(0.6829)	(0.8840)	(0.4273)
q-value	[1.0000]	[1.0000]	[1.0000]
N	344	344	315
Present Bias (Money)			
r: Full Sample	0.0446	0.0088	-0.0250
p-value	(0.3582)	(0.8556)	(0.6247)
q-value	[1.0000]	[1.0000]	[1.0000]
N	443	443	400
r: High WTP	-0.0247	0.0306	0.0248
p-value	(0.6551)	(0.5807)	(0.6692)
q-value	[1.0000]	[1.0000]	[1.0000]
N	342	342	312
r: Low WTP	0.0998	-0.0008	-0.0524
p-value	(0.0700)	(0.9885)	(0.3642)
q-value	[0.2660]	[1.0000]	[0.5730]
N	344	344	315

Notes: High WTP refers to participants who were willing to pay more than 5 (out of 10) minutes to keep their current ranking. Low WTP refers to participants willing to pay 5 or fewer minutes. Sample for Actual SC includes participants randomly assigned to work under possible temptation ("decide while working" condition). q-values are corrected for multiple inference to account for the number of correlated tests within each domain. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Table 5: The Relationship between Self-Reported and Behavioral Measures of Self-Control using Pairwise Pearson Correlations

	Demand for Commitment			Present Bias	
	Commitment	Perceived SC	Actual SC	Effort	Money
	(1)	(2)	(3)	(4)	(5)
BSCS					
r: Full Sample	0.1017*	0.0992*	0.0933*	-0.0442	-0.0516
p-value	(0.0360)	(0.0408)	(0.0677)	(0.3625)	(0.2877)
q-value	[0.0660]	[0.0660]	[0.0660]	[0.5690]	[0.5690]
N	443	443	400	443	443
r: High WTP	0.1252**	0.1335**	0.0878**		
p-value	(0.0232)	(0.0155)	(0.1297)		
q-value	[0.0370]	[0.0370]	[0.0460]		
N	342	342	312		
r: Low WTP	0.0579	0.0440	0.0771		
p-value	(0.2944)	(0.4256)	(0.1815)		
q-value	[0.7410]	[0.7410]	[0.7410]		
N	344	344	315		

Notes: High WTP refers to participants who were willing to pay more than 5 (out of 10) minutes to keep their current ranking; Low WTP refers to participants willing to pay 5 or fewer minutes. The sample for Actual SC includes participants randomly assigned to work under possible temptation ("decide while working" condition). q-values are corrected for multiple inference to account for the number of correlated tests within each construct. Specifically, q-values for Demand for Commitment are adjusted across the three corresponding correlation coefficients and q-values for Present Bias are adjusted across the two correlation coefficients reported for that measure. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

4.2 Impulsivity and its Link to Self-Control

Our analysis of impulsivity relies on a novel extension of Toussaert's 2018 experimental design that allows us to measure impulsivity in an economic decision-making framework. Specifically, we proxy impulsivity by: (i) the propensity to make an informed decision by considering optional information on the minimum duration of each break, prior to taking a break from the attention task (*Share Info Clicks*); and (ii) decision time, prior to accepting a break (*Decision Time*). Our analysis focuses on week 3 when, by design, all participants work on the task for at least 45 minutes. We examine participants' behavior during the first 45 minutes of the task (Min Time), as well as during the person-specific, total task duration (Total Time). Our measures of impulsivity are summarized in Table 6 and descriptive statistics are in Appendix Table A.4.

Our findings reveal that participants' self-assessed impulsivity is predictive of their impulsive behavior in our attention task (see Table 7). Those with higher AIMS scores are less likely to seek information before deciding to take a break and to make that decision faster. The Pearson correlation coefficient takes values $[-0.13, -0.10]$ in the context of seeking additional information (columns 1-2), and $[-0.14, -0.11]$ in the context of decision time (columns 3-4). All estimates are consistently statistically significant at the 5 percent level (based on the adjusted q-value). Our findings provide the first validation of the AIMS survey using behavioral observations in an

economic decision-making framework.

Table 6: Summary of Impulsivity Measures

Measure	Description	Reference
	Self-Reported	
Adjustable Impulsivity Scale (AIMS)	General trait capturing individual differences in real-world impulsive behaviors.	Huang et al., 2024
	Behavioral	
In-Task Impulsivity		
Share Info Clicks	Proportion of times participant clicked on the information button to learn minimum break time before taking a break during the attention task.	
Decision Time	Decision time, prior to taking a break during the attention task.	

Table 7: The Relationship between Self-Reported and Behavioral Measures of Impulsivity using Pairwise Pearson Correlations

	Share Info Clicks		Decision Time	
	Min Time	Total Time	Min Time	Total Time
	(1)	(2)	(3)	(4)
AIMS				
r	-0.1251**	-0.1041**	-0.1415**	-0.1087**
p-value	(0.0214)	(0.0525)	(0.0092)	(0.0428)
q-value	[0.0390]	[0.0410]	[0.0390]	[0.0410]
N	352	362	352	362

Notes: The sample includes participants randomly assigned to work under possible temptation ("decide while working" condition) and who accepted a break in the time frame under analysis. q-values are corrected for multiple inference to account for the number of correlated tests within each construct. Specifically, q-values for Share Info Clicks are adjusted across the two corresponding correlation coefficients and similar for Decision Time.* $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Conceptually, a higher degree of impulsivity is expected to be associated with less self-control. We investigate this by examining the extent to which our measures of impulsivity and self-control are related (Table 8). We find a strong negative correlation between self-reported measures of self-control (BSCS) and impulsivity (AIMS) (column 1, Pearson correlation coefficient = -0.75). Moreover, participants with higher AIMS scores are less likely to demand commitment, but also less likely to think they will be able to resist temptation (Panel A, columns 2-3, Pearson correlation coefficient takes value -0.12 and -0.11, respectively). Remarkably, the strength of correlation between AIMS and behavioral commitment measures of self-control is similar in magnitude to its correlation with BSCS scores (reported in Table 5). However, while participants' BSCS scores are also associated with actual self-control (Table 5), their AIMS scores are not. Finally, even though the associations between impulsivity AIMS score and present bias are positive, they are

not statistically significant.

We do not find a relationship between BSCS scores and behavioral measures of impulsivity (Table 8, Panel B, column 1). One possible explanation is that impulse control is only one out of five dimensions of self-control conceptualized as a personality trait (Tangney et al., 2004).[19] Accordingly, few items in the BSCS capture impulse control (5 out of 13, see Cobb-Clark et al., 2023). Moreover, we consistently find no association between the behavioral measures of self-control and impulsivity (Panel B, columns 2-6) measured in the attention task.

Table 8: The Relationship between Measures of Self-Control and Impulsivity using Pairwise Pearson Correlations

	BSCS	**Demand for Commitment**			**Present Bias**	
		Commitment	Perceived SC	Actual SC	Effort	Money
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
AIMS						
r	-0.7505***	-0.1241**	-0.1131**	-0.0540	0.0432	0.0567
p-value	(0.0000)	(0.0104)	(0.0196)	(0.2911)	(0.3733)	(0.2432)
q-value	[0.0000]	[0.0310]	[0.0310]	[0.1080]	[0.5960]	[0.5960]
N	443	443	443	400	443	443
Panel B						
Share Info Clicks						
r: Min Time	0.0056	0.0384	0.0746	0.1094	0.0390	-0.0999
p-value	(0.9182)	(0.4815)	(0.1714)	(0.0445)	(0.4751)	(0.0666)
q-value	[1.0000]	[0.5500]	[0.2970]	[0.2100]	[0.5500]	[0.2100]
N	352	352	352	352	352	352
r: Total Time	-0.0122	0.0324	0.0636	0.0975	0.0369	-0.0995
p-value	(0.8204)	(0.5470)	(0.2368)	(0.0694)	(0.4933)	(0.0640)
q-value	[1.0000]	[0.5740]	[0.3970]	[0.2100]	[0.5500]	[0.2100]
N	362	362	362	362	362	362
Decision Time						
r: Min Time	0.0614	0.0370	0.0450	0.1304	0.0366	-0.1014
p-value	(0.2606)	(0.4978)	(0.4097)	(0.0165)	(0.5026)	(0.0626)
q-value	[1.0000]	[0.5500]	[0.5500]	[0.2100]	[0.5500]	[0.2100]
N	352	352	352	352	352	352
r: Total Time	0.0403	0.0158	0.0424	0.1168	0.0170	-0.1002
p-value	(0.4537)	(0.7697)	(0.4309)	(0.0294)	(0.7523)	(0.0620)
q-value	[1.0000]	[0.7350]	[0.5500]	[0.2100]	[0.7350]	[0.2100]
N	362	362	362	362	362	362

Notes: The sample for Actual SC includes participants randomly assigned to work under possible temptation ("decide while working" condition). The sample for Share Info Click and Decision Time includes participants randomly assigned to work under possible temptation and who accepted a break in the time frame under analysis. q-values are corrected for multiple inference to account for the number of correlated tests within each construct. Specifically, q-values for Demand for Commitment are adjusted across the three corresponding correlation coefficients and q-values for Present Bias are adjusted across the two correlation coefficients. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Overall, our results point to a relationship between impulsivity and self-control that is clearly present, but nuanced. Self-reported impulsivity and self-control (AIMS and BSCS scores) are

[19]The other four dimensions are task performance (completing tasks on time, preventing leisure activities and emotional distractions from interfering with productive tasks), psychological adjustment (regulation of thought, affect and behavior), interpersonal relationships, and moral emotions.

highly correlated. Moreover, AIMS scores are correlated with some behavioral measures of self-control (demand for commitment and perceived self-control). Still, AIMS scores are not linked to actual self-control in the attention task or to present bias in either the effort or monetary domain. Other caveats are that BSCS scores do not predict behavioral impulsivity and, finally, that behavioral measures of self-control and impulsivity are unrelated. The key take-away message is that while there is a strong empirical link between self-reported measurements of self-control and impulsivity, there are important distinctions in the two when it comes to the behavior they predict in the experimental task. Self-control behavior is better captured with the BSCS, and impulsive behavior with AIMS.

4.3 Attention and its Link to Self-Control

Attention is characterized by the selective allocation, i.e. control, of mental resources (Loewenstein & Wojtowicz, 2023). The survey-based Attentional Control Scale has been designed to measure people's attention and is comprised of two sub-factors: (i) attention focus; and (ii) attention shift. Our experimental task requires people to maintain their attention on a productive task while facing the temptation to shift their attention to alternative leisure activities. We proxy attention control in the task by the total time spent on breaks, the number of breaks taken, and the period of time spent on the task prior to taking the first break. All of these measures are derived from behavior in the attention task in week 3 which all participants had to complete regardless of their choices. Maintaining attention on the task is a payoff maximizing strategy, as we observe no average productivity increase in the task immediately following the break. Further, our data reveal that taking breaks decreases average earnings in the task. An additional minute spent on breaks is associated with a 0.001 percentage point decrease in accuracy rate and a reduction of \$0.08 in earnings (see Appendix Table A.1). Table 9 summarizes our attention measures and descriptive statistics are in Appendix Table A.4.

We do not find a statistically significant relationship between the two self-reported measures of attention—focus and shift—and behavioral measures of attention (Table 10). Conceptually, the ability to focus one's attention is expected to be correlated with spending less time on breaks because it arguably makes maintaining attention in the task easier. In contrast, the ability to shift attention is expected to be associated with taking more frequent or earlier breaks since this makes it easier to redirect one's attention back to the task after a break. While the sign of some correlation coefficients is consistent with these theoretical expectations, none are statistically significant at conventional levels. Overall, we do not find a link between people's self-reported capacity for attention and their observed attention-related behavior in our task.

Table 9: Summary of Attention Measures

Measure	Description	Reference
	Self-Reported	
Attention Control & Shift (ACS)	General trait capturing individual differences in attentional control, particularly focusing on the abilities to concentrate (attention focus) and to shift attention between tasks or thoughts (attention shift).	Townshend and Bornschlegl (2025)
	Behavioral	
In-Task Attention		
Break Time	Total time spent on breaks during the attention task.	
#Breaks	Number of breaks taken during the attention task.	
Time Before Break	Time elapsed before taking a break during the attention task.	

Table 10: The Relationship between Self-Reported and Behavioral Measures of Attention using Pairwise Pearson Correlations

	Break Time		# Breaks		Time Before Break
	Min Time	Total Time	Min Time	Total Time	
	(1)	(2)	(3)	(4)	(5)
ACS					
r: Focus	-0.0895	-0.0924	-0.0164	0.0037	0.0545
p-value	(0.0798)	(0.0704)	(0.7484)	(0.9420)	(0.2866)
q-value	[0.2500]	[0.2500]	[0.9150]	[0.9150]	[0.4020]
N	400	400	400	400	400
r: Shift	0.0728	0.0677	-0.0395	-0.0365	-0.0298
p-value	(0.1543)	(0.1854)	(0.4404)	(0.4760)	(0.5597)
q-value	[0.8640]	[0.8640]	[0.8640]	[0.8640]	[0.8640]
N	400	400	400	400	400

Notes: The sample includes participants randomly assigned to work under possible temptation ("decide while working" condition). q-values are corrected for multiple inference to account for the number of correlated tests within each construct. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Next, we investigate the relationship between attention and self-control (Table 11). We find a strong association between attention focus and BSCS scores. The Pearson correlation coefficient is 0.52 and statistically significant at the 1 percent level (Panel A, column 1). Attention shift is also significantly correlated with BSCS scores (correlation coefficient takes value 0.24, statistically significant at the 1 percent level (Panel A, column 1)). While the self-reported attention and self-control scores are correlated, self-reported attention and behavioral measures of self-control are not (Panel A, columns 2-6). Moreover, we do not find any significant or economically relevant relationships between our behavioral measures of attention and self-control (Panel B).[20]

[20]In Table 11, we do not include the correlation coefficients between actual self-control and behavioral measures of attention because the former is partially based on behavior with respect to taking breaks.

Table 11: The Relationship between Measures of Self-Control and Attention using Pairwise Pearson Correlations

	BSCS	**Demand for commitment**			**Present bias**	
		Commitment	Perceived SC	Actual SC	Effort	Money
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
Focus						
r	0.5215***	0.0827	0.0340	0.0054	-0.0192	-0.0480
p-value	(0.0000)	(0.0882)	(0.4837)	(0.9161)	(0.6923)	(0.3233)
q-value	[0.0000]	[0.3600]	[0.9370]	[1.0000]	[1.0000]	[1.0000]
N	443	443	443	400	443	443
Shift						
r	0.2413***	0.0250	0.0819	-0.0232	0.0218	-0.0399
p-value	(0.0000)	(0.6062)	(0.0912)	(0.6502)	(0.6529)	(0.4111)
q-value	[0.0000]	[0.7660]	[0.3770]	[0.7660]	[1.0000]	[1.0000]
N	443	443	443	400	443	443
Panel B						
Break Time						
r: Min Time	-0.0225	-0.0194	-0.0581		-0.0087	0.0538
p-value	(0.6600)	(0.7052)	(0.2561)		(0.8648)	(0.2932)
q-value	[0.3590]	[1.0000]	[1.0000]		[1.0000]	[1.0000]
N	400	400	400		400	400
r: Total Time	-0.0414	-0.0134	-0.0729		-0.0027	0.0699
p-value	(0.4182)	(0.7935)	(0.1539)		(0.9576)	(0.1714)
q-value	[0.2650]	[1.0000]	[1.0000]		[1.0000]	[1.0000]
N	400	400	400		400	400
# Breaks						
r: Min Time	-0.0814	-0.0281	-0.0151		0.0118	0.0097
p-value	(0.1113)	(0.5829)	(0.7683)		(0.8184)	(0.8496)
q-value	[0.2180]	[1.0000]	[1.0000]		[1.0000]	[1.0000]
N	400	400	400		400	400
r: Total Time	-0.0920	-0.0281	-0.0188		0.0436	0.0273
p-value	(0.0715)	(0.5823)	(0.7139)		(0.3942)	(0.5938)
q-value	[0.2180]	[1.0000]	[1.0000]		[1.0000]	[1.0000]
N	400	400	400		400	400
Time Before Break						
r	0.0988	-0.0334	-0.0164		-0.0176	0.0194
p-value	(0.0529)	(0.5133)	(0.7483)		(0.7303)	(0.7044)
q-value	[0.2180]	[1.0000]	[1.0000]		[1.0000]	[1.0000]
N	400	400	400		400	400

Notes: The sample for Actual Self-Control, Break Time, #Breaks and Time Before Break, includes participants randomly assigned to work under possible temptation ("decide while working" condition). q-values are corrected for multiple inference to account for the number of correlated tests within each construct. Specifically, q-values for Demand for Commitment are adjusted across the three corresponding correlation coefficients and q-values for Present Bias are adjusted across the two correlation coefficients. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

4.4 Additional Results

4.4.1 Joint Association between Self-Reported and Behavioral Measures

Our study is motivated by the view that self-control is a multidimensional construct encompassing the demand for commitment, present bias, impulsivity, and attention. We, therefore, examine whether our behavioral measures are jointly associated with self-reported measures of self-control, impulsivity, and attention.

We estimate a series of regressions in which the dependent variable is participants' self-reported score (BSCS, AIMS, or ACS). The independent variables include our behavioral measures of

demand for commitment, present bias, impulsivity, and attention. Because we have multiple measures of each construct, each regression includes only one measure for each concept. We then run a set of regressions that vary the specific measures that are included (see Appendix Table A.5 for model specifications). We determine whether our behavioral measures are jointly associated with self-reported scores using a joint F-test and report q-values, defined as p-values from joint F-tests adjusted for multiple testing, in Appendix Table A.6.

We find that BSCS scores are not jointly predicted by our behavioral measures. In contrast, AIMS scores are jointly predicted when present bias is measured in the effort domain. Self-reported attention is generally not jointly associated with behavioral measures, except when attention is proxied by break time. Overall, these results indicate that behavioral measures align more closely with self-reported impulsivity than with general self-control or attention, highlighting important domain-specific—and construct-specific—differences.

4.4.2 Patience

People's capacity for self-control is intrinsically linked to their patience, i.e. their willingness to defer current consumption for greater consumption in the future. We develop a behavioral measure of patience using the decisions participants made in week 2 about the work time (or money) to be undertaken (or received) in weeks 3 and 4. Since these choices involve only future outcomes, they are not influenced by present bias. Those who allocate more work time (money) to the sooner (later) date relative to the later (sooner) date are classified as being more patient.[21]

Overall, we find no significant relationships between patience in either the effort- or money-domain and our measures of self-control, impulsivity, or attention. The only exception is that patience in the money domain is negatively correlated (-0.13) with the propensity to consider information prior to deciding to take a break, suggesting that more patient participants tend to make less informed (more impulsive) decisions. Detailed results are reported in Appendix Tables A.7 to A.9.

