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for Charlotte and Hanne

nothing compares to you

Decisions under Financial Scarcity

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Chapter 1

General introduction

Decisions under Financial Scarcity

659 million people (8.5% of the world population) live in extreme poverty, meaning that they have less than $2.15 to spend per day (The World Bank, 2023). Even in the richest countries of the world, many lack financial resources. In the Netherlands, 9% of households have strong difficulties to get by, 16% do not have enough money to go on a one-week vacation once per year, and 18% have no financial buffer to pay for unexpected expenses (Centraal Bureau voor de Statistiek, 2023). Poverty and, more generally, financial deprivation can have a myriad of negative consequences: For example, it negatively affects mental and physical health (Drentea & Lavrakas, 2000; Ridley et al., 2020; Sweet et al., 2013; Wagstaff, 2002), child development and education outcomes (Duncan et al., 2017), as well as social relations and political participation (Mood & Jonsson, 2016). Moreover, the effects of financial deprivation can reinforce financial problems, a phenomenon known as poverty traps (Azariadis & Stachurski, 2005; Bowles et al., 2016). Such poverty traps traditionally describe macro-economic and societal conditions that perpetuate poverty on the individual and societal level. More recently, research has started to investigate psychological poverty traps, describing the psychological effects of living with financial deprivation, and how these might perpetuate financial problems (Dalton et al., 2016; Haushofer, 2019; Ridley et al., 2020).

The most influential theory describing how financial deprivation affects the mind is financial scarcity theory (Mullainathan & Shafir, 2013). Prior research mainly examined psychological factors that might predict why some people end up with financial problems and others do not (Shah et al., 2012). Financial scarcity theory shifted this focus around, examining how the psychological reality of living in financial hardship affects psychological processes and thereby might perpetuate financial problems (Mullainathan & Shafir, 2013).

Financial scarcity is defined as the subjective experience of lacking resources to meet demands (Shah et al., 2012). Thus, financial scarcity refers to a psychological mindset in response to financial deprivation. This mindset is known to alter cognitive and affective processes. While this scarcity mindset is correlated with objective indicators of financial deprivation like (low) income and debts, they are conceptually distinct (De Bruijn & Antonides, 2022; Mullainathan & Shafir, 2013; Sommet & Spini, 2022; Van Dijk et al., 2022). Some people with fewer financial resources available might feel they get by just fine, while others with more resources available might feel that they have trouble to make ends meet. In line with the conceptualization of psychological stress (Lazarus & Folkman, 1984), the key determinant of a scarcity mindset is therefore the subjective perception that external demands are larger than available resources to deal with these demands. Importantly, subjective measures of financial scarcity seem to be more predictive of relevant outcomes than objective measures of financial deprivation (Sommet & Spini, 2022; Van Dijk et al, 2022). Experiencing financial scarcity is stressful (Haushofer & Fehr, 2014), causes anxiety and depression (Ridley et al., 2020; Sommet & Spini, 2022), impairs cognitive abilities (Mani et al., 2013a; Huijsmans et al., 2019), induces negative emotions (De Bruijn & Antonides, 2020), and affects decision-making (Elbaek et al., 2021; Haushofer & Fehr, 2014;

Shah et al., 2012, 2015, 2018). In this introductory chapter, I give a concise overview of financial scarcity theory and describe how the empirical chapters in this thesis contribute to the growing literature on financial scarcity.

Financial Scarcity Theory

Prior research has identified two pathways through which financial scarcity affects decisions and behavior (for a recent review, see De Bruijn & Antonides, 2022): First, a scarcity mindset directs attention. Early theorizing labelled this attentional shift as "tunnel vision" (Shah et al., 2012). People focus their attention on the financial problems at hand, while neglecting other matters. For example, a scarcity mindset might direct the attentional focus to the present, while neglecting the future. As such, financial scarcity can lead to overborrowing, whereby people borrow too much at too high interest (Cook & Sadeghein, 2018; Shah et al., 2012). Likewise, a scarcity mindset might direct attentional focus towards certain types of information, while neglecting others. Prior research showed that when choosing dishes from a menu, a scarcity mindset led to a stronger attentional focus on meal prices, while health information was disregarded (Tomm & Zhao, 2016). Describing the shift in attentional focus as a "tunnel" highlights the potential negative consequences of a narrow attentional focus if things outside it are neglected. However, more recent theorizing and evolutionary research have shown that focused attention on the problem at hand might frequently also be an adaptive response to a harsh environment (Fenneman & Frankenhuis, 2020; Frankenhuis & Nettle, 2019). As such, when resources are scarce, focusing on the present might increase the likelihood of survival (i.e., be beneficial). Moreover, making financial decisions with increased attentional focus can lead to a better alignment of decisions with rational economic predictions (Duflo, 2006; Shah et al., 2018). For example, research showed that financial scarcity can reduce bias from irrelevant framing cues by increasing trade-off thinking (Shah et al., 2015) and a stronger focus on utility maximization (Fehr et al., 2022). Taken together, a scarcity mindset directs attention towards the scarce resources. This attentional focus can be an adaptive response in an attempt to solve the problem at hand, but it might also have negative consequences if important matters are neglected.

The second pathway through which financial scarcity affects decisions and behavior is the impairment of cognitive function (Mani et al., 2013a). Tasks that are mundane to the affluent become burdensome to those with scarce resources (Shah et al., 2018). For example, when doing groceries with a limited budget, prices need to be compared and trade-offs between the most necessary goods have to be made. When there is no money left, a decision has to be made between going into overdraft, pawning the family heirloom, or stopping to the pay rent, electricity bills, or health insurance. Besides these inherently financial decisions, all aspects of life are seen through the lens of their expenses. Whether the kids can join a sports club or whether you can visit the dentist become financial decisions, where benefits need to be weighed against costs. Such a heightened focus on the financial dimension of every aspect of life is stressful (Haushofer & Fehr, 2014; Mani et al., 2013a) and consumes cognitive capacities, which in turn are less available for other tasks. Early research titled this mechanism a "mental

bandwidth tax", showing that a scarcity mindset reduces performance on working memory and fluid intelligence tasks (Mani et al., 2013a). The interpretation of these findings has since been debated (for comments, see Dang et al., 2015; Wicherts & Scholten, 2013, for a response, see Mani et al., 2013b) and later studies found no or inconsistent support for a negative effect of financial scarcity on cognitive performance (Carvalho et al., 2016; Dalton et al., 2020; Fehr et al., 2022). Other work showed that an experimentally induced scarcity mindset changed neural processes, with increased activation in brain regions associated with valuation processes and decreased activation in brain regions associated with goal-directed planning (Huijsmans et al., 2019). Taken together, as a second pathway, a scarcity mindset might induce cognitive load and thereby negatively affects decisions and behavior, although the current evidence is mixed (De Bruijn & Antonides, 2022).

Research Questions and Thesis Outline

Approximately a decade has passed since the inception of financial scarcity theory. Over the years, it has made valuable contributions to the understanding of the psychological reality of dealing with financial problems. Yet, several questions remain, some of which this thesis contributes to answering. In doing so, we employed a variety of methods, including experimental research with behavioral and physiological measures, as well as longitudinal and cross-societal panel studies. The chapters were written as empirical journal articles, so there is some overlap between them. All studies in this thesis were pre-registered, with openly available data, analyses codes, and materials (see Chapters 2–5).

Chapter 2: Financial Scarcity Increases Discounting of Gains and Losses: Experimental Evidence from a Household Task

Chapter 2 addresses the question in which situations a scarcity mindset increases temporal discounting, and whether discounting differs for the gain and loss domain. Temporal discounting is the tendency to devaluate outcomes that are realized in the future (for an overview, see Frederick et al., 2002). Given that financial scarcity shifts the attentional focus towards the financial problem at hand (Shah et al., 2012), a scarcity mindset might direct attention towards gains and losses that are realized sooner rather than later (i.e., increase discounting). For example, a scarcity mindset might lead to a stronger preference for receiving a smaller amount of money at present, over receiving a larger amount of money in the future (i.e., discounting of gains). Likewise, a scarcity mindset might lead to a stronger preference to pay a larger amount in the future, over paying a smaller amount at present (i.e., discounting of losses). Moreover when financial resources are scarce, paying money might be extra stressful. This suggests that financial scarcity might increase discounting particularly in the loss domain. Last, financial scarcity also leads to more trade-off thinking and better aligns decisions with rational economic predictions (Fehr et al., 2022; Shah et al., 2015). This might counteract the potential effects of a scarcity mindset on increased discounting in cases where it would not be rational to discount. Therefore, it is also important to discern the effect of a subjective scarcity mindset from an objective

constraint of available monetary resources. If a scarcity mindset increases discounting, a follow-up question arises whether this is also the case when people are not constrained in available financial resources.

To examine these questions, we developed a new experimental paradigm that we coined Household Task. In this paradigm, participants managed the finances of a household by earning income and paying expenses. We varied the ratio between income and expenses between conditions, such that participants accumulated debts or savings during the task (Studies 1 & 2) and gained or lost money while available resources were controlled for (Studies 3–5). We measured participants' discount rates with a task where they had to decide between receiving smaller amounts of money sooner and larger amounts of money later (i.e., discounting gains; Studies 1–5) and where they had to decide between paying smaller amounts sooner and larger amounts later (i.e., discounting losses; Study 2).

Chapter 3: The Prospective Associations between Financial Scarcity and Financial Avoidance

Chapter 3 addresses the question whether financial scarcity is associated with financial avoidance, which is the tendency to avoid dealing with one's finances (see also Tinghög et al., 2023). Financial avoidance can manifest in various ways, such as the avoidance of learning new information, making decisions, or taking action (Anderson, 2003, 2006; Gigerenzer & Garcia-Retamero, 2017; Goleman et al., 2017; Hertwig & Engel, 2016; Steel, 2007; Sweeny et al., 2010). Whether and how financial scarcity might be associated with financial avoidance is not a straightforward question. The attentional shift towards financial problems might indicate that a scarcity mindset reduces financial avoidance, as the financial problem becomes the center of the attentional focus. At the same time, it is possible that some important financial matters fall outside the attentional focus and are neglected or avoided. For example, if someone with a scarcity mindset receives a bill, it is possible that this person dedicates their full attention towards it in an attempt to solve the problem it poses. At the same time, it is also possible that this person focuses on their already existing financial problems and therefore puts "yet another bill" in a drawer to be dealt with later. Moreover, a scarcity mindset is characterized by the perception that available resources are insufficient to effectively deal with demands (Shah et al., 2012). As such, experiencing financial scarcity might entail a perceived lack of control over one's finances (Van Dijk et al., 2022; see also Chapter 5). If people feel that their finances are beyond their control and they will not be able to effectively deal with incoming bills anyways, they might as well ignore it. Over time, a financial scarcity mindset might therefore be associated with an increase in financial avoidance. In turn, financial avoidance might also be associated with an increase in financial scarcity over time. If someone continuously avoids dealing with their finances, their perception that they have the needed resources available to meet demands might decrease. Therefore, we tested whether financial scarcity is temporally associated with an increase in financial avoidance, and vice versa.

To do so, we conducted a longitudinal panel study with a large representative sample of the Dutch population. We collected data at two time points spanning a period of 22 months. To measure financial scarcity, we used the Psychological Inventory of Financial Scarcity (PIFS; Van Dijk et al., 2022).

To measure financial avoidance, we developed a new scale measuring financial avoidance via the tendency to avoid making financial decisions and to learn financial information. We analyzed the data such that we could test whether financial scarcity at t1 is associated with an increase in financial avoidance at t2 and vice versa, while controlling for autoregressive effects.

Chapter 4: Financial Scarcity and Financial Avoidance: An Eye-Tracking Experiment

Chapter 4 builds on Chapter 3, as it addresses the question whether financial scarcity also has a causal effect on financial avoidance. While the findings from our longitudinal study show temporally dynamic associations that might be indicative of a causal mechanism, the data are correlative and do not provide strict support for a causal mechanism.

Therefore, we conducted an experiment in which we manipulated financial scarcity with the Household Task (see Chapter 2) and measured avoidance with physiological and behavioral measures. Over multiple rounds, participants either accumulated debts or savings. At the end of each round, we presented them with two letters: One letter was an additional expense that had to be paid and the other letter was a control stimulus. During stimulus presentation, we measured participants' gaze patterns with an eye-tracker. The benefit of eye-tracking is that it allows to assess unobtrusively where people focus their attention on, live while they engage with a task (Holmqvist et al., 2011). We used two gaze measures to test whether participants with debts in the Household Task attentionally disengaged from their finances. First, we measured the time it took for participants to first fixate on a specific part of the expense letter, namely the amount that had to be paid. Second, we measured the overall duration that people fixated on the whole expense letter. Both measures had previously been used to show top-down processes of disengagement from aversive stimuli (Borozan et al., 2022; Pflugshaupt et al., 2005). As a behavioral measure of financial avoidance, we gave participants the option to delay paying the expense until the end of the experiment.

Chapter 5: Financial Scarcity and Perceived Control across Societies

Chapter 5 addresses the question whether financial scarcity is negatively associated with perceived control over one's life, and whether this association is ubiquitous or varies across the globe. Recent empirical and theoretical work (Sommet & Spini, 2022; To et al., 2023; Van Dijk et al., 2022) as well as Chapters 2–4 in this thesis point towards the crucial role of perceived control for decision–making under scarcity. Control is defined as the perceived ability to achieve desired outcomes and reach goals (Landau et al., 2015). An important antecedent of perceived control is the perception that one possesses the needed resources and abilities to reach one's goals. As such, experiencing that financial resources are scarce might also lead to a perceived inability to reach goals, and thus a reduced sense of control. If that is indeed the case, the question arises whether the association between financial scarcity is ubiquitous or differs across societies. That is, while lacking needed financial resources might be a threat to perceived control, ample research shows that other sources of control can compensate for such a threat (for an overview, see Landau et al., 2015). For example, if someone feels that they have too little

financial resources available, a strong social network or societal institutions might reduce the impact of one's personal finances on the perception that life is out of control. Importantly, the tightness of social networks (e.g., Hofstede et al., 2011) and the quality of institutions (e.g., The World Bank, 2022) varies considerably across the globe. This suggested that there might be structural differences in the association between financial scarcity and (lack of) control across societies.

To study these questions, we conducted a survey study in 51 societies, with approximately 250 participants per society. We measured financial scarcity with a short version of the Psychological Inventory of Financial Scarcity (PIFS; Van Dijk et al., 2022) and perceived control with a single-item measure used in previous research (Hornsey et al., 2019). Next, we selected and aggregated from openly available datasets a large number of cross-societal indicators for welfare provisions, quality of institutions, and labor conditions, as well as economic development and cultural difference indices. We merged these societal level indicators with the data from our survey study and tested whether these might explain differences in the association between financial scarcity and control.

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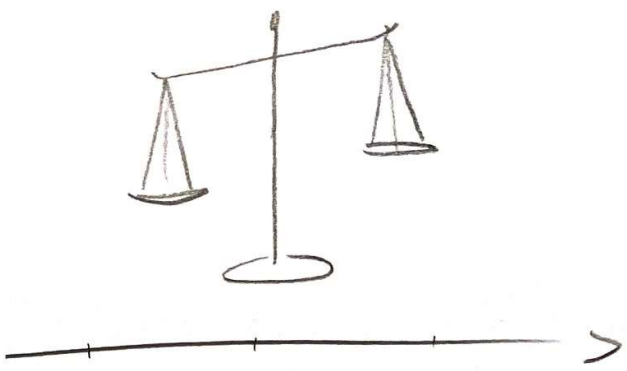

Chapter 2

Financial scarcity increases discounting of gains and losses: Experimental evidence from a household task

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Financial Scarcity Increases Discounting of Gains and Losses: Experimental Evidence from a Household Task

Having too little financial resources to meet demands greatly impacts people's lives. This situation of financial scarcity can result in the accumulation of debts (Gennetian & Shafir, 2015) and, in turn, seriously affect physical and psychological well-being (Drentea & Lavrakas, 2000; Sweet et al., 2013). In addition to these consequences for well-being, financial scarcity can also alter cognitive processes and decision-making (for an overview, see Sheehy-Skeffington & Rea, 2017). That is, financial scarcity evokes a mindset that is specifically geared toward dealing with current pressing financial concerns (Mullainathan & Shafir, 2013; Shah et al., 2018). An important aspect of this "scarcity mindset" is a strong focus on the immediate outcomes of one's decisions and actions (Haushofer & Fehr, 2014). In the present research, we aimed to show experimentally that financial scarcity increases temporal discounting of gains and losses.

Financial Scarcity

In line with previous research, we define financial scarcity as the subjective experience that available financial resources are insufficient to meet demands. (Shah et al., 2012). Here, demands constitute household expenses that have to be paid. Literature on financial scarcity suggests that his experience affects decision-making in (at least) two ways.

First, the experience of financial scarcity influences how people distribute their attention (Shah et al., 2012, 2019). That is, it directs attention to current pressing financial concerns. Based on this shift in attentional focus, we predict that financial scarcity leads to a preference for options that are optimal in the short-term over options that are optimal in the long-term. This might promote decisions where money can be earned quickly, while foregoing larger gains in the future. For example, people might prefer to keep financial resources available for present use rather than allocating these to more distant financial goals (e.g., investing it in retirement plans or long-term savings accounts). Likewise, this might promote decisions where due payments are delayed instead of paid directly. For example, people might be more likely to prefer paying in installments over paying in full immediately. In both cases, the attentional focus on the problem of having scarce resources at present might lead to decisions that have positive consequences in the short term but (larger) negative consequences in the long term. Thus, due to a shift of attentional focus towards pressing concerns, we predict that financial scarcity increases temporal discounting.

To focus one's attention in troublesome circumstances is generally an adaptive strategy because it can help to solve the problem at hand (Frankenhuis & Nettle, 2019). To illustrate, when making utility judgments under financial scarcity, people are more likely to focus their attention on the most relevant characteristics of their options and become less susceptible to irrelevant framing cues (Shah et al., 2015). In the context of temporal discounting, this attentional shift toward the present might thus constitute an adaptive (optimal) response to pressing financial concerns at present. However, it is also possible that the focus on the present might lead to attentional neglect (i.e., tunnel vision) of important

information or future consequences (Tomm & Zhao, 2016). This would suggest that the attentional shift towards the present might also constitute a maladaptive (sub-optimal) response in which future problems are disregarded. The current research contributes to clarifying this open question in the literature.

Second, and related to the attentional effect, financial scarcity elicits rumination and worries about money (De Bruijn & Antonides, 2020). Scarcity literature states that these processes consume mental resources, and thereby leave fewer resources available for other cognitive processes. For example, research shows that financial scarcity impedes cognitive functioning (Mani et al., 2013; but see Wicherts & Scholten, 2013). In addition, scarcity has been shown to reduce activity in the dorsolateral prefrontal cortex, which is an area that is responsible for goal-directed planning (Huijsmans et al., 2019). When making financial decisions, the mental tax of dealing with insufficient financial resources might impair the ability to plan ahead. If the ability to oversee future consequences is impaired, the likelihood might increase to make decisions favoring both small but immediate earnings and the delay of due payments. So, in addition to the attentional mechanism, cognitive load and the impeded ability to make plans and follow long-term goals might also play a mechanistic role for the effect of financial scarcity on increased discounting.

Temporal Discounting

Temporal discounting is defined as the devaluation of future outcomes which can be quantified with a discount rate (for an overview, see Frederick et al., 2002). When people devaluate future outcomes (i.e., have a high discount rate), they weigh outcomes that are attained sooner more heavily than outcomes that are attained later. When these outcomes are positive, such as receiving money, a high discount rate leads to a preference for immediate smaller gains over delayed larger gains. When outcomes are negative, such as paying money, a high discount rate leads to a preference for delayed larger losses over immediate smaller losses (for an overview on time preferences for receiving and paying money, see Green et al., 2014).

Research indeed suggests that financial scarcity is related to increased discounting. Yet, most of the studies are either correlational or conducted in the field, which hinders clear causal inferences. For example, a large correlational study (80,000 participants in 76 countries) showed that both across and within countries, people with less money had higher discount rates (Falk et al., 2018). In addition, a set of four studies showed that lower childhood SES was related to stronger discounting during adulthood (Amir et al., 2018). In our own research program, we conducted an online study with 300 participants and found that the subjective experience of financial scarcity was positively correlated with higher discount rates (see online supplement for working paper, open data, and open materials; https://doi.org/10.17605/OSF.IO/3BX2D).

In addition, several field studies showed a positive relation between a problematic financial situation, as a proxy for financial scarcity, and increased discounting. In two studies, it was found that present bias – a specific form of temporal discounting with inconsistent time preferences – was higher

before payday compared to after payday (Bos et al., 2016; Carvalho et al., 2016). Furthermore, a quasi-experimental study conducted in Singapore showed that the relief of several debt accounts reduced present bias of members of chronically indebted households (Ong et al., 2019). Likewise, a study conducted in Nepal found that unbanked citizens showed less discounting when they were provided with saving accounts (Carvalho et al., 2016).

Although these studies indicate that the attenuation of experienced financial scarcity is associated with less discounting, they do not provide strict evidence for a causal relation between these variables. It could be argued that a scarcity mindset leads to an attentional focus on immediate outcomes and impairs cognitive capacities needed for long-term planning, thereby increasing discount rates. Yet, it is also possible that decisions where future outcomes are heavily discounted lead to financial problems in the long run[1]. In addition, it is possible that other variables affect both financial scarcity and temporal discounting. Thus, experimental studies are needed to establish whether and how financial scarcity and temporal discounting are causally related.

Currently, only a few experiments have tested the effect of financial scarcity on temporal discounting. In one set of studies, participants with little resources in an experimental task were more likely to borrow resources from future rounds of that task, even if it was costly (Shah et al., 2012, 2018). Another study showed that the risk of financial exploitation by others increased discount rates (Haushofer et al., 2018). Research also showed that a negative income shock (i.e., unexpectedly losing a large amount of money) led to stronger discounting (Haushofer & Fehr, 2019). Together, these studies provide initial support for our contention that financial scarcity increases temporal discounting. It should be noted that these studies concerned discounting of gains. None of them investigated the effect of scarcity on discounting of losses. This is remarkable, as many decisions made in a context of financial scarcity concern losses (e.g., to overdraw a bank account or to postpone payment of bills). To our knowledge, there is only a single study that tested the effect of financial scarcity on the discounting of losses (Bickel et al., 2016). Although this study showed that financial scarcity increased discounting for both gains and losses similarly, the hypothetical scenarios used as experimental manipulation differed not only on financial scarcity, but also on several other aspects[2]. Therefore, it remains unclear whether the obtained effect on the discounting of gains and losses were caused by induced financial scarcity, other aspects on which the scenarios differed, or a combination of both.

The Present Research

In one pilot study and five experiments, we introduce a new experimental paradigm and tested the overall hypothesis that financial scarcity increases temporal discounting. First, we examined the

[1] In fact, both mechanisms being active at the same time have been coined as poverty trap (Gennetian & Shafir, 2015).

[2] In the experimental condition, participants were asked to imagine that they had been fired from their job, had to move to a city they did not like, and that they had to move in with a relative. In the control condition, participants were asked to imagine that they were being promoted and that they had the opportunity to move to an area that they liked, if they wanted to move.

effectiveness of the paradigm in a pilot study. Next, we used the paradigm in two experiments that tested our overall hypothesis in the domain of gains (Experiments 1 and 2) and losses (Experiment 2). Then, in Experiments 3–5, we tested the hypothesis that a financial scarcity mindset would also increase discounting of gains when the available resources were constant across conditions. For all studies, we report all measures, manipulations, and exclusion criteria. All data, analysis codes, and materials are available on the Open Science Framework (OSF; https://doi.org/10.17605/OSF.IO/3BX2D). Sample sizes were determined before data collection. No additional data were collected after the data had been analyzed.

Pilot Study: An Experimental Paradigm to Study Financial Scarcity

To examine the impact of financial scarcity on temporal discounting, we introduce a new experimental paradigm, which we coined the Household Task[3]. During the task, participants manage the finances of a household by earning an income and paying expenses. While expenses are the same for all participants, it is randomly determined whether they have an income that is higher, equal, or lower than their expenses. Consequently, based on their condition, participants accumulate debts, have a neutral balance, or accumulate savings. The random variation in available financial resources allows for an experimental test of the impact of financial scarcity on participants' discount rates. In this pilot study, we tested whether the Household Task successfully induces the experience of financial scarcity. Furthermore, we examined whether the induced experience of financial scarcity was independent from participants' actual income and their experienced financial scarcity in their real lives.

Method

Participants and Design

We recruited 150 British participants (M_{age} = 35.70 years, SD_{age} = 11.78; 84 females, 65 males, 1 participant indicated "other" as their gender) via the online platform *Prolific Academic*. Participants were randomly assigned to one of three conditions of a one-factorial between-participants design (Financial Resources: debts, control, savings) with the experience of financial scarcity as the main dependent variable. We hypothesized that participants in the debts condition would score higher on the financial scarcity measure than participants in the other two conditions. For all studies, we conducted sensitivity power analyses for our respective samples and designs, with the significance level at $\alpha = .05$ and a power level of $1-\beta = .80$, using G*Power (Faul at al., 2007). For our main hypothesis, the minimum effect size to consider the observed effect as relevant is $\eta^2 = .06$.

Procedure

After participants gave informed consent and read the general instructions, they were introduced to the Household Task and completed a practice round. The Household Task consisted of six rounds, and each round resembled a one-week period. Each round started with an overview of the

[3] Thereby, we build on the experimental design of Haushofer and Fehr (2019).

expenses. The overview first showed the total amount of expenses, and then listed the expenses for four separate sub-categories (housing, transportation, shopping, other). Expenses were based on average expenses of British households (Office for National Statistics, 2020), and ranged from £463 to £467 between rounds. The order of the rounds was randomized.

After participants had previewed their expenses of a round, they continued with an effort task, which represented their "weekly work shift". In this effort task, participants were presented with ten strings on their screen. Each string consisted of ten random numbers and (upper and lower case) letters. Participants were given two minutes to type as many of these strings in backward order as possible. After two minutes, their work shift ended and they were automatically forwarded to the next page. Participants received a fixed income for completing the task and a bonus income for each string they correctly typed backwards[4]. Participants were shown their income and asked to confirm the payment of their expenses of that round. Subsequently, they were shown their updated balance and continued with the next round. After six rounds, the Household Task ended and participants were shown their final balance.

Following the Household Task, participants filled out a set of questionnaires to measure their subjective experience of financial scarcity during the task. At the end, participants gave their demographic information, were informed about their earnings, and were thanked and debriefed.

The average completion time of the study was 25 minutes. Participants received incentivized payment based on the outcome of the task. They started the study with an initial endowment of £4.00. This endowment could be increased or reduced with an amount of up to £1.25 based on participants' final balance. Participant payments thus ranged from £2.75 to £5.25.

Manipulation of Financial Resources

In line with financial scarcity theory (Mullainathan & Shafir, 2013; Shah et al., 2012), we simulated a situation in which participants have too little resources to meet their needs. That is, we manipulated whether participants would accumulate debts or savings in the Household Task. Moreover, a control condition was included in which neither debts nor savings were accumulated. In the debt, control, and savings condition, participants received a fixed income of £275, £455, or £635 per round, respectively. In all three conditions, participants could receive a bonus income of £2 for each string they typed correctly backwards[5]. This resulted in a maximum bonus income of £20 per round. The expenses were the same for the three conditions and were on average £465 per round. For participants solving half of the strings correctly, this would lead, per round, to a change of -£180 in the debts condition, a change of £0 in the control condition, and a change of +£180 in the savings condition. Thus, over six

[4] We chose this type of task because it does not require prior knowledge, is easily measurable, and has little room for learning while being relatively boring and pointless, making sure that the task entails a cost of effort for the participants (see Abeler et al., 2011).

[5] Participants were instructed that they would receive both a fixed income and a bonus income, but they were only shown their total income for each round.

rounds, participants could accumulate debts, accumulate savings, or none of both. Participants completed the Household Task with a mean balance of -£1,043.73 (*SD* = 20.29) in the debts condition, a mean balance of +£40.66 (*SD* = 16.57) in the control condition, and a mean balance of +£1,117.49 (*SD* = 20.53) in the savings condition.

Dependent Variables

As a main dependent variable for the pilot, we measured participants' subjective experience of financial scarcity during the Household Task. To do so, we used a measure that is based on appraisals of financial scarcity and consists of 11 items (for a list of all items, see online supplement on the OSF). Following research on the experiential correlates of financial scarcity, these items concern the appraisal of having too little financial resources (Shah et al., 2012), a lack of control over one's finances (Hilbert et al, 2022b), whether participants felt capable of dealing with their financial situation (Hilbert et al., 2022b), whether they were worried about their finances (De Bruijn & Antonides, 2020), whether they felt positive or negative about their finances, and whether they were stressed (Haushofer & Fehr, 2014). All items were framed to assess participants' experience during the Household Task specifically and were measured on a seven-point Likert-scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*. The items showed very high internal consistency (Cronbach's $\alpha = .96$).

Then, we asked participants about their actual financial situation to test whether the effectiveness of our manipulation was dependent upon participants' real-life finances. Therefore, we used the Psychological Inventory of Financial Scarcity (PIFS; Van Dijk et al., 2022) to assess how much financial scarcity participants experienced concerning their real-life finances, regardless of the results of the Household Task. The PIFS measures appraisals of insufficient resources and lack of control, in addition to rumination, worry, and short-term focus. The PIFS consists of twelve items measured on a seven-point Likert-scale, ranging from 1 = *strongly disagree* to 7 = *strongly agree*.

In addition, as an objective measure of participants' real-life finances, we included a single item to assess participants' yearly net income (with the income brackets: *less than £10k*, *£10k – £20k*, […], *£90k – £100k*, *£100k – £150k*, *more than £150k*).[6]

Results and Discussion

We conducted a one-way between-participants ANOVA with Financial Resources (debts, control, savings) as predictor and experienced financial scarcity as dependent variable. As hypothesized, Financial Resources had an effect on experienced financial scarcity, $F(2, 147) = 133.34$, $p < .001$, $\eta^2 = .65$. Planned contrasts revealed that participants in the debts condition experienced more financial scarcity ($n = 49$, $M = 6.17$, $SD = 0.96$) than those in the control condition ($n = 51$, $M = 3.43$, $SD = 1.22$), $t(147) =$

[6] We also included several items that asked participants for detailed feedback on the Household Task. Those items were not intended for hypothesis testing are and thus not reported here. In addition, we also measured participants' experience of control over their finances and over their life in general, which were included for a different project (for a full list, see open materials on the OSF).

12.00, $p < .001$, $g = 2.48$. Furthermore, participants in the control condition experienced more financial scarcity than those in the savings condition ($n = 50$, $M = 2.57$, $SD = 1.21$), $t(147) = 3.77$, $p < .001$, $g = 0.70$. The results indicate that the Household Task effectively induces the experience of financial scarcity.

Next, we explored whether the extent to which participants experienced financial scarcity regarding their real-life finances affected the impact of our experimental manipulation. Therefore, we added participants' scores on the PIFS as a covariate to a one-way ANCOVA with Financial Resources (debts, control, savings) as predictor and experienced financial scarcity as dependent variable. Financial Resources remained a significant predictor of experienced financial scarcity, $F(2, 144) = 131.22$, $p < .001$, $\eta^2 = .65$. Participants' PIFS-scores had no relationship with experienced financial scarcity in the task, $F(1, 144) = 0.28$, $p = .599$, $\eta^2 = .00$. Moreover, there was no interaction effect between Financial Resources and the PIFS on experienced financial scarcity, $F(2, 144) = 1.07$, $p = .347$, $\eta^2 = .02$. Thus, there was no evidence indicating that the effectiveness of our manipulation was altered by the level of financial scarcity people experience in their real lives.

Last, we explored whether the effectiveness of our experimental manipulation was dependent upon participants' actual income. Therefore, we added participants' real-life income as a covariate to a one-way ANCOVA with Financial Resources (debts, control, savings) as predictor and experienced financial scarcity during the task as dependent variable. Seven participants decided not to disclose their income and their data were excluded from this analysis. Financial Resources remained a significant predictor of experienced financial scarcity, $F(2, 137) = 130.63$, $p < .001$, $\eta^2 = .66$. Participants' income was not associated with experienced financial scarcity, $F(1, 137) = 0.04$, $p = .847$, $\eta^2 = .00$. Moreover, there was no interaction effect between Financial Resources and income on experienced financial scarcity during the task, $F(2, 137) = 1.73$, $p = .181$, $\eta^2 = .03$. Thus, there was no evidence indicating that the effectiveness of our experimental manipulation was altered by participants' real-life income.

Taken together, these results show that having debts in the Household Task effectively induces the experience of financial scarcity. Importantly, our experimental manipulation was strong and independent of participants' real-life financial situation. Thus, we conclude that the Household Task is a suitable experimental paradigm to further investigate the effects of financial scarcity on temporal discounting.

Experiment 1: Financial Scarcity and Temporal Discounting of Gains

In Experiment 1, we tested the hypothesis that financial scarcity increases temporal discounting in the domain of gains. More specific, we hypothesized that participants in the debts condition have a higher discount rate than those in the control or savings condition. We preregistered our hypothesis, method, and analysis plan on the OSF (https://doi.org/10.17605/OSF.IO/XZJ3Q).

Method

Participants and Design

We recruited 210 British participants via the online platform *Prolific Academic*, whereof 209 completed the experiment (M_{age} = 33.98 years, SD_{age} = 12.27; 145 females, 64 males). Participants were randomly assigned to one of the three experimental conditions (Financial Resources: debts, control, savings) of our one-factorial design. Participants' indifference point in the temporal discounting task was the main dependent variable. Four participants were excluded from the analyses because they switched back and forth between immediate and delayed outcomes multiple times, which makes it impossible to calculate a single indifference point.[7] Thus, the final sample consisted of 205 participants. For our main hypothesis, the minimum effect size to consider the observed effect as relevant is $\eta^2 = .05$.

Procedure

The procedure was very similar to the pilot study. Participants first completed the Household Task and then filled in our dependent measures. For the Household Task, we shortened the time participants had available for each work shift to 1 minute and 40 seconds to increase the difficulty of the task[8]. Following the Household Task, participants completed a temporal discounting measure. At the end, participants gave their demographic information, were informed about their payment, and were thanked and debriefed. The average completion time of the study was 23 minutes. Participants received incentivized payment based on the outcome of the Household Task. They started the study with an initial endowment of £3.00 as show-up fee. Based on the outcome of the task, they could earn or lose an additional amount of up to £1.25. This resulted in a payment range of £1.75 to £4.25.

Dependent Variable: Temporal Discounting Task

After participants finished the last round of the Household Task, they continued with an adapted version of a validated temporal discounting measure (Hardisty & Weber, 2009). Participants learned that they would receive a tax return of £250, added to their balance in the Household Task. Subsequently, they were presented with 10 hypothetical binary choices regarding this tax return. That is, participants were asked whether they would prefer to receive a varying amount of money in a year instead of the £250 today (£410, £390, £370, £350, £330, £310, £290, £270, £250, £230). We calculated the indifference point as the amount of money at which preferences switch from the delayed larger reward to the immediate smaller reward. For example, if someone preferred receiving £310 in a year over £250 today but did not prefer receiving £290 in a year over receiving £250 today, their indifference point would be set to £300 (see also, Hardisty & Weber, 2009; Joshi & Fast, 2013). Thus, the indifference

[7] This exclusion criterion is missing in our preregistration form. However, we uploaded an addendum to the form time stamped prior to data collection on the OSF.

[8] In addition, we made minor adjustments to some of the expenses based on the feedback from participants in the pilot study (e.g., we decreased the weekly costs for clothes and increased the weekly costs for groceries). These changes did not influence the total amount of income and expenses per week or the overall payoff structure for participants in this study.

point is the size of the delayed reward for which one is indifferent to receiving £250 immediately[9]. A higher indifference point measures increased discounting because it requires a higher "premium" for the delayed option to be equally valued. Additionally, we asked participants for their indifference point directly in an open question (i.e., "I would be equally happy with receiving £250 right now and receiving £___ in a year."). The analysis with this additional measure yielded similar results as the analysis with the main dependent variable (see open materials on the OSF). Upon completion of the temporal discounting task, the tax return of £250 was added to participants' final balance in the Household Task.

Results and Discussion

As hypothesized, Financial Resources had an effect on temporal discounting, $F(2, 204) = 6.26$, $p = .002$, $\eta^2 = .06$. Planned contrast analysis showed that the indifference point was higher in the debts condition ($n = 67$, $M = 353.13$, $SD = 62.72$) than in the control condition ($n = 69$, $M = 325.80$, $SD = 59.12$), $t(202) = 2.77$, $p = .006$, $g = 0.45$, and in the savings condition (n = 69, $M = 320.58$, $SD = 50.06$), $t(202) = 3.30$, $p = .001$, $g = 0.58$. The indifference point did not differ between the latter two conditions, $t(202) = 0.53$, $p = .595$, $g = 0.10$.

These findings indicate that financial scarcity increased temporal discounting of gains. Moreover, given that the control and savings condition did not differ, this finding cannot be explained by the wealth effect (see Lettau & Ludvigson, 2004).

Experiment 2: Financial Scarcity and Temporal Discounting of Gains and Losses

In our second experiment, we examined whether the finding that financial scarcity increases discounting of gains would replicate and whether a similar effect could be obtained for losses. Experiment 2 thus served as a replication and extension of Experiment 1 and tested two specific hypotheses: Financial scarcity increases discount rates for gains (Hypothesis 1) and financial scarcity increases discount rates for losses (Hypothesis 2).

Experiment 2 also connects to previous research on the differences between temporal discounting of gains and losses. Previous research has shown that, independent of people's financial situation, gains are discounted stronger than losses (Estle et al., 2006; Hardisty & Weber, 2009; Thaler, 1981). In line with these findings, our third hypothesis was that, overall, temporal discounting is stronger in the domain of gains than the domain of losses. That is, we expected that gains are discounted more so than losses, both in a situation of financial scarcity and in a situation of financial abundance.

Moreover, we expected that the difference between the temporal discounting of gains and losses is dependent upon experienced financial scarcity. That is, participants who already are in financial arrears might be disproportionally likely to try to avoid losing money in the present. Therefore, we

[9] In our preregistration, we stated that we would calculate the discount rate from the indifference point using a linear transformation. However, to increase ease of interpretation, we chose to report the findings using the original values of the indifference point. This deviation from the preregistration has no influence on the results of the statistical analyses.

predicted that the expected difference in temporal discounting between gains and losses is smaller for participants who experience financial scarcity. Thus, our fourth hypothesis was that, compared to participants who experience financial abundance, those who experience financial scarcity in the Household Task show a smaller difference in discounting of gains and losses. In other words, we expected that the motivation to avoid immediate losses for participants who experience scarcity moderates (i.e., attenuates) the overall effect of gains being discounted more than losses.

We preregistered all our hypotheses, method, and analysis plan on the OSF (https://doi.org/10.17605/OSF.IO/2R5KC).

Method

Participants and Design

We recruited 220 British participants via the online platform *Prolific Academic*, whereof 219 completed the study (M_{age} = 34.63 years, SD_{age} = 12.70; 137 females, 80 males, 2 participants indicated "other" as their gender). In line with our preregistered exclusion criteria, we excluded two participants because they switched back and forth between immediate and delayed outcomes in the temporal discounting task multiple times, making it impossible to calculate a single indifference point. In addition, we excluded two participants who switched between immediate and delayed outcomes in such a way that indicated it a preference for more losses. We interpreted that these two participants did not understand the task or did not complete it seriously. These exclusions led to a final sample of 215 participants. For our main-effect hypotheses, the minimum effect size to consider the observed effect as relevant is $\eta^2 = .04$.

The experiment had a two-factorial between-participants design, with Financial Resources (debts, savings) and Domain (gains, losses) as factors. Participants' indifference point in the temporal discounting task was the dependent measure. Note that we omitted the control condition from Experiment 1 in our experimental design for efficiency reasons and because it did not yield different results from the savings condition.

Procedure

The procedure was the same as in Experiment 1, except that the outcome of the tax assessment at the end of the Household Task differed between the gains and losses conditions. In the gains condition, the tax assessment stated that participants would receive a tax return of £250 (cf. Experiment 1). In the losses condition, the tax assessment stated that participants would need to pay £250 of additional taxes. Then, participants made the respective 10 binary hypothetical decisions between receiving (vs. paying) £250 right now and a varying amount in a year. The average completion time of the study was 23 minutes. Participant payment was similar as in Experiment 1.

Results and Discussion

A 2 (Financial Resources: debts, savings) x 2 (Domain: gains, losses) between-participants ANOVA with indifference point as dependent variable showed a main effect of Financial Resources, $F(1, 211) = 20.70$, $p < .001$, $\eta^2 = .09$. A planned contrast analysis showed that the indifference point for gains was higher in the debts condition ($n = 53$, $M = 341.89$, $SD = 56.33$) than in the savings condition ($n = 56$, $M = 320.00$, $SD = 43.48$), $F(1, 211) = 5.83$, $p = .017$, $g = 0.44$. This finding confirmed Hypothesis 1 and replicated the results from Experiment 1, namely that financial scarcity increased discounting of gains. A second planned contrast analysis showed that for losses, the indifference point was higher in the debts condition ($n = 52$, $M = 294.23$, $SD = 51.08$) than in the savings condition ($n = 54$, $M = 257.41$, $SD = 36.25$), $F(1, 211) = 16.07$, $p < .001$, $g = 0.83$. This finding confirmed Hypothesis 2 and indicated that financial scarcity also increased discounting of losses. Results of the ANOVA also yielded a main effect of Domain, $F(1, 211) = 73.00$, $p < .001$, $\eta^2 = .26$. Planned contrast analyses showed that the indifference point was higher for gains than for losses, both in the debts conditions ($p < .001$, $g = 0.89$) and in the savings conditions ($p < .001$, $g = 1.56$). These findings confirmed Hypothesis 3 and indicated that, both in a situation of financial scarcity and in a situation of financial abundance, gains were discounted more than losses. Finally, results showed no interaction between Financial Resources and Domain, $F(1, 211) = 1.34$, $p = .248$, $\eta^2 = .01$. This finding did not support Hypothesis 4. Thus, our results did not indicate that, as compared to financial abundance, financial scarcity leads to more discounting in the domain of losses than in the domain of gains.

In sum, Experiment 2 replicated the effect that financial scarcity increased discounting in the domain of gains. In addition, Experiment 2 also showed a similar effect in the domain of losses. Moreover, in line with previous research we found that, independent of the financial situation, gains were discounted stronger than losses (Estle et al., 2006; Hardisty & Weber, 2009; Thaler, 1981). However, we did not find support for the hypothesis that this effect was less pronounced for people experiencing financial scarcity.

Together, Experiments 1 and 2 showed that when people have debts compared to savings (i.e., scarce financial resources), they tend to make decisions that focus more on short-term instead of long-term consequences. These findings were reliable and replicate and extend previous research. Notably, while participants in the debts conditions of our experiments were always able to pay their expenses, it is still possible that they felt they simply could not afford to be patient (i.e., experienced liquidity constraints). Then, they would also make decisions that are optimal in the short-term but the underlying psychological mechanism might be a different one than increased temporal discounting. Therefore, we conducted a set of three experiments in which we manipulated the experience of financial scarcity (i.e., a scarcity mindset) while keeping the available financial resources positive and constant between conditions.

Experiment 3: Scarcity Mindset and Late Income Shock

In Experiment 3, we tested whether financial scarcity also increases temporal discounting when controlling for available financial resources. Here, we made minimal changes to the Household Task compared to Experiments 1 and 2. That is, we kept the savings condition from previous experiments the same and added a positive income shock to the debts condition, such that participants in this condition would end the task with the same final balance as participants in the savings condition. We hypothesized that participants who accumulate debts and receive a positive income shock at the end of the Household Task would have higher discounting than participants who accumulated savings throughout the task. This was based on the prediction that the experience of having debts throughout the task would induce a scarcity mindset, which might still affect discounting after debts had been equalized. We preregistered our hypothesis, method, and analysis plan on the OSF (https://doi.org/10.17605/OSF.IO/AN7H5).

Method

Participants and Design

We recruited 200 British participants via the online platform *Prolific Academic* (M_{age} = 33.42 years, SD_{age} = 10.93; 148 females, 47 males, three participants indicated "other" as their gender, and two preferred not to indicate their gender). In line with our preregistered exclusion criteria, we excluded five participants because they switched multiple times back and forth between immediate and delayed outcomes in the temporal discounting task, making it impossible to calculate a single indifference point. This led to a final sample of 195 participants. For our hypothesis, the minimum effect size to consider the observed effect as relevant is g = 0.36.

The experiment had a one-factorial between-participants design, with Financial Resources (savings, losses-and-shock) as single factor. As in previous experiments, participants' indifference point in the temporal discounting task was the dependent measure.

Procedure

The procedure was similar to our previous experiments, with the following changes: At the start of the Household Task, all participants were instructed that, during the task, they might experience a change in their income once or not at all. Then, after round five of the Household Task, participants were informed that a new collective bargaining agreement had been reached. For participants in the savings condition, the outcome stated that there were no changes to their salary. Thus, the savings condition was basically the same as in Experiment 1 and 2. For participants in the losses-and-shock condition, the outcome of the collective bargaining agreement stated that they would receive a one-time payment of +£2,160. At the time of the collective bargaining agreement, they had accumulated average debts of approximately -£875. The size of this positive income shock was such that participants in both conditions ended the Household Task with a similar amount of savings (approx. +£1,110). Then, participants completed the discounting measure with gain framing (i.e., receiving £250 today or a larger amount in the future). In an experiment conducted for a different project, we used the same

experimental manipulation together with the debts condition from Experiments 1 and 2. Results of the manipulation check (similar) showed that this manipulation successfully induced an experience of financial scarcity, similar in strength to the manipulation from Experiment 1 and 2 (see online supplement on the OSF).

The average completion time of the study was 22 minutes. Participant payment was the same as in previous experiments.

Results and Discussion

Contrary to our hypothesis, a two-sided *t*-test indicated that the indifference point was not significantly higher in the losses-and-shock condition (n = 98, M = 333.67, SD = 52.21) than in the savings condition (n = 97, M = 324.74, SD = 51.21), $t(193) = 1.21$, $p = .228$, $g = 0.17$. Thus, as compared to accumulating savings, accumulating losses and receiving a positive income shock did not significantly increase temporal discounting. This result did not support our hypothesis that the experience of financial scarcity throughout the task also increases discounting when controlling for available financial resources. The finding of this experiment therefore failed to provide evidence for a mindset effect of financial scarcity.

We see two potential reasons for this. First, it is possible that financial scarcity only increases discounting when financial resources are lacking (as in Experiment 1 and 2) but not when financial scarcity is manipulated merely as a mindset. This would suggest that financial scarcity only increases discounting in so far that it is a rational response to the present concern of lacking financial resources. Following this, as soon as financial problems are resolved, discount rates would revert to baseline level. Second, it is possible that the (manipulated) experience of financial scarcity induced a scarcity mindset that could have increased discounting as hypothesized, but which was subsequently overruled by the positive income shock. While in the losses-and-shock condition the losses per round were considerable, the income shock was so high that participants ended the task with a large amount savings (more than £1,000). In addition, the timing of the shock was such that it occurred shortly before the discounting task. Together, the size and timing of the shock might have induced a feeling of relief and thereby overruled the psychological impact of the debts in the previous rounds. This would be in line with findings from field experiments showing that debt relief reduces discounting (Ong et al., 2019). Moreover, the debts might have even served as a reference point for participants, such that they evaluated the same financial situation even more positively than participants in the savings condition while making the discounting decisions (Tversky & Kahnemann, 1991). Therefore, we conducted an additional experiment in which we adjusted the timing and size of the income shock while keeping available resources constant between conditions.

Experiment 4: Scarcity Mindset and Early Income Shock

In Experiment 4, we administered the income shock in an earlier round and also changed the amount of savings and losses for both conditions, such that participants ended the task with a smaller

amount of savings on their final balance. We hypothesized that participants who accumulate debts and receive a positive income shock in an earlier round of the Household Task would have a higher discount rate than participants who accumulated savings throughout the task. This was based on the prediction that after receiving the income shock, participants in the losses-and-shock condition would lose money each round and plunge through their savings, inducing a scarcity mindset. We preregistered our hypothesis, method, and analysis plan on the OSF (https://doi.org/10.17605/OSF.IO/W2TNM).

Method

Participants and Design

We recruited 300 British participants via the online platform *Prolific Academic* (M_{age} = 41.76 years, SD_{age} = 14.25; 177 females, 120 males, three participants indicated "other" as their gender). In line with our preregistered exclusion criteria (see above), we excluded one participant. This led to a final sample of 299 participants. For our hypothesis, the minimum effect size to consider the observed effect as relevant is g = 0.29. The experiment followed the same design as Experiment 3.

Procedure

The procedure was similar to the previous study, except that in the savings condition, participants earned approximately +£20 per round. In the losses-and-shock condition, participants accumulated losses of approximately -£230 per round. The income shock was framed similarly as in Experiment 3 but administered after the first round. In the losses-and-shock condition, participants received a positive income shock (windfall) of +£1,500. Consequently, both conditions finished the task with a final balance of approximately +£120. While in the savings condition, gains were accumulated slowly but steadily, participants in the losses-and-shock condition experienced heavy losses to their balance every round, reducing the savings they had received from the income shock.

The average completion time of the study was 24 minutes. Participant payment was the same as in previous experiments.

Results and Discussion

Contrary to our hypothesis, a two-sided t-test indicated that the indifference point in the losses-and-shock condition (n = 153, M = 337.65, SD = 55.58) was not significantly higher than in the savings condition (n = 146, M = 332.33, SD = 53.83), $t(298) = 0.84$, $p = .402$, g = 0.10. Thus, as compared to accumulating savings, accumulating losses and receiving a positive income shock did not significantly increase temporal discounting.

As for Experiment 3, this result did not support our hypothesis that the experience of financial scarcity increases discounting when controlling for available financial resources. In contrast to Experiment 3, this null finding cannot be explained by the timing and size of the income shock or the psychological effect of a negative reference point. Therefore, a remaining explanation for this null finding is that only a lack of available resources leads to a rational response such that present financial

concerns are met with increased discounting. When controlling for available resources, the experience of financial scarcity itself might not increase discounting.

However, it is also possible that the framing of the experiment might have given participants a sense of closure, such that a potential effect of a scarcity mindset was overruled. When making the discounting decision, participants were explicitly informed that the last round of the Household Task had passed. This might have given participants a sense of closure, as they finished the task while avoiding to get into debts. As a result, they might have closed a mental account with small savings for the Household Task and then moved on to the discounting decisions (see also Thaler, 1985).

To further investigate the roles of lacking resources and cognitive closure for the discounting effect, we conducted an additional experiment. If lacking financial resources at present increases discounting while a mere scarcity mindset does not, one could expect that anticipating a lack of financial resources in the future would also increase discounting, even if current available resources are controlled for.

Experiment 5: Scarcity Mindset and Endowment

In Experiment 5, all values for income and expenses stayed the same as in Experiment 4. However, instead of receiving an income shock, participants in the endowment-and-losses condition (see below) now started the Household Task with an endowment of +£1,500. In addition, to avoid giving participants a psychological sense of closure and avoid end-of-task effects, we changed the instructions such that participants were not explicitly informed that the task had ended at the time they made the discounting decision. Last, we extended the scale of the discounting measure to give participants a broader range to indicate their indifference point.[10] We hypothesized that participants who received a positive endowment and then accumulated losses throughout the Household Task would have a higher discount rate than participants who accumulated savings throughout the task. We preregistered our hypothesis, method, and analysis plan on the OSF (https://doi.org/10.17605/OSF.IO/MJUQC).

Method

Participants and Design

We recruited 302 British participants via the online platform *Prolific Academic* (M_{age} = 38.66 years, SD_{age} = 14.54; 219 females, 79 males, 3 participants indicated "other" as their gender, and one preferred not to indicate their gender)[11]. In line with our preregistered exclusion criteria (see above), we excluded ten participants. This led to a final sample of 292 participants. For our hypothesis, the minimum effect size to consider the observed effect as relevant is g = 0.29. The experiment followed the

[10] Data exploration from the results of Experiments 3 and 4 indicated that 27 and 59 participants, respectively, scored the highest indifference point that the scale could assess. This may have restricted the variance on the dependent measure (see online supplement on the OSF).