4.4.3 Individual Differences in Self-Control, Impulsivity, and Attention

Economists have a long tradition of studying how people's economic preferences are related to their demographic and socio-economic characteristics (e.g., Croson & Gneezy, 2009; Dohmen et al., 2011; Falk et al., 2021) and personality traits (e.g., Becker et al., 2012; Borghans et al., 2008; Jagelka, 2024). The richness of our data allows us to provide a systematic comparison of the relationship between participants' characteristics and different measures—self-reported and be-

[21] Specifically, patience in the effort domain is captured, separately for each of the five week 2 allocation decisions, by the ratio of work time allocated to week 3 to total work time. Similarly, in the monetary domain, patience in each allocation decision is given by the proportion of money allocated to week 4 relative to the total monetary amount. Participants' patience in each of the two reward domain is then calculated as the mean patience level across across all five week 2 decisions. On average, patience in the effort domain equals 39.31 percent (s.d. 17.84), while patience in the money domain equals 81.82 percent (s.d. 6.34).

havioral—of self-control, impulsivity, and attention. Following the literature, we focus on gender, age, and socio-economic background (education, occupation, and satisfaction with income). We also consider the role of personality differences using the Big Five traits (extroversion, agreeableness, neuroticism, conscientiousness, and openness) as well as intelligence (proxied by IQ scores). Finally, we investigate self-reported hours of sleep, which we interpret to be an indicator of daily functioning and cognitive resources.[22] We summarize our results in Table 12 (see Appendix Tables A.10 to A.12 for full results) and discuss our main insights below.

Previous studies have found gender gaps in self-control among children (Matthews et al., 2009; Silverman, 2003), but not among adults (Cobb-Clark et al., 2024b). Consistent with this, we find that gender is unrelated to self-control in our sample of adults. There is only limited evidence on the role of age in shaping the self-control of adults (Cobb-Clark et al., 2024b). Although the older participants in our sample report that they have more self-control, greater attention focus, and lower impulsivity, they do not behave differently from younger participants in experimental tasks. Surprisingly, having achieved a higher education degree is not associated with any of our measures. Income satisfaction is positively associated with self-reported self-control and attention focus, and negatively with self-reported impulsivity, but not with behavioral measures.

Finally, we find that all Big Five personality traits, with the exception of openness, are positively associated with self-reported self-control, attention and negatively associated with self-reported impulsivity. The relationship between the Big Five and behavioral measures is not clear-cut, however. The most interesting associations are those with conscientiousness. In particular, people who report that they are more conscientious also behaviorally display greater self-control and lower present bias (money). Taken together, these findings provide additional support for the close link between conscientiousness and self-control (Duckworth & Kern, 2011). At the same time, IQ is not associated with any of our measures, while hours of sleep is positively associated with self-reported self-control and attention focus, and present bias (money).

[22]In all cases, we calculate Pearson's pairwise correlation coefficients using inverse probability weighting to account for selective attrition (Wooldridge, 2002) as in Sections 4.1-4.3.

Table 12: Summary of Determinants of Self-Control, Impulsivity and Attention

Correlate	Findings
Sociodemographics	
Female	**Self-reported measures**: no association. **Behavioral measures**: negative association with impulsivity (decision time) and attention (time on breaks).
Age	**Self-reported measures**: positive association with BSCS and ACS, negative association with impulsivity. **Behavioral measures**: negative association with present bias (money) and impulsivity (propensity to consider information prior to decision).
Higher Education	**Self-reported measures**: no association. **Behavioral measures**: no associations.
Occupation	**Self-reported measures**: employed: positive association with attention (shift) associations. **Behavioral measures**: employed: positive association with attention (time on breaks); unemployed: no associations; retired: negative association with attention (time on breaks).
Income Satisfaction	**Self-reported measures**: positive association with BSCS, ACS Focus; negative association with AIMS. **Behavioral measures**: No association.
Personality Traits	
Extraversion	**Self-reported measures**: positive association with BSCS, ACS; negative association with AIMS. **Behavioral measures**: negative association with attention (time before taking a break).
Agreeableness	**Self-reported measures**: positive association with BSCS, ACS, negative association with AIMS. **Behavioral measures**: negative association with attention (number of breaks).
Neuroticism	**Self-reported measures**: negative association with BSCS, ACS, positive association with AIMS. **Behavioral measures**: no association.
Conscientiousness	**Self-reported measures**: positive association with BSCS, ACS, negative association with AIMS. **Behavioral measures**: positive association with self-control (commitment, perceived and actual), negative association with present bias (money).
Openness	**Self-reported measures**: positive association with ACS shift. **Behavioral measures**: negative association with self-control (demand for commitment), positive association with present bias (effort).
IQ	**Self-reported measures**: no association. **Behavioral measures**: no association.
Hours of Sleep	**Self-reported measures**: positive association with BSCS and ACS (focus). **Behavioral measures**: positive association with present bias (money).

5 Discussion

Our research explores the conceptual foundations of self-control—and its links to impulsivity and attention—using an online incentive-compatible experiment in which an unusually rich set of behavioral and self-reported measures were collected from participants recruited from a general population. Our primary finding is that present bias is not associated with either the demand for commitment or self-assessed self-control. There are several possible explanations. Previous research suggests that the level of temptation in standard subject pools may be lower if present

bias is elicited in the monetary domain than if it is elicited for primary rewards (Augenblick et al., 2015; Cheung et al., 2026; Reuben et al., 2010; Tsukayama & Duckworth, 2010).[23] This may explain the lack of an empirical relationship between present bias and other measures of self-control. Regardless of whether we measure present bias in the monetary or effort domain, however, there is no evidence of a statistically significant or economically meaningful relationship between present bias, on the one hand, and self-reported and commitment-based measures of self-control, on the other. Taken together, our results suggest that the lack of correspondence between present bias and other measures of self-control is more fundamental than a simple issue of domain specificity.

Another possibility is that present bias reflects a different component of executive function. However, we do not find that it correlates with either impulsivity or attention scales (or their behavioral counterparts). Finally, it is possible that the explanation lies in the fact that measures of present bias—unlike both the BSCS scores and the demand for commitment—do not require participants to be sophisticated about their self-control limitations. Present bias is likely to reflect behavior among both sophisticated and naive individuals, whereas the BSCS scores and commitment measures identify self-control problems among those who recognize them. If so, present bias need not correlate with any measure that presupposes such sophistication. At the same time, the empirical evidence linking present bias, sophistication and the take-up of commitment devices is mixed. Sophistication is not always associated with a greater demand for commitment and present focus is often positively correlated with using commitment devices even when naive and sophisticated individuals are not separately identified (see Cobb-Clark et al., 2024a).

Our second key finding is that self-reported self-control is empirically linked to the demand for commitment in a behavioral setting in which participants must focus attention on a productive, yet tedious, task. This is noteworthy in providing empirical evidence of the validity of the BSCS as a measure of self-control in a well-controlled, economic decision making context, opening the door to enhancing the external validity of experiments capturing the demand for commitment using population-representative data that include BSCS scores. In addition to demanding commitment, study participants who self-report a greater capacity for self-control are also more likely to stick to their personal goals by anticipating and preempting temptation, providing an important insight into the mechanisms through which the BSCS scores predict life success.

Researchers are increasingly recognizing that people's own self-awareness matters for the measurement of their cognitive traits (Dohmen & Jagelka, 2024; Falk et al., 2025). People are unlikely to accurately report their capacity for self-control if they are unaware of their self-control limitations, reducing the power of self-assessments to predict life outcomes. Similarly, demanding commitment to avoid self-control failures requires the ability to project oneself into the future and anticipate the cost of temptation. In our view, it is likely that self-awareness plays a pivotal role

[23]We note that in subject pools where both money and food is tempting, Cheung et al., 2022 found a strong correlation in the present bias for money and food.

in explaining the empirical correspondence between self-reported and demand-for-commitment measures of self-control that we find.

Still, our estimated correlations between self-reported and behavioral measures, while statistically significant, are small (consistently around 0.1). Thus, our results also add weight to those studies demonstrating the weak correspondence between behavioral and survey-based measures of psychological traits and economic preferences (Bauer et al., 2020; Becker et al., 2012; Duckworth & Kern, 2011; Lönnqvist et al., 2015).

Our third key finding is that the self-reported measure of impulsivity (AIMS score) developed by Huang et al. (2024) is associated with impulsive behavior in our attention task. This result provides the first validation of AIMS using an economic decision-making experiment. Interestingly, we also found a robust association between AIMS scores and behavioral measures of self-control reflected in the demand for commitment. This confirms that, conceptually, impulsivity and self-control are closely linked, supporting the inclusion of impulsivity as one of the dimensions of self-reported self-control (see Tangney et al., 2004). Finding an association between AIMS scores and the commitment-based behavioral measures of self-control provides additional support for the validation of AIMS and the empirical cross-concept link.

Finally, we find no relationship between our self-reported and behavioral measures of attention. This is consistent with previous evidence that the ACS is uncorrelated with objective measures of attention control in psychology (Clarke & Todd, 2021). Moreover, while self-reported attention and self-control are strongly correlated, there is no relationship between our behavioral measures of attention and self-control. These results are somewhat surprising given our focus on a validated self-reported measure of attention—(ACS) (Townshend & Bornschlegl, 2025)—and laboratory-based behavioral measures inspired by previous economic studies (Toussaert, 2018). Our results point to an important gap in the measurement of this key aspect of cognitive function.

6 Conclusion

Whether people are successful in intentionally directing their behavior to achieve their long-term goals fundamentally depends on their capacity to exert self-control, avoid impulsive choices and maintain attention. Given this, it is not hard to understand why self-control has been referred to as "one of the most powerful and beneficial adaptations of the human psyche" (Tangney et al., 2004, p. 272). Self-control is a multi-dimensional construct studied across economics, psychology and neuroscience. Continued progress in understanding the behavioral foundations of self-control requires that we not only bridge the disciplinary and methodological boundaries in the way it is conceptualized, but also that we pay careful attention to measurement. The measures we choose will lay the foundation for building evidence-based theories, testing hypotheses, and refining concepts.

Our study combines validated survey scales with incentivized behavioral tasks in an integrated

framework to jointly measure self-control, impulsivity, and attention, allowing us to not only study the relationship between these constructs, but also how each contributes to the allocation of effort over time. Our results lead to several conclusions. The first is that cost-of-temptation (Gul & Pesendorfer, 2001) and present-bias (Laibson, 1997) models of self-control—the two dominant paradigms in economics—are not only theoretically distinct, they are also behaviorally distinct. People's degree of present bias is unrelated to their desire to reduce temptation in the same effort task. Moreover, the extent of people's present bias (measured in the usual way) is unrelated to their self-reported capacity for self-control or their effort choices when working on an attention task under temptation.

We are not the first to note that present bias does not always predict self-control in everyday settings (see Zhang et al., 2024, for example). When measured in the monetary domain, present bias consistently predicts financial outcomes (Goda et al., 2019; Meier & Sprenger, 2010; Nguyen, 2016); educational investments (Tanaka & Yamano, 2015); and vaccination uptake (Nuscheler & Roeder, 2016). Evidence linking monetary present bias to health and lifestyle behaviors is more mixed, however, and only a few studies have explored whether present bias measured using non-monetary rewards predicts real-world outcomes (see Cheung et al., 2022). One possibility is that present bias, which is influenced by how people subjectively perceive time delays, does not fully capture the self-control failures that result from immediate visceral influences which lead people to deviate from their ideal course of action (see Delaney & Lades, 2017; Loewenstein & Carbone, 2024). To the extent this is true, developing a broad understanding of the impact of constrained self-control on social and economic well-being will require that economists move beyond an exclusive focus on present bias when conceptualizing and measuring self-control.

Second, self-awareness may be one mechanism linking self-reported and behavioral measures of self-control. People's self-reported capacity for self-control (as reflected in the BSCS) is predictive of those behavioral measures of their self-control that account for their demand for commitment. Both rely on a degree of self-awareness. A greater emphasis on self-awareness when studying self-control would be valuable for several reasons. In particular, this would likely support efforts to incorporate visceral influences in measures of self-control. It is difficult to imagine studying the effect of visceral influences on people's choice to exercise self-control or not if they are completely unaware of them. Moreover, knowing more about people's awareness of their own self-control limitations might make it possible to design interventions that focus on increasing self-awareness rather than increasing self-control per se. Importantly, there is an opportunity to reduce attenuation bias in observational studies of self-control by incorporating people's self-awareness of their own reliability in answering survey questions (Dohmen & Jagelka, 2024).

In addition, we see value in introducing behavioral measures of impulsivity into economic research. Conceptually, impulsivity is important; it is a key mechanism driving people's self-control limitations. Moving beyond issues in crime and deviant behavior to study the role of impulsivity in human capital investments, consumption decisions, savings behavior, etc. has great

potential. Empirically, the survey measure of impulsivity (AIMS) recently proposed by Huang et al. (2024) is promising. Our results make an important contribution by, for the first time, establishing that self-reported impulsivity (as captured in AIMS) predicts our novel, dedicated measure of behavioral impulsivity in an economic decision-making context. At the same time, we are aware that finding a measure of self-assessed impulsivity that is relevant for a broad range of economic decisions is a challenging task. The decision context no doubt matters and there may not be one behavioral measure that predicts all outcomes of interest. Future research investigating this would be particularly valuable in not only furthering our understanding of the behavioral foundations of impulsivity, but also in helping researchers marry the most appropriate experimental designs to their specific research questions.

Finally, developing a measure of attention control that is economically relevant and can be delivered in surveys is a high priority. The rapid expansion of the digital economy means that attention is increasingly an economic commodity that can be bought, sold or even stolen (see Loewenstein & Wojtowicz, 2023). This makes the lack of a valid survey-based measure of attention that can be used to predict economic choice especially problematic. Economists' ability to understand the functioning of the economy depends on their ability to understand—and measure —people's limited and selective attention.

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Appendix A Additional Figures and Tables

Figure A.1: Experiment Timeline and Design.