[11] We aimed to recruit 300 participants, but two participants did not finalize their submission on prolific after finishing their participation. This led to an automatic refill of two additional participants.

same design as Experiment 4. Participants were randomly allocated to either the endowment-and-losses condition or the savings condition.

Procedure

We adapted the debts-and-shock condition from Experiment 4 to an endowment-and-losses condition. That is, instead of receiving an income shock of +£1,500 during the task, participants in the endowment-and-losses condition started the task with an endowment of +£1,500. The savings condition remained the same as in the previous experiment. In addition, we adapted the instructions of the task such that participants were not told the exact number of rounds of the Household Task. Thus, when they completed the discounting measure, they were not informed explicitly that the last round of the Household Task had passed already. Last, we added five binary hypothetical decisions to the discounting task to allow participants to indicate a wider range of time preferences (participants could now also indicate their preference between earning £250 today and £510, £490, £470, £450, and £430 in a year).

The average completion time of the study was 24 minutes. Participant payment was the same as in previous experiments.

Results and Discussion

In line with our hypothesis, a two-sided *t*-test indicated that the indifference point in the endowment-and-losses condition (n = 148, M = 384.32, SD = 95.32) was significantly higher than in the savings condition (n = 144, M = 355.14, SD = 87.62), $t(290) = 2.72$, $p = .007$, $g = 0.32$. Thus, even though participants in the endowment-and-losses condition had the same balance as participants in the savings condition when making the discounting decision, they showed stronger temporal discounting. This finding suggests that participants in Experiments 1 and 2 did not show higher discounting simply because they felt liquidity constraint. Next, contrary to Experiments 3 and 4, participants in the endowment-and-losses condition made their discounting decision without knowing that the Household Task had ended. Instead, they could reasonably expect that the pattern of repeated losses per round would continue and that they might therefore get into debts in the next round. Participants could thus anticipate a negative balance in the future. This suggests that participants might have adjusted their temporal preferences based on expected financial problems in the future.

General Discussion

Here, we showed that financial scarcity increases temporal discounting. In the pilot, we found that the Household Task can be used to induce financial scarcity in an experimental setting. In Experiment 1, we found support for our hypothesis that financial scarcity increases discounting in the domain of gains. In Experiment 2, we replicated this finding and extended it to discounting of losses. Together, the two experiments showed that when people lack needed financial resources (i.e., they have household debts), they focus more on short-term consequences of their decisions. The magnitude of these effects was substantial: From participants' indifference points, we calculated the highest interest

rate participants would be willing to pay to borrow money from the future[12]. Regarding gains, participants with resource scarcity (i.e., who had household debts) devalued hypothetical future outcomes with a yearly interest rate between 37% and 41%, whereas participants with sufficient financial resources did so with a yearly interest rate of 28% (Experiment 1 and 2). Regarding losses, participants with resource scarcity devalued hypothetical future outcomes with a yearly interest rate of 18%, whereas participants with sufficient financial resources did so with a yearly interest rate of 3% (Experiment 2). We had also hypothesized that financial scarcity would increase the discounting of losses more strongly relative to the discounting of gains (Experiment 2). However, the findings did not support this hypothesis. Experiments 3 and 4 failed to provide evidence for a similar effect when participants experienced financial scarcity while the available resources were constant between conditions. Thus, when experiencing scarcity but having sufficient resources available, there was no evidence for increased discounting. In Experiment 5, we found that even when resources were positive and constant between conditions, differences in the predicted financial future might have led to differences in discounting. That is, discounting might have increased because participants were expecting future debts compared to future savings. Taken together, the pattern of results from our five experiments suggests that when experiencing scarcity, discounting increases as a response to a current or anticipated future shortcoming of available financial resources, but there was no effect of scarcity per se. That is, we did not find evidence that discounting increased when a scarcity mindset was induced in isolation.

This pattern of results is informative for financial scarcity theory, which initially has put a strong emphasis on sub-optimal effects of financial scarcity on decision-making and cognition (e.g., Mani et al., 2013; Vohs, 2013; see also, Dang et al., 2015). However, in our experiments, we only found evidence for increased discounting when it might have been optimal in terms of rational choice but not when it would have been sub-optimal in these terms. When experiencing scarcity, participants only showed increased discounting when there was a current shortcoming in financial resources. In this instance, it is possible that a focus on the present can lead to better outcomes in the future, because potential benefits of a long-term focus might not materialize (Mischel, 1974; Tomlin et al., 2015). Thus, our findings are in line with contentions that financial scarcity might lead to an adaptive response in an unfavorable environment (Frankenhuis & Nettle, 2019) and that it might align behavior with predictions of a rational choice model (Shah et al., 2015, 2018).

Our findings also corroborate and extend previous correlational and field research on financial hardship and temporal discounting (e.g., Bos et al., 2016; Carvalho et al., 2016; Falk et al., 2018). Our experimental findings add to the literature by providing additional causal evidence for an effect of

[12] While the outcome of the Household Task was incentivized, these results were obtained using a hypothetical discounting task. Yet, previous studies showed that discounting functions similarly for real and hypothetical rewards and that hypothetical discounting tasks are ecologically valid (Johnson & Bickel, 2002; Lagorio & Madden, 2005; Locey et al., 2011).

financial scarcity on temporal discounting. Of the few previously conducted experiments in the literature, one found that financial scarcity only increased temporal discounting when participants experienced a negative 'income shock' (i.e., lost a large amount of money unexpectedly) and not when they were relatively poor throughout the whole experiment (i.e., had less money than others; Haushofer & Fehr, 2019). In Experiment 1 and 2, we also found an effect of financial scarcity on discounting when participants became gradually indebted, while Experiment 5 provided evidence for such an effect when participants gradually lost their savings and could expect future debts. Thus, for a discounting effect to appear, we think it is necessary that the need of having sufficient resources is seriously threatened. This might be the case when experiencing a negative income shock as previous research has shown (Haushofer & Fehr, 2019), or when losing money while having to pay one's expenses, as our current research indicates, but not when simply having less than others (i.e., relative scarcity). Relatedly, our findings add to the literature by showing that financial scarcity increases discounting in the context of problematic household finances. Previous experiments found this effect with different methods, namely when participants could borrow turns from future rounds of an experimental task (Shah et al., 2012, 2018) and in the context of economic exploitation by others (Haushofer et al., 2018).

Avenues for Future Research

With the Household Task, we were able to induce financial scarcity in an experimental setting, which was associated with the experience of stress and feelings of financial worry and lack of control. Thus, the paradigm allows researchers to simulate a problematic financial situation in a fully controlled environment, which participants experience as immersive and threatening. This is a valuable addition to the field of financial scarcity, given that a recent empirical audit and review found that there was only little evidentiary value within the published experimental studies in the field of financial scarcity (O'Donnell et al., 2021). The authors conducted 20 replications of studies that used experimental manipulations of financial scarcity, of which only four yielded significant results. They conclude that "although many replications failed to find evidence for the psychological consequences of primed scarcity, real-life scarcity likely has many antecedents and consequences" (O'Donnell et al., 2021, p. 3). The authors thus point towards the currently available experimental methods as most likely explanation for the surprisingly large number of failed replications. We agree that for researchers in the field of financial scarcity, it is a non-trivial challenge to translate the threatening experience of lacking needed financial resources from real-life into the laboratory (for a discussion on this, see also Hilbert et al., 2022b). Interestingly, O'Donnell and colleagues (2021) point out that the most promising approach to study effects of financial scarcity in experiments was to "prime participants with some type of financial constraint and then requiring them to engage in a financial or consumer decision task under these constraints" (p. 3).[13] The Household Task can be used to do just this. We think that it is therefore a

[13] We note that this conclusion is also in line with the pattern of results from our experiments, as our manipulation only affected discounting when varying (anticipated) financial constraints. Moreover, we found additional support for this conclusion in an earlier experiment that showed no effect of financial scarcity on temporal discounting

valuable additional experimental paradigm for the field of financial scarcity research––a field that is still in the process of assembling a reliable toolkit to test its theory in the laboratory.

In the current research, we used a constrained version of the Household Task, meaning that participants had limited options of making financial decisions. For example, they were not able to work extra shifts to generate more income and could not decide to cut expenses or delay their payment. We chose such a constrained version of the paradigm to establish it as a strong and consistent manipulation of financial scarcity. An important advantage of the Household Task, however, lies in the flexibility of its design. The paradigm could easily be adapted for future studies to investigate a wide range of behavioral, cognitive, or emotional effects of financial scarcity. For example, building on longitudinal findings showing that financial scarcity and financial avoidance increase alongside each other (Hilbert et al., 2022b), one could investigate the underlying causal mechanism of this temporal association by giving participants the opportunity to avoid or delay the payments of their expenses within the Household Task. In addition, one could use various kinds of tasks as work shifts (i.e., effort tasks, cognitive tasks) and test whether the performance during these tasks is affected by financial scarcity. The experimental manipulation could also be adapted to test the effects of various economic stressors. For example, building on existing field studies showing that financial hardship reduces the effectiveness of job search (Gerards & Welters, 2022), one could manipulate job security or employment status and investigate this effect under laboratory control. In addition, one could manipulate the volatility of the expenses and study effects of economic uncertainty on household decision-making.

Last, future research could further investigate potential underlying mechanisms explaining the effect of financial scarcity on temporal discounting. Besides financial scarcity theory, financial problems might lead to a decreased connectedness with the future self (Hershfield & Bartels, 2018; Hershfield et al, 2011) or a constricted scope of reference (Frederickson, 2004), which might mediate the effect of financial scarcity on temporal discounting. A better understanding of the psychological mechanism underlying the effect of financial scarcity on temporal discounting might further inform researchers and policy makers for potential leverage points of policy interventions.

Conclusion

When having trouble to make ends meet, people experience financial scarcity. Here, we investigated whether this experience of financial scarcity increases temporal discounting. To do so, we developed an experimental paradigm that allows to study causal effects of financial scarcity in the context of problematic household finances. We found that when having household debts, temporal discounting increases, both for the discounting of gains and losses. We did not find evidence for increased discounting when inducing a scarcity mindset while keeping available resources positive (i.e.,

when participants made the discounting decisions after the "financial constraint was lifted". That is, participants first did the Household Task and then completed a discounting measure that was unrelated (this was also explicit in the instructions; see online materials on the OSF for working paper, open materials, open data and preregistration).

without debt) and constant between conditions. However, when experiencing scarcity and expecting to become indebted, discounting increased as well. Taken together, these findings suggest that the effect of financial scarcity on temporal discounting is based on a (rational) response to pressing financial concerns. When these concerns are resolved, the experience of scarcity does not seem to increase discounting.

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Chapter 3

The prospective associations between financial scarcity and financial avoidance

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The Prospective Associations between Financial Scarcity and Financial Avoidance

When being poor or having debts, people can experience financial scarcity (Mullainathan & Shafir, 2013). Financial scarcity is characterized by the subjective experience of lacking financial resources to cope with demands (Shah et al., 2012). This can be stressful and elicit a range of cognitive, affective, and behavioral responses (Blascovich, 2008; Cundiff et al., 2020; Haushofer & Fehr, 2014; Lazarus & Folkman, 1984; Sheehy-Skeffington & Rea, 2017). When experiencing financial scarcity, pressing financial problems capture attention, while other important matters tend to be neglected (Shah et al., 2012). In addition, financial scarcity impedes cognitive function (Mani et al., 2013; but see Wicherts & Scholten, 2013), induces worry, depression, and anxiety (De Bruijn & Antonides, 2020; Ridley et al., 2020), and increases temporal discounting (Haushofer & Fehr, 2014, 2019; Hilbert et al., 2022a) and risk aversion (Haushofer & Fehr, 2014; but see Dalton et al., 2020)

In the current study, we examine the temporal relation between financial scarcity and financial avoidance. More specific, we posit that financial scarcity is related to an increase in financial avoidance over time, which, in turn, is related to an increase in financial scarcity over time. We build this reasoning on the aforementioned research combining financial scarcity and stress. That is, we conceptualize financial scarcity as a psychological state in which an appraisal of threat (i.e., shortage of money) is combined with the perceived inability to adequately deal with this threat (i.e., a lack of control of one's financial situation). This state elicits ruminative thoughts and worry, as well as a short-term focus (see also, Van Dijk et al., 2022). We refer to financial avoidance as a range of different behaviors where people avoid dealing with their financial situation (cf. financial homo ignorans, Tinghög et al., 2023). These include avoiding to learn information, decision avoidance, and failing to act according to one's goals (Anderson, 2003, 2006; Gigerenzer & Garcia-Retamero, 2017; Goleman et al., 2017; Hertwig & Engel, 2016; Karlsson et al., 2009; Steel, 2007).

While financial scarcity and financial avoidance have not been linked directly, several findings suggest that they should affect each other. When being in a situation of financial scarcity, it is important to approach one's financial problems and to try to solve them. Not dealing with one's problematic finances (e.g., not opening a letter, not paying a bill) may come with the risk of worsening the situation. This risk is especially high for those who lack financial resources because they do not have financial safety nets and therefore have a smaller margin for error (Bertrand et al., 2006). Research in health psychology has shown that when avoidance imposes a high personal risk, people are more likely to approach the problem (Sweeny et al., 2010). For example, when the perceived personal risk for breast cancer is high, women are more likely to sign up for screening mammograms (Aiken et al., 1994; McCaul et al., 1996). In addition, research on selective exposure to information suggest that negative information is more likely to be approached if it can help to reach one's goals (Hart et al., 2009). Thus, one could expect that financial scarcity increases the likelihood to engage with one's finances, because avoidance carries the risk of higher costs.

We predict, however, that people who experience financial scarcity will avoid rather than approach their financial situation. First, threatening stimuli are generally avoided (Elliot, 2006), especially when threat-managing resources are lacking (Howell et al., 2014, Sweeny et al., 2010). Thus, when money is scarce and dealing with one's finances becomes stressful and threatening (Shah et al., 2012, 2018), the tendency to avoid dealing with one's financial situation might increase as well. Relatedly, research from several domains indicates that when perceived control about potential consequences of negative information is low, the tendency to avoid such information increases (Sweeny et al., 2010).[14] For example, when a serious disease is described as untreatable compared to treatable (i.e., uncontrollable vs. controllable), people are less willing to be tested for it (Dawson et al., 2006). Likewise, people are more likely to remain passive and fail to follow up on their intentions if they experience low control (Fishbein & Ajzen, 2009; Sheeran, 2002) and are more likely to procrastinate tasks when they have low self-efficacy solving them (Steel, 2007). Relatedly, feeling financially insecure decreases the likelihood to engage in challenging tasks (Banker et al., 2020). In line with these findings, we posit that when people experience low control over their financial situation, they are more likely to avoid negative financial information.

Next, information is frequently avoided when it is expected to induce negative emotions (Sweeny et al., 2010). When experiencing financial scarcity, financial information reminds people of their financial problems (Shah et al., 2018). This can induce negative emotions and stress (Haushofer & Fehr, 2014), which might lead to avoidance of the financial information. For example, when financial information induces shame, people are more likely to avoid it and disengage from their finances (Gladstone et al., 2021). In addition, financial scarcity frequently leads to financial rumination and worry (De Bruin & Antonides, 2020). Both ruminative thoughts and worry concern the engagement in self-focused, repetitive, negative thoughts and can lead to the perception that one's problems are unsolvable (Lyubomirsky et al., 1999; Nolen-Hoeksema et al., 2008).[15] This perception frequently results in passivity and failures to act upon one's intentions to solve the problem at hand (Nolen-Hoeksema et al., 2008). Thus, while financial scarcity might direct attention to one's financial problems, it may do so in an obsessive but passive way, especially when financial problems are enduring (Kane, 1987).

Last, the experience of financial scarcity increases short-term focus (Haushofer & Fehr, 2014, 2019; Hilbert et al., 2022a). A short-term focus may further increase financial avoidance. Dealing with problematic household finances is often an aversive task that has to be done first, before potential positive consequences of taking action can be realized later (Goleman et al., 2017). Thus, a stronger short-term focus puts a heavier weight on the immediate disutility derived from dealing with one's

[14] We note that lack of control might also lead to approach motivation in the short-term (Greenaway et al., 2015). However, as these authors state, this does only apply when lack of control is not chronic and taking action has a realistic chance to restore control. The longer the experience of low control, the more likely people become avoidant and end up in a state of learned helplessness (Kane, 1987).

[15] Rumination and worry are closely related concepts with similar effects on cognition, motivation, and emotion. For a detailed comparison between the two concepts, see Nolen-Hoeksema et al. (2008).

financial problems, while the delayed utility derived from the positive consequences of taking action is more strongly discounted (Zhang & Feng, 2020). This is corroborated by findings that procrastination is more likely for aversive tasks (Steel, 2007), and that people delay making decisions when they have to decide between options with negative consequences (Dhar & Nowlis, 1999).

Taken together, we propose that when experiencing financial scarcity, the decision whether to engage or avoid with one's finances is based on a utility judgement. On the one hand, engaging with one's finances can help to reduce the personal risks that one's financial situation deteriorates even further. In addition, engaging with one's finances might help to reach personal goals in the long term. On the other hand, doing so causes negative emotions in the short term. Moreover, to feel able to reduce risks and reach goals, one needs to perceive that one is in control of one's financial situation and that one is able to cope with the demands the engagement with one's finances might pose. Yet, these crucial prerequisites are frequently lacking when experiencing financial scarcity. Last, potential long-term benefits of taking action might be discounted. Therefore, we propose that financial scarcity will be associated with an increase in subsequent financial avoidance.

In turn, while avoiding to deal with one's problematic financial situation can be a coping mechanism to relieve stress in the short term, it might increase financial scarcity. For instance, when in financial arrears, avoiding to deal with one's finances can lead to an accumulation of interest or late payment fees, for which there is little economic buffer (Bertrand et al., 2006). Thus, financial avoidance might increase the experience of financial scarcity by directly exacerbating a problematic financial situation.

Moreover, financial avoidance might increase feelings of lack of control over one's financial situation. After not having dealt effectively with a financial problem, people might perceive their situation to have become even more difficult to manage. This is supported by literature on inaction inertia, that shows that people become more avoidant after having missed an initial opportunity to act (Van Putten et al., 2013). After avoiding to engage with their finances for a longer time and thereby failing to effectively deal with their financial problems, people might also develop a state of learned helplessness regarding their financial situation (see for an overview, Mikulincer, 2013). Thus, avoiding to deal with one's finances might also increase financial scarcity by changing the appraisal of one's financial situation.

The Present Research

In the current study, we examine the prospective associations between financial scarcity and financial avoidance. We hypothesize that the experience of financial scarcity is related to an increase in subsequent financial avoidance (Hypothesis 1). In addition, we hypothesize that financial avoidance is related to an increase in subsequent experienced financial scarcity (Hypothesis 2). To test these hypotheses, we conducted a longitudinal study that included a large, representative sample of adult Dutch citizens. We measured financial scarcity and financial avoidance in two waves and used a cross-lagged panel model to analyze the data—a technique that allows testing the prospective effects between

two variables, while controlling for their autoregressive effects (Kearney, 2017). Thus, building on the existing literature, the present research contributes to theories on financial scarcity and financial avoidance by investigating their temporal associations over time in a representative sample of the Dutch population. We preregistered our longitudinal hypotheses and analysis plan after analyzing data for wave 1, but before collecting data for wave 2 (https://osf.io/9yjm6). We report all measures, analyses, and exclusion criteria. All data, analysis codes, and materials are available on the Open Science Framework (OSF; https://osf.io/zmh5n/).

Method

Participants and **Design**

Participants were recruited from the LISS panel (Longitudinal Internet studies for the Social Sciences), which is administered by CentERdata of Tilburg University (Netherlands). The LISS panel consists of approximately 7,500 members from 5,000 different households. Households included in the panel are a true probability sample of Dutch households drawn from the population register. The panel provider assures that its samples are representative of the Dutch population by various measures, for example by providing households with an internet connection or a computer if they would not have one themselves (for more information, see https://www.lissdata.nl/about-panel). The LISS Panel has received the Data Seal of Approval (DSA) by the International Science Council.

Data was collected in April 2018 (wave 1; t1 = 0 months) and February 2020 (wave 2; t2 = 22 months). At t1, 1,497 panel members were selected for participation by the panel provider to form a representative sample of the Dutch population, whereof 1,122 members responded. With 8 incomplete responses this led to a sample of N = 1,114 for the first wave. At t2, 993 respondents of the first wave were still active panel members, and these members were invited for the second wave. This resulted in 837 panels members completing both questionnaires at t2.[16] This final sample consisted of 450 females and 387 males, with a mean age of 54.4 years (SD = 16.9) and a mean monthly net income of €1785 (SD = €906). Participants who remained in the sample did not differ from participants that dropped out, with regards to their gender and income (see Appendix, Table I). Also, they did not differ in their scores on the financial scarcity and financial avoidance measures. However, participants remaining in the sample were significantly older (M = 54.4 years) than participants who dropped out (M = 48.6 years), $t(427) = 4.49$, $p < .001$. This increased the average age of the remaining sample by 1.4 years. Yet, we assume that overall, our final sample is representative of the adult Dutch population and that our results are generalizable. The panel provider compensates participants based on a rate of €15 per hour.

[16] Originally, we had planned and pre-registered to collect three waves of data for this project. However, the COVID-19 pandemic with its psychological and economic consequences hit the Netherlands after the second wave of data collection. Therefore, we decided to exclude the third wave of data collected in August 2020 from the analyses in the present research. We will report the results including the third wave together with additional data in a forthcoming paper specifically focusing on the impact of the COVID-19 pandemic on financial scarcity. Yet, preliminary analyses suggest that the results generally replicate for the time interval between wave 2 and 3 and also hold when constraining the model parameters to be equal across time intervals (see open data and analysis code; https://osf.io/zmh5n/).

Measures

For both waves, participants were asked to complete a set of questionnaires on financial scarcity and financial avoidance (see Table 1 for a list of all items).[17]

Financial Scarcity

To assess their experienced financial scarcity, participants first completed the Psychological Inventory of Financial Scarcity (PIFS; Van Dijk et al., 2022). The PIFS is a self-rating scale that captures financial scarcity through self-assessments of subjective perceptions of one's financial situation and affective and cognitive responses to these appraisals. The PIFS is based on a conceptualization of financial scarcity that combines a psychological stress framework (e.g., Cundiff et al., 2020) with the 'attentional focus and neglect' theory of scarcity (Mullainathan & Shafir, 2013). Financial scarcity is regarded as a situation in which pressing financial concerns are appraised as exceeding available resources, that, in turn, evoke affective and cognitive responses that typify attentional narrowing and neglect.

On the basis of this conceptualization, the PIFS includes four subcomponents measured with three items each on 7-point Likert scales (1 = *completely disagree*; 7 = *completely agree*). All items are displayed in Table 1. The first subcomponent concerns an appraisal of shortage of money, which is perceived as a threat (items FS_{SoM1}, FS_{SoM2}, FS_{SoM3}). The second subcomponent concerns an appraisal of lack of control over one's financial situation, which is the perceived inability to adequately deal with that threat (items FS_{LoC1}, FS_{LoC2}, FS_{LoC3}). The other two subcomponents of the PIFS concern responses to the two included appraisals. Financial rumination and worrying is included as an affective response (items FS_{FWR1}, FS_{FWR2}, FS_{FWR3}), whereas a short-term focus is included as a cognitive response (items FS_{STF1}, FS_{STF2}, FS_{STF3}).

For both waves, the PIFS showed high internal consistency (α_{t1} = .93, α_{t2} = .94). To provide a validation of the PIFS for the present research, we conducted an Exploratory Factor Analysis (EFA) with direct oblimin rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = .94) and Bartlett's test of sphericity, $\chi^2(66) = 8514$, $p < .001$, suggested that the correlation structure was factorable. Results of the EFA indicated a one-factor solution, which explained 56.9% of the total variance.

As a next step in the examination of the underlying structure of the PIFS, we conducted a Confirmatory Factor Analysis (CFA). We compared two different models; a one-factor model encompassing all 12 items (FS_{total}) and a four-factor model that differentiated between each of the four subcomponents of the PIFS (Factor 1: Shortage of Money, $FS_{SoM1\text{-}3}$; Factor 2: Lack of Control, $FS_{LoC1\text{-}3}$; Factor 3: Financial Rumination and Worry, $FS_{FRW1\text{-}3}$; Factor 4: Short-Term Focus, $FS_{StF1\text{-}3}$). Results showed that the one-factor model had good absolute fit, $\chi^2(54) = 858$, $p < .001$. Comparative fit indices

[17] The current study was combined with a study on financial scarcity and social exclusion (Doolaard et al., 2021). For reasons of efficiency and transparency, both studies were pre-registered jointly.

indicated that a single factor solution was adequate, CFI = .91, TLI = .88, RMSEA = .12, 95%CI [.11, .12]. The four-factor model showed even better fit, $\chi^2(6) = 507.5$, $p < .001$, CFI = .96, TLI = .95, RMSEA = .08, 95% CI [.07, .08].

Based on these results, we decided to conduct all relevant analyses for both the total scale (FS_{total}) and its four subcomponents (FS_{SoM}, FS_{LoC}, FS_{FRW}, FS_{STF}). In our pre-registration, we only addressed analyses with the total scale, so the added analyses should be considered as exploratory.

Financial Avoidance

Next, participants completed our measure of financial avoidance (FA), consisting of eight items on 7-point Likert scales (1 = *completely disagree*; 7 = *completely agree*). In line with the concept of the financial homo ignorans (Tinghög et al., 2023), financial avoidance is conceptualized as an underlying motivation to avoid dealing with one's finances. This motivation can manifest in various avoidant behaviors. Here, financial avoidance is captured by two subcomponents assessed with four items each. The first subcomponent concerns the delay of making financial decisions (items FA_{DFD1}, FA_{DFD2}, FA_{DFD3}, FA_{DFD4},) and is based on a conceptualization of decision avoidance and choice deferral theories (Anderson, 2003, 2006; Dhar & Nowlis, 1998). The second subcomponent concerns the avoidance of financial information (items FA_{AFI1}, FA_{AFI2}, FA_{AFI3}, FA_{AFI4}) and is based on a conceptualization of information avoidance theories (Gigerenzer & Garcia-Retamero, 2017; Goleman et al., 2017; Hertwig & Engel, 2016; Sweeny et al., 2010).