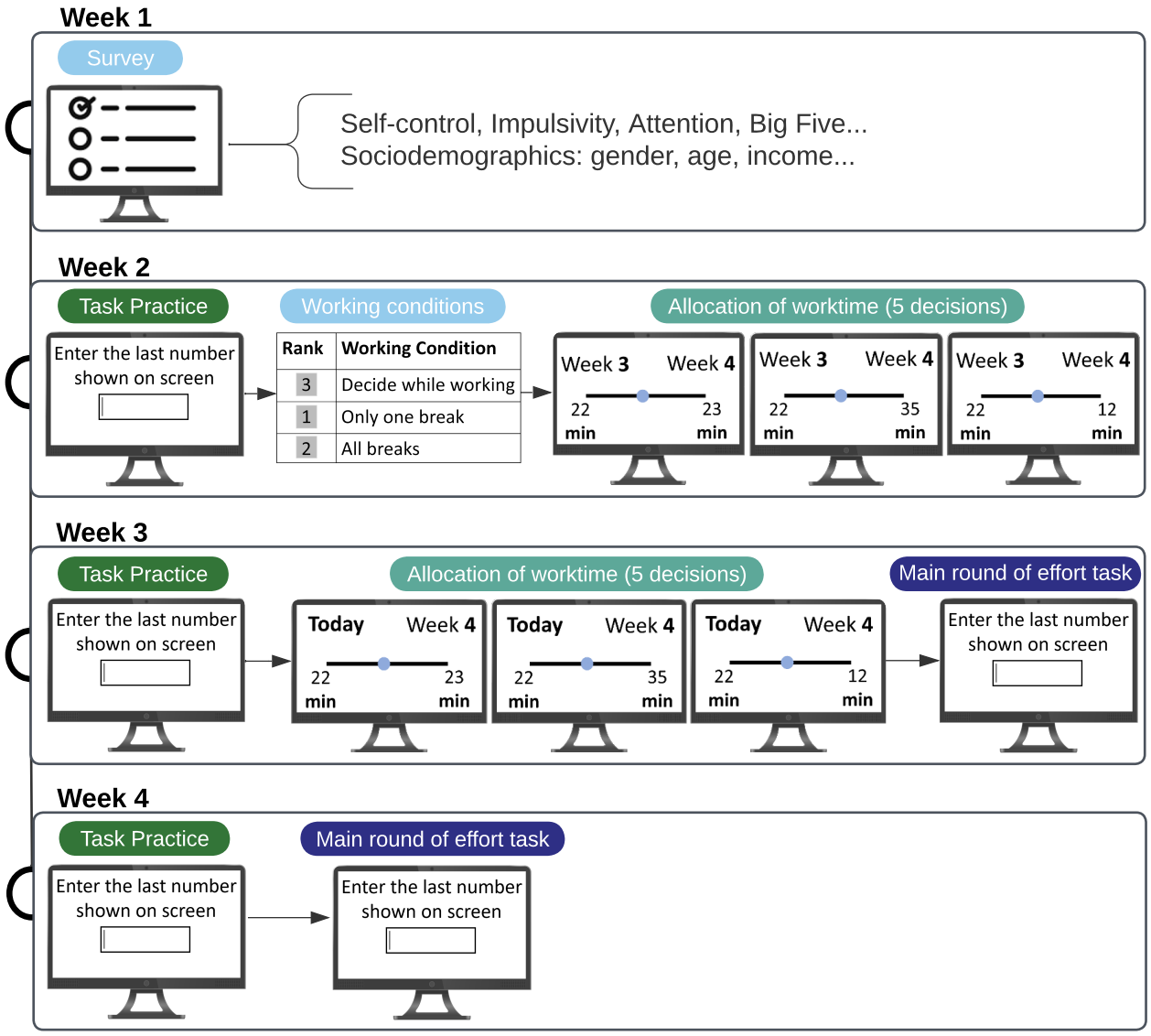


Figure A.2: Distribution of Predicted Probability of Completing the Experiment

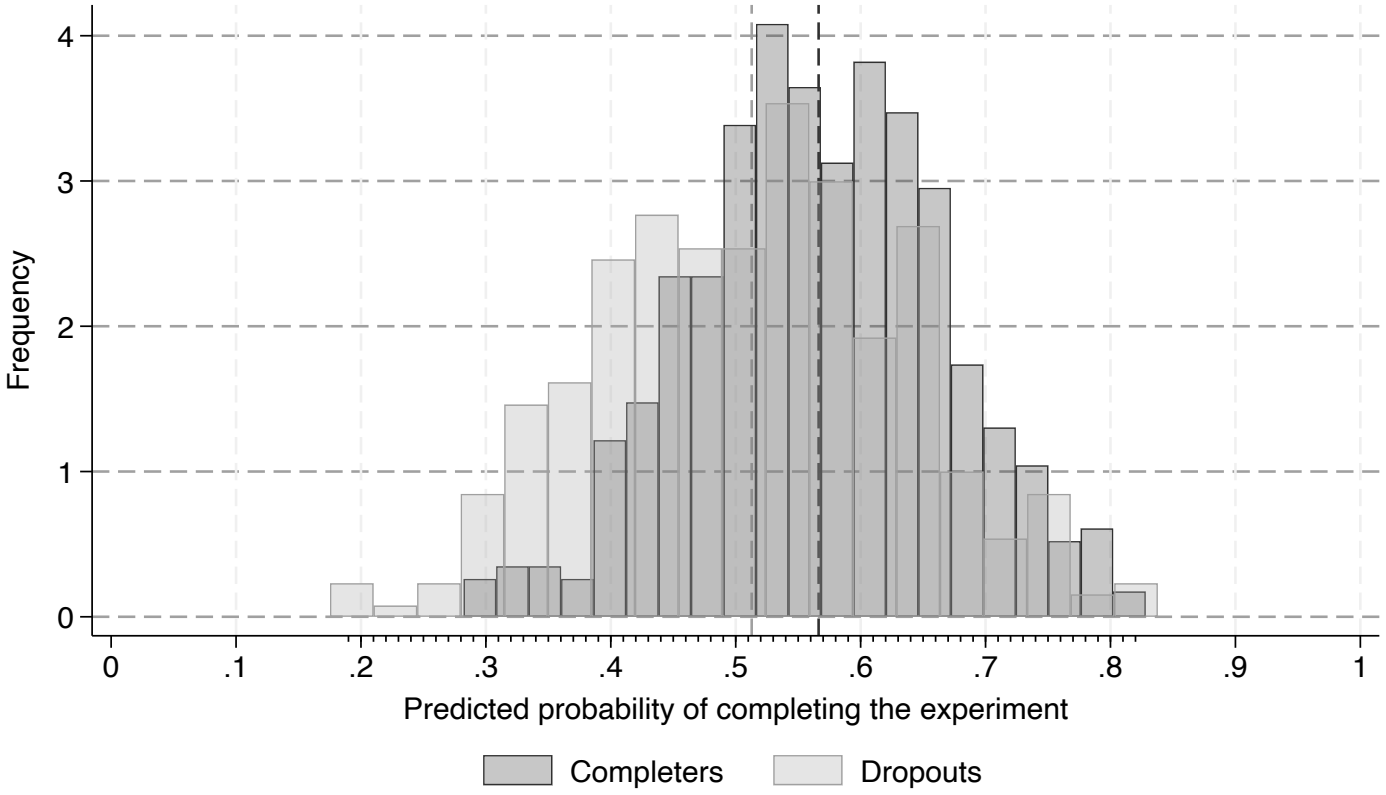


Table A.1: The Effect of Break Time on Study Payoff and Task Accuracy

	Payoff	Accuracy
Break time (mins)	-0.080***	-0.001***
	(0.025)	(0.000)
N	443	443

Notes: Payoff refers to study payoff from the real-effort task only. Accuracy is calculated as total number of correct answers divided by total number of questions. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2: Comparison of Sociodemographic Characteristics between Analysis Sample and HILDA

	Sample	
	Analysis (W1-W4) [N=443]	**HILDA**
Sociodemographics	Mean (SD)	
Age	52.67 (15.95)	46.28 (19.28)
	Percent of Sample	
Female	53.95	50.80
Reside in Capital City	64.56	66.30
Education		
Less than Year 12	10.84	21.39
Year 12	12.42	15.90
Vocational Education	30.25	30.01
Higher Education	46.50	32.69
Occupation		
Employed	56.43	64.83
Unemployed	6.09	2.37
Retired	26.64	9.07
Other	10.84	23.73
Marital Status		
Married or De Facto	56.88	56.91
Never married	26.19	27.66
Divorced	12.19	11.28
Widowed	4.06	4.15
Household Income (in $1,000)		
<40	16.48	7.05
40-60	14.22	11.48
60-80	11.96	9.19
80-100	10.84	9.34
100-125	9.93	9.85
125-150	9.71	10.42
150-200	15.35	15.93
>200	8.58	26.74
No Response	2.93	-
Socio-Economic Status		
Low SES	25.05	27.85
Middle SES	39.28	41.72
High SES	35.67	30.25
No Response	-	0.18

Notes: HILDA data for all variables is obtained from data collection Wave 23 (except for income, obtained from Wave 22). We use the HILDA sample weights so that the data is representative of the broader Australian population.

Table A.3: Comparison of Personality Traits between Analysis Sample and HILDA

	Sample	
	Analysis (N=443)	**HILDA**
Measures [possible min,max]	Mean (SD)	
BSCS [0,52]	31.17 (8.16)	31.76 (8.73)
Risk Question [0,10]	4.81 (2.59)	4.60 (2.46)
Locus of Control [0,42]	26.30 (8.67)	29.55 (8.23)
Extroversion [0,48]	23.88 (8.63)	24.50 (7.20)
Agreeableness [0,42]	30.49 (6.49)	30.91 (6.14)
Neuroticism [0,36]	11.53 (7.25)	10.90 (6.70)
Conscientiousness [0,42]	30.32 (6.93)	28.95 (6.97)
Openness [0,36]	20.74 (6.22)	18.86 (6.52)

Notes: HILDA data is obtained from data collection Wave 23 for BSCS and Locus of Control, Wave 22 for risk attitudes, and Wave 21 for the big five. We use the HILDA sample weights so that the data is representative of the broader Australian population.

Table A.4: Descriptive Statistics of Behavioral Measures

	Mean	SD	Min	Max	N
Self-Control					
Demand for Commitment	0.45	0.50	0	1	443
Perceived Self-Control	0.31	0.46	0	1	443
Actual Self-Control	0.16	0.37	0	1	400
Present Bias (effort)	2.69	21.82	-67.62	100	443
Present Bias (money)	-0.25	6.94	-32.38	21.28	443
Impulsivity					
a. Minimum Work Time					
Share Info Clicks	28.98	43.63	0	100	352
Decision Time	4.10	2.18	1	15	352
b. Full Work Time					
Share Info Clicks	29.33	43.54	0	100	362
Decision Time	4.11	2.09	1	13	362
Attention					
a. Minimum Work Time					
Break Time (in seconds)	333.34	718.43	0	11083	400
#Breaks	2.19	1.81	0	9	400
Time Before Break (in seconds)	1055.03	945.74	178	4651	400
b. Full Work Time					
Break Time (in seconds)	427.46	778.93	18	11083	400
#Breaks	2.92	2.49	1	18	400

Notes: The sample for Actual Self-Control, Break Time, #Breaks and Time Before Break, includes participants randomly assigned to work under possible temptation ("decide while working" condition). The sample for Share Info Clicks and Decision Time includes participants randomly assigned to work under possible temptation and who accepted a break in the time frame under analysis.

Table A.5: Model Specifications for Behavioral Measures in Table A.6

Model	Present Bias	Impulsivity	Attention
(1)	Effort	Share Info Clicks	Break time
(2)	Effort	Decision time	Break time
(3)	Effort	Share Info Clicks	# Breaks
(4)	Effort	Decision time	# Breaks
(5)	Effort	Share Info Clicks	Time Before Break
(6)	Effort	Decision time	Time Before Break
(7)	Money	Share Info Clicks	Break time
(8)	Money	Decision time	Break time
(9)	Money	Share Info Clicks	# Breaks
(10)	Money	Decision time	# Breaks
(11)	Money	Share Info Clicks	Time Before Break
(12)	Money	Decision time	Time Before Break

Notes: This table summarizes the behavioral measure combinations used to construct Models (1)–(12) for the joint-association tests in Table A.6. Each model includes one proxy for present bias, one proxy for impulsivity, and one proxy for attention.

Table A.6: Joint Association between Behavioral Measures and Self-Reported Self-Control (q-values)

	Model Specification											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: Total Time												
Commitment												
BSCS	0.2820	0.2820	0.2820	0.2820	0.2820	0.2820	0.8630	0.8630	0.8630	0.8630	0.8630	0.8630
AIMS	0.0720	0.0720	0.072	0.0720	0.0720	0.0600	0.1040	0.1040	0.1040	0.1040	0.1040	0.1040
ACS: Focus	0.2100	0.2100	0.2100	0.2100	0.2100	0.2100	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900
ACS: Shift	0.0650	0.0650	1.000	1.000	1.000	1.000	0.0440	0.0440	1.000	1.000	1.000	1.000
Perceived Self-Control												
BSCS	0.2110	0.2110	0.2110	0.2110	0.2110	0.2110	0.5860	0.5860	0.5860	0.5860	0.5860	0.5860
AIMS	0.0370	0.0310	0.0370	0.0310	0.0310	0.0210	0.0570	0.0570	0.0570	0.0570	0.0560	0.0420
ACS: Focus	0.2890	0.2890	0.2890	0.2890	0.2890	0.2890	0.3960	0.3960	0.3960	0.3960	0.3960	0.3960
ACS: Shift	0.0190	0.0190	0.6690	0.6690	0.6690	0.6690	0.0170	0.0170	0.6420	0.6420	0.6420	0.6420
Panel B: Total Time												
Commitment												
BSCS	0.1500	0.1500	0.1500	0.1500	0.1500	0.1500	0.3970	0.3970	0.3970	0.3970	0.3970	0.3970
AIMS	0.0850	0.0850	0.0850	0.0850	0.0850	0.0850	0.1780	0.1780	0.1780	0.1780	0.1780	0.1780
ACS: Focus	0.1790	0.1790	0.1810	0.1810	0.1810	0.1810	0.3440	0.3440	0.3440	0.3440	0.3440	0.3440
ACS: Shift	0.3800	0.3800	1.000	1.000	1.000	1.000	0.3540	0.3540	1.000	1.000	1.000	1.000
Perceived Self-Control												
BSCS	0.1060	0.1060	0.1060	0.1060	0.1060	0.1060	0.3280	0.3280	0.3280	0.3280	0.3280	0.3280
AIMS	0.0450	0.0450	0.0450	0.0450	0.0450	0.0450	0.1160	0.1160	0.1160	0.1160	0.1160	0.1160
ACS: Focus	0.3610	0.3610	0.3610	0.3610	0.3610	0.3610	0.7390	0.7390	0.7390	0.7390	0.7390	0.7390
ACS: Shift	0.0950	0.0950	0.8130	0.8130	0.8130	0.8130	0.1080	0.1080	0.8440	0.8370	0.8370	0.8370

Notes: Each entry reports a q-value, defined as the p-value from a joint F-test adjusted for multiple testing. The joint F-test is conducted by estimating a series of regressions in which the dependent variable is a self-reported outcome (e.g., BSCS) and the independent variables consist of one behavioral proxy for each self-control component. For demand for commitment, we use behavioral measures of Commitment and Perceived Self-Control, and exclude Actual Self-Control because its construction incorporates other behavioral measures (e.g., the number of breaks taken). For present bias, impulsivity, and attention, the behavioral proxy used in each specification is listed in Table A.5. Panel A uses behavioral measures constructed from the first 45 minutes of the task (*Min Time*), while Panel B uses measures constructed from participants' full task duration (*Total Time*).

Table A.7: The Relationship between Patience and Self-Control using Pairwise Pearson Correlations

	Demand for Commitment			BSCS
	Commitment	Perceived SC	Actual SC	
	(1)	(2)	(3)	(4)
Panel A: Patience (Effort)				
r: Full Sample	0.0637	0.0083	-0.0272	-0.0442
p-value	(0.1895)	(0.8647)	(0.5954)	(0.3625)
q-value	[1.0000]	[1.0000]	[1.0000]	[0.3625]
N	443	443	400	443
r: High WTP	0.0529	0.0284	0.0197	
p-value	(0.3392)	(0.6078)	(0.7342)	
q-value	[1.0000]	[1.0000]	[1.0000]	
N	342	342	312	
r: Low WTP	0.0653	0.0057	-0.0464	
p-value	(0.2366)	(0.9174)	(0.4214)	
q-value	[1.0000]	[1.0000]	[1.0000]	
N	344	344	315	
Panel B: Patience (Money)				
r: Full Sample	-0.0054	-0.0389	-0.0536	-0.0516
p-value	(0.9112)	(0.4234)	(0.2945)	(0.2877)
q-value	[1.0000]	[1.0000]	[1.0000]	[0.2877]
N	443	443	400	443
r: High WTP	-0.0619	-0.0586	-0.0376	
p-value	(0.2631)	(0.2897)	(0.5165)	
q-value	[0.7690]	[0.7690]	[0.7690]	
N	342	342	312	
r: Low WTP	0.0503	-0.0018	-0.0482	
p-value	(0.3621)	(0.9739)	(0.4041)	
q-value	[1.0000]	[1.0000]	[1.0000]	
N	344	344	315	

Notes: High WTP refers to participants who were willing to pay more than 5 (out of 10) minutes to keep their current ranking; Low WTP refers to participants willing to pay 5 or fewer minutes. The sample for Actual SC includes participants randomly assigned to work under possible temptation ("decide while working" condition). q-values are corrected for multiple inference to account for the number of correlated tests within each construct. Specifically, for the Demand for Commitment construct, q-values are adjusted across the three corresponding correlation coefficients, separately for effort and money. p-values for the correlation between Patience and BSCS are not adjusted for multiple inference because only one coefficient is estimated in each domain. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Table A.8: The Relationship between Patience and Impulsivity using Pairwise Pearson Correlations

	AIMS	Share Info Clicks		Decision Time	
		Min Time	Total Time	Min Time	Total Time
	(1)	(2)	(3)	(4)	(5)
Patience (Effort)					
r	-0.0099	-0.0819	-0.0899	-0.0032	-0.0201
p-value	(0.8383)	(0.1329)	(0.0940)	(0.9539)	(0.7088)
q-value	[0.8383]	[0.3630]	[0.3630]	[0.9120]	[0.8960]
N	443	352	362	352	362
Patience (Money)					
r	0.0289	-0.1269**	-0.1290**	-0.0404	-0.0440
p-value	(0.5525)	(0.0196)	(0.0161)	(0.4594)	(0.4138)
q-value	[0.5525]	[0.0410]	[0.0410]	[0.2990]	[0.2990]
N	443	352	362	352	362

Notes: The sample for Share Info Clicks and Decision Time includes participants randomly assigned to work under possible temptation ("decide while working" condition) and who accepted a break in the time frame under analysis. *q*-values are corrected for multiple inference to account for the number of correlated tests within each domain. *p*-values for the correlation between Patience and AIMS are not adjusted for multiple inference because only one coefficient is estimated in each domain. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Table A.9: The Relationship between Patience and Attention using Pairwise Pearson Correlations

	Focus	Shift	Break Time		# Breaks		Time Before Break
			Min Time	Total Time	Min Time	Total Time	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Patience (Effort)							
r	0.0919	0.0295	0.0075	0.0540	-0.0159	0.0917	0.0021
p-value	(0.0579)	(0.5437)	(0.8832)	(0.2914)	(0.7556)	(0.0725)	(0.9676)
q-value	[0.1310]	[0.3740]	[1.0000]	[1.0000]	[1.0000]	[0.5690]	[1.0000]
N	443	443	400	400	400	400	400
Panel B: Patience (Money)							
r	0.0271	-0.0644	0.0806	0.0787	0.0847	0.0607	-0.0607
p-value	(0.5775)	(0.1847)	(0.1145)	(0.1233)	(0.0972)	(0.2348)	(0.2350)
q-value	[0.5860]	[0.5860]	[0.2590]	[0.2590]	[0.2590]	[0.2590]	[0.2590]
N	443	443	400	400	400	400	400

Notes: The sample for Break Time, #Breaks and Time Before Break, includes participants randomly assigned to work under possible temptation ("decide while working" condition). *q*-values are corrected for multiple inference to account for the number of correlated tests within each construct. * $q < 0.10$, ** $q < 0.05$, *** $q < 0.01$.

Table A.10: Determinants of Self-Control using Pairwise Pearson Correlations

	BSCS	Demand for Commitment			Present bias	
		Commitment	Perceived SC	Actual SC	Effort	Money
	(1)	(2)	(3)	(4)	(5)	(6)
Female	-0.0130	0.0323	0.0277	-0.0013	-0.0410	0.0261
	(0.7898)	(0.5062)	(0.5684)	(0.9803)	(0.3987)	(0.5910)
Age	0.2241***	0.0265	0.0072	0.0591	0.0238	-0.1297***
	(0.0000)	(0.5851)	(0.8824)	(0.2481)	(0.6239)	(0.0074)
Higher Education	-0.0299	-0.0725	-0.0298	-0.0097	-0.0387	0.0342
	(0.5382)	(0.1353)	(0.5396)	(0.8493)	(0.4253)	(0.4815)
Occupation						
Employed	-0.0556	0.0168	0.0586	-0.0208	-0.0494	0.0466
	(0.2530)	(0.7291)	(0.2281)	(0.6844)	(0.3093)	(0.3379)
Retired	0.0526	0.0288	-0.0149	0.0440	0.0402	-0.0312
	(0.2796)	(0.5535)	(0.7588)	(0.3899)	(0.4089)	(0.5215)
Unemployed	0.0375	0.0250	0.0218	0.0371	-0.0460	0.0524
	(0.4411)	(0.6076)	(0.6536)	(0.4689)	(0.3442)	(0.2807)
Income Satisfaction	0.1289***	0.0060	0.0586	0.0764	0.0486	0.0377
	(0.0077)	(0.9015)	(0.2274)	(0.1352)	(0.3172)	(0.4378)
Extraversion	0.1872***	0.0242	0.0251	-0.0354	-0.0443	0.0675
	(0.0001)	(0.6188)	(0.6060)	(0.4885)	(0.3619)	(0.1640)
Agreeableness	0.4034***	0.0431	0.0452	0.0001	-0.0214	-0.0467
	(0.0000)	(0.3752)	(0.3524)	(0.9987)	(0.6601)	(0.3358)
Neuroticism	-0.5479***	-0.0368	-0.0608	-0.0455	0.0369	0.0611
	(0.0000)	(0.4490)	(0.2105)	(0.3747)	(0.4472)	(0.2083)
Conscientiousness	0.5984***	0.1411***	0.1917***	0.1247**	-0.0538	-0.0842*
	(0.0000)	(0.0035)	(0.0001)	(0.0145)	(0.2682)	(0.0827)
Openness	-0.0024	-0.0840*	-0.0613	-0.0193	0.0918*	-0.0355
	(0.9605)	(0.0834)	(0.2063)	(0.7064)	(0.0582)	(0.4644)
IQ Score	0.0238	0.0395	-0.0263	0.0140	-0.0450	-0.0574
	(0.6242)	(0.4167)	(0.5886)	(0.7847)	(0.3545)	(0.2380)
Hours of Sleep	0.1114**	-0.0504	-0.0707	0.0014	-0.0373	0.0872*
	(0.0217)	(0.3001)	(0.1455)	(0.9784)	(0.4434)	(0.0725)
N	443	443	443	400	443	443

Notes: p-values in parentheses. Correlation coefficients for Employed, Retired, Unemployed, IQ score and Hours of Sleep are based on partial correlation controlling for Age. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11: Determinants of Impulsivity using Pairwise Pearson Correlations

	AIMS (1)	Share Info Clicks (2)	Decision Time (3)
Female	0.0703	-0.0086	-0.1201**
	(0.1476)	(0.8737)	(0.0251)
Age	-0.1257***	-0.1123**	-0.0006
	(0.0094)	(0.0363)	(0.9912)
Higher Education	-0.0568	0.0684	0.0620
	(0.2421)	(0.2034)	(0.2490)
Occupation			
Employed	0.0095	-0.0497	0.0220
	(0.8458)	(0.3562)	(0.6829)
Retired	0.0346	-0.0241	0.0022
	(0.4768)	(0.6545)	(0.9671)
Unemployed	-0.0097	-0.0002	-0.0084
	(0.8422)	(0.9970)	(0.8758)
Income Satisfaction	-0.0829*	0.0849	0.0112
	(0.0873)	(0.1142)	(0.8348)
Extraversion	-0.0981**	-0.0779	-0.0545
	(0.0430)	(0.1472)	(0.3105)
Agreeableness	-0.3573***	-0.0676	0.0048
	(0.0000)	(0.2088)	(0.9293)
Neuroticism	0.6155***	-0.0202	-0.0313
	(0.0000)	(0.7077)	(0.5603)
Conscientiousness	-0.5622***	-0.0263	-0.0275
	(0.0000)	(0.6255)	(0.6098)
Openness	-0.0556	-0.0299	0.0491
	(0.2522)	(0.5783)	(0.3612)
IQ Score	0.0368	0.0314	0.0242
	(0.4487)	(0.5605)	(0.6529)
Hours of Sleep	-0.0680	0.0082	0.0236
	(0.1619)	(0.8792)	(0.6619)
N	443	362	362

Notes: p-values in parentheses. Correlation coefficients for Employed, Retired, Unemployed, IQ score and Hours of Sleep are based on partial correlation controlling for Age. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.12: Determinants of Attention using Pairwise Pearson Correlations

	Focus (1)	Shift (2)	Break Time (3)	# Breaks (4)	Time Before Break (5)
Female	-0.0103	0.0179	-0.0946*	-0.0274	-0.0459
	(0.8325)	(0.7124)	(0.0639)	(0.5920)	(0.3700)
Age	0.2050***	0.1212**	0.0352	-0.0140	-0.0196
	(0.0000)	(0.0123)	(0.4917)	(0.7846)	(0.7016)
Higher Education	-0.0043	-0.0316	-0.0796	-0.0797	0.0531
	(0.9294)	(0.5149)	(0.1195)	(0.1187)	(0.2988)
Occupation					
Employed	0.0134	0.1070**	0.1232**	0.0453	-0.0129
	(0.7827)	(0.0274)	(0.0158)	(0.3761)	(0.8011)
Retired	-0.0241	-0.0477	-0.1058**	-0.0395	-0.0375
	(0.6197)	(0.3262)	(0.0384)	(0.4402)	(0.4648)
Unemployed	-0.0274	-0.0754	-0.0186	0.0249	0.0798
	(0.5736)	(0.1206)	(0.7160)	(0.6271)	(0.1190)
Income Satisfaction	0.1563**	0.0729	-0.0067	-0.0142	-0.0134
	(0.0012)	(0.1329)	(0.8956)	(0.7812)	(0.7928)
Extraversion	0.2181***	0.1832***	0.0089	0.0121	-0.0959*
	(0.0000)	(0.0001)	(0.8622)	(0.8124)	(0.0604)
Agreeableness	0.2564***	0.2421***	-0.0651	-0.0849*	-0.0246
	(0.0000)	(0.0000)	(0.2027)	(0.0964)	(0.6310)
Neuroticism	-0.5005***	-0.1851***	0.0467	0.0011	0.0199
	(0.0000)	(0.0001)	(0.3611)	(0.9824)	(0.6971)
Conscientiousness	0.4647***	0.3053***	0.0065	-0.0173	-0.0350
	(0.0000)	(0.0000)	(0.8993)	(0.7350)	(0.4946)
Openness	-0.0450	0.2889***	-0.0064	-0.0741	0.0521
	(0.3546)	(0.0000)	(0.9005)	(0.1473)	(0.3086)
IQ Score	0.0692	0.0080	-0.0806	-0.0551	-0.0265
	(0.1546)	(0.8699)	(0.1151)	(0.2817)	(0.6050)
Hours of Sleep	0.0849*	0.0377	-0.0536	-0.0211	-0.0310
	(0.0802)	(0.4380)	(0.2957)	(0.6810)	(0.5456)
N	443	443	400	400	400

Notes: p-values in parentheses. Correlation coefficients for Employed, Retired, Unemployed, IQ score and Hours of Sleep are based on partial correlation controlling for Age. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix B Instructions Script

Session 1 Script

Welcome to our study! In this video, we will go through the key information that you need to know before agreeing to participate.

How many sessions do I need to attend?

You need to attend four sessions in total, with each session taking place one week apart from each other. Today will be your first session. It is very important that you complete all four sessions, so please only agree to participate if you can attend all four sessions.

How much will I earn?

By completing all four sessions, you can expect to earn on average a total of $100. We use the word average because some people will earn more than $100, and others less than $100. This is because how much you earn depends on your decisions. At the beginning of each session, we will explain how your decisions affect your earnings. Your payment will be spread out across four sessions and includes a $25 completion fee for completing all four sessions.

What will I be doing in each session?

In today's session, you will answer questions about yourself and complete a short quiz. You will be given instructions about the tasks you will need to complete in the beginning of each session, so there is no need to study or plan ahead. Throughout this study you will be asked to make decisions and answer questions. There are no wrong answers, so please respond to each question as truthfully as you can.

Does it matter when I decide to do each session?

Yes, it does! You must complete Sessions 3 and 4 on the same day of the week that you complete Session 2. For example, if you decide to complete Session 2 on Tuesday, you must complete Session 3 on Tuesday the following week, and Session 4 on Tuesday the week after that. Please check your calendar and make sure that the day you decide to complete Session 2 is one where you are available for the following two weeks! Although the day matters, the time does not – so feel free to begin each session at any time.

How long will this study take?

You will spend approximately 3 hours in total across all four sessions. The exact time will depend on the session activities and the decisions you make. At the end of each session, we will give you information on how long the next session will take, so that you can pick the best time to begin each session.

Who do I talk to if I have any questions?

If you do have any questions regarding the study, please email us on juliana.goncalves@sydney.edu.au, and we will get back to you as soon as possible.

At the bottom of this page, you there is a downloadable link that includes the information that was covered in this video and a consent form. Please read through this information carefully. You can save a copy before continuing with the study. If you agree to participate, please click next to begin your Session 1 activities. We expect Session 1 to take approximately 30 minutes.

(next video)

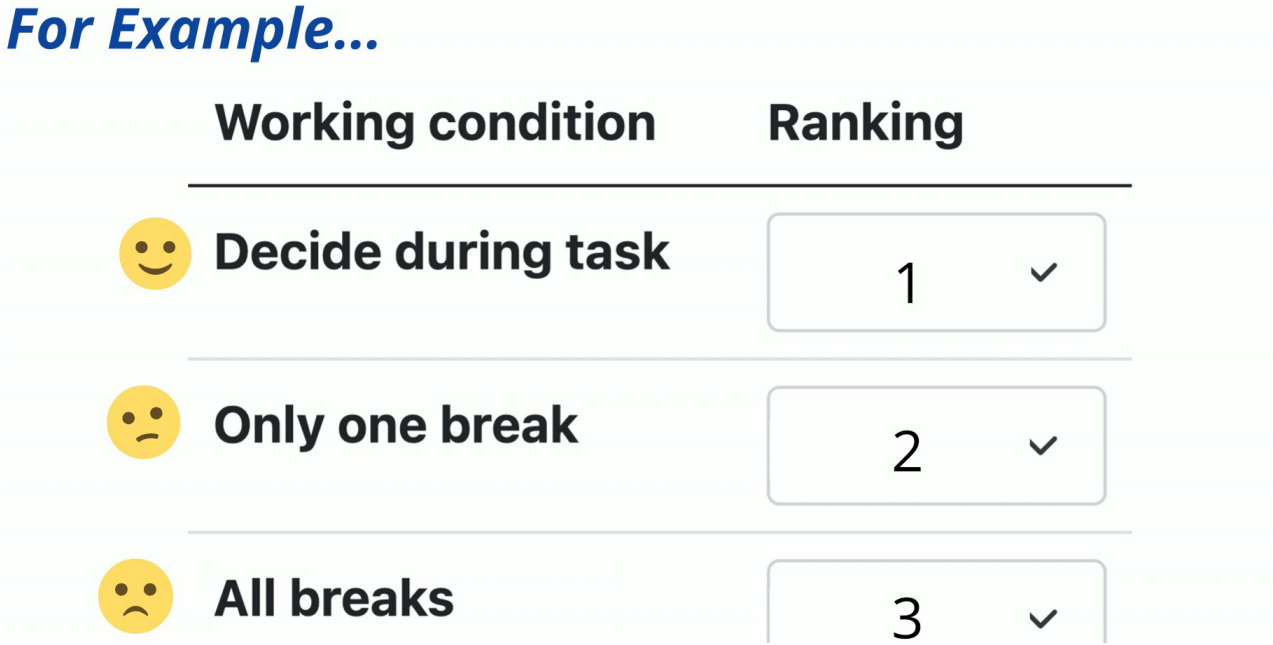
Thank you for agreeing to participate in our study. In today's session, you will complete a series of questions. We expect this to take approximately 30 minutes. For completing all questions

you will earn $15. Your truthful answers are important for this study. Please click next when you are ready to begin.

Session 2 Script

Welcome back to Session 2 of our study! This session includes 4 parts that we expect will take approximately 40 minutes to complete. You will earn $20 for completing this session.

Over the next two sessions you will be working on the "Recall Last Number" task. In this task, you must fix your attention on a 2-digit number displayed on the screen. This number will change every few seconds. At random times, you will be asked to enter the last 2-digit number that you saw on the screen.



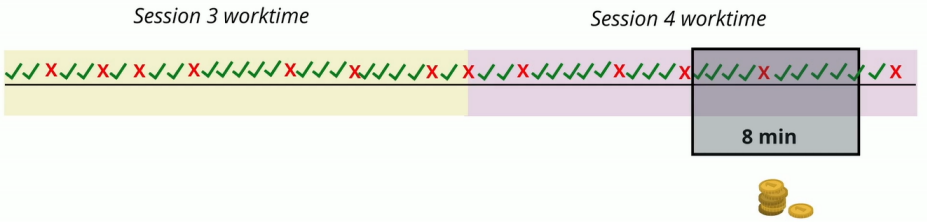
To familiarise yourself with the "Recall Last Number" task, you will now do a 5-minute practice round. How well you do within this practice round will not affect your earnings. It is just a practice. Please click next when you are ready to begin.

(next video)

Thank you for completing the practice round!

Over the next two sessions, you will do the "Recall Last Number" task for between 75 and 135 minutes in total.

How well you do will affect your payment. In the last session of our study, the computer will randomly select an 8-minute "payment window". You will earn 70 cents for each correct answer you give within the payment window. The payment window can fall either in Session 3 or in Session 4, and you won't know in advance in which session it will fall. As any window of time may be selected as a payment window, it is best for you to answer each recall correctly.



If you give more than 5 incorrect answers in Sessions 3 or in Session 4, you will lose your $25 completion payment in Session 4.

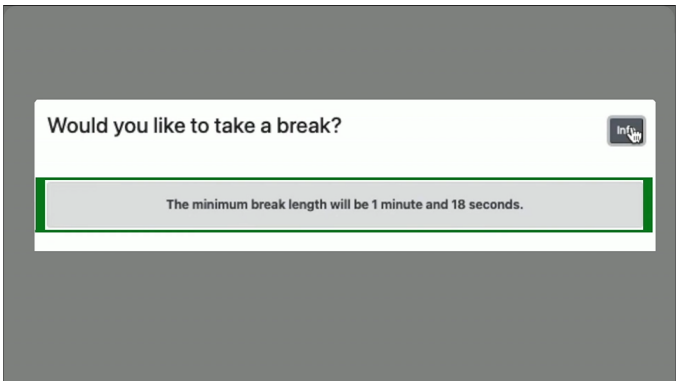
You will have the opportunity to take breaks throughout the task. While you are on a break, you will watch funny short videos so that you can relax.

This is how it will work.

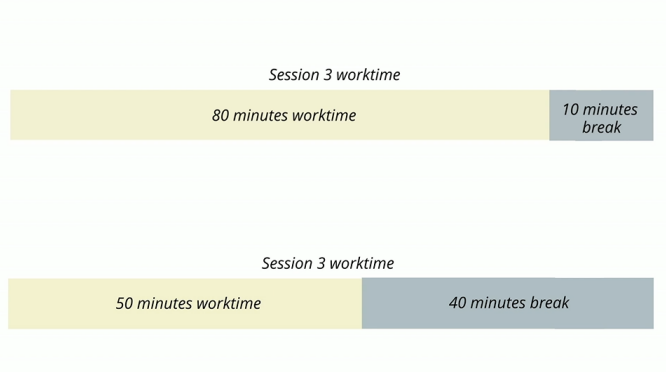
At random times, you will be offered the chance to take a break and you can decide if you want to take it or not. In each session, you must take at least one break at some point during the task. This means that, in each session, while you work on the task, you can decide to take all, most, some, or only one break. To ensure that you take at least one break during the task, if you have not taken a break within the final minutes of the task, you will be automatically assigned to take the next break, without being asked.

There's a minimum time, between 15 seconds and 3 minutes, that you must remain on each break. This minimum break time is randomly selected and it will vary across breaks. You can find out the minimum break time before you make your decision.

By taking breaks, your effective worktime will decrease, because you will not make up for the time you were on a break. For example, suppose that in session 3 one person needs to work on the



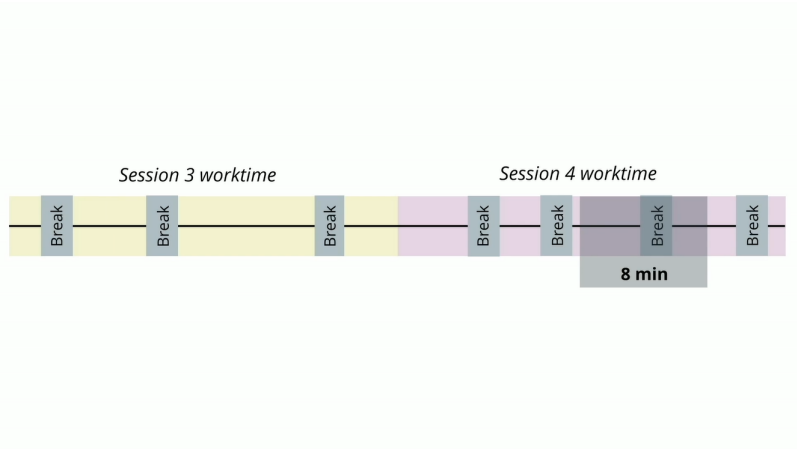
"recall last number" task for 90 minutes. If they take breaks totaling 10 minutes, their actual task work time will be 80 minutes. In contrast, another person who also needs to work for 90 minutes but is on a break for 40 minutes, will have an actual worktime of only 50 minutes.

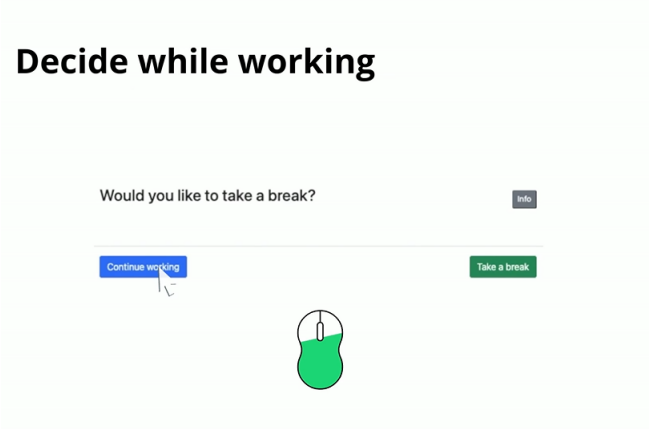


The payment window may occur at any time while you are working on the task, including when you are taking a break. This means that if the entire, or part, of the payment window falls at a time that you are on a break, you will miss out on the opportunity to earn money.

Next, you will decide how you prefer to take breaks while completing the "Recall Last Number" task. Here are the options:

1) "Decide while working" - you will be offered breaks while you work on the task, and you get to decide if you want to take a break or not, each time that it is offered.





2) “Only one break” - you will be offered breaks while you work on the task until you accept one break. After you have taken a break, you will not be offered to take any more breaks.

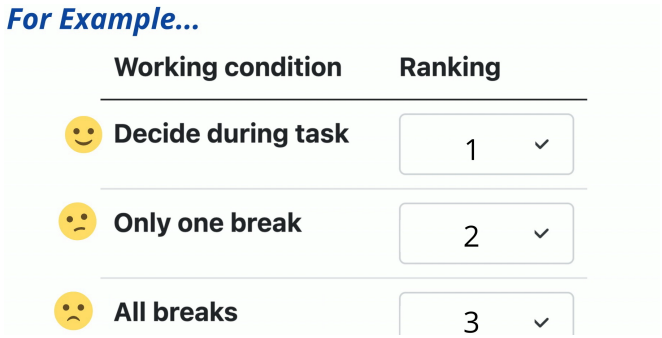
3) “All breaks” - you will automatically take all scheduled breaks during the task, without being asked.