For both waves, the financial avoidance measure showed high internal consistency ($\alpha_{T1} = .90$, $\alpha_{T2} = .91$). To provide further validation of our 8-item Financial Avoidance (FA) scale, we conducted an EFA with direct oblimin rotation. The Kaiser-Meyer Olkin measure of sampling adequacy (KMO = .91) and Bartlett's test of sphericity, $\chi^2(28) = 5193$, $p < .001$, suggested that the correlation structure was factorable. Results of the EFA indicated a one-factor solution, which explained 59.8% of the total variance.

As a next step in the examination of the underlying structure of the financial avoidance measure, we conducted a Confirmatory Factor Analysis (CFA). We compared two different models; a one-factor model encompassing all eight FA items (FA_{total}) and a two-factor model that differentiated between the two sub-components of the FA scale (Factor 1: Delaying Financial Decisions, FA_{DFD1-4}; Factor 2: Avoiding Financial Information, FA_{AFI1-4}). Results showed that the one-factor model had good absolute fit, $\chi^2(20) = 738$, $p < .001$. Comparative fit indices, however, indicated that a single factor solution was not adequate, CFI = .86, TLI = .81, RMSEA = .18, 95% CI [.17, .19]. These indices missed conventional cut-offs for appropriate model fit (Bentler & Bonett, 1980; Hu & Bentler, 1999), but we note that reliance on cut-off criteria for fit indices is generally debated (Marsh et al., 2004). In the present research, the non-normality of the data might increase the likelihood of false negative indication of the model fit (Yu, 2002). The two-factor model showed better fit, $\chi^2(1) = 681.6$, $p < .001$, CFI = .99, TLI = .99, RMSEA = .04, 95% CI [.03, .06].

Based on these results, we decided to conduct all relevant analyses for both the total scale (FA_{total}) and its two subcomponents (FA_{DFD}, FA_{AFI}). In our pre-registration, we only addressed analyses with the total scale, so the added analyses should be considered as exploratory analyses.[18]

Table 1

Items of the Financial Scarcity and Financial Avoidance Measures

FS	*Label*	*Item*
	FS_{SoM1}	I often don't have enough money.
	FS_{SoM2}	I am often not able to pay my bills on time.
	FS_{SoM3}	I often don't have money to pay for the things that I really need.
	FS_{FWR1}	I am constantly wondering whether I have enough money.
	FS_{FWR2}	I have a hard time thinking about things other than my financial situation.
	FS_{FWR3}	I worry about money a lot.
	FS_{STF1}	I am only focusing on what I have to pay at this moment rather than my future expenses.
	FS_{STF2}	Because of my financial situation, I live from day to day.
	FS_{STF3}	I don't take future expenses into account.
	FS_{LoC1}	I experience little control over my financial situation.
	FS_{LoC2}	I am not able to manage my finances properly.
	FS_{LoC3}	When I think about my financial situation, I feel powerless.
FA	*Label*	*Item*
	FA_{DFD1}	I sometimes delay making financial decisions until it is too late.
	FA_{DFD2}	I waste a lot of time on other matters before making important financial decisions.
	FA_{DFD3}	Even financial decisions that require little else except sitting down and doing them, I find that they seldom get done for days (e.g., paying a bill, transferring money).
	FA_{DFD4}	Putting financial decisions off till the last minute has cost me money in the past.
	FA_{AFI1}	I would avoid learning how high my expenses will be next month.
	FA_{AFI2}	Sometimes it feels unpleasant to think about my financial situation.
	FA_{AFI3}	I can think of situations in which I would rather not know the exact state of my finances.
	FA_{AFI4}	I would rather not know about the consequences of financial setbacks.

Note. FS = Financial Scarcity, FA = Financial Avoidance.

Results

Statistical Analyses

To test how financial scarcity (FS) and financial avoidance (FA) relate to each other over time, we analyzed the data using a Cross Lagged Panel Model (CLPM). The CLPM is a specific structural equation model (SEM) suitable for longitudinal panel research (Kearney, 2017). It is used to test the structural relations between latent variables that are measured repeatedly and allows to test temporally dynamic associations (Selig & Little, 2012). Figure 1 depicts our cross-lagged panel model with the two latent variables (FS and FA) measured at two points in time (denoted with subscript 1 and 2).

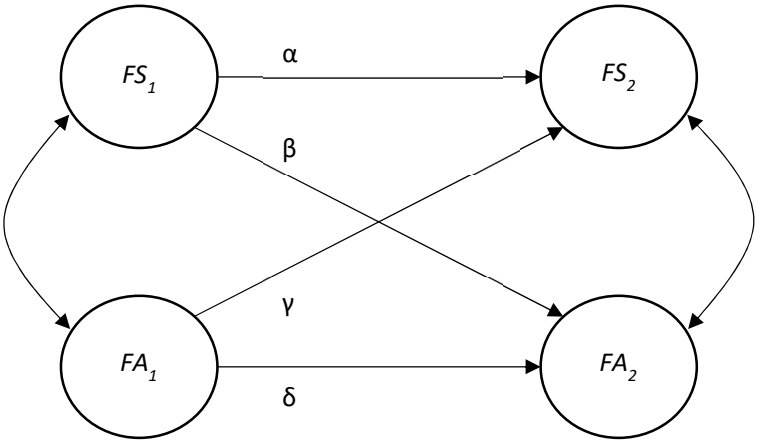
The model allows to obtain estimates for the cross-lagged effects of FS_1 on FA_2 (β) and FA_1 on FS_2 (γ), while controlling for temporal stability of the constructs (FS_1 on FS_2, α; and FA_1 on FA_2, δ). Thus, the model allows to test whether financial scarcity at t1 (FS_1) can predict financial avoidance at t2 (FA_2), while controlling for the autoregressive effect of financial avoidance at t1 (FA_1). Likewise, the model

[18] In the first wave, we had also included the behavioral inhibition and behavioral activation questionnaire (BIS BAS; Carver & White, 1994). We decided not to include this questionnaire in subsequent waves, because it does not focus specifically on a financial context, and was therefore less relevant for our research interests.

allows to test whether financial avoidance at t1 (FA_1) can predict variable financial scarcity at t2 (FS_2), while controlling for the autoregressive effect of financial scarcity at t1 (FS_1).

Figure 1

Conceptual CLPM with Financial Scarcity and Financial Avoidance Measured at two Time Points



Note. FS = Financial Scarcity, FA = Financial Avoidance.

As a specific type of SEM, the CLPM is based on the assumption of causal effects, even if it is not used to make causal claims. That is, by specifying the paths of the CLPM (straight arrows), we formulate weak causal assumptions that both FA and FS at t1 have linear, non-zero effects on both FA and FS at t2. In addition, we specify that at both time points, FS and FA have a covariance that is non-zero (curved double-arrows). In stating these causal assumptions, we follow recent developments of the methodological debate on causal inferences in non-experimental research (Grosz et al., 2020). Although our analysis cannot provide direct evidence for our causal model, if the data were not to fit the model, this could be interpreted as evidence against our specified causal model of linear effects.

Several additional assumptions underlie the cross-lagged panel model (see Selig & Little, 2012). First, factorial invariance is assumed, meaning that the psychometric properties of the items are expected to be stable over time. This should not be an issue for the present research, given that the measurement period of 22 months is not long enough to change the meaning of how the items are interpreted. Relatedly, we assume that the measurement error is stable over our measurement period and that there are no re-test effects. Next, we use a representative sample and check for selective attrition, to ensure that drop-outs are missing at random (MAR). Last, as for any statistical model based on observational data, we assume that our model is specified properly and that there are no confounding variables outside our model that might explain our cross-lagged effects. This is a challenging assumption to check (for a discussion of this issue, see Selig & Little, 2012) but based on the theoretical framework introduced above, we posit that our effects are not driven by unobserved confounds.

There are different types of CLPMs that can be analyzed to test various types of hypotheses. Here, our hypotheses concern between-participant effects of financial scarcity and financial avoidance. We test whether, compared to participants who experience less financial scarcity at t1, participants who

experience more financial scarcity at t1 have a stronger increase in financial avoidance at t2 (Hypothesis 1). Also, we test whether, compared to participants who experience less financial avoidance at t1, participants who experience more financial avoidance at t1 have a stronger increase in financial scarcity at t2 (Hypothesis 2). To test these between-participants hypotheses, a standard CLPM is most appropriate to use (Orth et al., 2020).[19]

Descriptives

Descriptives of the variables included in the model are displayed in Table 2. The data were skewed, meaning that many participants did not experience intense financial scarcity or showed much financial avoidance. Therefore, we report Spearman rank correlations in the descriptives and use bootstrapped standard errors with 10,000 samples in the CLPM to avoid biased estimates[20].

Table 2
Descriptives for Financial Scarcity and Financial Avoidance at two Waves (1, 2)

	n	*M*	*SD*	*Minimum*	*Maximum*	*Skewness*	*Kurtosis*
FS_1	1,115	1.96	1.12	1	7	1.41	1.65
FS_2	842	1.93	1.13	1	7	1.52	2.17
FA_1	1,114	1.96	1.15	1	6.75	1.30	1.10
FA_2	841	1.84	1.09	1	6.38	1.56	2.18

Note. Financial Scarcity = FS, Financial Avoidance = FA.

Table 3 shows the correlations between financial scarcity and financial avoidance as measured at the two time points. Notably, financial scarcity and financial avoidance show strong positive correlations in both waves. In addition, both measures also correlate highly with themselves at the two different points in time. This indicates that both measures were relatively stable, yet there was still sufficient variance to be explained by other factors.

[19] Some researchers have suggested that adding random intercepts to a CLPM generally improves interpretability of cross-lagged effects (RI-CLPM; Hamaker et al., 2015). In the RI-CLPM, individual differences between participants are controlled for, including only within-person changes from the person mean in the model parameters. Thus, a RI-CLPM would be suitable to test within-person hypotheses. However, given that our hypotheses concern between-person effects and our waves are measured at large time intervals, using the standard CLPM is a better fit (Orth et al., 2020). In addition, RI-CLPMs require at least three waves of data to not be oversaturated.

[20] This is a post-hoc deviation from our preregistered analysis plan we consider necessary. Running the model without bootstrapped standard errors as pre-registered yields similar results (see open materials).

Table 3
Spearman Rank Correlations of Financial Scarcity and Financial Avoidance at two Waves (1, 2)

	FS_1	FS_2	FA_1
FS_2	.67		
FA_1	.75	.61	
FA_2	.58	.71	.66

Note. All correlations are significant with $p < .001$. FS = Financial Scarcity, FA = Financial Avoidance

Cross-Lagged Panel Model

To test our hypotheses, we analyzed the data with a CLPM with 10,000 bootstrapped resamples (Table 4). The CLPM shows that experienced financial scarcity at t1 was associated with an increase of financial avoidance at t2, $\beta = .13$, $p = .023$. This effect was present while controlling for the autoregressive effect of financial avoidance at t1, $\beta = .57$, $p < .001$. Thus, as hypothesized, participants who initially experienced more financial scarcity subsequently were more avoidant in dealing with their financial situation than participants who initially experienced less financial scarcity.

Table 4
Cross-Lagged and Autoregressive Parameters for a CLPM with 10,000 Bootstrapped Resamples

Dependent variable	*Predictor*	*β*	*SE*	*z*	*p*	*95% CI*
FS_2	FS_1	.57	.05	10.60	< .001	[.46, .67]
	FA_1	.19	.05	3.53	< .001	[.09, .30]
FA_2	FS_1	.13	.06	2.27	.023	[.02, .24]
	FA_1	.57	.06	9.35	< .001	[.45, .69]

Note. Confidence intervals are based on bootstrapped standard errors using 10,000 resamples. CLPM = Cross-Lagged Panel Model.

Moreover, financial avoidance at t1 was associated with an increase in experienced financial scarcity at t2, $\beta = .19$, $p < .001$. Again, this effect was present while controlling for the autoregressive effect of financial scarcity at t1, $\beta = .57$, $p < .001$. Thus, as hypothesized, participants who initially were more avoidant in dealing with their finances subsequently experienced more financial scarcity than participants who initially were less avoidant in dealing with their financial situation.

Taken together, these findings support both our hypotheses and show that financial scarcity and financial avoidance have a positive, temporally dynamic relation with each other. This indicates that people who score high on either of the two variables at present will show a relatively stronger increase on the other variable in the future. Given that the confidence intervals of both cross-lagged effects have substantial overlap, there is no clear indication that one direction of the temporal relationship is stronger than the other. Thus, our results suggest that over time, financial scarcity and financial avoidance increase alongside each other.

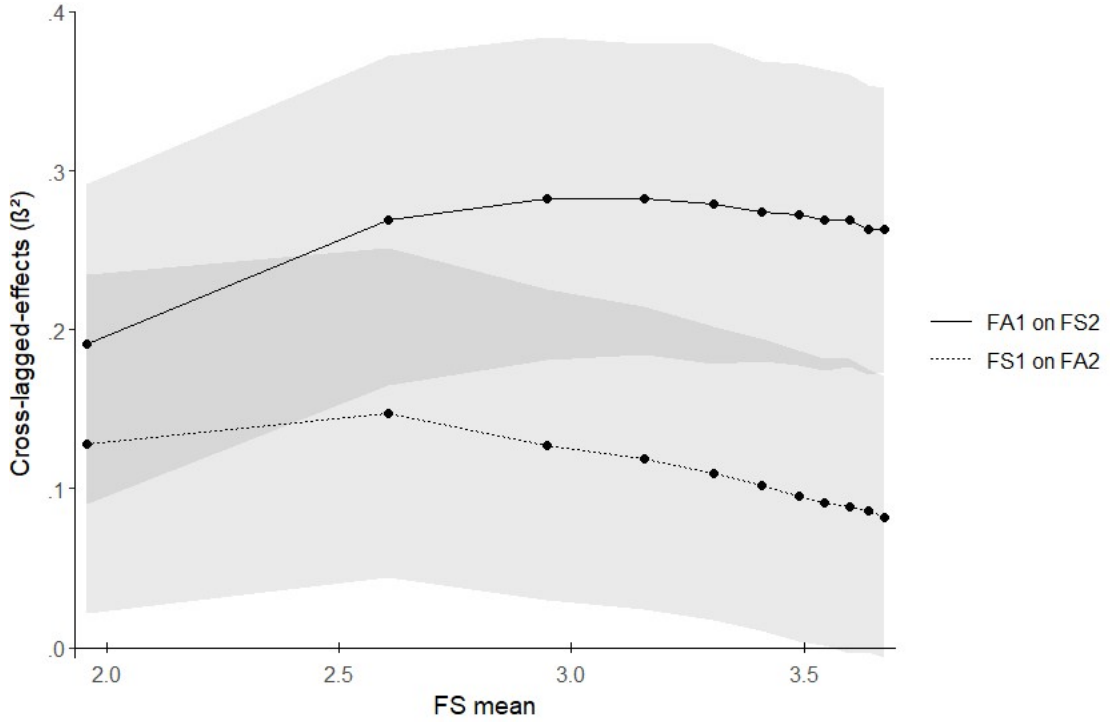
Robustness Checks

Weighted Bootstrap Re-sampling

While the representativeness of our sample allows to draw valid inferences from the results for the Dutch population, participants' scores on financial scarcity and financial avoidance were relatively low. This might limit the inferences that can be drawn for scarcity and avoidance theory. To address this issue, we conducted a robustness check in which we ran our main analysis on a range of bootstrapped re-samples, where the sampling probability for each participant was weighted based on their score on the variables included in the model. That is, participants scoring higher on financial scarcity and financial avoidance were more likely to be re-sampled. Figure 2 shows the average cross-lagged effects in 1,000 bootstrapped resamples with varying sampling weights.

Figure 2

Average Cross-Lagged Effects for a Range of 1,000 Bootstrapped Samples with Weighted Sampling Probabilities



Note. The x-axis shows bootstrapped sample means of FS.1 for each weight. The sampling probability (p) at weight (k) for each case (i) was $p_{k,i} = 1 + k \cdot FS.1_i \cdot FS.2_i \cdot FA.1_i \cdot FA.2_i$, with k = {0, 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.1}.[1] Sampling weights increase from left to right, with the leftmost dot (k = 0) representing equal sampling weights for each participant (standard bootstrap of original sample). Grey areas indicate the bootstrapped 95% CI for the cross-lagged effects. FS = Financial Scarcity, FA = Financial Avoidance.

The results show that the cross-lagged effects are robust across a wide range of weighted bootstrapped samples, including samples scoring above the midpoint of the financial scarcity and financial avoidance scale. The cross-lagged effect of financial avoidance at t1 on the increase of financial scarcity at t2 increases slightly with stronger sampling weights. At the same time, the cross-lagged effect of financial scarcity at t1 on the increase of financial avoidance at t2 decreases slightly with stronger

sampling weights, with the 95% CI including 0 for the last three sampling weights. In addition, the 95% CIs of the two cross-lagged effects do not overlap for the strongest sampling weight.

Taken together, in our view, these results support the notion that our findings are not only generalizable to the Dutch population, but also to populations of people experiencing more financial hardship. In addition, for populations scoring higher on financial scarcity and avoidance, the effect of financial avoidance on an increase in financial scarcity over time might be stronger than the other way around.

Relationship between Measures

Next, we ensured that our results were not biased by conceptual overlap of the scales. Therefore, we conducted an exploratory factor analysis (EFA) with all 20 items included in the main model (FS and FA items). Then, we excluded those items that showed the strongest overlap with the other scale and re-ran our main analysis.

We conducted an EFA with direct oblimin rotation on the 12 items of the financial scarcity measure and the 8 items of the financial avoidance items. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO = .96) and Bartlett's test of sphericity, $\chi^2(190) = 15173$, $p < .001$, suggested that the correlation structure was factorable. Results of the EFA indicated a two-factor solution, which explained 59.2% of the total variance. The first component represented the financial scarcity measure and explained 36.2% of the total variance. The second component represented the financial avoidance measure and explained 23.0% of the total variance. The components were correlated with $r = .62$.[21] Two items loaded stronger on the component that represented the other measure. Namely, item FS_{LoC2} ("I am not able to manage my finances properly.") of the financial scarcity measure loaded stronger on the financial avoidance component and item FA_{AFI2} ("Sometimes it feels unpleasant to think about my financial situation.") of the avoidance measure loaded stronger on the scarcity component (for all item loadings, see Appendix Table II).

When excluding the respective items from the main analyses, the cross-lagged effects for the association of financial avoidance at t1 with an increase in financial scarcity at t2, β = .15, *SE* = .06, *z* = 2.80, *p* = .005, 95%CI [.05, .26], and the association of financial scarcity at t1 with an increase in financial avoidance at t2, β = .12, *SE* = .05, *z* = 2.49, *p* = .013, 95%CI [.03, .22], remained unchanged. We therefore conclude that our findings were not confounded by overlapping scales.

Last, we conducted a set of nested CFAs on all 20 items included in the main analyses. Table 5 shows an overview of comparative fit indices for the nested models with increasing number of factors. The single factor solution did not show a good fit. The two-factor solution with the financial scarcity measure (FS_{Total}) and the financial avoidance (FA_{Total}) measure specified on separate factors showed better fit, but the comparative fit indices missed conventional cut-offs.[22] The three-factor solution with

[21] Note, however, that the correlation between the two scales is controlled for in the cross-lagged panel model.
[22] For a discussion on the reliance on cut-off criteria for the present research, see section 3.2.2.

the financial avoidance measure specified based on its subscales (FA_{DFD} and FA_{AFI} with FS_{Total}) and the five-factor solution with the financial scarcity measure specified based on its subscales (FS_{SoM}, FS_{LoC}, FS_{FRW}, FS_{STF} with FA_{Total}) showed good fit. The six-factor solution with both measures specified based on their subscales showed very good fit.

On the basis of these results, we think that our pre-registered analysis is robust. In additional exploratory analyses, we further verified the robustness of our main results by running separate CLPMs for each of the subscales of the financial scarcity and the financial avoidance measure.

Table 5
Overview of Model Fits for CFA with a Different Number of Factors on all Items from Wave 1

Model	*CFI*	*TLI*	*RMSEA*	*95% CI*	*AIC*	*BIC*
Single factor	.81	.78	.13	[.12, .13]	68,592	68,893
Two factors (FS_{Total} and FA_{Total})	.87	.85	.10	[.10, .11]	67,644	67,950
Three factors (FS_{Total}, FA_{DFD}, and FA_{AFI})	.91	.90	.08	[.08, .09]	66,977	67,293
Five factors (FS_{SoM}, FS_{LoC}, FS_{FRW}, FS_{STF} and FA_{Total})	.90	.88	.09	[.09, .09]	67,132	67,483
Six factors (FS_{SoM}, FS_{LoC}, FS_{FRW}, FS_{STF}, FA_{DFD}, and FA_{AFI})	.95	.94	.07	[.06, .07]	66,453	66,829

Note. FS = Financial Scarcity, FA = Financial Avoidance.

Exploratory Analyses

To further explore the prospective associations between financial scarcity and financial avoidance, we ran several cross-lagged panel models with each of the subscales of the two constructs separately.

The cross-lagged effects for each of the financial avoidance subscales delay of financial decisions (FA_{DFD}) and avoidance of financial information (FA_{AFI}) did not differ from the main analysis with the total financial avoidance scale (FA_{Total}). Financial scarcity (FS_{Total}) at t1 was associated with an increase in delay of financial decisions (FA_{DFD}) at t2, β = .15, *SE* = .05, *z* = 3.30, *p* = .001, 95%CI [.07, .25]. In addition, delay of financial decisions (FA_{DFD}) at t1 was associated with an increase of financial scarcity (FS_{Total}) at t2, β = .11, *SE* = .05, *z* = 2.10, *p* = .036, 95%CI [.01, 21]. Likewise, financial scarcity (FS_{Total}) at t1 was associated with an increase of avoidance of financial information (FA_{AFI}) at t2, β = .28, *SE* = .07, *z* = 3.86, *p* < .001, 95% [.14, .43]. In addition, avoidance of financial information at t1 was associated with an increase of financial scarcity (FS_{Total}) at t2, β = .14, *SE* = .04, *z* = 3.21, *p* = .001, 95% [.05, .22]. Taken together, the prospective association between financial scarcity and financial avoidance was similar for the tendency to delay making financial decisions and the tendency to avoid learning financial information. This indicates financial scarcity might be associated with a general motivation to avoid dealing with one's finances, which can manifest in various avoidant behaviors.

The cross-lagged effects did differ for the subscales of the financial scarcity measure (Table 6). Financial scarcity at t1 was only associated with an increase of financial avoidance (FA_{Total}) at t2 for the subscales shortage of money (FS_{SoM}) and financial rumination and worry (FS_{FRW}). The cross-lagged effects for lack of control (FS_{LoC}) and short-term focus (FS_{STF}) at t1 on financial avoidance (FA_{Total}) at t2

were not significant. This might suggest that people engage in financial avoidance as a coping response especially after experiencing negative emotions (such as worry) from dealing with their finances.

In turn, financial avoidance (FA_{Total}) at t1 was associated with an increase of financial scarcity at t2 for all subscales of the financial scarcity measure. Interestingly, financial avoidance (FA_{Total}) at t1 was associated with a very strong increase in lack of control (FS_{LoC}), financial rumination and worry (FS_{FRW}), and short-term focus (FS_{STF}) at t2, while the association with increased appraisal of a shortage of money (FS_{SoM}) was less strong. This might indicate that avoiding to deal with one's finances especially relates to subsequent increases in how problematic one's financial situation is perceived. While the appraised lack of money only increases slightly, one feels more strongly that one's financial situation gets out of control, one ruminates and worries more strongly about it, and one feels more strongly obliged to make short-sighted financial decisions.

Table 6

Cross-Lagged Parameters for Separate CLPMs per Financial Scarcity Subscale with 10,000 Bootstrapped Resamples

Dependent Variable	*Predictor*	*β*	*SE*	*z*	*p*	*95% CI*
$FS_{SoM.2}$	$FA_{Total.1}$	.15	.05	2.87	.004	[.05, .25]
$FA_{Total.2}$	$FS_{SoM.1}$	.09	.04	2.14	.033	[.01, .17]
$FS_{FRW.2}$	$FA_{Total.1}$	.32	.06	5.24	< .001	[.20, .44]
$FA_{Total.2}$	$FS_{FRW.1}$	.08	.04	2.19	.028	[.01, .15]
$FS_{STF.2}$	$FA_{Total.1}$	.28	.05	5.88	< .001	[.19, .37]
$FA_{Total.2}$	$FS_{STF.1}$	.06	.04	1.58	.115	[-.01, .13]
$FS_{LoC.2}$	$FA_{Total.1}$	.41	.06	7.37	< .001	[.30, .53]
$FA_{Total.2}$	$FS_{LoC.1}$	.05	.05	1.10	.270	[-.04, .14]

Note. Confidence intervals are based on bootstrapped standard errors using 10,000 resamples.

Discussion

Financial scarcity is a stressful experience in which pressing financial concerns exceed available resources (Haushofer & Fehr, 2014; Shah et al., 2012). This experience often entails a perceived shortage of financial resources, financial rumination and worry, lack of control over one's financial situation, and a short-term focus (Van Dijk et al., 2021). Results of a longitudinal panel study spanning 22 months showed that financial scarcity was positively associated with an increase in subsequent financial avoidance, which is the tendency to avoid dealing with one's finances. Financial avoidance can manifest in various behaviors, such as information avoidance, decision avoidance, inaction, and procrastination (Anderson, 2003, 2006; Gigerenzer & Garcia-Retamero, 2017; Goleman et al., 2017; Hertwig & Engel, 2016; Steel, 2007). It can be triggered by financial cues, like letters or bills, perceived as threats that cannot be adequately dealt with (i.e., a lack of control of one's financial situation). In such situations, avoiding the threatening cues (e.g., not opening letters or placing bills out of sight) might seem the only viable way to cope with the situation. Moreover, financial avoidance was positively associated with an increase in subsequent experienced financial scarcity. This indicates that after disengaging from their finances, people feel that their financial situation further deteriorated. These findings suggest that financial scarcity and financial avoidance might reinforce each other, with potentially dire

consequences. When financial resources are scarce and people feel that their financial problems are beyond their control, they might avoid dealing with their financial problems. Neglecting their financial problems, in turn, might worsen an already problematic situation.

Our finding that financial scarcity and financial avoidance have prospective associations with each other adds to theories on financial scarcity. Previous studies on financial scarcity have mainly focused on cognitive and affective effects (e.g., Haushofer & Fehr, 2014; Mani et al., 2013) or investigated how financial scarcity changes the way people make decisions (Haushofer & Fehr, 2019; Shah et al., 2015). Here, we show that people who experience financial scarcity are more likely to avoid dealing with their finances altogether. This is important in context of one of the main positions of financial scarcity theory, namely that financial scarcity directs attention towards financial problems (Shah et al., 2012, 2015, 2018). Our findings suggest that while financial scarcity might draw attention towards one's financial problems, this might nevertheless manifest in behavioral disengagement.

Moreover, the temporal dimension of our findings suggest that this relationship becomes stronger over time. Participants who initially experienced more financial scarcity showed a stronger increase in subsequent financial avoidance. This suggests that the longer people experience financial scarcity, the more they disengage from their financial problems. Likewise, participants avoiding to deal with their finances showed a stronger increase in financial scarcity over time. This also suggests that the longer people avoid dealing with their finances, the more their experience of financial scarcity increases.

In addition, our findings add to theories on avoidance by showing that financial avoidance forms a temporally dynamic association with financial scarcity. Previous findings from health psychology indicate that people should be more likely to engage with potential problems when avoidance would impose great personal risks (e.g., Aiken et al., 1994), but only if they feel that that taking action has the chance of improving the situation (Dawson et al., 2006; see also: Sweeny et al., 2010). We extend these findings to the area of financial decision-making. That is, when perceived control is low and one feels like one does not have the (financial) resources to cope with one's (financial) problems, engaging with one's financial problems might not be seen as an effective way to reach one's goals and avoidance increases over time. Then, the negative emotions associated with approaching one's financial problems outweigh and people avoid dealing with their finances altogether. Last our findings also point towards potential consequences of avoidance in the area of household finances. After avoiding to engage with their finances, people subsequently experienced more financial scarcity, even when controlling for initial levels of financial scarcity.

Next, our exploratory analyses revealed some interesting findings. First, the results were similar for the two subscales of financial avoidance, which are the tendency to delay financial decisions and the tendency to avoid financial information. This suggests that financial scarcity might be associated with a general underlying motivation to avoid dealing with one's finances, which might manifest similarly in various behavioral avoidance strategies.

Second, the results were different for the four subscales of financial scarcity. Regarding the effect of initial levels of financial scarcity on an increase of financial avoidance over time, there was only an effect for initial appraisals of shortage of money and financial rumination and worry, but not for initial lack of control and short-term focus. This might indicate that financial avoidance is a coping response especially employed when the experience of a shortage of money is accompanied by negative emotions, such as worry. Regarding the effect of initial levels of financial avoidance on an increase of financial scarcity over time, there was an association for all subscales of financial scarcity. However, the effect of initial financial avoidance was stronger for subsequent increases in the appraisal of lack of control, financial worry and rumination, and short-term focus. This might indicate that people who initially avoid dealing with their finances might not necessarily perceive that they are losing a lot of money over time. Yet, they might perceive that over time, they lose the grip on their finances. Then, they might become more worried and show stronger temporal discounting. Future confirmatory studies could test the robustness of these findings and investigate to what extent they point towards potentially underlying mechanisms.

A strength of the current study is the repeated assessment of our key variables in a large, representative sample of adult Dutch citizens. These aspects add importantly to the ecological validity of our findings. In our view, this is valuable for the field of financial scarcity, where researchers have to balance concerns of internal and external validity. Systematically manipulating financial scarcity in laboratory experiments (e.g., with vignettes, scenarios, or economic games; see Hilbert et al., 2022a) has great internal validity and allows for the investigation of causal effects, which is a less strong point in many observational studies. Yet, laboratory experiments often suffer from problems of generalizability, which can be better studied with observational designs. This is especially relevant for research on financial scarcity. For example, take the psychological state of a participant in an experiment who is presented with a hypothetical scenario in which they lost their job and received an unexpectedly large bill. Now, they are asked whether they would decide to open the bill or not. While this study allows to make inferences about the causality of financial scarcity on avoidance, it is an entirely different question whether it would translate to a context outside the laboratory. Compare this with the psychological state of a potential participant in our study, who might have too little money to pay their health insurance and over time, decides they should stop opening letters from their insurance company. While this study does not allow to make inferences about the causality between scarcity and avoidance, it gives valuable insights in the associations between these variables in the real world. We think that both types of studies are important for the theory of financial scarcity, and the combination of both can provide converging evidence for relevant insights in the psychology of financial hardship.

At the same time, a limitation of the present study is that our data are observational and that the CLPM is not a causal model (Selig & Little, 2012). Thus, even though we think that a causal model of bidirectional effects between financial scarcity and financial avoidance is most likely, it is possible that third variables not included in the model might be causally responsible for the temporal associations.

Building on our findings, experimental follow-up studies could further investigate the causality of the associations between financial scarcity and financial avoidance.

If the effect between financial scarcity is indeed causal and bidirectional, financial avoidance would contribute to a "poverty trap", a situation so problematic that it is difficult to escape it without outside help (Azariadis & Stachurski, 2005).[23] The existence of such effects is corroborated by the bidirectional causal effects between poverty and mental health (Ridley et al., 2020). That is, poverty increases the likelihood of suffering from anxiety and depression—for example, by decreasing physical health and social status, and increasing worry and stress. Anxiety and depression, in turn, increase poverty—for example, by reducing productivity and the ability to generate income, as well as by affecting preferences, beliefs, and lowering the quality of decision-making (Ridley et al., 2020). Likewise, financial scarcity has been found to be associated with financial shame, which in turn might lead to disengagement and thereby increase financial hardship (Gladstone et al., 2021). Thus, dealing with financial problems might have psychological consequences that reinforce financial problems (but see, Frankenhuis & Nettle, 2019).

Conclusion

Having trouble to make ends meet induces a psychological state of financial scarcity. In a longitudinal study that included a large, representative sample of adult Dutch citizens, we show that experienced financial scarcity is associated with a subsequent increase in financial avoidance. In addition, financial avoidance is associated with a subsequent increase in financial scarcity. This shows that when experiencing financial scarcity, people are more likely to act in line with the concept of the financial homo ignorans (Tinghög et al., 2023). Moreover, these findings point towards a downward spiral of increasing disengagement from mounting financial problems. To tackle such a psychological poverty trap, researchers, practitioners, and policy makers might further address the psychological dimensions of financial scarcity and their relations with financial avoidance.

[23] While we focus on psychological mechanisms, there are also economic or societal mechanisms that function as a poverty trap (Azariadis & Stachurski, 2005; Bowles et al., 2016).

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Appendix

Table I

Selective Attrition Test at t1 on Variables in the Model and Background Variables

Variable	*t*	*df*	*p*	*M diff*	*d*
FS	-0.18	465	.854	-0.01	-0.01
FA	-1.78	439	.076	-0.15	-0.13
Income	-0.96	266	.340	-0.12	-0.08
Age	4.49	427	< .001	5.87	0.32
Gender	-1.33	482	.185	-0.05	-0.09

Note. *Df* are adjusted to account for unequal variances. Contrasts were set such that positive values indicate higher scores for remaining participants compared to dropouts.

Table II

Item Loadings for a PCA with FS and FA Items with Data from Wave 1

	Component 1	Component 2
FS_{SoM1}	.84	
FS_{SoM2}	.62	
FS_{SoM3}	.83	
FS_{FRW1}	.90	
FS_{FRW2}	.82	
FS_{FRW3}	.87	
FS_{STF1}	.59	
FS_{STF2}	.76	
FS_{STF3}	.34	
FS_{LoC1}	.57	
FS_{LoC2}		.43
FS_{LoC3}	.80	
FA_{DFD1}		.83
FA_{DFD2}		.87
FA_{DFD3}		.84
FA_{DFD4}		.67
FA_{AFI1}		.57
FA_{AFI2}	.58	.32
FA_{AFI3}		.58
FA_{AFI4}		.54

Note. Loadings <.3 are suppressed. Oblimin rotation was used. Number of components was determined based on parallel analysis.

Chapter 4

Financial scarcity and financial avoidance: An eye-tracking experiment

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Financial Scarcity and Financial Avoidance: An Eye-Tracking Experiment

Financial scarcity is the subjective experience that financial resources are insufficient to meet demands (Shah et al., 2012). This experience can result in stress if the financial situation is seen as a threat that cannot adequately be dealt with (Van Dijk et al., 2022). In the present study, we investigated experimentally whether financial scarcity increases financial avoidance. Here, financial avoidance is the tendency to avoid dealing with one's finances (see Hilbert et al., 2022a) and can take different forms, such as avoiding financial information (Gigerenzer & Garcia-Retamero, 2017; Golman et al., 2017; Hertwig & Engel, 2016) or delaying financial decisions (Anderson, 2003). This research extends previous correlational findings showing that financial scarcity is associated with an increase financial avoidance over time (Hilbert et al., 2022a), that low economic status is associated with a general avoidance motivation (Gilbert et al., 2022), and that people generally tend to avoid to learn financial information if they expect it to be negative (Loewenstein et al., 2009).

Financial Scarcity and Financial Avoidance

Existing literature suggests that financial scarcity may increase financial avoidance via negative emotions, perceived lack of control over one's finances, and increased temporal discounting. First, dealing with one's finances when experiencing financial scarcity may trigger negative emotions like worry and shame (De Bruijn & Antonides, 2020; Plantinga, 2019). Research suggests that (financial) information eliciting such negative emotions may be avoided, particularly when people feel they cannot cope with it (Elliot, 2006; Sweeny et al., 2010). Therefore, when having too little money, people might avoid cues that remind them of their financial problems. Second, when resources are perceived to be lacking, one's financial problems seem difficult to solve (Shah et al., 2018). As such, a core aspect of financial scarcity is the perception of having little control over one's financial situation (Van Dijk et al., 2022). When experiencing financial scarcity, people thus feel that dealing with financial problems does not consistently lead to desired outcomes (Landau et al., 2015). For example, when receiving letters that are likely to contain bills, people might not open them because they feel that they do not have enough money to pay them. Thus, financial scarcity might lead to financial avoidance because people feel that they cannot resolve their financial problems anyways (Howell et al., 2014). Third financial scarcity increases discounting of future outcomes (Haushofer & Fehr, 2014; Hilbert et al., 2022b). Therefore, when experiencing financial scarcity, financial avoidance may be further intensified by weighing the immediate benefits of avoidance (feeling better) more strongly than any delayed outcome of acting (having less problems).

In line with this logic, previous longitudinal research spanning about two years has shown that financial scarcity and financial avoidance have a prospective association with each other (Hilbert et al., 2022a). That is, initial high levels of financial scarcity had a positive association with an increase in financial avoidance more than two years later, and vice versa. Although these findings can help to explain psychological poverty traps (see also Haushofer, 2019), more research is necessary to establish

the causal order of the effects. Therefore, we conducted a laboratory experiment in which we investigated whether induced financial scarcity indeed causes financial avoidance.

Eye Tracking and Avoidance

In the current study, we induced financial scarcity with the Household Task and examined financial avoidance by measuring gaze patterns with an eye-tracker. The benefit of eye-tracking is that it is an unobtrusive physiological measure, that allows to assess where people look at while they engage in task (Holmqvist et al., 2011). Thus, unlike more explicit avoidance measures like survey questions, it is less sensitive to experimenter effects and socially desirable responses. Importantly, previous research has shown that gaze patterns are indicative of where people direct their attention to (Carrasco, 2011, Findlay & Gilchrist, 2003; Wedel & Pieters, 2008). More specifically, it has been shown that fixations are indicative of where they focus their attention, and that attentional avoidance is associated with less fixations on the stimulus (see also Borozan et al., 2022).

To date, most eye-tracking research on avoidance has been conducted in clinical samples. For example, research shows that pations with anorexia nervosa avoid looking at pictures of food (Giel et al., 2011), patients with arachnophobia avoid looking at pictures of spiders (Rinck & Becker, 2006), and patients with social anxiety disorder are less likely to look others in the eye (Chen & Clarke, 2017; Weeks et al., 2019). When confronted with a stimulus that depicts the object of their phobia, patients generally show a gaze pattern in line with the hypervigilance-avoidance hypothesis (Pflugshaupt et al., 2005). Following this hypothesis, as compared with healthy controls, phobic patients fixate quicker on the feared stimulus in the orienting phase after stimulus presentation (hypervigilance), and subsequently, spend less time looking at the feared stimulus (avoidance). This reasoning indicates that after an orienting phase, top-down processes can regulate attention, and therewith gaze-patterns, away from aversive stimuli (see also Lang et al., 1997).

This is supported by findings in non-clinical samples. For example, participants presented with a political advertisement alongside a control stimulus avoided to look at the advertisement if it was inconsistent with their partisan ideology (Schmuck et al., 2020). Likewise, social media users who are not interested in politics spend less time looking at political posts (Bode et al., 2017) and smokers spend less time looking at health warnings on cigarette packages (Maynard et al., 2014). Together, these studies show that eye-tracking can be a valuable tool to measure attentional disengagement from aversive stimuli.

The Present Research

In the current study, we used an eye-tracking experiment to test whether financial scarcity leads to financial avoidance. To induce financial scarcity, participants engaged in a task called "Household Task" that simulated the management of a household's monthly finances. During the task, participants managed the finances of a household over several rounds by earning income and paying expenses. Participants' financial resources were either insufficient (financial scarcity condition) or sufficient

(financial abundance condition) to deal with the financial demands of the situation (Hilbert et al., 2022b). Specifically, between conditions, we manipulated financial scarcity by varying whether participants accumulated debts or savings. To assess financial avoidance, participants were presented simultaneously with two letters at the end of each round. One letter constituted the financial stimulus, indicating that an additional expense had to be paid (i.e., expense letter). The other letter was unrelated to participants financial situation and served as a control stimulus.

We chose the following two gaze measures to assess the extent to which participants avoided looking at the expense letter: First, we measured the time it took participants to first fixate on the amount that had to be paid stated on the expense letter. Here, we assumed that as an orienting response after stimulus onset, participants would first read the titles of the two letters. Then, after finding out that one letter was an additional expense, we expected that participants experiencing scarcity would avoid looking at the detailed information stating the amount that had to be paid. This reasoning is in line with prior research on scanpaths of print and online newspapers (Holsanova et al., 2006; Bucher & Schumacher, 2006), websites (Buscher et al., 2009), and printed advertisements (Lohse, 1997), suggesting that people first look at headlines and larger font sizes as an orientation for which content to further direct their attention to (see also, Rahal & Fiedler, 2019). Thus, Hypothesis 1a stated that compared to participants in the abundance condition, participants in the scarcity condition show a longer time to first fixation on the amount stated on the expense letter. Second, we assessed participants' total fixation duration on the whole expense letter. This was included as an overall measure for attentional disengagement. This measure is commonly used to assess the distribution of attention towards stimuli in research on financial decision-making (Borozan et al., 2022). Thus, Hypothesis 1b stated that compared to participants in the abundance condition, participants in the scarcity condition spend less time looking at the whole expense letter.

We also included a behavioral measure of financial avoidance. This entailed that participants could decide to either pay the additional expense directly or to delay its payment. Thus, Hypothesis 2 stated that, as compared to the abundance condition, participants in the scarcity condition are more likely to delay the payment of the additional expense.

We preregistered our hypotheses, method, and analysis plan (https://doi.org/10.17605/OSF.IO/SJRWC). All data, analysis codes, and materials are available on the Open Science Framework (OSF; https://doi.org/10.17605/OSF.IO/ZR49X).

Method

Participants and Design

We recruited 62 undergraduate students of Leiden University with normal or corrected eyesight as participants for the experiment (M_{age} = 23.03 years, SD_{age} = 3.09; 54 females, 8 males). We conducted a preregistered sequential analysis with adjusted alpha levels (Lakens, 2014) and decided to stop data

collection at this point in favor of collecting the full sample of 100 participants.[24] To retain a total false positive rate of five percent, the adjusted alpha level for all hypothesis tests was set to $\alpha = .031$ (for calculation of adjusted alpha levels, see open materials).

Participants were randomly assigned to one of two conditions of a mixed two-factorial design, with Financial Resources (scarcity, abundance) manipulated between participants and Rounds (one to six) of the Household Task as within factor. Financial avoidance was measured each round with the time to first fixation on the amount on the expense letter (for Hypothesis 1a) and the total fixation duration on the whole expense letter (for Hypothesis 1b), as well as the decision to pay the extra expense directly or delay the payment (for Hypothesis 2).

Setup and Apparatus

The experiment was programmed in E-prime (version 3.0). Participants completed the study on a laptop with a 15″ wide screen with full HD resolution in the video laboratory of Leiden University. Gaze data was assessed with a Tobii X2-60 eye-tracker. The tracker uses an unobtrusive infrared camera system mounted on the laptop screen, allowing for free head movements. Gaze data was sampled at a rate of 60hz, matching the refresh rate of the laptop screen.

In line with our pre-registered exclusion criteria, we excluded gaze data from the analyses case wise for each round if the valid gaze percentage was lower than 75%. This led to an exclusion of data for 70 rounds, which was 18.8% of the total rounds[25]. The total number of rounds with valid gaze data was 302, clustered in 58 participants.

Procedure

Participants first gave informed consent, after which they were seated approximately 60 centimeter in front of the laptop screen and the eye-tracker was calibrated. Then, they were introduced to the Household Task, which is a task where participants have to manage the finances of a household. The task can be used to manipulate financial scarcity in a setting of household finances (Hilbert et al., 2022b). Participants completed a practice round to familiarize themselves with the task.

The Household Task consisted of six rounds presented in random order. A round resembled a period of one month in which participants had to earn an income by doing a "monthly work shift", pay their regular monthly expenses, and respond to mail they received. Each round started with an overview of their expenses. The overview first showed the total amount of expenses, and then listed the expenses for four separate sub-categories (i.e., housing, education, shopping, other). After previewing their expenses, participants continued with an effort task, which represented their work shift. For this effort

[24] We had to stop recruitment of participants in March 2020 when campus was closed due to the outbreak of the COVID-19 pandemic. Before deciding whether to commence data collection or not, and without prior knowledge of the already collected data, we added the sequential analysis plan to our pre-registration. Based on the sequential analysis, we adjusted the alpha levels for all hypothesis tests. Based on the findings, we decided not to pick up data collection again when students returned to campus in summer 2021.

[25] Inclusion of these data points did not change the results in a meaningful way (see open materials on the OSF).

task, participants were presented with 15 sliders on their screen and were given 30 seconds to adjust the sliders such that the indicator was set to the middle position (adapted from Gill & Prowse, 2011). Participants received a fixed income for completing their work shift and a bonus income for each slider they adjusted correctly. Subsequently, they were shown their total income and asked to confirm the payment of their expenses of that round. Then, to measure financial avoidance in the form of attentional disengagement, participants were presented with an additional expense letter and a control stimulus letter for 15 seconds during which we assessed their eye movements. At the end of each round, participants made a binary decision on how to respond to each of the letters, one constituting the behavioral measure of financial avoidance and the other one being a filler task. Then, participants continued with the next round of the Household Task.

After six rounds, the Household Task ended and participants filled in a manipulation check measure and were informed about their earnings and debriefed. Participation took approximately 30 minutes. Participants received €4.00 or course credit as show-up fee and up to €3.00 of incentivized payment based on the final balance in the Household Task.

Financial Scarcity Manipulation

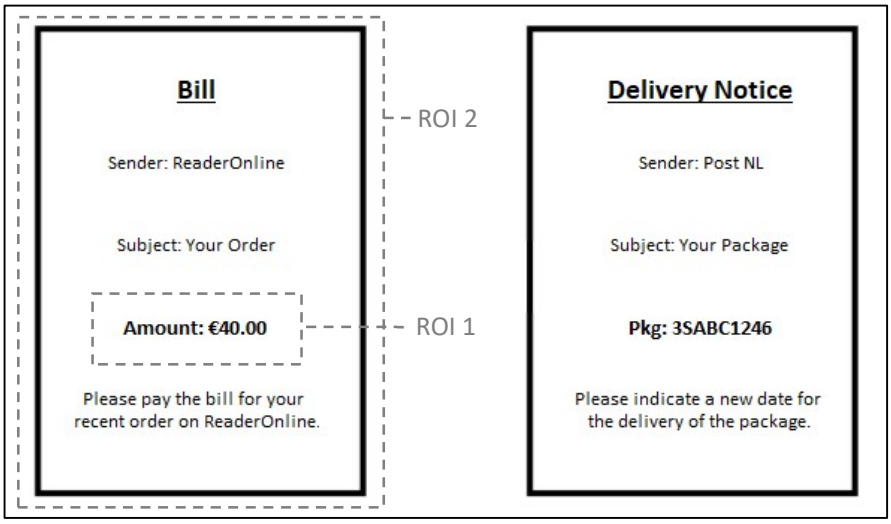
To manipulate financial scarcity, we varied participants' income in the Household Task between conditions. In the scarcity condition, participants had a fixed income of €880 while in the abundance condition, participants had a fixed income of €1204. In addition, participants received a bonus income of €5 for each slider they adjusted correctly[26]. Expenses were based on average expenses for Dutch students and ranged from €1040 to €1120 between rounds, equally across conditions. Each round, participants in the scarcity condition accumulated debts with an average change in balance of -€175 (*SD* = 8.27), and participants in the abundance condition accumulated savings with an average change in balance of +€137 (*SD* = 10.5).

Financial Avoidance Measures

Each round, after paying expenses and earning income, participants received two letters. One letter indicated that an additional expense had to be paid, the other letter served as a control stimulus (see Figure 1). The letters were displayed next to each other in randomized position and structured as follows: The header was written in bold, underscored, had a larger font size, and indicated whether the letter informed about a due payment (e.g., bill, invoice) or something non-financial (e.g., delivery notice, registration deadline). The first line stated the sender of the letter and the second line stated the subject of the letter. The third line was in bold and indicated the amount that had to be paid (for the additional expense) or other numerical information (for the control stimulus). Below that, a short sentence asked participants to react to the letter (e.g., please pay the bill).

[26] Participants were instructed that they would receive both a fixed income and a bonus income, but they were only shown their total income for each round.

Figure 1
Example Stimuli for Gaze Measurements



Note. The left letter shows an expense stimulus, the right letter shows an example for a control stimulus. ROI = region of interest.

Gaze Measures

The letters were displayed on screen for 15 seconds, during which we assessed participants' gaze data. Two regions of interest (ROIs) were defined to code the fixations of participants (Figure 1). The first ROI was the amount of money that had to be paid stated on the expense letter. As a measure for Hypothesis 1a, we calculated the time to first fixation on this ROI. To count as fixation on the ROI, the fixation duration had to be at least 100 milliseconds. The second ROI was the whole expense letter. As a measure for Hypothesis 1b, we assessed participants 'dwell time' on this ROI by calculating the relative total fixation percentage on the expense letter compared to all valid fixations on the screen (Maynard et al., 2014; Schmuck et al., 2020).

Behavioral Measure

Each round, after being presented with the two letters, participants made a binary decision about each of them. Regarding the expense letter, participants could choose to either "Pay the expense now" or to "Pay the expense later", constituting the measure for Hypothesis 2. If participants decided to pay the expense directly, the respective amount was deducted from their balance. If participants decided to pay the expense later, they were presented with it again at the end of the experiment. Delaying payment was not associated with a risk or cost. The decisions about the control letter were inconsequential for the outcome of the experiment (e.g., "Please pick a new date for the delivery of your parcel") and were included to avoid the experimental design steering the attentional focus on the expense letters over rounds. At the end of each round, participants were shown their updated balance.

Manipulation Check

To test whether the difference in balance between conditions successfully manipulated participants' experience of financial scarcity, we included a four-item self-report measure of financial scarcity at the end of the experiment. Participants reported their experience of financial scarcity throughout the task, with two positively coded items ("I worried about my financial situation", "I felt stressed about my financial situation") and two negatively coded items ("I felt I had enough money", "I felt I had control over my finances"). The items were adapted from Hilbert et al. (2022a) and assessed on a seven-point Likert-scale, ranging from 1 = *totally disagree* to 7 = *totally agree*. The measure showed high internal consistency (Cronbach's α = .87).

Results

Manipulation Check

Confirming that the manipulation was successful, participants in the scarcity condition reported a stronger experience of financial scarcity (n = 31, M = 5.98, SD = 0.89) compared to participants in the abundance condition (n = 31, M = 2.82, SD = 1.07, t[57.9] = 12.63, p < .001, g = 3.21).

Gaze data

Time to First Fixation

First, to test Hypothesis 1a, we fitted a linear mixed model (REML) with time to first fixation (in seconds) on the amount of the additional expense as dependent variable. All mixed models included random intercepts for participants, a fixed level-1 factor for the number of rounds and a fixed level-2 factor for the experimental condition. We also included a cross-level interaction between the two fixed effects for exploratory analyses. Random slopes were not included as this would have led to singularity issues. Overall, the total variance explained was r^2 = .06. The intra-class-correlation (ICC) was low, r = .05. The variance explained by the fixed effects was r^2 = .02. Not supporting Hypothesis 1a, the fixed effect of the experimental condition was not significant, F(1, 46.3) = 0.22, p = .638. The time to first fixation on the amount of the additional expense was not significantly higher in the scarcity condition compared to the abundance condition, γ = 0.22, SE = 0.46, 95%CI [-1.12, 0.68]. Also not significant were the fixed effect of Round, F(5, 222.2) = 0.54, p = .745, and the cross-level interaction, F(5, 222.2) = 0.25, p = .94.

Fixation Duration

Next, to test Hypothesis 1b, we fitted the same linear model with relative dwell time on the whole expense letter as dependent variable. Overall, the total variance explained in the final model was r^2 = .33. The intra-class-correlation (ICC) was moderate, r = .30. The variance explained by the fixed effects was r^2 = .05. Not supporting Hypothesis 1b, the fixed effect of the experimental condition was not significant, F(1, 54.2) = 0.60, p = .441. The fixation duration percentage on the amount of the extra expense was not significantly higher in the scarcity condition compared to the abundance condition, γ

= -1.34, *SE* = 1.73, 95%CI [-2.05, 4.73]. Also not significant were the fixed effect of Round, $F(5, 239.5) = 2.13$, $p = .063$, and the interaction of the two fixed effects, $F(5, 239.5) = 1.41$, $p = .221$.

Taken together, for the gaze data, there was no evidence that the experience of financial scarcity increased financial avoidance.