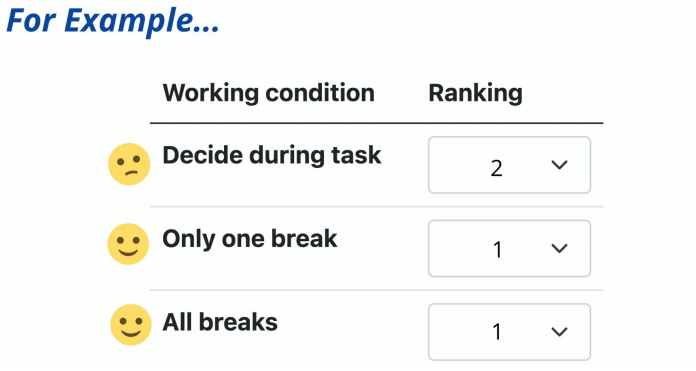
You will need to rank all three working conditions using the table shown on screen. Put "1" next to your most preferred option, "2" next to your second preferred, and "3" next to your least preferred option in the table.

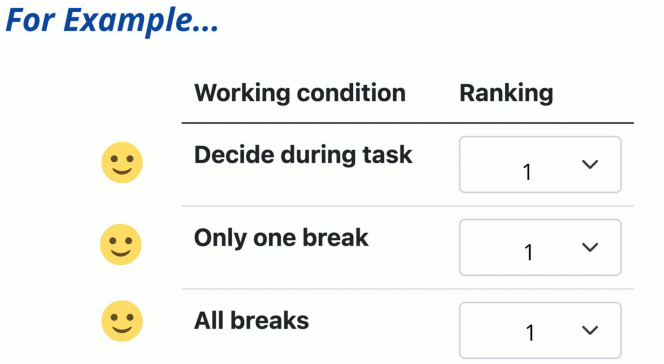
For example, if you like "decide while working" the most, "only one break" the second most, and "all breaks" the least, you would fill out the table like this:

If you are indifferent between two options, you can give them the same ranking. For example, if you equally want "only one break" and "all breaks" the most, you would give them both the rank of 1, and "decide while working" the rank of 2.

As a final example, if you do not care which condition applies to you, you would put a 1 next to all working conditions, like this:

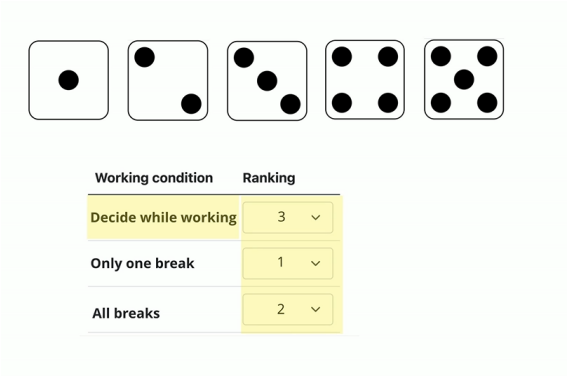






After you put in your rankings, the computer will roll a 6-sided die.

If 1, 2, 3, 4, or 5 is rolled, you will work under the "Decide while working" condition, no matter what your rankings are.



But if the number rolled is 6, the computer will select your working condition based on your ranking, giving your higher ranked options higher chance of being chosen.

Please indicate your rankings truthfully, so the computer can assign your most preferred option the highest chance of being selected.

You can now either listen to these instructions again, or click next to rank the options.

(next video)

Thank you for completing the questionnaire.

In Session 3, you will work on the Recall Last Number task for a minimum of 45 minutes. There is no minimum work time in Session 4.

Your next task is to decide how to split the additional work time across Sessions 3 and 4. We call this your worktime decisions.

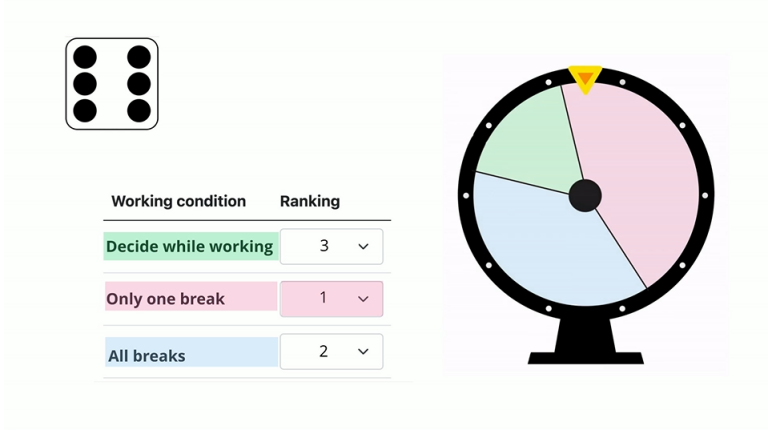
Remember, Sessions 3 and 4 will take place one week apart from each other.

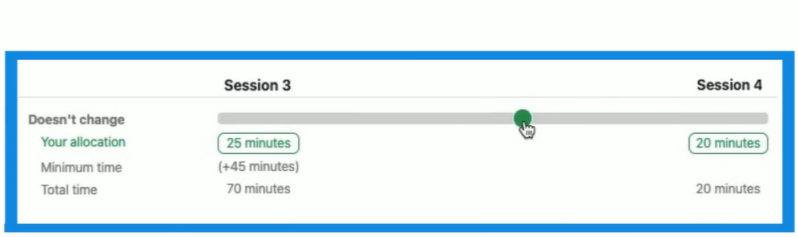
Let's take some time to explain how worktime decisions work.

To split the additional work time between Sessions 3 and 4, you will be using a slider like the one shown on the screen.

Your position on this slider is given by the green dot.

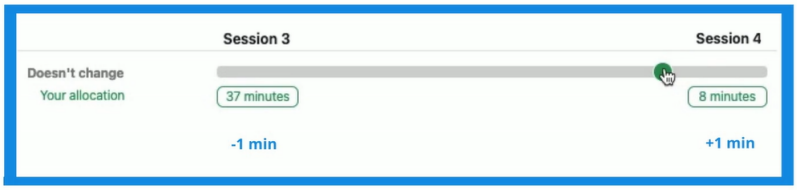
Notice how the number of minutes allocated to Sessions 3 and 4 change as you move the green dot.





In this slider, the additional work time is 45 minutes, regardless of how you split it between Sessions 3 and 4.

This means that if you decrease the additional work time in Session 3 by 1 minute by moving the green dot to the left, you will increase your work time in Session 4 by exactly 1 minute, always leaving the additional work time to be 45 minutes.



In this example, your total additional work time doesn't change depending on how you split it. However, in some of the worktime decisions you make, each extra minute of worktime that you postpone to Session 4 may increase your total additional work time beyond 45 minutes.

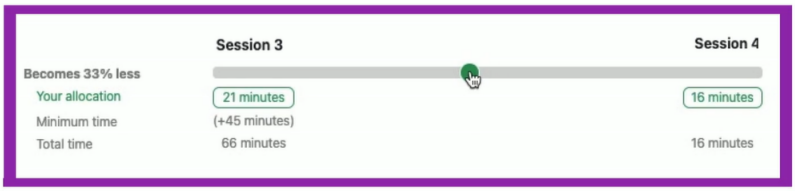
Here is an example of how this may look.

Notice that in this slider, as you postpone additional worktime to Session 4, by dragging the green dot to the left, the total additional work time increases.

This is because in this slider, each minute of additional work time that is postponed to Session 4 decreases your additional work time in Session 3 by exactly 1 minute, but increases your work time in Session 4 by 2 minutes.

That means that the additional worktime that is postponed to Session 4 doubles.

You will also make decisions where postponing additional worktime to Session 4 decreases your total additional work time below 45 minutes. Here is an example of how this may look.



Notice that in this slider, the total additional work time decreases as you postpone worktime to Session 4, by dragging the green dot along the slider to the left.

This is because in this slider, each minute of additional work time that is postponed to Session 4 will decrease your additional work time in Session 3 by exactly 1 minute and increase your work time in Session 4 by less than 1 minute.

When deciding, please pay attention to how the additional worktime in each session changes as you move along the slider.

Before making your 5 worktime decisions, we will give you a few practice sliders and comprehension questions to try.

You can now either listen to these instructions again or click next to start the practice slider section.

(next video)

You will make the same 5 worktime decisions today and again at the beginning of next session. After you make your worktime decisions in session 3, the computer will randomly select 1 out of your 10 decisions, these decisions determine how long you will work on the Recall last number task in Sessions 3 and 4. It is in your best interest to think carefully about each decision, as any one of them could be selected by the computer.

In Session 3, you will learn which of your worktime decisions was selected.

When you are ready to make your first 5 worktime decisions, please click next.

(next video)

Thank you for making your worktime decisions.

We have one more task for you to complete today.

In sessions 3 and 4, you will also receive earnings that do not depend on how well you perform on the Recall Last Number task.

In Session 3, you will receive a guaranteed payment of $15. There is no guaranteed payment in Session 4.

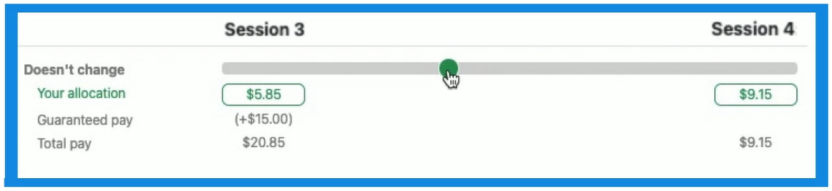
In addition to a guaranteed payment of $15, you may receive additional earnings in Session 3. Your final task today is to decide how to split the additional earnings across Sessions 3 and 4. We will call these decisions your money decisions.

Remember, Sessions 3 and 4 will take place one week apart from each other.

Let's take some time to explain how money decisions work.

In sessions 3 and 4, you will also receive earnings that do not depend on how well you perform on the Recall Last Number task.

To split your additional earnings between Sessions 3 and 4, you will be using sliders just like the ones you used in the worktime decisions, where your position on the slider is given by the green dot.



Notice how the earnings allocated to Sessions 3 and 4 change as you move the green dot.

In this slider, the additional earnings amount to $15, regardless of how you split them across Sessions 3 and 4.

This means that if you decrease your earnings in Session 3 by $1 by moving the green dot to the left, you will increase your earnings in Session 4 by exactly $1, always leaving the additional earnings to be $15.

In this example, your additional earnings don't change depending on how you split them. However, in some of the money decisions you make, each extra dollar that you postpone to Session 4 may increase your additional earnings above $15.

Here is an example of how this may look.

Notice that in this slider, as you postpone earnings to Session 4, by dragging the green dot to the left, your additional earnings increase.

This is because in this slider, each dollar that is postponed to Session 4 decreases your earnings in Session 3 by exactly $1 but increases your earnings in Session 4 by $2.

This means that the earnings that are postponed to Session 4 double.

You will also make decisions where each extra dollar postponed to Session 4 decreases your additional earnings below $15. Here is an example of how this may look.

Notice that in this slider, your additional earnings decrease as you postpone earnings to Session 4, by dragging the green dot along the slider to the left.

This is because in this slider, each dollar that is postponed to Session 4 decreases your earnings in Session 3 by exactly $1, and increases your earnings in Session 4 by less than $1.

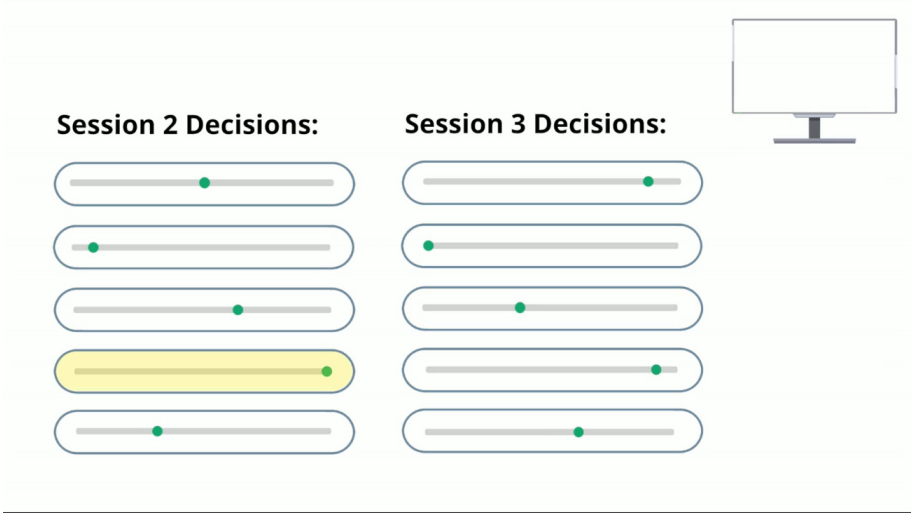
When deciding, please pay attention to how the additional earnings you receive in each session change as you move along the slider.

Before making your 5 money decisions, we will give you a few practice sliders and comprehension questions to try.

You can now either listen to these instructions again or click next to start the practice slider section.

(next video)

You will make the same 5 money decisions today and again at the beginning of next session. After you make your money decisions in Session 3, the computer will randomly select 1 out of your 10 decisions, these decisions determine how your additional earnings will be split across Sessions 3 and 4. It is in your best interest to think carefully about each decision, as any of them could be the one selected by the computer.



In Session 3, you will learn which of your money decisions was selected.

When you are ready to make your first 5 money decisions, please click next.

Session 3 Script

Welcome back to Session 3 of our study!

The duration of this session will depend on your choices for how long you decide to complete the "Recall Last Number" task, which you will get to know later in this session.

Let's begin with a 5-minute practice round, so that you can re-familiarise yourself with the "Recall Last Number" task.

In the "Recall Last Number" task, you must pay attention to a 2-digit number displayed on the screen. This number will change every few seconds. At random times, you will be asked to enter the last 2-digit number that you saw on the screen.

How well you do in this practice round does not affect your earnings.

Please click next when you are ready to begin the practice round.

(next video)

Thank you for completing the practice round.

Today, you will work on the Recall Last Number task for a minimum of 45 minutes. There is no minimum work time in Session 4.

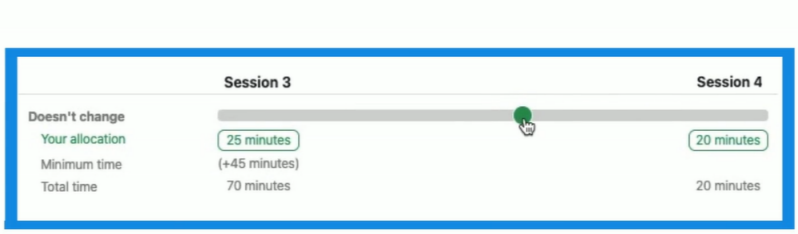
Your next task is to decide how to split the additional work time across today and Session 4. We will call this your worktime decisions.

Remember, today's session and Session 4 will take place one week apart from each other.

Let's take some time to explain how worktime decisions work.

Today, you will work on the Recall Last Number task for a minimum of 45 minutes. There is no minimum work time in Session 4.

To split the additional work time between today and Session 4, you will be using a slider like the one shown on the screen.



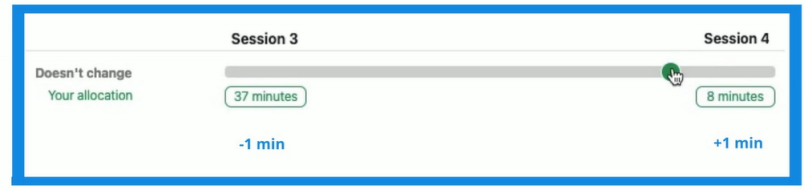
Your position on this slider is given by the green dot.

Notice how the number of minutes allocated to today and Session 4 change as you move the green dot.

In this slider, the additional work time is 45 minutes, regardless of how you split it between today and Session 4.

This means that if you decrease the additional work time today by 1 minute by moving the green dot to the left, you will be increasing your work time in Session 4 by exactly 1 minute, always leaving the additional work time to be 45 minutes.

In this example, your total additional work time doesn't change depending on how you split it. However, in some of the worktime decisions you make, each extra minute of worktime that you postpone to Session 4 may increase your total additional work time beyond 45 minutes.



Here is an example of how this may look.

Notice that in this slider, as you postpone additional worktime to Session 4, by dragging the green dot to the left, the total additional work time increases.

This is because in this slider, each minute of additional work time that is postponed to Session 4 decreases your additional work time today by exactly 1 minute but increases your work time in Session 4 by 2 minutes.

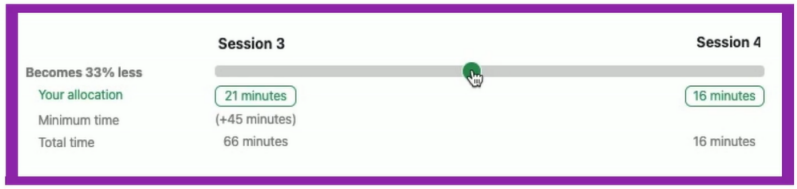
That means that the additional worktime that is postponed to Session 4 doubles.

You will also make decisions where postponing additional worktime to Session 4 decreases your total additional work time below 45 minutes. Here is an example of how this may look.

Notice that in this slider, the total additional work time decreases as you postpone worktime to Session 4, by dragging the green dot along the slider to the left.

This is because in this slider, each minute of additional work time that is postponed to Session 4 will decrease your additional work time today by exactly 1 minute and increase your work time in Session 4 by less than 1 minute.

When deciding, please pay attention to how the additional worktime in each session changes as you move along the slider.

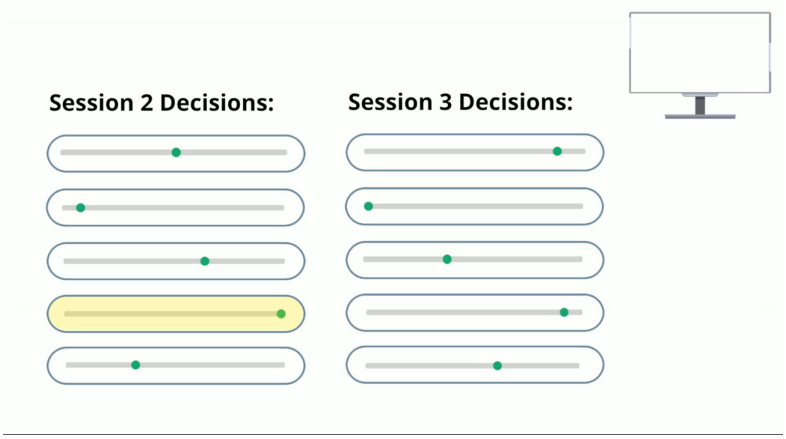


Before making your 5 worktime decisions, we will give you a few practice sliders and comprehension questions to try.

You can now either listen to these instructions again or click next to start the practice slider section.

(next video)

You will make 5 worktime decisions today. The computer will then randomly select 1 out of your 10 decisions, including the 5 decisions you made last week and the 5 decisions that you are about to make today, these decisions determine how long you will work on the Recall last number task today and in Session 4. It is in your best interest to think carefully about each decision, as any one of them could be selected by the computer.



Before beginning the main round of the recall last number task today, we will tell you which decision was selected.