Behavioral Data

Next, to test Hypothesis 2, we fitted a logistic mixed model with a binomial dependent variable, indicating for each round whether participants decided to pay their additional expense directly or delayed their payment. The model contained the same predictors as the previous models. Overall, 58% of the total variance was explained ($r^2 = .58$), whereby 41% was explained by the fixed effects ($r^2 = .41$). The fixed effect for the experimental condition was significant, $\chi^2 (1) = 32.96$, $p < .001$.

Confirming Hypothesis 2, as compared to participants in the abundance condition, those in the scarcity condition were more likely to delay payment of their additional expense, $\gamma = 3.36$, *SE* = 0.59, exp(B) = 28.84, 95%CI [9.15, 90.85]. This indicates that each round, participants in the scarcity condition were 28.8 times more likely to delay payment of the additional expense than participants in the abundance condition. This was equivalent to a total *M* = 2.84 (*Median* = 3, *SD* = 1.70) of delayed payments in the scarcity condition and total *M* = 0.42 (*Median* = 0, *SD* = 0.85) of delayed payments in the abundance condition. The fixed effect of Rounds was not significant, $\chi^2 (5) = 8.66$, $p = .123$. Likewise, the interaction between the two fixed factors was not significant, $\chi^2 (5) = 5.35$, $p = .375$.

Thus, unlike the gaze data, the behavioral data did support the hypothesis that financial scarcity increases financial avoidance.

Discussion

Previous longitudinal research showed that when experiencing financial problems, people are more likely to avoid potentially negative financial information and delay making financial decisions (Hilbert et al., 2022a; see also Gilbert et al., 2022). Here, we experimentally investigated whether financial scarcity increases financial avoidance. That is, depending on experimental condition, participants either accumulated household debts or savings, which served as a manipulation of financial scarcity and financial abundance, respectively. Then, participants received an additional expense letter in their mail. We tested whether participants who experienced financial scarcity would attentionally disengage from the expense letter and delay their payment. We measured attentional disengagement with an eye-tracker in two ways: First, we assessed the time it took people to look at amount they had to pay stated on the expense letter. Second, we assessed the total time people spent looking at the expense letter compared to a control stimulus. Then, as a behavioral measure of financial avoidance, we gave participants the option to delay the payment of the bill without additional cost until the end of the experiment. The eye-tracking data did not support our hypothesis that financial scarcity leads to attentional disengagement. The behavioral data, however, supported our hypothesis that financial scarcity increases the likelihood to delay the payment of bills.

There are several methodological and theoretical considerations that might explain the null findings for the hypothesized effect of financial scarcity on attentional disengagement. First, it could be that the eye-tracking data was too noisy to reliably detect a true effect. This seemed particularly the case for the first hypothesis (H1a) regarding the time it took participants to first fixate on the amount of the expense letter. The size of this ROI was relatively small, which can lead to misclassifications of fixations (fixations on ROI being classified as outside, and vice versa) if the accuracy of the gaze measure is imperfect (Holmqvist et al., 2022). In addition, this gaze measure only consisted of a single fixation per round (six per participant), and varied considerably. This was represented in a very small amount of explained variance in gaze data and a low ICC, indicating that most of the variance in gaze data was random error. Thus, it is possible that the null result for H1a might be explained by noisy data. The data for the second hypothesis (H1b) was based on the percentage of all fixation durations on a much larger ROI, and varied less extremely. This was also represented in a moderate portion of explained variance in the gaze data by the predictors and a medium to large ICC (Bliese, 2000; James, 1982). Thus, it is less likely that the results for H1b are due to noisy data.

Second, it is possible that in the current experimental setup, financial scarcity indeed does not lead to attentional disengagement from one's financial problems. Here, participants had the option to delay paying their additional expense at no cost and could thereby effectively deal with the problem at hand (for the time being). This might have provided them with a sense of control over their problematic financial situation and led to the perception that the additional expenses were manageable. Crucially, previous research has shown that a threat leads to disengagement when threat-management resources are lacking (Howell et al., 2014) but not when the threat is perceived to be manageable (i.e., under control; Garrett et al., 2018). That is, the general tendency to avoid negative information (Sweeny et al., 2010) can be attenuated under controllable threat, as all information might be crucial to survival and therefore processed equally. Therefore, we think that the perception of (not) having control over one's finances might be a crucial moderator that influences whether one's financial problems are seen as an uncontrollable threat that should be avoided or a challenge that can be overcome. Future research could systematically investigate the potential moderating role of perceived lack of control for the effect of financial scarcity on financial avoidance, for example by introducing and varying an additional cost for the option to delay one's additional expenses.

The behavioral findings conceptually replicate and extend previous correlational research showing that the experience of financial scarcity is associated with an increase in financial avoidance over time (Hilbert et al., 2022a), that low economic status is associated with a general avoidance motivation (Gilbert et al., 2022), and that–regardless of one's financial situation–negative financial information is more likely to be avoided (Loewenstein et al., 2009). Here, we showed experimentally that financial scarcity increases financial avoidance behavior. In the current setup, financial avoidance behavior was operationalized by the option to delay paying one's expenses. Importantly, this option was not associated with additional costs (e.g., a late payment fee or interest rate) and therefore a sensible

choice. Our finding is thus in line with previous research showing that financial scarcity increases temporal discounting in situations where it might be rational (Hilbert et al., 2022b; see also Frankenhuis & Nettle, 2019). Yet, future research is needed to investigate whether financial scarcity also leads to financial avoidance when it would be costly.

Conclusion

When people have too little financial resources to meet demands, they can experience financial scarcity. Here, we tested whether the experience of financial scarcity during the Household Task would lead to financial avoidance, measured as attentional disengagement from expense letters with an eye-tracker and behavioral avoidance by delaying the payment of expenses. The experiment did not provide evidence in support of the hypothesis that financial scarcity affects how people distribute their attention, as there was no effect of participants' financial situation on their gaze pattern. However, financial scarcity increased the likelihood to delay paying one's expenses, when doing so was not associated with an additional cost. This finding extends previous correlational findings by establishing a causal order on the association between scarcity and avoidance.

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Chapter 5

Financial scarcity and perceived control across societies

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Financial Scarcity and Perceived Control across Societies

A basic human need is to feel in control over one's life (Landau et al., 2015; Rothbaum et al., 1982). Such control is defined as the perceived ability to determine one's states and behaviors, achieve desired outcomes, and prevent undesired outcomes (Landau et al., 2015; Wallston et al., 1987). Maintaining control is highly consequential: It induces positive affect (Helzer & Jayawickreme, 2015), facilitates goal pursuit (Bhanji et al., 2015; Heckhausen et al., 2010), and increases mental and physical health (Greenaway et al., 2015; Heckhausen et al., 2010). Lacking control is aversive and stressful (Landau et al., 2015), and relates to depression and anxiety (Jonas et al., 2014; Ross & Mirowsky, 2013). Previous cross-cultural research has shown that humans desire and experience control similarly across the globe (Hornsey et al., 2019; Noordewier et al., 2023).[27] Yet, worldwide, people face a variety of threats to control. One such threat might be financial scarcity (Fritsche & Jugert, 2017), which is the subjective experience of lacking financial resources to meet demands (Mullainathan & Shafir, 2013; Shah et al., 2012). Following this, we investigated the existence, prevalence, and cross-societal variation of the association between financial scarcity and control across 51 societies (N = 12,779).

Financial Scarcity and Control

Experiencing financial scarcity is stressful (Haushofer & Fehr, 2014; Jachimowicz et al., 2022; Van Dijk et al., 2022) and induces negative emotions like worry and shame (De Bruijn & Antonides, 2020; Walker et al., 2013). Moreover, financial scarcity affects how people allocate their attention (Shah et al., 2012, 2015).[28] For example, it draws attention towards pressing financial concerns, which induces a short-term focus (Carvalho et al., 2016; Haushofer & Fehr, 2014; Hilbert et al., 2022a; Ruggeri et al., 2022). At the same time, financial scarcity is associated with avoidance of one's finances (Hilbert et al., 2022b), increases the likelihood to engage in unethical economic behavior (Elbaek et al., 2021) and might negatively affect cognitive functioning (Huijsmans et al., 2019; Mani et al., 2013; but see Wicherts & Scholten 2013).[29]

Here, we hypothesized that (H1) across the globe, financial scarcity is negatively associated with perceived control over one's life. Lacking needed financial resources might impede the ability to effectively attain desired life outcomes or prevent undesired ones (Fritsche & Jugert, 2017), which is the central for the belief that life is under control (Landau et al., 2015; Wallston et al., 1987). Thus, we propose that financial scarcity entails a perceived lack of control over one's financial situation (see also Van Dijk et al., 2022), which can generalize to a perceived lack of control over one's life (Fritsche & Jugert, 2017). In line with this reasoning, a longitudinal study using Swiss panel data showed that over time, financial scarcity was associated with reduced self-mastery, a subcategory of perceived control

[27] With the exception of lower levels of perceived and desired control in Japan.
[28] For replication attempts, see Camerer et al. (2018), O'Donnell et al. (2021), and Shah et al. (2019)
[29] Evidence for the latter effect is mixed (e.g., Carvalho et al., 2016; for an overview, see De Bruijn & Antonides 2021)

(Sommet & Spini, 2022).[30] Similarly, a diary study in the United States showed that after receiving income (i.e., a reduction of financial scarcity), participants experienced more control over their lives (Jachimowicz et al., 2022).[31] While these studies provide valuable evidence for the relevance of financial scarcity for perceived control, they were conducted exclusively with WEIRD samples (White, Educated, Industrialized, Rich, Democratic; Henrich et al., 2010). Given that financial scarcity and need for control are global phenomena, it is crucial to investigate whether this association is indeed ubiquitous or varies across the globe.

Societal Buffers to Control Threats

Even though control threats and needs have been shown to exist relatively similarly across the globe, we predict that their association might vary across societies. Societies differ on various economic, cultural, and social qualities, which might serve as compensation sources against the control threat of financial scarcity. Much research has been conducted on how people try to restore a threatened sense of control (for an overview, see Landau et al., 2015). It has been shown that a threat to personal control—like lacking needed financial resources—can be compensated by a stronger reliance on secondary sources of control (Kay et al., 2009; Landau et al., 2015). For example, when feeling unable to achieve goals through own means, people might justify and rely more on the government and institutions or put faith into a controlling god (Kay et al., 2008, 2010; Rothbaum et al., 1982). Thus, societal differences in the prevalence and availability of these qualities might shape the association between financial scarcity and control.

Therefore, we propose that several societal qualities might buffer against the control threat of financial scarcity. First, *welfare provisions*—the social and monetary services provided by a society to benefit its citizens—might protect people who experience financial scarcity from the feeling that life is slipping out of control. This is supported by prior research that has shown that welfare provisions can attenuate negative psychological and economic consequences of financial deprivation by reducing the risk that financial problems deteriorate into an existential threat (Attah et al., 2016; Israel, 2016). Second, higher *quality of institutions*—describing the effectiveness and efficiency of institutions and processes by which authority is exercised and controlled in a society—might restore some threatened sense of control by increasing trust in governance and perceptions of order and safety (Chong & Calderon, 2000; Kay et al., 2008, 2010). In line with this, according to the material security hypothesis, efficient societal institutions can satisfy basic needs and mitigate threats related to environmental and resource insecurity (Hruschka et al., 2014; Hruschka & Henrich, 2013). Third, better *labor conditions*—citizens equal access to work opportunities, good working conditions, and fair wages—might protect people with little financial resources from feeling a lack of control over their life and more severe economic, health, and psychological consequences of exploitation (Muntaner et al., 2010).

[30] This paper also reports findings from a cross-societal study showing a negative association between financial scarcity and mental health. Yet, the cross-societal study did not examine the role of perceived control.
[31] Subsequently, participants also felt less distressed and reported higher life satisfaction.

Taken together, we hypothesized (H2a–c) that in societies with higher welfare provisions, higher quality of institutions, and better labor conditions, the negative association between financial scarcity and perceived control would be weaker. Importantly, all three of these societal qualities vary considerably across the globe (Coppedge et al., 2022; Freedom House, 2020; the Economist Intelligence Unit, 2020; World Bank, 2023; World Economic Forum, 2020), suggesting that there might be considerable heterogeneity in the association between financial scarcity and perceived control across societies.

Method

The study was approved by the Psychology Research Ethics Committee of Leiden University (The Netherlands), application number: 2020-02-03-A.Romano-V1-2068. All participants provided informed consent. All data, analysis codes, and materials are openly available at the Open Science Framework (OSF; https://doi.org/10.17605/OSF.IO/UPAJ3).

Participants and Data Collection

Participants were recruited through the Toluna Panel and its third-party panel providers from December 2020 to February 2021. Our goal was to recruit 12,750 participants across 51 societies (approximately 250 per society, stratified by age and gender). Of the 12,863 participants that completed the study, 84 had incomplete data and were excluded from all analyses, leading to a final sample of 12,779 participants.[32] Sample descriptives per society are displayed in the Appendix A, Table 1. We collected data from the following 51 societies (Figure 1): Algeria, Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Czech Republic, Egypt, Finland, France, Germany, Greece, Hong Kong, Hungary, India, Indonesia, Ireland, Israel, Italy, Japan, Kenya, Malaysia, Mexico, Morocco, Netherlands, Nigeria, Peru, Poland, Portugal, Romania, Russian Federation, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Tunisia, Turkey, United Arab Emirates, United Kingdom, United States, and Vietnam.

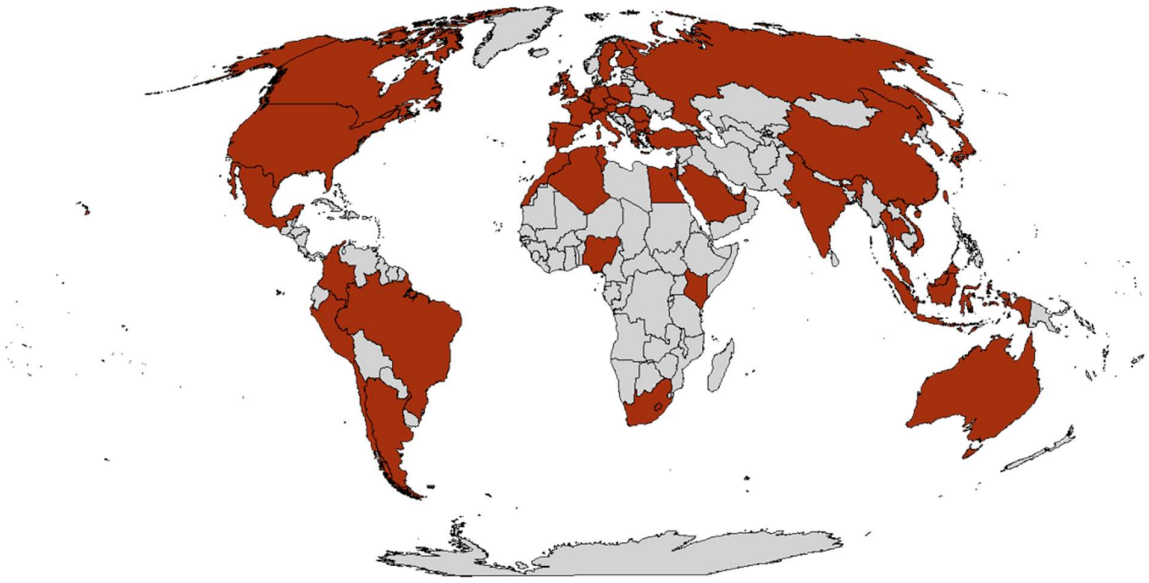
Preregistration

We preregistered the study setup, hypotheses, measures, and analysis plan prior to data collection on the OSF (https://doi.org/10.17605/OSF.IO/6KTHF). Before linking our own data with the data for the societal indicators, we updated the preregistration to specify the cross-societal hypotheses 2a–c and respective analyses plan, and dropped the secondary analyses on the items assessing the endorsement of compensatory control sources. We deviated from the final preregistered analysis plan in the following way: To extract components for the societal indicator of "labor conditions", we had planned to include the indicators *Collective Bargaining Coverage Rate* and *Compliance with Labor Rights* from the International Labor Organization (ILO). However, these indicators contained missing data for

[32] For participants that dropped out of the study or that failed all attention checks, new participants were recruited by the panel provider until the target sample size was met. The total number of recruited participants was 16,659.

many of the societies in our study (18 *NA* and 19 *NA*, respectively), which would have resulted in a loss of approximately 35% of data, too many to reliably impute.

Figure 1
World Map Displaying Societies Included in the Study in Red



Procedure

Participants first conducted a behavioral experiment unrelated to our project (see Romano et al., 2022). Then, participants responded to a number of questionnaires: First, participants responded to the single item measure on perceived control and then completed the Psychological Inventory of Financial Scarcity (Van Dijk et al., 2022). Thereafter, participants responded to several items unrelated to this project and gave their demographic information.

Measures

Perceived Control

Participants filled in a single-item measure for perceived control as used in the World Values Survey (Haerpfer et al., 2020). The item was introduced as follows: "This questionnaire is about control. Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them." Then, on a seven-point Likert-scale ranging from 1 = *totally disagree* to 7 = *totally agree*, participants were asked to indicate their agreement with the statement "I have control over my life". Histograms for perceived control scores in each society are displayed in Appendix A, Figure 1a. For all analyses, perceived control scores were z-standardized within societies.

Psychological Inventory of Financial Scarcity (PIFS)

Participants filled in a short version of the PIFS (Van Dijk et al., 2022), which consists of five items measured on a seven-point Likert-scale, ranging from 1 = *totally disagree* to 7 = *totally agree*. The five items were: "I often don't have enough money", "I am constantly wondering whether I have enough money", "I worry about money a lot", "I am only focusing on what I have to pay at this moment, rather than my future expenses", and "I experience little control over my financial situation".[33] Reliability analyses based on multilevel confirmatory factor analysis (mCFA) using the *multilevelTools* package in *R* (Geldhof et al., 2014) revealed that the scale was reliable within societies, ω_{within} = .84, 95%CI [.84, .85], and between societies, $\omega_{between}$ = .95, 95%CI [.92, .97]. Histograms for PIFS scores in each society are displayed in Appendix A, Figure 1b.[34] For all analyses, PIFS scores were z-standardized within societies.

Cross-Societal Indicators

To test our preregistered interaction hypotheses, we combined our dataset with several societal level indicators from openly available datasets. We selected data for the indicators from the same time period of our data collection. If these were not available, the closest available time point was used. To increase the reliability and generalizability of our analyses, we selected multiple indicators for each of the concepts below and conducted principal component analyses to extract components representing each of the concepts (see Appendix B). We extracted a number of components that explained at least 80% in the total variance for all indicators. To keep data loss at a minimum, we imputed missing data based on "leave one out" cross-validation using the *missMDA* package in *R* (Josse & Husson, 2016). The number of missing cases for each indicator was low (≤ 6), suggesting that imputation was appropriate.

Welfare Provisions. As indicators for welfare provisions, we used the *Social Safety Net Expenditure by GDP* measure from the ASPIRE dataset of the World Bank (2023a) and the *Social Protection* indicator from the Global Social Mobility Index of the World Economic Forum (2020). The two indicators correlated with r = .86. Principal component analyses revealed a single component that explained 92.6% of the total variance. We extracted and z-standardized societies scores on this component for our analyses, with higher scores indicating more welfare provisions.

Quality of Institutions. As indicators for the quality of institutions, we used the six *Worldwide Governance Indicators* of the World Bank (2022; i.e., Voice and Accountability, Regulatory Quality, Political Stability and Absence of Violence/Terrorism, Rule of Law, Government Effectiveness, and Control of Corruption), the *Liberal Component Index* of the Varieties of Democracies Institute (Coppedge et al., 2022; Pemstein et al., 2022), the *Efficient and Inclusive Institutions* indicator from the Global Social

[33] Given that the last item is conceptually related to the dependent measure on perceived control over one's life, we ran robustness checks with this item removed. Results did not differ in direction or magnitude (see supplementary material).
[34] For more analyses on the PIFS in this dataset, including measurement invariance tests, see (Gallucci et al., 2023)

Mobility Index of the World Economic Forum (2020), the *Rule of Law* indicator of Freedom House (2023), and the *Functioning of Government* indicator from the Democracy Index of the Economist Intelligence Unit (2020). Principal component analyses revealed a single component that explained 80.1% of the total variance. We extracted and z-standardized societies scores on this component for our analyses, with higher scores indicating higher quality of institutions.

Labor Conditions. As indicators for labor conditions, we used the three indicators *Work Opportunities*, *Fair Wages*, and *Working Conditions* from the Global Social Mobility Index of the World Economic Forum (2020). Principal component analyses revealed a solution of two orthogonal components, the first one representing labor conditions as a whole and explaining 69.3 % of the total variance, and the second one representing mainly work opportunities and explaining 21.0 % of the total variance. We extracted and z-standardized societies scores on both component for our analyses, with higher scores indicating better labor conditions and work opportunities, respectively.

Results

Cross-Societal Variation in Perceived Control

A random intercept model with societies explained R^2 = .049 of the total variance in perceived control, indicating that people experience control relatively similar across the globe (i.e., ICC < .10, see Byrne & Van de Vijver, 2014). Yet, simulation-based exact tests conducted with the *RLRsim* package (Scheipl et al., 2008) indicated that random effects for societies explained a significant amount of variance in the random intercept model (RLRT = 488.76, p < .001), suggesting that mixed model analyses were appropriate.

Confirmatory Analyses

Fixed Effect of Financial Scarcity

Results for the preregistered hypotheses tests are displayed in Table 1. Data showed support for our hypothesis that across societies, financial scarcity is associated with lower perceived control over one's life (Model 1). A mixed model with random intercepts for societies and controlling for age, gender, and education showed a negative effect of financial scarcity on perceived control, β = -.24, 95%CI [-.26, -.22], p < .001. The fixed effect of financial scarcity explained an additional R^2 = .028 of the total variance in perceived control, 95%CI [.022, .034], as estimated with the *partR2* package using 1000 bootstrap samples (Stoffel et al., 2021). This finding suggests that across the globe, people who experience financial scarcity are more likely to perceive lower control over their lives.

Table 1

Model Summaries for Preregistered Hypotheses Tests

	Model 1				Model 2				Model 3				Model 4			
		95% CI				95% CI				95% CI				95% CI		
	Est	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Predictors																
Intercept	5.27	5.18	5.36	**< .001**	5.27	5.19	5.35	**< .001**	5.27	5.19	5.35	**< .001**	5.27	5.19	5.35	**< .001**
Financial scarcity	-0.24	-0.26	-0.22	**< .001**	-0.24	-0.27	-0.22	**< .001**	-0.24	-0.26	-0.21	**< .001**	-0.24	-0.26	-0.22	**< .001**
Education	0.04	0.02	0.07	**< .001**	0.04	0.02	0.07	**.001**	0.04	0.02	0.07	**< .001**	0.04	0.02	0.07	**.001**
Age	0.02	-0.01	0.04	.170	0.02	-0.01	0.04	.213	0.01	-0.01	0.04	.308	0.01	-0.01	0.04	.249
Gender	-0.01	-0.06	0.04	.652	-0.01	-0.06	0.04	.769	-0.01	-0.06	0.04	.631	-0.01	-0.06	0.04	.739
Welfare					-0.18	-0.25	-0.10	**< .001**								
Scarcity x Welfare					-0.09	-0.11	-0.07	**< .001**								
Institutions									-0.16	-0.24	-0.08	**< .001**				
Scarcity x Institutions									-0.10	-0.12	-0.08	**< .001**				
Labor conditions													-0.12	-0.20	-0.04	**.003**
Work opportunities													0.12	0.05	0.20	**.002**
Scarcity x Labor conditions													-0.09	-0.11	-0.06	**< .001**
Scarcity x Work opportunities													0.01	-0.01	0.03	.435
Random Effects																
Random effects variance (σ^2)	1.86				1.85				1.85				1.85			
Random intercept variance (τ_{00})	0.10				0.07				0.08				0.07			
ICC	0.05				0.04				0.04				0.04			
Marg. R^2 / Cond. R^2	0.031 / 0.080				0.050 / 0.085				0.048 / 0.086				0.049 / 0.085			

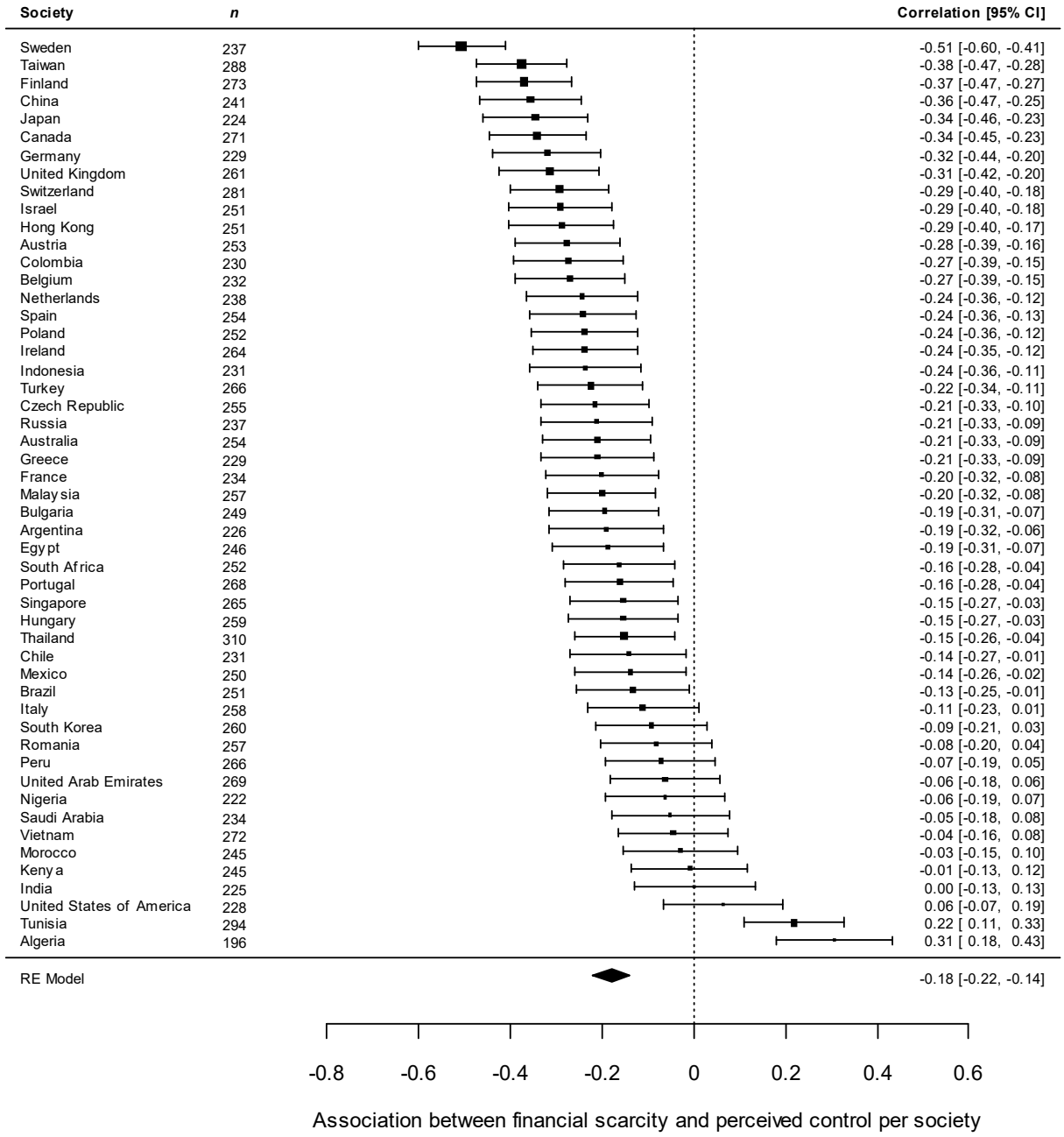
Note. Results for preregistered mixed models predicting perceived control. Models include random intercepts for societies, are based on i = 12779 observations clustered in n = 51 societies. The predictors financial scarcity, education, and age were measured on the individual level and z-standardized within each society. The societal indicators welfare, institutions, labor conditions, and work opportunities were measured on the societal level. Bold p-values are statistically significant. Est = estimates, LL = lower limit, UL = upper limit.

Meta-Analysis

We conducted a meta-analysis to estimate the heterogeneity of the association between financial scarcity and perceived control across societies. In line with results of the mixed model, the meta-analysis showed a moderate association between financial scarcity and perceived control across societies, r = -.18, SE = .02, 95% CI [-.22, -.14], z = -8.86, p < .001. Moreover, there was strong heterogeneity in effect sizes between societies, τ^2 = .017, SE = .004, Q(50) = 303.5, p < .001. Of the total variance in effect sizes, 82.9 % could be attributed to heterogeneity between societies. This indicates that societies explained H^2 = 5.85 times more variance than could be expected by random error. Figure 2 shows the correlation between financial scarcity and perceived control per society, displaying the strong cross-societal variation. Correlations ranged from -.51 to .31, indicating that financial scarcity was strongly negatively associated with perceived control in some societies (explaining up to 25% of the total variance) and moderately positively associated with perceived control in others (explaining up to 9.6% of the total variance). Overall, the association between scarcity and perceived control was negative for 37 societies in our sample, not significantly different from zero in 12 societies, and positive in 2 societies. Thus, while the study provides evidence in support of our hypothesis that financial scarcity is negatively associated with perceived control, this association might not be ubiquitous across the globe.

Figure 2

Forest Plot showing the Meta-Analytic Results for the Association between Financial Scarcity and Control



Note. The forest plot displays the meta-analytic effect sizes for financial scarcity on perceived control per society. For each society, we report the Pearson correlation coefficient (*r*) and its 95% confidence interval. The size of the square indicates the relative weight the societal estimates for the overall effect size. The diamond displays the overall effect size is for the random effects (RE) model. *n* = sample size for each society.

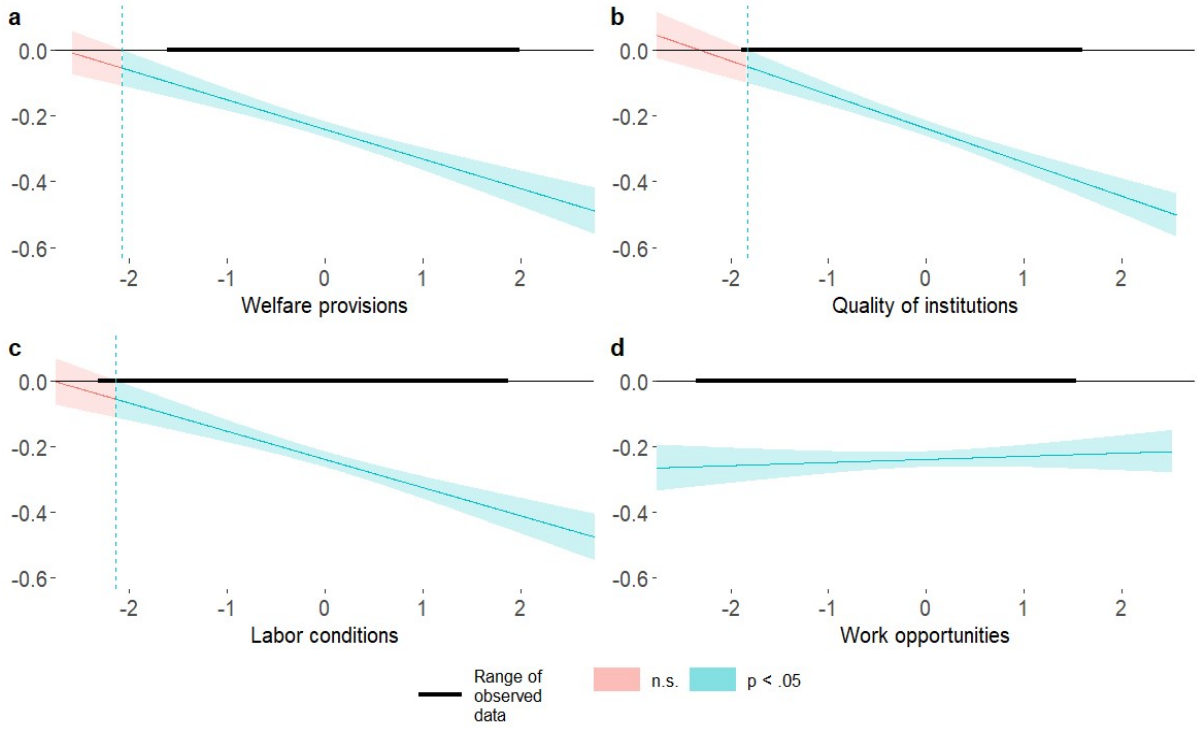
Cross-Level Interactions with Societal Indicators

Next, we tested our preregistered hypotheses that several societal level indicators might covary with the observed heterogeneity in effect sizes between countries and moderate the association between financial scarcity and perceived control. Results revealed interaction effects between financial scarcity and each of the components for welfare provisions (β = -.09, $p < .001$), quality of institutions (β = -.10, $p < .001$), and labor conditions (β = -.09, $p < .001$), but not for work opportunities (β = .01, $p = .435$; Figures 3a–d; Table 1, Models 2–4). However, these effects were in the opposite direction to our preregistered hypotheses. The negative association between financial scarcity and perceived control was weaker for societies with lower—not higher—welfare provisions, quality of institutions, and labor conditions.

In addition to the interaction terms, the main effects for the three indicators were also significant. Regardless of their financial situation, participants experienced more control over their lives in societies with lower welfare provisions, lower quality of institutions, and worse labor conditions. As evident in Table 1, including the fixed effects for the societal indicators and their cross-level interaction with financial scarcity in the model increased the variance explained by fixed effects by an additional $R^2_{\text{marginal}} \approx .02$. This increase in explained (marginal) variance constituted approximately 40% of the total variance explained by societies in the random intercept model (see above). Thus, a substantial part of the heterogeneity between societies in perceived control covaried with the societal qualities included in our preregistered models. Thus, contrary to our hypotheses, experiencing financial scarcity in societies that score lower—not higher—on these indicators was associated less with reduced sense of control over one's life.

Figure 3

Johnson-Neyman Plots Showing the Slopes for Financial Scarcity on Control for the Different Levels of the Societal Indicators



Note. Figure 3a shows that at lower levels of welfare provisions, the negative association between financial scarcity and perceived control becomes weaker. Figures 3b and 3c show similar results for quality of institutions and labor conditions, respectively, with the association being non-significantly different from zero for the lowest scoring societies. Figure 3d does not provide evidence for a similar effect for the interaction of financial scarcity and work opportunities.

Robustness Checks

We conducted several analyses to test whether the findings of our preregistered analyses were robust (Appendix C, Tables 2–5). First, we included random slopes for societies in the models. Second, we ran the analyses without control variables. Third, we excluded an item from the PIFS on perceived financial control, which shows some conceptual overlap with our dependent variable. Fourth, we excluded societies from the analyses which showed extreme values for the association between financial scarcity and control. Fifth, we added the societal indicators from the exploratory analyses (see below) and their interaction terms with financial scarcity as covariates to the analyses. Sixth, we added societal means for financial scarcity as a control variable to the analyses. Seventh, we added the individual level variables from the exploratory analyses (see below) and their interaction terms with financial scarcity as covariates to our analyses. Eighth, we added control variables for the impact of the COVID-19 pandemic to the analyses. For all robustness checks, the direction and significance of our original findings did not change. When controlling for the impact of the COVID-19 pandemic, the fixed effect for financial scarcity was stronger than in our preregistered analyses.

Exploratory Analyses

As with any correlational design, it is possible that hidden variables not included in our analyses explain these contradicting findings. Moreover, even if the influence of these variables is statistically controlled for, measurement error might prevent effective control of hidden variables influencing the observed association (Wysocki et al., 2022). Therefore, we explored potential alternative moderation models.

As a follow up, we explored whether other societal indicators might also covary with the strong heterogeneity in effect sizes across societies. Therefore, we first conducted a literature search and identified four additional societal indicators that might also moderate the association between financial scarcity and perceived control (i.e., economic development, economic inequality, secular vs. traditional values, and individualistic vs. collectivistic values). In addition, we tested whether two individual level variables from our dataset might also function as moderators in alternative models (i.e., religiosity and family support). Regression tables for all exploratory analyses and a correlation table of all societal level indicators can be found in Appendix D. We report all exploratory analyses that were conducted and use a Bonferroni correction for the alpha level based on six additional analyses ($\alpha = .008$).

First, we checked whether the association between financial scarcity and perceived control is weaker in societies characterized by relatively lower wealth. It is possible that having little financial resources in these societies does not constitute such strong threat to one's sense of control because it entails fewer negative social comparisons (Kley, 2022). To test this, we included GDP per capita (The World Bank, 2023b) as a measure for economic development in our analyses. In line with this reasoning, the negative association between financial scarcity and control was weaker in societies with lower GDP per capita ($\beta = -.08$, $p < .001$). Thus, in economically less developed societies, financial scarcity was associated less with a perceived lack of control over one's life.

Second, based on a similar reasoning, we also tested whether the association between financial scarcity and perceived control might be dependent on economic inequality within a society. As with economic development, it is possible that in economically equal societies, the experience of financial scarcity results in a higher prevalence of negative social comparisons (Kley et al., 2022). To test this, we used the gini coefficient (The World Bank, 2023c) as a measure for economic inequality in our analyses. However, results did not provide evidence in support of this alternative moderation model. The association between financial scarcity and perceived control did not differ based on gini scores ($\beta = .02$, $p = .216$). Thus, there was no evidence suggesting that the association between financial scarcity and control is weaker in more unequal societies.

Third, we explored whether differences in cultural values might covary with the heterogeneity in the association between financial scarcity and perceived control. One of the most prominent cultural dimensions differentiates between individualistic and collectivistic values (Hofstede, 2011). As suggested by Jachimowicz et al (2022), it is possible that the negative association between financial scarcity and perceived control is weaker in collectivistic societies compared to individualistic societies,

as stronger social bonds in collectivistic societies might buffer against negative effects of financial scarcity (Mikucka, 2013). Compensatory control theory posits a similar reasoning: Identifying more closely with others can restore control perceptions when personal control is threatened (Rothbaum et al., 1982). To test this logic, we used data on Hofstede's (2023) cultural dimension on individualism vs. collectivism in our exploratory analyses. Results supported this contention: The negative association between financial scarcity and perceived control was weaker in more collectivistic societies relative to more individualistic societies ($\beta = -.05$, $p < .001$).

Fourth, we explored whether societal differences in the cultural values regarding traditionalism vs. secularism might be associated with the observed heterogeneity in effects. Compared to secular values, traditional values emphasize the importance of religion, family ties, and authority (Inglehart & Welzel, 2005). Literature shows that religious beliefs (Hoogeveen et al., 2018; Jackson & Bergeman, 2011; Kay et al., 2008, 2010), close social networks (Rothbaum et al., 1982), and authority (Friesen et al., 2014; Goode et al., 2014) can all function as secondary sources for control. To test whether traditional values might compensate for a control threat of financial scarcity, we used data on traditionalism vs. secularism from the World Values Survey (Haerpfer et al., 2020). In line with this reasoning, the negative association between financial scarcity and perceived control was weaker in societies with more traditional values compared to societies with more secular values ($\beta = -.06$, $p < .001$). Thus, also in societies with more traditional values, financial scarcity was associated less strongly with a perceived lack of control over one's life.

Finally, we also explored whether other individual level variables in our dataset might covary with the heterogeneity in effect sizes. For a different project, we had collected single item measures for religiosity and for the willingness to seek financial support from friends and family in times of need. In line with the results on traditional vs. secular values on the societal level, we found that the more religious people were, the less their experience of financial scarcity was associated with lower perceived control ($\beta = .09$, $p < .001$). Likewise, in line with prior research (Israel, 2016; Mikucka, 2013) and the results on collectivism on the societal level, we found that the more likely people were to seek financial support from family and friends in times of need, the smaller the negative association between financial scarcity and perceived control ($\beta = .09$, $p < .001$).

Taken together, our findings show that financial scarcity was negatively associated with perceived control. Yet, the strength of the association varied for societies and individuals. Surprisingly, we found that the negative association between financial scarcity and perceived control was smaller in societies with lower—not higher—levels of welfare provisions, quality of institutions, and labor conditions. These societal indicators were correlated with other prominent indicators used in cross-cultural research. Our exploratory analyses revealed that the negative association of financial scarcity with perceived control was also weaker in societies with lower economic development (but not economic equality) and more traditional and collectivistic values. In line with these findings, the association between financial scarcity and perceived control was also weaker for individuals who were

more religious and for those who would ask family or close friends for financial support when having financial problems.

Discussion

Perceiving control over one's life is a basic and universal human need (Hornsey et al., 2019; Landau et al., 2015). Yet, when people experience financial scarcity, this need might be threatened (Fritsche & Jugert, 2017). The feeling of not having control over one's life has far reaching consequences, including detrimental effects on goal pursuit (Bhanji et al., 2015; Heckhausen et al., 2010), and mental and physical health (Jonas et al., 2014; Ross & Mirowsky, 2013). To examine the association between financial scarcity and perceived control across the globe, we conducted a cross-societal study with 12,779 participants from 51 societies. We measured financial scarcity and perceived control with validated self-report items, and combined our data with societal indicators from several prominent available datasets.

In line with previous findings from WEIRD samples (Jachimowicz, 2022; Sommet & Spini, 2022), we found that across the societies included in our study, on average financial scarcity is negatively associated with perceived control over one's life. Our findings suggest that those with problematic household finances are likely to also experience a control threat. Crucially, the association between financial scarcity and perceived control varied considerably across the globe. In a large majority of the societies included in our study, we found evidence for a negative association between financial scarcity and control. In some societies, however, this association was so strong that financial scarcity explained approximately 25% of the variance in perceived control. Yet, in other societies, the association was smaller or not significantly different from zero. In two societies, we even found evidence for a positive association between financial scarcity and control. This suggests that the association between financial scarcity and perceived control might not be ubiquitous, highlighting the relevance of cross-societal research on financial scarcity.

In line with prior research (Attah et al., 2016; Chong & Calderon, 2000; Hruschka et al., 2014; Hruschka & Henrich, 2013; Israel, 2016; Kay et al., 2008, 2010; Muntaner et al., 2010) and a compensatory control logic (Landau et al, 2015), we had hypothesized that welfare provisions, quality of institutions, and labor conditions might help to explain this heterogeneity in associations across societies. Results, however, showed effects opposite to our hypotheses: The negative association between financial scarcity and perceived control was smaller in societies with lower—instead of higher—welfare provisions, lower quality of institutions, and worse labor conditions. These moderation effects were relatively strong and statistically robust when probed in a range of alternative models and when controlling for various background variables. Yet, given the contrast of our findings with the existing literature, more research is needed to reach more definite conclusions.

Moreover, in line with existing literature, exploratory analyses revealed that also in societies with lower economic development (Kley et al., 2022), as well as more traditional (Friesen et al., 2014; Goode et al., 2014; Hoogeveen et al., 2018; Jackson & Bergeman, 2011; Kay et al., 2008, 2010; Rothbaum

et al., 1982) and more collectivist values (Mikucka, 2013; Rothbaum et al., 1982), financial scarcity was associated less with perceived control. Notably, these indicators correlated strongly with the cross-societal indicators from our pre-registered analyses. Thus, a society with low welfare provisions, low quality of institutions, and weak labor rights was also more likely to be less economically developed and had a stronger prevalence of traditional and collectivistic values.

A limitation of this study is its correlational nature, preventing causal interpretations of the findings. Yet, in line with the recent meta-scientific debate on causal inferences from non-experimental psychological research (Grosz et al., 2020), we see value in discussing the likelihood of certain causal explanations for the observed pattern of results. Regarding the overall negative association between financial scarcity and perceived control, we think that a causal negative effect of financial scarcity on control is indeed the most likely explanation for the data. A causal mechanism suggesting that the experience of having too little financial resources to meet demands can lead to a perceived inability to achieve goals and determine life outcomes seems logical and is supported by previous findings (Jachimowicz, 2022; Sommet & Spini, 2022; Van Dijk et al., 2022). However, people who experience low control over their lives might also be less able to regulate negative emotions and stress about their finances (Wallstone et al., 1987; Webb et al., 2012) and might have a stronger short-term focus (Pepper & Nettle, 2017), which are central to the experience of financial scarcity (De Bruijn & Antonides, 2022; Van Dijk et al., 2022). While some experimental evidence for a causal effect of financial scarcity on reduced control exists (Hilbert et al., 2022a; To et al., 2023) future experimental or longitudinal research might help to better understand the causal mechanism between these concepts.

Regarding the observed moderation of welfare provisions, quality of institutions, and labor conditions (opposite to our hypotheses), potential causal explanations are much less clear. While these findings were statistically robust, they were in conflict with prior results and theory suggesting that these societal qualities might buffer against a control threat of financial scarcity (Attah et al., 2016; Chong & Calderon, 2000; Hruschka et al., 2014; Hruschka & Henrich, 2013; Israel, 2016; Kay et al., 2008, 2010; Landau et al, 2015; Muntaner et al., 2010). Exploratory analyses further revealed that the societal qualities from our preregistered hypotheses correlate with many other societal indicators that also might affect the association between financial scarcity and control. To us, it seems more likely that the observed heterogeneity in associations across societies could be explained by either one of these factors or a combination of them. Yet, follow-up research is needed to test whether the exploratory findings can be confirmed in other data, and future experimental or longitudinal studies would be valuable to generate a better understanding of potential causal mechanisms.

Conclusion

Across the globe, people experience financial scarcity. In a large cross-societal study, we found that overall, this experience is associated with the perception of lower control. Yet, we also found that the negative association between financial and perceived control is not ubiquitous. Contrary to our hypotheses, the association was weaker in societies with lower welfare provisions, lower quality of

institutions, and worse labor conditions. Exploratory analyses additionally revealed that the association was also weaker in societies with lower economic development as well as with more traditional and collectivistic values. These findings highlight the relevance of perceived control for people who experience financial scarcity, as well as the importance to conduct research with culturally diverse samples.

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Appendix A: Descriptives

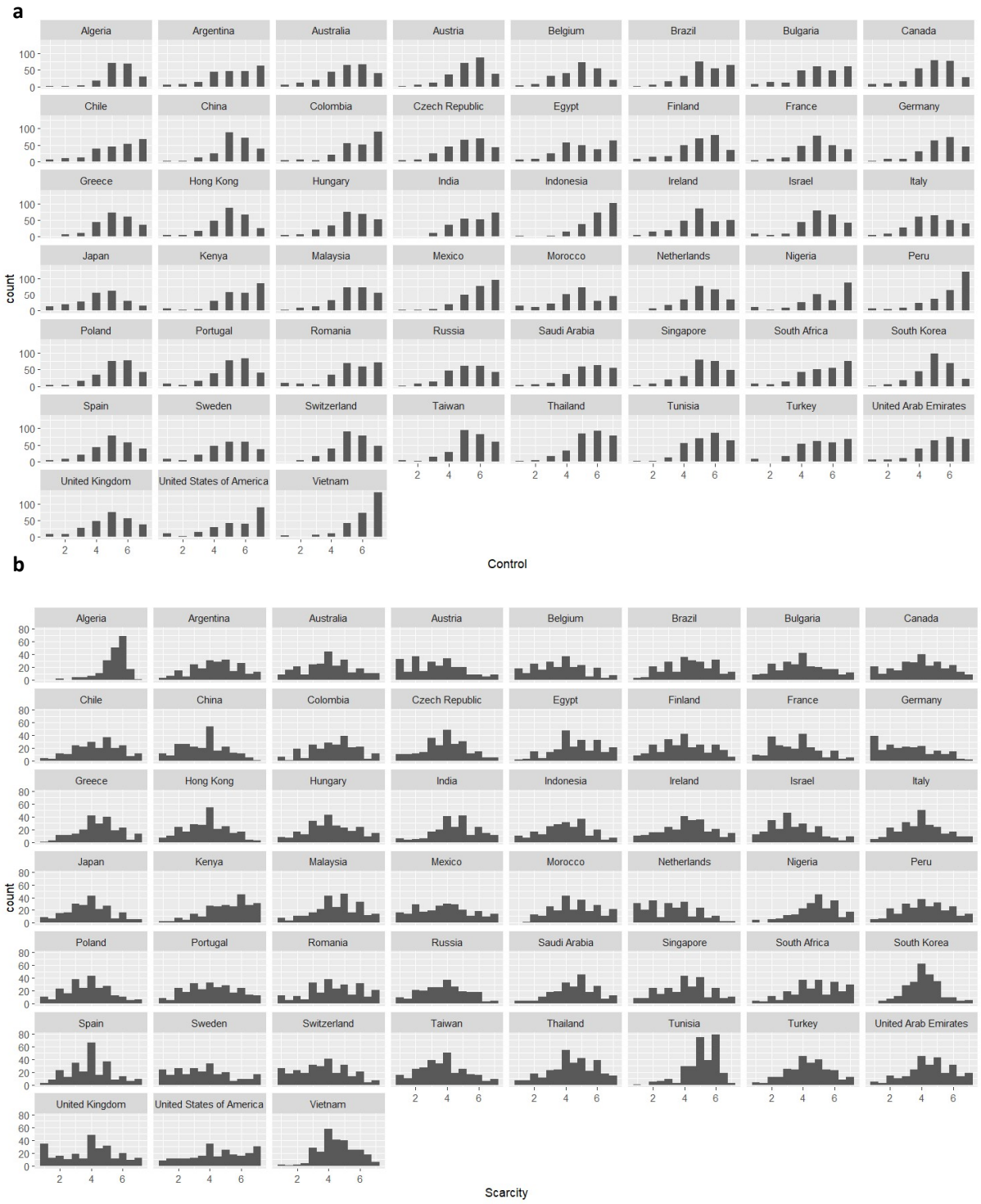
Table 1
Sample Descriptives per Society

			Age		Education		Scarcity		Control	
Country	*N*	*% female*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Algeria	196	29.08	36.92	10.72	4.83	0.85	5.47	0.83	5.46	1.08
Argentina	227	55.07	37.20	12.56	4.20	0.99	4.39	1.46	5.24	1.55
Australia	254	53.94	44.18	12.74	4.63	1.09	3.99	1.56	5.04	1.47
Austria	253	52.17	39.40	13.43	4.40	1.26	3.36	1.63	5.30	1.24
Belgium	232	52.16	41.25	13.19	3.76	1.27	3.64	1.53	4.80	1.34
Brazil	251	51.39	37.85	12.24	4.35	1.05	4.32	1.50	5.39	1.36
Bulgaria	249	43.37	38.80	11.98	4.33	1.17	3.94	1.55	5.11	1.58
Canada	274	54.38	44.83	12.71	4.54	0.99	3.93	1.62	4.97	1.35
Chile	231	62.77	34.39	12.10	4.19	1.10	4.34	1.45	5.35	1.54
China	241	47.72	37.89	11.34	4.88	0.62	3.62	1.39	5.36	1.15
Colombia	230	50.43	38.77	12.81	4.48	0.95	4.30	1.42	5.77	1.36
Czech Republic	256	51.17	39.46	13.68	2.89	1.33	3.89	1.40	5.12	1.37
Egypt	247	41.30	35.08	11.05	4.76	0.77	4.63	1.44	5.06	1.58
Finland	274	52.19	41.76	12.72	3.94	1.33	3.98	1.55	4.98	1.47
France	234	52.56	43.66	11.91	4.37	1.23	3.55	1.47	5.07	1.33
Germany	229	51.97	45.55	12.33	4.63	1.27	3.20	1.65	5.39	1.29
Greece	229	54.15	38.42	12.19	4.34	1.16	4.46	1.28	5.18	1.24
Hong Kong	251	50.20	38.73	12.50	3.58	1.13	3.80	1.35	5.02	1.24
Hungary	259	52.12	40.93	14.28	3.62	1.09	4.14	1.51	5.24	1.39
India	225	50.22	37.65	12.44	5.35	0.73	4.49	1.37	5.61	1.25
Indonesia	231	48.05	37.90	11.92	4.52	0.95	4.00	1.44	6.07	1.10
Ireland	264	57.58	40.70	11.82	4.43	1.07	4.15	1.50	4.97	1.48
Israel	251	47.01	40.15	13.08	4.44	1.16	3.41	1.46	5.17	1.37
Italy	258	50.78	40.91	13.01	3.70	1.12	3.97	1.43	4.87	1.45
Japan	224	39.29	43.04	11.23	4.29	1.02	3.86	1.35	4.27	1.54
Kenya	245	58.78	31.47	9.38	4.55	0.80	5.13	1.39	5.61	1.42
Korea	260	45.00	40.59	11.87	4.55	0.94	4.12	1.07	5.04	1.18
Malaysia	258	45.35	37.28	12.00	4.29	1.05	4.49	1.43	5.34	1.36
Mexico	250	50.80	37.57	12.03	4.65	0.74	3.83	1.66	5.87	1.23
Morocco	245	35.10	30.80	9.36	4.47	1.03	4.57	1.38	4.70	1.66
Netherlands	238	53.78	42.56	12.53	3.63	0.94	3.14	1.52	5.16	1.27
Nigeria	222	70.72	30.43	10.70	4.62	0.94	4.85	1.29	5.48	1.64
Peru	266	52.63	34.15	11.12	4.41	0.98	4.21	1.50	5.83	1.47
Poland	252	48.81	38.45	13.08	4.23	1.19	3.78	1.43	5.27	1.30
Portugal	268	51.12	40.16	13.19	4.38	1.19	4.11	1.56	5.20	1.35
Romania	257	49.42	39.43	13.56	4.35	1.11	4.33	1.61	5.38	1.50
Russia	237	51.05	40.77	12.46	4.67	0.93	3.81	1.42	5.19	1.34
Saudi Arabia	234	47.86	33.98	9.81	4.68	0.84	4.53	1.36	5.37	1.38
Singapore	265	47.55	39.78	12.55	4.72	0.98	4.08	1.52	5.23	1.37
South Africa	252	52.38	37.55	12.87	4.20	1.01	4.77	1.51	5.35	1.55
Spain	254	46.46	40.45	12.24	4.35	1.05	3.95	1.34	5.04	1.40
Sweden	237	50.63	43.77	13.25	3.01	1.28	3.59	1.73	5.00	1.47
Switzerland	281	53.74	41.66	13.00	4.77	1.14	3.63	1.57	5.29	1.22
Taiwan	288	46.53	36.97	12.07	3.85	0.79	3.70	1.47	5.40	1.27
Thailand	310	50.32	39.90	13.03	4.71	0.93	4.43	1.44	5.52	1.25
Tunisia	294	39.46	40.56	11.99	4.63	0.88	5.09	1.03	5.39	1.26
Turkey	266	53.38	35.34	11.50	4.41	1.00	4.36	1.32	5.27	1.47
United Arab Emirates	270	46.67	34.24	10.30	4.92	0.79	4.54	1.40	5.37	1.45
United Kingdom	261	54.02	43.07	13.32	4.33	1.10	3.84	1.74	4.87	1.49
United States of America	228	51.75	44.11	14.01	4.58	1.12	4.53	1.74	5.47	1.67
Vietnam	272	51.47	33.53	9.65	4.79	0.80	4.56	1.13	6.08	1.24

Note. Education was measured as a categorical variable with categories 1 = Elementary school, 2 = Middle school, 3 = High school, 4 = Some college, 5 = Bachelor degree, 6 = Graduate school or higher.