When you are ready to make your 5 worktime decisions, please click next.

(next video)

Thank you for making your worktime decisions.

Today and in Session 4, you will also receive earnings that do not depend on how well you perform on the Recall Last Number task.

Today, you will receive a guaranteed payment of $15. There is no guaranteed payment in Session 4.

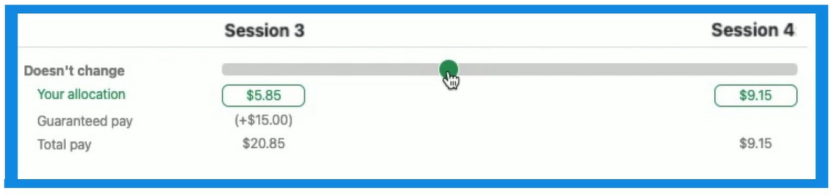
In addition to a guaranteed payment of $15, you may receive additional earnings today. You will need to decide how to split the additional earnings across today and Session 4. We will call these decisions your money decisions.

Remember, today's session and Sessions 4 will take place one week apart from each other.

Let's take some time to explain how money decisions work.

Today, you will receive a guaranteed payment of $15. There is no guaranteed payment in Session 4.

To split your additional earnings between today and Session 4, you will be using sliders just like the ones you used in the worktime decisions, where your position on the slider is given by the green dot.



Notice how the earnings allocated to today and Session 4 change as you move the green dot.

In this slider, the additional earnings amount to $15, regardless of how you split them across today and Session 4.

This means that if you decrease your earnings today by $1 by moving the green dot to the left, you will increase your earnings in Session 4 by exactly $1, always leaving the additional earnings to be $15.

In this example, your additional earnings don't change depending on how you split them. However, in some of the money decisions you make, each extra dollar that you postpone to Session 4 may increase your additional earnings above $15.

Here is an example of how this may look.

Notice that in this slider, as you postpone earnings to Session 4, by dragging the green dot to the left, your additional earnings increase.

This is because in this slider, each dollar that is postponed to Session 4 decreases your earnings today by exactly $1, but increases your earnings in Session 4 by $2.

This means that the earnings that are postponed to Session 4 double.

You will also make decisions where each extra dollar postponed to Session 4 decreases your additional earnings below $15. Here is an example of how this may look.

Notice that in this slider, your additional earnings decrease as you postpone earnings to Session 4, by dragging the green dot along the slider to the left.

This is because in this slider, each dollar that is postponed to Session 4 decreases your earnings today by exactly $1, and increases your earnings in Session 4 by less than $1.

When deciding, please pay attention to how the additional earnings you receive in each session change as you move along the slider.

Before making your 5 money decisions, we will give you a few practice sliders and comprehension questions to try.

You can now either listen to these instructions again or click next to start the practice slider section.

(next video)

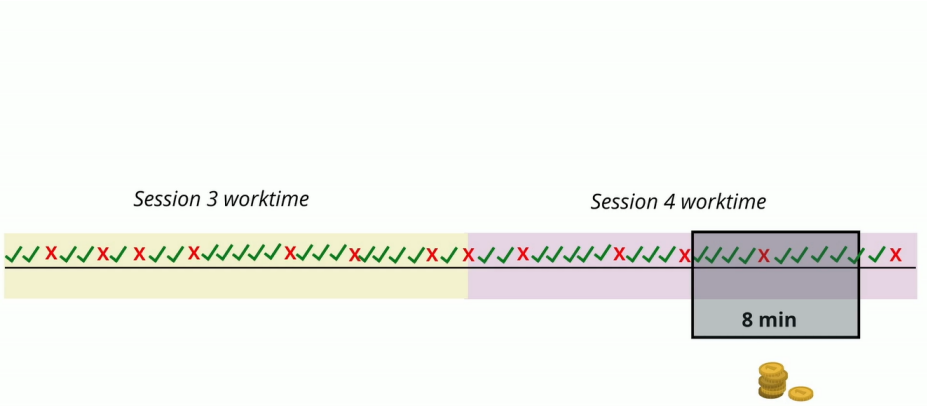
You will make 5 money decisions today. The computer will then randomly select 1 out of your 10 decisions, including the 5 decisions you made last week and the 5 decisions that you are about to make today, to determine how your additional earnings will be split across today and Session 4. It is in your best interest to think carefully about each decision, as any one of them could be selected by the computer.

At the end of today's session, we will tell you which decision was selected.

When you are ready to make your 5 money decisions, please click next.

(next video)

Remember, your earnings in the "Recall Last Number" task will be determined by how many recalls you answer correctly within the payment window. At the end of this study, the computer will randomly select an 8-minute payment window across today and next week's work time. You will earn 70 cents for each correct answer you give within the payment window.



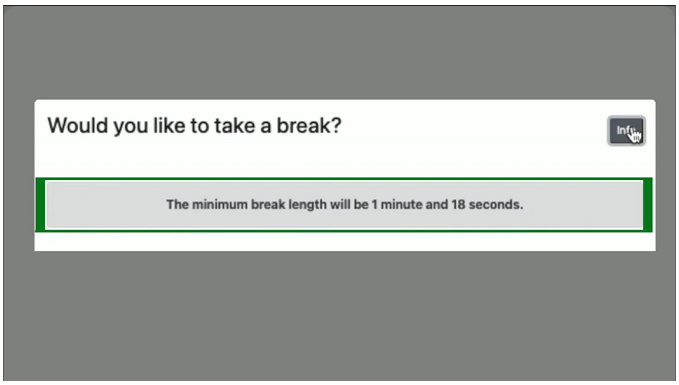
As any window of time may be selected to be part of this payment window, it is best for you to perform the task as well as you can.

You will have the opportunity to take breaks throughout the task. While you are on a break, you will watch funny short videos so that you can relax.

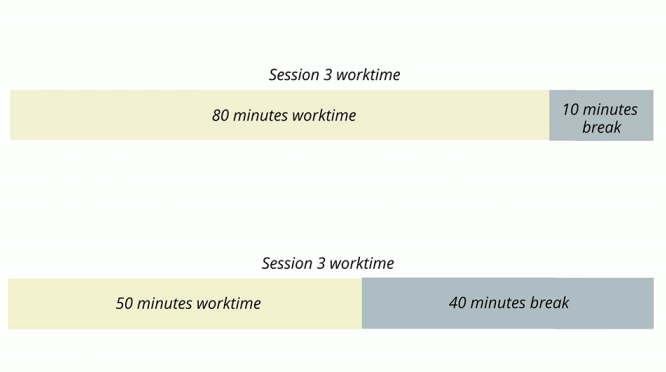
While you work on the task, you can decide to take all, most, some, or only one break. You must take at least one break at some point during the task. To ensure that you take at least one break during the task, if you have not taken a break within the final minutes of the task, you will automatically be assigned to take the next break, without being asked.

When you take a break, there's a minimum time, between 15 seconds and 3 minutes, that you must remain on the break. This minimum break time is randomly selected and it will vary across breaks. You can find out the minimum break time before you make your decision.

By taking breaks, your effective worktime will decrease, because you will not make up for the time you were on a break. For example, suppose that one person needs to work on the "recall last



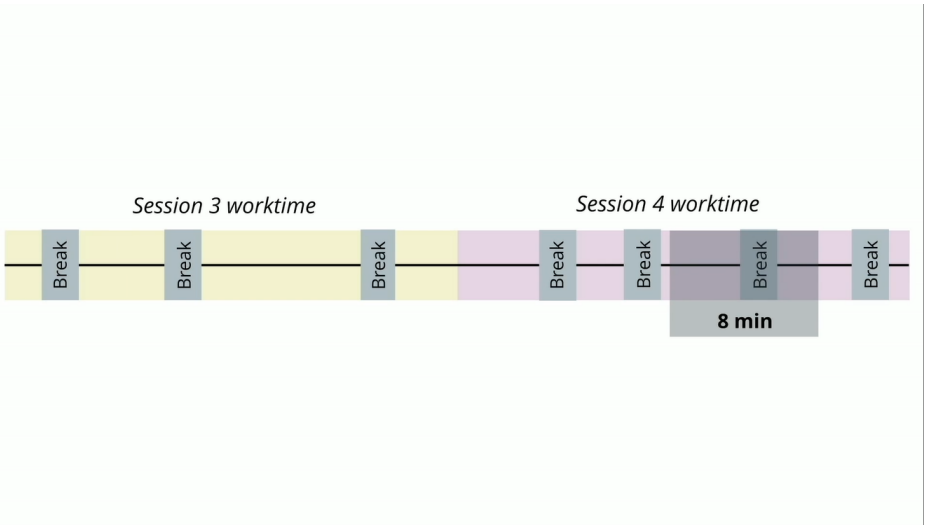
number" task for 90 minutes. If they take breaks totalling 10 minutes, their actual task work time will be 80 minutes. In contrast, another person who also needs to work for 90 minutes but is on a break for 40 minutes, will have an actual worktime of only 50 minutes.



The payment window may occur at any time while you are working on the task, including when you are taking a break. This means that if the entire, or part, of the payment window falls at a time that you are on a break, you will miss out on the opportunity to earn money.

At the end of next week's session, you will learn how much you earned in the "Recall Last Number" task.

If within this session, you get more than 5 wrong answers on the task, you will lose your $25 study completion payment paid in next week's session.

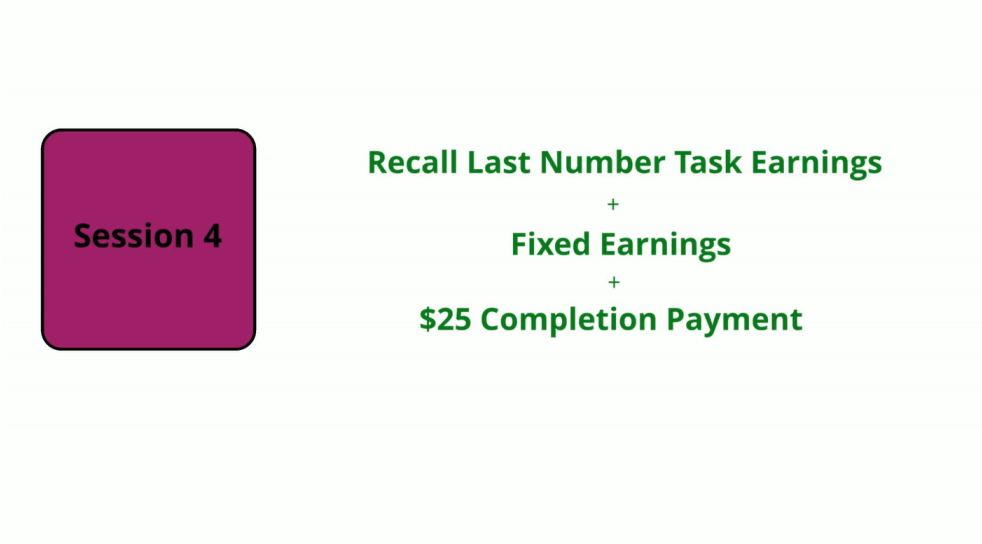


Click next to see the time allocations and the working condition that the computer selected for you.

Session 4 Script

Welcome back to your final session of this study. Thank you for sticking with us!

After you complete this session, you will receive your "Recall Last Number" task earnings, your Session 4 earnings from money decision, and your $25 study completion payment.



Let's begin with a 5-minute practice round, so that you can re-familiarise yourself with the "Recall Last Number" task.

In this task, you must pay attention to a 2-digit number displayed on the screen. This number will change every few seconds. At random times, you will be asked to enter the last 2-digit number that you saw on the screen.

Please click next when you are ready to begin the practice round. How well you do within this practice round will not affect your earnings.

(next video)

Thank you for completing the practice round.

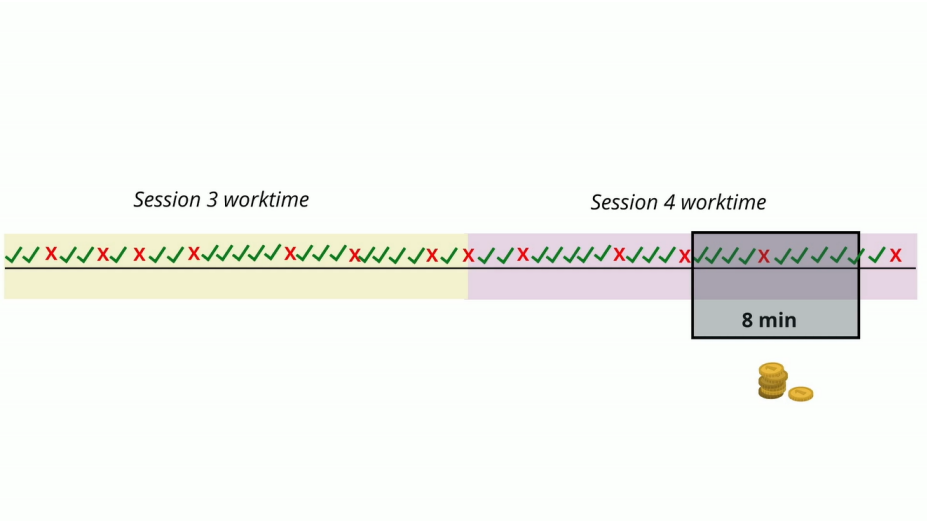
Remember, your earnings in the "Recall Last Number" task will be determined by how many recalls you answer correctly within the payment window. At the end of this session, the computer will randomly select an 8-minute payment window across today and last week's work time. You will earn 70 cents for each correct answer you give within the payment window.

As any window of time may be selected to be part of this payment window, it is best for you to perform the task as well as you can.

You will have the opportunity to take breaks throughout the task. While you are on a break, you will watch funny short videos so that you can relax.

While you work on the task, you can decide to take all, most, some, or only one break. You must take at least one break at some point during the task. To ensure that you take at least one break during the task, if you have not taken a break within the final minutes of the task, you will automatically be assigned to take the next break, without being asked.

When you take a break, there's a minimum time, between 15 seconds and 3 minutes, that you must remain on the break. This minimum break time is randomly selected and it will vary across



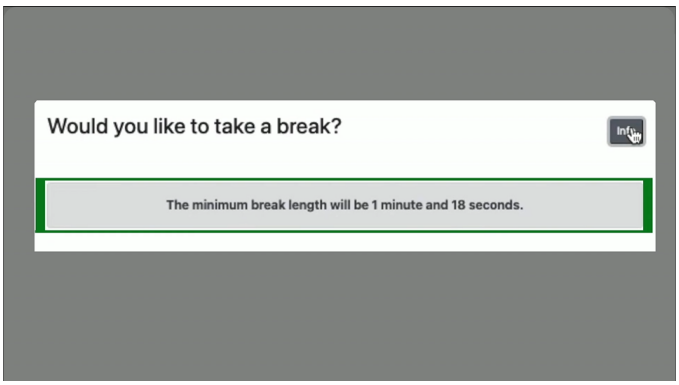
breaks. You can find out the minimum break time before you make your decision.

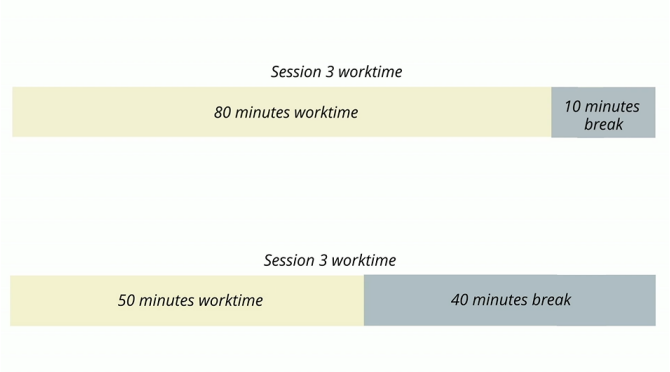
By taking breaks, your effective worktime will decrease, because you will not make up for the time you were on a break. For example, suppose that one person needs to work on the "recall last number" task for 90 minutes. If they take breaks totalling 10 minutes, their actual task work time will be 80 minutes. In contrast, another person who also needs to work for 90 minutes but is on a break for 40 minutes, will have an actual worktime of only 50 minutes.

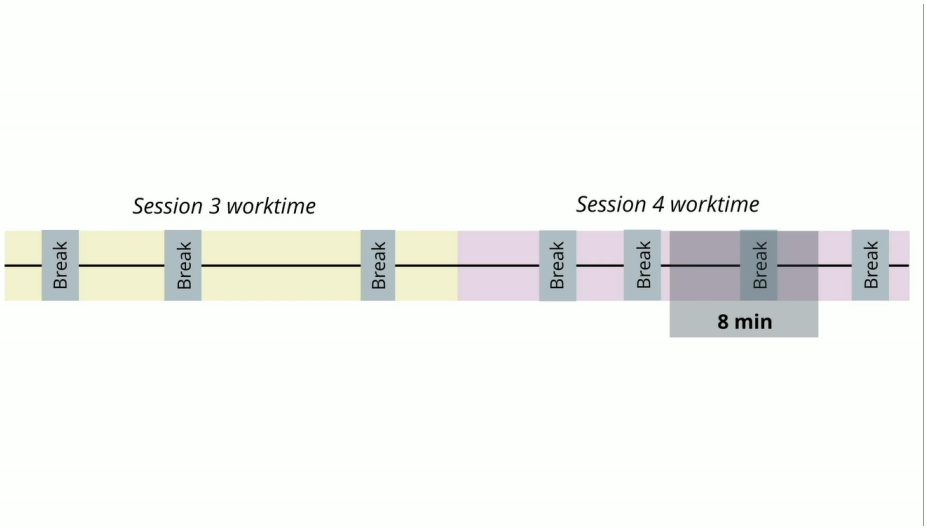
The payment window may occur at any time while you are working on the task, including when you are taking a break. This means that if the entire, or part, of the payment window falls at a time that you are on a break, you will miss out on the opportunity to earn money.

If within today's session, you get more than 5 wrong answers on the task, you will lose your $25 study completion payment.

Click next to see the time allocation and working condition that the computer selected for you.


Would you like to take a break?
Info
The minimum break length will be 1 minute and 18 seconds.


Session 3 worktime
80 minutes worktime
10 minutes break
Session 3 worktime
50 minutes worktime
40 minutes break


Session 3 worktime
Session 4 worktime
Break
Break
Break
Break
Break
Break
Break
8 min

Appendix C Demographic and Psychometric Questionnaires

About you (page 1/2)

Please indicate the month you were born:

Please indicate the year you were born:

Are you:

Please specify your ethnicity (select all that apply):

- [x] Australian
- [ ] Aboriginal and/or Torres Strait Islander
- [ ] New Zealander
- [ ] Asian
- [ ] Indian
- [ ] Middle Eastern
- [ ] European
- [ ] North American
- [ ] South American
- [ ] African
- [ ] Other
- [ ] Prefer not to say

Please specify your current occupation:

- ○ Studying at university or TAFE
- ○ Employed Full-time
- ○ Employed Part-time
- ○ Retired
- ○ Unemployed and looking for work
- ○ Unemployed and not looking for work
- ○ Not in the labour force
- ○ Other
- ○ Prefer not to say

In which country did you attend primary school?

Where do you currently live?

What is the highest degree or level of education you have completed?

What is your relationship status?

What would you say is the approximate combined annual income of everyone in your household before tax, during the last financial year?

How many people are supported by this income?

How do you feel about your household's income nowadays?

Think of this ladder as representing where people stand in Australia. At the top of the ladder are the people who are the best off – those who have the most money, the most education, and the most respected jobs. At the bottom are the people who are the worst off – those who have the least money, the least education, the least respected jobs, or no job.

Please choose a number corresponding to where you think you stand at this time in your life relative to other people in Australia.

○ 1 ○ 2 ○ 3 ○ 4 ○ 5 ○ 6 ○ 7 ○ 8 ○ 9 ○ 10

Next

About you (page 2/2)

Do you ever work night shifts?

During the past month, on a usual weekday, at what time did you go to bed at night?

During the past month, on a usual weekday, how long (in minutes) has it usually taken you to fall asleep at night?

During the past month, on a usual weekday, when have you usually gotten up in the morning?

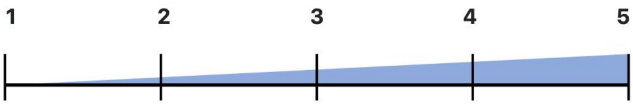
During the past month, on a usual weekday, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

Next

Your typical behaviour (page 1/10)

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

There are no right or wrong answers.



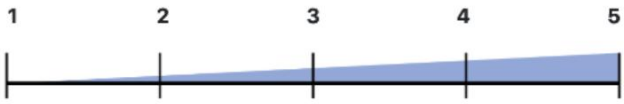
	Not at all				Very much
I am good at resisting temptation	○	○	○	○	○
I have a hard time breaking bad habits	○	○	○	○	○
I am lazy	○	○	○	○	○
I say inappropriate things	○	○	○	○	○
I do certain things that are bad for me, if they are fun	○	○	○	○	○
I refuse things that are bad for me	○	○	○	○	○
I wish I had more self-discipline	○	○	○	○	○

Next

Your typical behaviour (page 2/10)

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

There are no right or wrong answers.



	Not at all				Very much
People would say that I have iron self-discipline	○	○	○	○	○
Pleasure and fun sometimes keep me from getting work done	○	○	○	○	○
I have trouble concentrating	○	○	○	○	○
I am able to work effectively toward long-term goals	○	○	○	○	○
Sometimes I can't stop myself from doing something, even if I know it is wrong	○	○	○	○	○
I often act without thinking through all the alternatives	○	○	○	○	○

Next

Your typical behaviour (page 3/10)

Using the scale provided, please indicate the extent to which each of the following statements reflects how you typically are.

There are no right or wrong answers.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Sometimes I do things on impulse that I later regret	○	○	○	○	○
I often do things on the spur of the moment	○	○	○	○	○
I am always able to keep my feelings under control	○	○	○	○	○
I often make matters worse because I act without thinking when I am upset	○	○	○	○	○
I say things without thinking	○	○	○	○	○
When I am upset, I often act without thinking	○	○	○	○	○
I often get involved in things I later wish I could get out of	○	○	○	○	○
Over the years, I have done some pretty stupid things	○	○	○	○	○
I always consider the consequences before I take action	○	○	○	○	○
When a project gets too difficult, I am inclined to start a new one	○	○	○	○	○
I have trouble controlling my impulses	○	○	○	○	○

Next

Your typical behaviour (page 4/10)

Using the scale provided, please indicate the extent to which each of the following statements reflects how you typically are.

There are no right or wrong answers.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
When I feel rejected, I will often say things that I later regret	○	○	○	○	○
I sometimes eat myself sick	○	○	○	○	○
I waste a lot of time before settling down to work	○	○	○	○	○
In the heat of an argument, I will often say things that I later regret	○	○	○	○	○
There are so many little jobs that need to be done that I sometimes just ignore them all	○	○	○	○	○
I think things through before coming to a decision	○	○	○	○	○
I have trouble resisting my cravings	○	○	○	○	○
I am often not as cautious as I should be	○	○	○	○	○
I am a productive person who always gets the job done	○	○	○	○	○
When excited, I cannot control myself	○	○	○	○	○
I am an impulsive person	○	○	○	○	○

Next

Your typical behaviour (page 5/10)

Using the scale provided, please indicate the extent to which each of the following statements reflects how you typically are.

There are no right or wrong answers.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I tend to give up easily	○	○	○	○	○
I often get into trouble because I don't think before I act	○	○	○	○	○
I buy things on impulse	○	○	○	○	○
Often, I don't spend enough time thinking over a situation before I act	○	○	○	○	○
I often make up my mind without taking the time to consider the situation from all angles.	○	○	○	○	○
I often say and do things without considering the consequences	○	○	○	○	○
I don't "pay attention"	○	○	○	○	○
I concentrate easily	○	○	○	○	○
I "squirm" at plays or lectures	○	○	○	○	○
I am a steady thinker	○	○	○	○	○
I am restless at the theatre or lectures	○	○	○	○	○

Next

Your typical behaviour (page 5/10)

Using the scale provided, please indicate the extent to which each of the following statements reflects how you typically are.

There are no right or wrong answers.

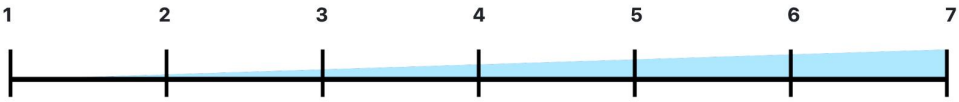
	Almost Never	Sometimes	Often	Always
It's very hard for me to concentrate on a difficult task when there are noises around	○	○	○	○
When I need to concentrate and solve a problem, I have trouble focusing my attention	○	○	○	○
When I am working hard on something, I still get distracted by events around me	○	○	○	○
When I am reading or studying, I am easily distracted if there are people talking in the same room	○	○	○	○
When trying to focus my attention on something, I have difficulty blocking out distracting thoughts	○	○	○	○
I have a hard time concentrating when I'm excited about something	○	○	○	○
I can quickly switch from one task to another	○	○	○	○
It is difficult for me to co-ordinate my attention between the listening and writing required when taking notes during lectures	○	○	○	○
I can become interested in a new topic very quickly when I need to	○	○	○	○
After being interrupted or distracted, I can easily shift my attention back to what I was doing before	○	○	○	○
When a distracting thought comes to mind, it is easy for me to shift my attention away from it	○	○	○	○
It is easy for me to alternate between two different tasks	○	○	○	○

Next

Your typical behaviour (page 6/10)

Using the scale provided, please indicate how well each of the following words describe you.

There are no right or wrong answers.



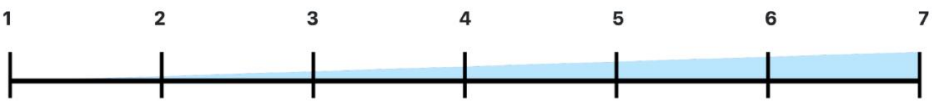
	Does not describe me at all						Describes me very well
talkative	○	○	○	○	○	○	○
sympathethic	○	○	○	○	○	○	○
orderly	○	○	○	○	○	○	○
envious	○	○	○	○	○	○	○
deep	○	○	○	○	○	○	○
withdrawn	○	○	○	○	○	○	○
harsh	○	○	○	○	○	○	○
systematic	○	○	○	○	○	○	○
moody	○	○	○	○	○	○	○

Next

Your typical behaviour (page 7/10)

Using the scale provided, please indicate how well each of the following words describe you.

There are no right or wrong answers.



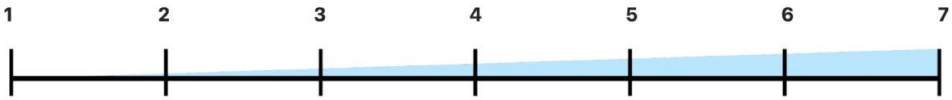
	Does not describe me at all						Describes me very well
philosophical	○	○	○	○	○	○	○
bashful	○	○	○	○	○	○	○
kind	○	○	○	○	○	○	○
inefficient	○	○	○	○	○	○	○
touchy	○	○	○	○	○	○	○
creative	○	○	○	○	○	○	○
quiet	○	○	○	○	○	○	○
cooperative	○	○	○	○	○	○	○
sloppy	○	○	○	○	○	○	○

Next

Your typical behaviour (page 8/10)

Using the scale provided, please indicate how well each of the following words describe you.

There are no right or wrong answers.



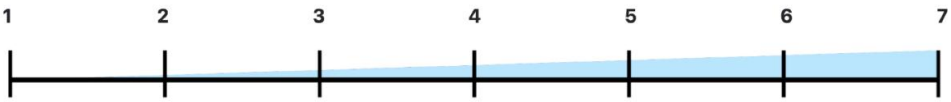
	Does not describe me at all						Describes me very well
jealous	○	○	○	○	○	○	○
intellectual	○	○	○	○	○	○	○
extroverted	○	○	○	○	○	○	○
cold	○	○	○	○	○	○	○
disorganised	○	○	○	○	○	○	○
temperamental	○	○	○	○	○	○	○
complex	○	○	○	○	○	○	○
shy	○	○	○	○	○	○	○
warm	○	○	○	○	○	○	○

Next

Your typical behaviour (page 9/10)

Using the scale provided, please indicate how well each of the following words describe you.

There are no right or wrong answers.



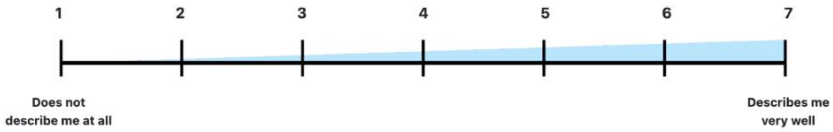
	Does not describe me at all						Describes me very well
efficient	○	○	○	○	○	○	○
fretful	○	○	○	○	○	○	○
imaginative	○	○	○	○	○	○	○
enthusiastic	○	○	○	○	○	○	○
selfish	○	○	○	○	○	○	○
careless	○	○	○	○	○	○	○
calm	○	○	○	○	○	○	○
traditional	○	○	○	○	○	○	○
lively	○	○	○	○	○	○	○

Next

Your typical behaviour (page 10/10)

Using the scale provided, please indicate the extent to which you agree or disagree with the following statements.

There are no right or wrong answers.



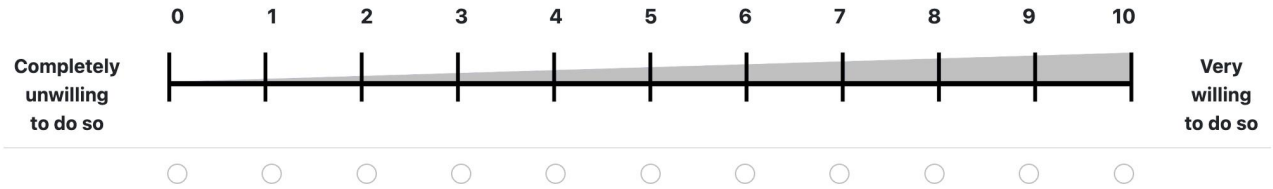
I have little control over the things that happen to me	○	○	○	○	○	○	○
There is really no way I can solve some of the problems I have	○	○	○	○	○	○	○
There is little I can do to change many of the important things in my life	○	○	○	○	○	○	○
I often feel helpless in dealing with the problems of life	○	○	○	○	○	○	○
Sometimes I feel that I am being pushed around in life	○	○	○	○	○	○	○
What happens to me in the future mostly depends on me	○	○	○	○	○	○	○
I can do just about anything I really set my mind to do	○	○	○	○	○	○	○

Next

Your willingness to delay rewards

How willing are you to give up something that is beneficial for you today in order to benefit more from that in the future?

Please indicate your answer on a scale from 0 to 10, where **0 means** you are ***completely unwilling to do so*** and **10 means** you are ***very willing to do so***.



Next

Your willingness to delay rewards

Suppose you had to **choose** between receiving a **payment today** or a **payment in 12 months**.

We will present you with 5 situations in which you will need to make a hypothetical choice between a payment today and a payment in 12 months. The **payment today is the same** in each of these situations, whereas the **payment in 12 months is different in every situation**.

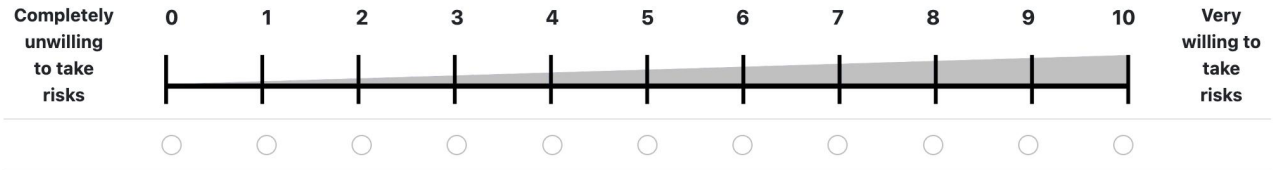
For each of these situations we would like to know which option you would choose. Please assume there is no inflation, that is, future prices are the same as today's prices.

Next

Your willingness to take risks

In general, how willing are you to take risks?

Please indicate your answer on a scale from 0 to 10, where **0 means** you are ***completely unwilling to take risks*** and **10 means** you are ***very willing to take risks***.



Next

Payment details for Session 1

Thank you for completing Session 1.

Your payment:

You will receive AUD $15.00 for today's session.

Session 2 (Next week):

You will receive an email reminder through PureProfile to complete Session 2, which will include a link to the Session 2 portal. **Please check your calendar and make sure that the day you decide to complete Session 2 is the one where you have time over the following two weeks!** Session 2 should take approximately 40 minutes.

You must complete Session 2 next week to remain in the study and earn additional money.

Next

Table C.1: Self-Reported Measures of Self-Control, Impulsivity and Attentional Control

Brief Self-Control Scale (BSCS)

1. I am good at resisting temptation
2. I have a hard time breaking bad habits (R)
3. I am lazy (R)
4. I say inappropriate things (R)
5. I do certain things that are bad for me, if they are fun (R)
6. I refuse things that are bad for me
7. I wish I had more self-discipline (R)
8. People would say that I have iron self-discipline
9. Pleasure and fun sometimes keep me from getting work done (R)
10. I have trouble concentrating (R)
11. I am able to work effectively toward long-term goals
12. Sometimes I can't stop myself from doing something, even if I know it is wrong (R)
13. I often act without thinking through all the alternatives (R)

Adjustable Impulsivity Scale (AIMS)

1. Sometimes I do things on impulse that I later regret
2. I often do things on the spur of the moment
3. I am always able to keep my feelings under control (R)
4. I often make matters worse because I act without thinking when I am upset
5. I say things without thinking
6. When I am upset, I often act without thinking
7. I often get involved in things I later wish I could get out of
8. Over the years, I have done some pretty stupid things
9. I always consider the consequences before I take action (R)
10. When a project gets too difficult, I am inclined to start a new one
11. I have trouble controlling my impulses
12. When I feel rejected, I will often say things that I later regret
13. I sometimes eat myself sick
14. I waste a lot of time before settling down to work
15. In the heat of an argument, I will often say things that I later regret
16. There are so many little jobs that need to be done that I sometimes just ignore them all
17. I think things through before coming to a decision (R)
18. I have trouble resisting my cravings
19. I am often not as cautious as I should be
20. I am a productive person who always gets the job done (R)
21. When excited, I cannot control myself
22. Are you an impulsive person?
23. I tend to give up easily
24. I often get into trouble because I don't think before I act
26. I buy things on impulse
32. Often, I don't spend enough time thinking over a situation before I act
34. I often make up my mind without taking the time to consider the situation

Continued on next page

Table C.1 – continued from previous page

48. I often say and do things without considering the consequences from all
Attentional Control Scale (f:focus, s:shift)
1. It's very hard for me to concentrate on a difficult task when there are noises around (f)
2. When I need to concentrate and solve a problem, I have trouble focusing my attention (f)
3. When I am working hard on something, I still get distracted by events around me (f)
4. When I am reading or studying, I am easily distracted if there are people talking in the same room (f)
5. When trying to focus my attention on something, I have difficulty blocking out distracting thoughts (f)
6. I have a hard time concentrating when I'm excited about something (f)
7. I can quickly switch from one task to another (s)
8. It is difficult for me to co-ordinate my attention between the listening and writing required when taking notes during lectures (f)
9. I can become interested in a new topic very quickly when I need to (s)
10. After being interrupted or distracted, I can easily shift my attention back to what I was doing before (s)
11. When a distracting thought comes to mind, it is easy for me to shift my attention away from it (s)
12. It is easy for me to alternate between two different tasks (s)

Notes: Answer options are given on a 5-point Likert scale for BSCS and AIMS, and on a 4-point Likert scale for Attentional Control Scale. (R) means the item scale is reversed.

Appendix D Session 2 and 3 Decision Tasks

Session 2

Rank working conditions

Please rank the 3 working conditions described in the instructions, according to your preferences.

Please tell us which one you prefer by entering a number (either 1, 2 or 3) in the box corresponding to each option. If you are indifferent between two options, please enter the same number.

Remember that your ranking affects your chances of being assigned each of the working conditions.

Working condition	Ranking
Decide while working	--------
Only one break	--------
All breaks	--------

Next

Rank working conditions

Thank you for filling in your preferred working conditions. The **selected working condition will be revealed to you in Session 3**, before you begin the main round of the *Recall Last Number* task.

Please click "Next" to continue.

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Questionnaire (1/5)

We will now ask how much you value the working conditions that you have just ranked.

You have ranked the 3 working conditions as follows:

Only one break: 1

Decide while working: 2

All breaks: 3

Imagine that you get "Decide while working".

Think about how many extra minutes, between 0 and 10, you are willing to work on the *Recall Last Number* task to switch to your preferred working condition "Only one break"?

Your answer may affect your **actual working condition**. Please keep in mind the following when deciding:

1. **The longer you are willing to work extra in the task, the better your chances of ending up with your preferred working condition.**
2. How long you are willing to work extra in the task is not the extra time will you work. It is just the **maximum extra time you are willing to work if you switch to your preferred condition**.
   (If you want to know more about how this works, please click here).

Now please answer the question below:

If you get "Decide while working", how many extra minutes are you willing to work on the *Recall Last Number* task to switch to your preferred working condition "Only one break"?

Minutes	0	1	2	3	4	5	6	7	8	9	10
	○	○	○	○	○	○	○	○	○	○	○

Next

Questionnaire (2/5)

You have ranked the 3 working conditions as follows:

Only one break: 1

Decide while working: 2

All breaks: 3

Imagine that you get "All breaks".

Think about how many extra minutes, between 0 and 10, you are willing to work on the *Recall Last Number* task to switch to your second preferred working condition "Decide while working"?

Your answer may affect your **actual working condition**. Please keep in mind the following when deciding:

1. **The longer you are willing to work extra in the task, the better your chances of ending up with your preferred working condition.**
2. How long you are willing to work extra in the task is not the extra time will you work. It is just the **maximum extra time you are willing to work if you switch to your preferred condition**.
   (If you want to know more about how this works, please click here).

Now please answer the question below:

If you get "All breaks", how many extra minutes are you willing to work on the *Recall Last Number* task to switch to your second preferred working condition "Decide while working"?

Minutes	0	1	2	3	4	5	6	7	8	9	10
	○	○	○	○	○	○	○	○	○	○	○

Please wait. The "Next" button will appear soon...

Questionnaire (3/5)

Imagine you were assigned the working condition "Decide while working" and that, while you work in the task, you are asked 10 times if you would like to take a break.

How many breaks **would you like to take**? Please indicate your answer on a scale from 1 to 10, where 1 means *only one break* and 10 means *all breaks*.

	Only one break	1	2	3	4	5	6	7	8	9	10	All breaks
		○	○	○	○	○	○	○	○	○	○	

Please wait. The "Next" button will appear soon...

Questionnaire (4/5)

Imagine you were assigned the working condition "Decide while working" and that, while you work in the task, you are asked 10 times if you would like to take a break.

How many breaks do you think **you will actually take**? Please indicate your answer on a scale from 1 to 10, where 1 means *only one break* and 10 means *all breaks*.

	Only one break	1	2	3	4	5	6	7	8	9	10	All breaks
		○	○	○	○	○	○	○	○	○	○	

Please wait. The "Next" button will appear soon...

Questionnaire (5/5)

Your answer to this question will influence your earnings. **Think about another person in this study who has chosen the same rankings that you have**. Imagine this person ends up working on the *Recall Last Number* task under the condition "Decide while working", and is asked 10 times during the task in Session 3 whether they want to take a break.

Out of 10 breaks, how many breaks do you think this person will take?

Only one break	1	2	3	4	5	6	7	8	9	10	All breaks
	○	○	○	○	○	○	○	○	○	○	

At the end of Session 3, we will look for a participant who has chosen the same rankings that you have. If your guess for what they did is correct, you will earn an extra dollar, paid to you in Session 4.

Please wait. The "Next" button will appear soon...

Worktime decisions practice questions (1/2)

Please use the practice slider to see how the worktime in Sessions 3 and 4 changes as you move the green dot along the slider and answer the practice questions.

Practice slider

Worktime postponed:	Session 3	Session 4
Doesn't change		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--

Practice questions

Imagine that you made the decision below, and it was the one selected by the computer:

Worktime postponed:	Session 3	Session 4
Doesn't change		
Your allocation	30 minutes	15 minutes
Minimum time	(+45 minutes)	
Total time	75 minutes	15 minutes

How many minutes will you work on the *Recall Last Number* task in Session 3?

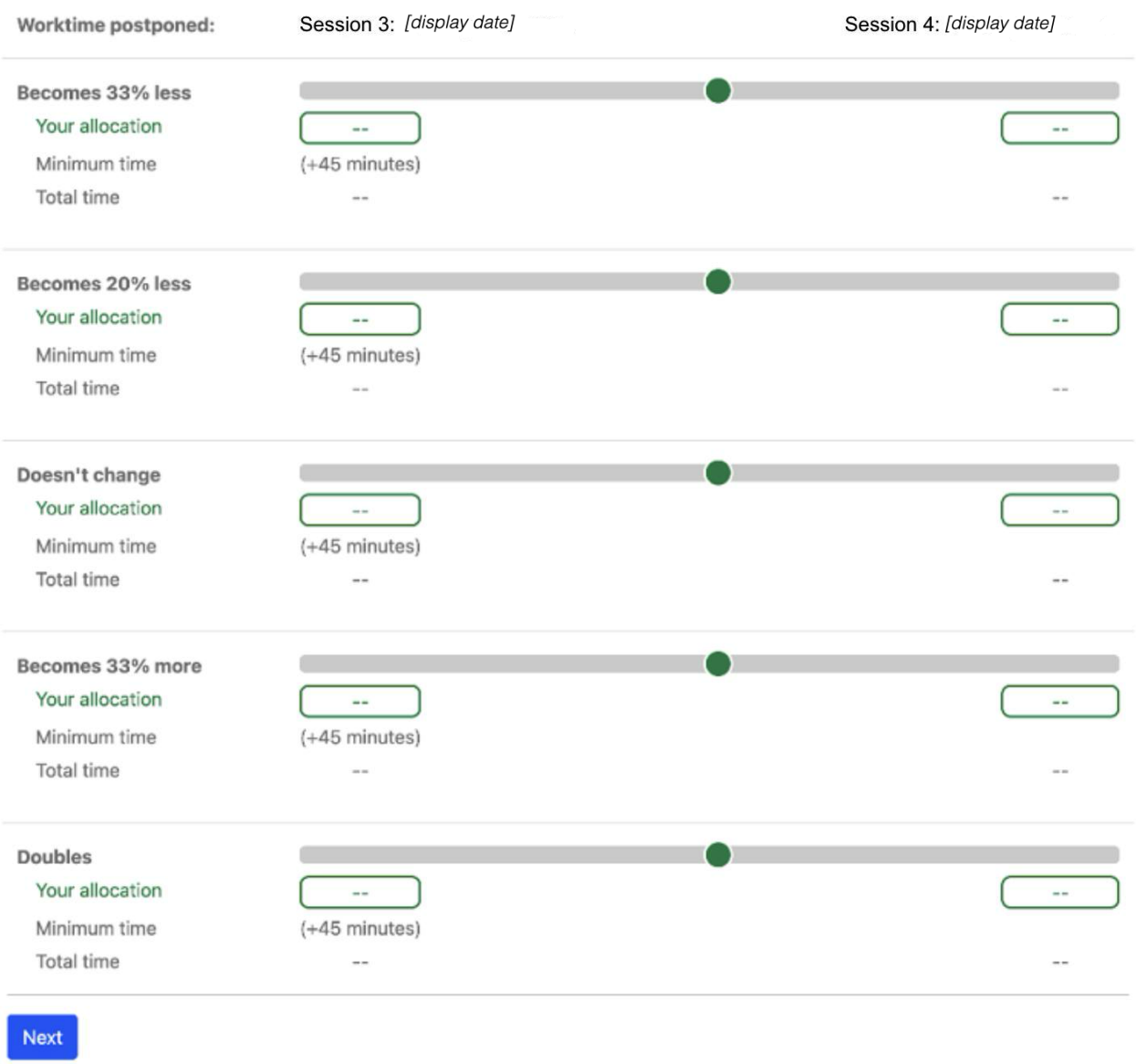
How many minutes will you work on the Recall Last Number task in total, that is, across Sessions 3 and 4?

Check answers

Worktime decisions

Using the sliders provided, please indicate how you would like to split your additional time across Session 3 and 4.

Session 3 will take place 1 week from today (*[display date]*) and Session 4 will take place 2 weeks from today (*[display date]*).



Money decisions practice questions (1/2)

Please use the practice slider to see how your earnings in Sessions 3 and 4 change as you move the green dot along the slider and answer the practice questions.

Practice slider

Worktime postponed:	Session 3	Session 4
Doesn't change		
Your allocation	--	--
Guaranteed pay	(+$15.0)	
Total pay	--	--

Practice questions

Imagine that you made the decision below and it was the one selected by the computer:

Worktime postponed:	Session 3	Session 4
Doesn't change		
Your allocation	$7.50	$7.50
Guaranteed pay	(+$15.0)	
Total pay	$22.50	$7.50

How much will you earn in Session 3?

How much additional earnings will you receive in Session 4?

Check answers

Money decisions practice questions (2/2)

Please use the practice slider to see how your earnings in Sessions 3 and 4 change as you move the green dot along the slider and answer the practice questions.

Practice slider

Worktime postponed:	Session 3	Session 4
Become 33% less		
Your allocation	--	--
Guaranteed pay	(+$15.0)	
Total pay	--	--

Practice questions

Imagine that you made the decision below and it was the one selected by the computer:

Worktime postponed:	Session 3	Session 4
Become 33% less		
Your allocation	$15.00	$0.00
Guaranteed pay	(+$15.0)	
Total pay	$30.00	$0.00

How much will you earn in Session 3?

How much additional earnings will you receive in Session 4?

Now imagine that you made the decision below, and it was the one selected by the computer:

Worktime postponed:	Session 3	Session 4
Become 33% less		
Your allocation	$0.00	$10.00
Guaranteed pay	(+$15.0)	
Total pay	$15.00	$10.00

How much will you earn in Session 3?

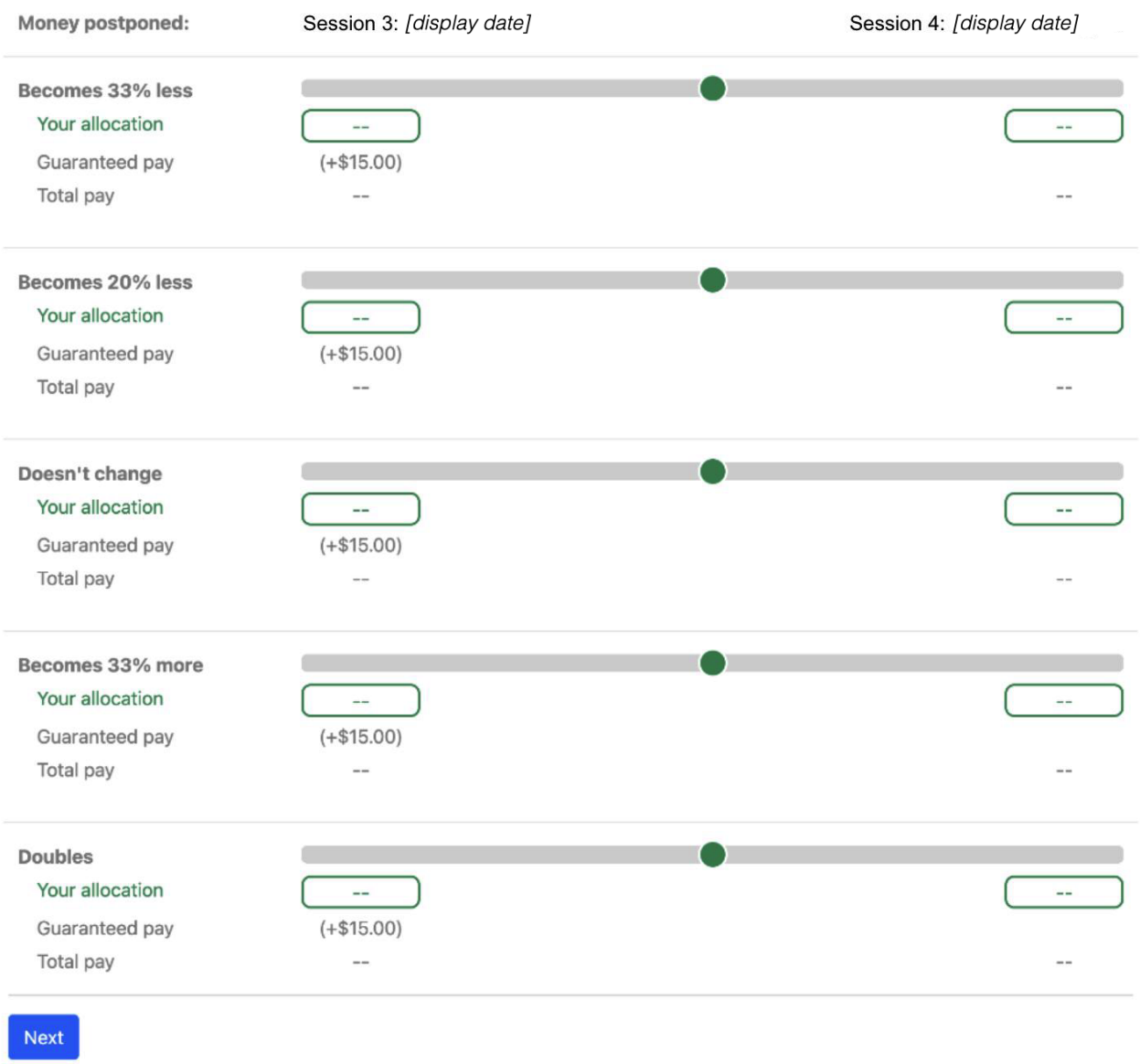
How much additional earnings will you receive in Session 4?

Check answers

Money decisions

Using the sliders provided, please indicate how you would like to split your additional earnings across Session 3 and 4.

Session 3 will take place 1 week from today (*[display date]*) and Session 4 will take place 2 weeks from today (*[display date]*).



Payment details for Session 2

Thank you for completing Session 2!

Your payment:

You will receive AUD $20.00 for today's session.

Session 3 (Next week):

Your next session will be on *[display date]* , and we will send you a reminder email.

How long it will take?

It will depend on the worktime allocation that is randomly selected by the computer. This will be revealed to you in Session 3.

Please make sure you complete next session on *[display date]* **. Otherwise, you will be excluded from the study and lose all future earnings, including the $25 completion fee.**

Next

Worktime decisions practice questions (1/2)

Please use the practice slider to see how the worktime today and in Session 4 changes as you move the green dot along the slider and answer the practice questions.

Practice slider

Worktime postponed:	Today	Session 4
Doesn't change		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--

Practice questions

Imagine that you made the decision below, and it was the one selected by the computer:

Worktime postponed:	Today	Session 4
Doesn't change		
Your allocation	30 minutes	15 minutes
Minimum time	(+45 minutes)	
Total time	75 minutes	15 minutes

How many minutes will you work on the *Recall Last Number* task today?

How many minutes will you work on the *Recall Last Number* task in total, that is, across today and Session 4?

Check answers

Worktime decisions

Using the sliders provided, please indicate how you would like to split your work time on the *Recall Last Number* task across today and Session 4. Session 4 will take place 1 week from today (*[display date]*).

Worktime postponed:	**Today**	**Session 4:** *[display date]*
Becomes 33% less		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--
Becomes 20% less		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--
Doesn't change		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--
Becomes 33% more		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--
Doubles		
Your allocation	--	--
Minimum time	(+45 minutes)	
Total time	--	--

Next

Money decisions practice questions (1/2)

Please use the practice slider to see how your earnings today and in Session 4 change as you move the green dot along the slider and answer the practice questions.

Practice slider

Worktime postponed:	Today	Session 4
Doesn't change		
Your allocation	--	--
Guaranteed pay	(+$15.0)	
Total pay	--	--

Practice questions

Imagine that you made the decision below and it was the one selected by the computer:

Worktime postponed:	Today	Session 4
Doesn't change		
Your allocation	$7.50	$7.50
Guaranteed pay	(+$15.0)	
Total pay	$22.50	$7.50

How much will you earn today?

How much additional earnings will you receive in Session 4?

Check answers

Money decisions

Using the sliders provided, please indicate how you would like to split your additional earnings across today and Session 4. Session 4 will take place 1 week from today (*[display date]*).

Money postponed:	**Today**	**Session 4:** *[display date]*
Becomes 33% less		
Your allocation	--	--
Guaranteed pay	(+$15.00)	
Total pay	--	--
Becomes 20% less		
Your allocation	--	--
Guaranteed pay	(+$15.00)	
Total pay	--	--
Doesn't change		
Your allocation	--	--
Guaranteed pay	(+$15.00)	
Total pay	--	--
Becomes 33% more		
Your allocation	--	--
Guaranteed pay	(+$15.00)	
Total pay	--	--
Doubles		
Your allocation	--	--
Guaranteed pay	(+$15.00)	
Total pay	--	--

Next

Worktime allocation

We will now reveal the time allocation and the working condition that the computer has selected.

Worktime today: 60 minutes
(Total worktime today: 45 minutes minimum 15 minutes additional worktime)

Worktime next week: 30 minutes

Working condition: Decide while working.
It means that you will decide whether to take each break during the task. However, you must take at least one break. If no break is taken within 10 minutes before the end of a session, you will be forced to take a break without being asked.

Please read before proceeding:
There's a minimum time, between 15 seconds and 3 minutes, that you must remain on each break. This minimum is randomly selected and will vary across breaks. You can find out the minimum break time before you make your decision.

While you are on a break, once the minimum break time has passed, the "Return to the task" button will appear. Press that button when you wish to end the break and return to the "Recall last number" task.

By taking breaks and not working on the task, your effective worktime will decrease, because you will not make up for the time you were on a break.

Please wait. You will be able to proceed soon...

Worktime allocation

We will now reveal the time allocation and the working condition that the computer has selected.

Worktime today: 60 minutes
(Total worktime today: 45 minutes minimum 15 minutes additional worktime)

Worktime next week: 30 minutes

Working condition: Decide while working.
It means that you will decide whether to take each break during the task. However, you must take at least one break. If no break is taken within 10 minutes before the end of a session, you will be forced to take a break without being asked.

Please read before proceeding:
There's a minimum time, between 15 seconds and 3 minutes, that you must remain on each break. This minimum is randomly selected and will vary across breaks. You can find out the minimum break time before you make your decision.

While you are on a break, once the minimum break time has passed, the "Return to the task" button will appear. Press that button when you wish to end the break and return to the "Recall last number" task.

By taking breaks and not working on the task, your effective worktime will decrease, because you will not make up for the time you were on a break.

To ensure this instruction is clear, please complete the comprehension questions below.

I will work for 60 minutes on the *Recall last number task* today and 30 minutes on the *Recall last number task* next week.

I will work under Decide while working working condition which means I will decide whether to take each break during the task.

Check answers

End of Session 3!

Thank you for completing the *Recall Last Number* task!

Your payment:

In addition to your AUD $15.00 payment for completing this session, based on your choices in the money task you will receive an additional $0.75. In Session 4, you will receive $14.20 for the money task.

Session 4 (Next week):

Session 4 will be on *[display date]* , and we will send you a reminder email.

How long will it take?

Your worktime on the *Recall Last Number* task for Session 4 is **30 minutes**.

Please make sure you complete the final session next *[display date]***. Otherwise, you will lose future earnings**.

Next