Figure 1

Histograms for Perceived Control (a) and Financial Scarcity (b) per Society



Appendix B: Principal Component Analyses (PCA) for Societal Indicators

Imputation of Missing Data

Before conducting the PCA for each societal indicator, missing data were imputed with the *missMDA* package using the 'estim_ncpPCA' function (Josse & Husson, 2016). This function imputes missing data based on a PCA estimation with cross-validation. In a first step, the optimal number of dimensions that should be used for PCA estimation algorithm are calculated. Then, for the "leave-one-out" cross-validation that was used here, missing data are imputed based on subsamples where for each iteration, one case is excluded from the dataset. The iterative algorithm imputes values for each subsample until the model converges (i.e., the PCA has minimum prediction error).

Table 2

Principal Component Analyses with Imputed Data for Societal Indicators

					Loadings	
Component	*Indicator*	*Source*	*Year*	*Imputed*	*C1*	*C2*
Welfare Provisions	Social Safety Net Expenditure by GDP	WB	2020	0	.70	
	Social Protection	WEF	2020	6	.70	
				Explained variance	*92.6%*	
Quality of Institutions	Voice and Accountability	WB	2020	1	.30	
	Regulatory Quality	WB	2020	1	.33	
	Political Stability and Absence of Violence/Terrorism	WB	2020	1	.31	
	Rule of Law	WB	2020	1	.33	
	Government Effectiveness	WB	2020	1	.32	
	Control of Corruption	WB	2020	1	.33	
	Liberal Component Index	VDEM	2021	0	.27	
	Efficient and Inclusive Institutions	WEF	2020	6	.34	
	Rule of Law	FH	2020	0	.32	
	Functioning of Government	EIU	2020	1	.30	
				Explained variance	*80.1%*	
Labor Conditions	Working Conditions	WEF	2020	6	.62	-.25
	Fair Wages	WEF	2020	6	.59	-.47
	Work Opportunities	WEF	2020	6	.51	.85
				Explained variance	*69.3%*	*21.0%*

Note. C1 = Component 1, C2 = Component 2, WB = World Bank, WEF = World Economic Forum, VDEM = Varieties of Democracies Institute, FH = Freedom House, EIU = The Economist Intelligence Unit.

Appendix C: Robustness Checks

Table 2

Robustness Checks with Alternative Model Specifications

	Robustness check 1				**Robustness check 2**				**Robustness check 3**				**Robustness check 4**			
		95% CI				*95% CI*				*95% CI*				*95% CI*		
Predictors	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Financial Scarcity	-0.24	-0.29	-0.19	**< .001**	-0.25	-0.27	-0.22	**< .001**	-0.21	-0.23	-0.18	**< .001**	-0.25	-0.28	-0.23	**< .001**
Scarcity x Welfare	-0.09	-0.14	-0.04	**< .001**	-0.09	-0.14	-0.04	**< .001**	-0.08	-0.11	-0.06	**< .001**	-0.07	-0.09	-0.05	**< .001**
Scarcity x Institutions	-0.10	-0.15	-0.06	**< .001**	-0.10	-0.25	-0.06	**< .001**	-0.11	-0.13	-0.08	**< .001**	-0.07	-0.10	-0.05	**< .001**
Scarcity x Labor Conditions	-0.08	-0.13	-0.04	**< .001**	-0.08	-0.13	-0.04	**< .001**	-0.08	-0.10	-0.06	**< .001**	-0.06	-0.08	-0.03	**< .001**
Scarcity x Work Opportunities	0.01	-0.04	0.06	.654	0.01	-0.04	0.06	.635	0.00	-0.02	0.02	.970	0.02	0.00	0.05	.065

Note. Robustness check 1 = models include random slopes for societies. Robustness check 2 = models without controlling for education, age, and gender. Robustness check 3 = models with PIFS scale excluding item on financial control. Robustness check 4 = models excluding data for Algeria, Tunisia and Sweden. All models include random intercepts for societies. Models 1–3 are based on i = 12779 observations clustered in N = 51 societies. Model 4 is based on i = 12044 observations clustered in N = 48 societies. Bold p-values are statistically significant. Est = estimates, LL = lower limit, UL = upper limit.

Table 3

Robustness Checks Controlling for Societal Indicators from Exploratory Analyses

	Robustness check 5				**Robustness check 6**				**Robustness check 7**				**Robustness check 8**			
		95% CI				*95% CI*				*95% CI*				*95% CI*		
Predictors	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Financial scarcity	-0.23	-0.26	-0.21	**< .001**	-0.23	-0.26	-0.21	**< .001**	-0.23	-0.26	-0.21	**< .001**	-0.23	-0.26	-0.21	**< .001**
Scarcity x Welfare1	-0.07	-0.10	-0.05	**< .001**	-0.07	-0.10	-0.05	**< .001**	-0.07	-0.10	-0.05	**< .001**	-0.07	-0.10	-0.05	**< .001**
Scarcity x Institution1	-0.10	-0.15	-0.06	**< .001**	-0.10	-0.15	-0.06	**< .001**	-0.10	-0.15	-0.06	**< .001**	-0.10	-0.15	-0.06	**< .001**
Scarcity x Labor1	-0.06	-0.09	-0.02	**< .001**	-0.06	-0.09	-0.02	**< .001**	-0.06	-0.09	-0.02	**< .001**	-0.06	-0.09	-0.02	**< .001**
Scarcity x Labor2	0.01	-0.01	0.03	.379	0.01	-0.01	0.03	.379	0.01	-0.01	0.03	.379	0.01	-0.01	0.03	.379
$N_{Societies}$	50				43				50				43			
$I_{Observations}$	12483				10733				12519				10848			

5 = controlling for GDP per capita. Robustness check 6 = controlling for Gini. Robustness check 7 = controlling for Individualism vs. Collectivism. Robustness check 8 = controlling for Secular values vs. Traditional values. All models include random intercepts for societies and an interaction term between financial scarcity and the respective control variable. Bold p-values are statistically significant. Est = estimates, LL = lower limit, UL = upper limit.

Given that the data were collected during the COVID-19 pandemic, it was possible that societal differences in the extent of fatalities or governmental restrictions might confound our findings. Therefore, we collected data on three items regarding the COVID-19 pandemic. Participants indicated whether they thought about the COVID-19 pandemic while responding to the items, whether their health was affected by the COVID-19 pandemic, and whether their financial situation was affected by the COVID-19 pandemic.

Table 4

Robustness Checks with Societal Means for Financial Scarcity and Individual Level Variables

	Robustness check 9				**Robustness check 10**				**Robustness check 11**			
		95% CI				*95% CI*				*95% CI*		
Predictors	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Financial Scarcity	-0.24	-0.26	-0.22	**< .001**	-0.25	-0.28	-0.23	**< .001**	-0.27	-0.29	-0.24	**< .001**
Scarcity x Welfare	-0.09	-0.11	-0.07	**< .001**	-0.09	-0.12	-0.07	**< .001**	-0.09	-0.11	-0.07	**< .001**
Scarcity x Institutions	-0.10	-0.13	-0.08	**< .001**	-0.10	-0.13	-0.08	**< .001**	-0.10	-0.13	-0.08	**< .001**
Scarcity x Labor Conditions	-0.09	-0.11	-0.06	**< .001**	-0.09	-0.11	-0.06	**< .001**	-0.09	-0.11	-0.06	**< .001**
Scarcity x Work Opportunities	0.01	-0.01	0.03	.435	0.01	-0.02	0.03	.562	0.01	-0.02	0.03	.478

Note. Robustness check 9 = models include fixed effect for societal level means of financial scarcity. Robustness check 10 = controlling for individual level religiosity. Robustness check 11 = controlling for individual level family support. All models include random intercepts for societies. Robustness checks 10 and 11 include interaction term between financial scarcity and respective control variable. Models are based on i = 12771 observations clustered in N = 51 societies. Bold p-values are statistically significant. Est = estimates, LL = lower limit, UL = upper limit.

Table 5

Robustness Checks Controlling for the Impact of the COVID-19 Pandemic

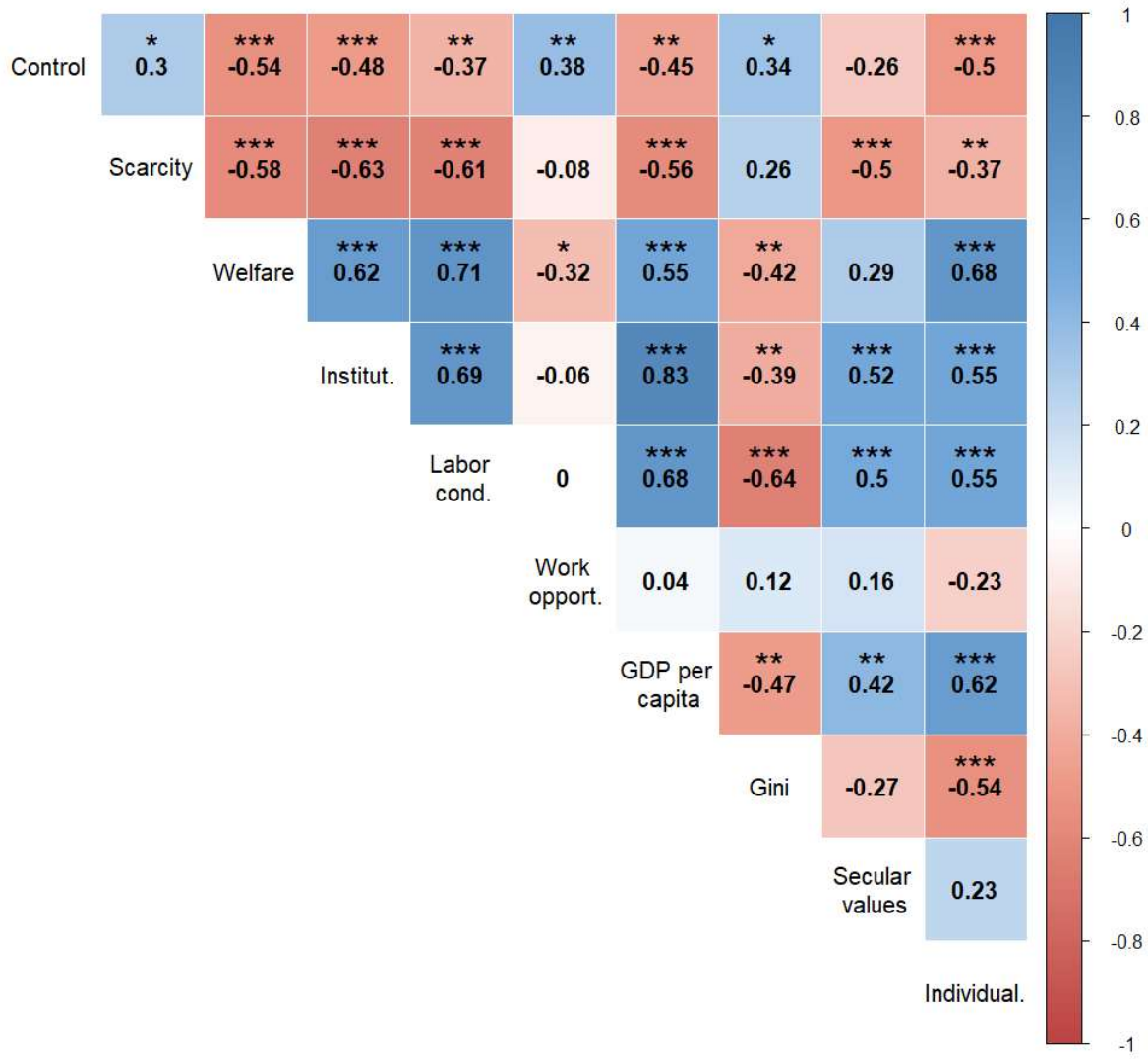
	Robustness check 12				**Robustness check 13**				**Robustness check 14**			
		95% CI				*95% CI*				*95% CI*		
Predictors	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Financial Scarcity	-0.46	-0.51	-0.41	**< .001**	-0.46	-0.51	-0.41	**< .001**	-0.47	-0.53	-0.41	**< .001**
Scarcity x Welfare	-0.08	-0.10	-0.05	**< .001**	-0.07	-0.10	-0.05	**< .001**	-0.07	-0.10	-0.05	**< .001**
Scarcity x Institutions	-0.09	-0.12	-0.07	**< .001**	-0.09	-0.12	-0.07	**< .001**	-0.09	-0.11	-0.06	**< .001**
Scarcity x Labor Conditions	-0.07	-0.10	-0.05	**< .001**	-0.07	-0.10	-0.05	**< .001**	-0.07	-0.09	-0.04	**< .001**
Scarcity x Work Opportunities	0.00	-0.02	0.03	.730	0.00	-0.02	0.02	.980	0.00	-0.02	0.03	.697

Note. Robustness check 12 = controlling for influence of COVID-19 on responses. Robustness check 13 = controlling for influence of COVID-19 on health. Robustness check 14 = controlling for influence of COVID-19 on financial situation". All models include random intercepts for societies and interaction terms for financial scarcity and the control variable. Models are based on i = 12771 observations clustered in N = 51 societies. Bold p-values are statistically significant. Est = estimates, LL = lower limit, UL = upper limit.

Appendix D: Exploratory Analyses

Figure 4

Correlation Table for Societal Level Associations between variables from Pre-registered and Exploratory Models



Note. Scarcity and Control variables were aggregated to societal mean scores. Missing cases were excluded for pairwise comparisons. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 1

Model Summaries for Exploratory Analyses with Societal Indicators

	Model 1				Model 2				Model 3				Model 4			
		95% CI				95% CI				95% CI				95% CI		
	Est	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Predictors																
Intercept	5.27	5.18	5.36	**< .001**	5.26	5.16	5.37	**< .001**	5.27	5.19	5.35	**< .001**	5.27	5.17	5.38	**< .001**
Financial scarcity	-0.23	-0.26	-0.21	**< .001**	-0.25	-0.27	-0.22	**< .001**	-0.24	-0.26	-0.22	**< .001**	-0.25	-0.28	-0.23	**< .001**
Education	0.04	0.02	0.06	**.001**	0.04	0.01	0.06	**.004**	0.04	0.02	0.07	**< .001**	0.05	0.02	0.07	**< .001**
Age	0.01	-0.01	0.04	.327	0.01	-0.02	0.04	.496	0.02	-0.01	0.04	.155	0.01	-0.01	0.04	.356
Gender	-0.01	-0.06	0.03	.571	0.02	-0.04	0.07	.549	-0.01	-0.06	0.04	.627	-0.01	-0.07	0.04	.605
GDP per capita	-0.15	-0.23	-0.06	**.001**												
Scarcity × GDP per capita	-0.08	-0.10	-0.06	**< .001**												
Gini					0.12	0.02	0.22	.019								
Scarcity × Gini					0.02	-0.01	0.04	.216								
Individualism									-0.16	-0.25	-0.08	**< .001**				
Scarcity × Individualism									-0.05	-0.07	-0.02	**< .001**				
Secular values													-0.09	-0.19	0.01	.092
Scarcity × Secular values													-0.06	-0.08	-0.03	**< .001**
Random Effects																
Random effects variance (σ^2)	1.86				1.85				1.85				1.85			
Random intercept variance (τ_{00})	0.08				0.10				0.08				0.10			
ICC	0.04				0.05				0.04				0.05			
$N_{country}$	50				43				50				43			
Observations	12483				10733				12519				10848			
Marginal R^2 / Conditional R^2	0.043 / 0.084				0.038 / 0.089				0.046 / 0.084				0.040 / 0.091			

Note. Results for preregistered mixed models predicting perceived control. Models include random intercepts for societies, are based on i = 12779 observations clustered in n = 51 societies. The predictors financial scarcity, education, and age were measured on the individual level and z-standardized within each society. The societal indicators welfare, institutions, labor conditions, and work opportunities were measured on the societal level. Bold p-values are statistically significant. Est = estimates, LL = lower limit, UL = upper limit.

Table 7

Model Summaries for Exploratory Analyses with Individual Level Variables

	Model 5				Model 6			
		95% CI				95% CI		
	Est	*LL*	*UL*	*p*	*Est*	*LL*	*UL*	*p*
Predictors								
Intercept	5.27	5.18	5.36	**< .001**	5.25	5.15	5.34	**< .001**
Scarcity	-0.25	-0.28	-0.23	**< .001**	-0.27	-0.29	-0.24	**< .001**
Education	0.04	0.01	0.06	**.002**	0.04	0.01	0.06	**.003**
Age	0.01	-0.01	0.03	.428	0.03	0.00	0.05	.026
Gender	-0.02	-0.07	0.03	.426	0.01	-0.04	0.05	.832
Religiosity	0.13	0.11	0.16	**< .001**				
Scarcity × Religiosity	0.09	0.07	0.12	**< .001**				
Family support					0.15	0.13	0.18	**< .001**
Scarcity × Family Support					0.09	0.07	0.11	**< .001**
Random Effects								
Random effects variance (σ^2)	1.83				1.82			
Random intercept variance (τ_{00})	0.10				0.10			
ICC	0.05				0.05			
Marginal R^2 / Conditional R^2	0.045 / 0.094				0.048 / 0.096			

Note. Model 5 includes a self-report item for religiosity. Model 6 includes a self-report item on whether one would ask family or close friends for help when having financial problems. All models include random intercepts for societies. Adjusted alpha level after Bonferroni-correction for 6 alternative models is α = .008. Models are based on *i* = 12771 observations clustered in *N* = 51 societies. Est = estimates, LL = lower limit, UL = upper limit.

Chapter 6

General discussion

Decisions under Financial Scarcity

Having too little financial resources to meet demands can induce a scarcity mindset (Mullainathan & Shafir, 2013). Such a scarcity mindset draws attention towards the scarce resources (Shah et al., 2012), impairs cognitive functioning (Mani et al., 2013), induces negative emotions (De Bruijn & Antonides, 2020), and affects how people make decisions (Haushofer & Fehr, 2014). Across four empirical chapters, this thesis contributes to the growing literature on financial scarcity. We studied the impact of financial scarcity in the context of temporal discounting decisions for gains and losses (Chapter 2), financial avoidance (Chapters 3 and 4), and perceived control (Chapter 5). Below, I first give a short summary of the findings from each empirical chapter and then end with a conclusion.

Chapter 2: Financial Scarcity Increases Discounting of Gains and Losses: Experimental Evidence from a Household Task

In Chapter 2, we addressed the question whether financial scarcity increases temporal discounting, which is the tendency to devaluate future outcomes (Frederick et al., 2002). We studied this effect both in the gain domain (receiving money now versus later) and loss domain (paying money now versus later), and when an induced scarcity mindset was accompanied by an objective lack of resources and when a scarcity mindset was induced while objective resources were not lacking.

To do so, we developed an incentivized task where participants over multiple rounds manage the finances of a household by earning income and paying expenses. Between conditions, we varied whether participants accumulated debts, kept a neutral balance, or accumulated savings. The debts condition proved to be effective in inducing a scarcity mindset (Pilot). Next, we found that participants with debts discounted future gains more than participants with savings and with a neutral balance (Experiment 1). We then replicated this finding and extended it to the domain of losses (Experiment 2). That is, compared to participants with savings, participants with debts showed higher discounting for both future gains and losses. We did not find support for the interaction hypothesis that participants with debts disproportionally discount losses relative to gains. Experiments 1 and 2 thus show that a scarcity mindset increases discounting when available financial resources are lacking. Experiments 3–5 were conducted to test whether a scarcity mindset would also increase discounting when controlling for available financial resources. Here, we manipulated between conditions whether participants were losing or gaining money each round, while keeping constant the balance at the end of the task when the discounting decisions were made. An additional pilot study confirmed that such a manipulation induced a similar scarcity mindset as the manipulation from Experiments 1 and 2. Yet, results did not show support for the hypothesis that when controlling for available resources, a scarcity mindset increases discounting (Experiments 3 and 4). Last, we found that when participants experienced financial scarcity and could expect that available resources would be lacking in the future, discounting increased even when available resources were controlled for (Experiments 5).

Taken together, Chapter 2 shows that financial scarcity increases temporal discounting of gains and losses, but only when financial resources are (predictably) lacking. These findings are in line with

the contention that financial scarcity leads to an attentional shift towards the problem at hand (Shah et al., 2012). Moreover, they first show that financial scarcity increases discounting of losses, with no evidence suggesting that losses are discounted differently from gains. Last, in line with recent work (Fenneman & Frankenhuis, 2020; Ruggeri et al., 2022), the findings suggest that financial scarcity might only lead to increased discounting as a (rational) response to pressing financial concerns.

Chapter 3: The Prospective Associations between Financial Scarcity and Financial Avoidance

In Chapter 3, we addressed the question whether financial scarcity is associated with an increase in financial avoidance (i.e., information avoidance and decision avoidance) over time, and in turn, whether financial avoidance is associated with an increase in financial scarcity over time. Here, we conceptualized financial avoidance as a general motivation to avoid dealing with one's finances (see also Tinghög et al., 2023), which can manifest in the tendency to avoid financial information (Gigerenzer & Garcia-Retamero, 2017; Golman et al., 2017; Hertwig & Engel, 2016; Sweeny et al., 2010) and to avoid making financial decisions (Anderson, 2003, 2006). We measured financial scarcity and financial avoidance with self-report questionnaires in a longitudinal panel study with a representative sample of the Dutch population. We analyzed the data with a Cross-Lagged-Panel-Model (CLPM), which allows to test for the effect of each construct at timepoint one (t1) on the change at the other construct at timepoint two (t2), while controlling for autoregressive effects. We found that financial scarcity at t1 was associated with an increase of financial avoidance at t2, and vice versa. Moreover, in a robustness check, we found that the prospective associations were not only present in the representative sample of the Dutch population (which generally scores rather low on financial scarcity and financial avoidance), but also in weighted-bootstrap subsamples with higher levels of scarcity and avoidance.

In follow-up analyses, we explored whether the strength of these effects differed for the dimensions of our financial scarcity measure. We found that particularly the dimensions for perceived lack of money as well as financial worry and rumination were associated with a subsequent increase in financial avoidance. This might suggest that predominantly after experiencing negative emotions about a difficult financial situation, people avoided dealing with their finances as a coping response. In addition, we found that financial avoidance was associated particularly with a subsequent increase in financial worry and rumination, increased lack of control, and increased short-term focus, while it was not associated with an increase in perceived lack of money. This might suggest that after avoiding their finances, people might feel that their situation became more problematic, even though they do not perceive a change in how much money they had available.

Taken together, Chapter 3 shows that, both in a representative sample of the Dutch population and in subsamples that experience higher levels of financial deprivation, financial scarcity and financial avoidance increase alongside each other over time. Although the findings do not provide causal evidence, they were in line with mechanisms of a psychological poverty trap (e.g., Haushofer, 2019), suggesting that financial scarcity and financial avoidance might mutually reinforce each other.

Chapter 4: Financial Scarcity and Financial Avoidance: An Eye-Tracking Experiment

In Chapter 4, we addressed the question whether financial scarcity is also causally related to financial avoidance, with regards to physiological and behavioral responses to problematic household finances. To do so, we conducted an experiment with the Household Task and manipulated whether over multiple rounds participants accumulated debs or savings (see Chapter 2). At the end of each round, participants were presented with two letters for a fixed amount of time. One letter concerned an expense that had to be paid and the other letter was a control stimulus.

During the presentation of the two letters, we assessed participants' gaze patterns with an eye-tracker. Based on prior research (Borozan et al., 2022; Carrasco, 2011; Findlay & Gilchrist, 2003; Wedel & Pieters, 2008), we used two measures to test whether participants with debts attentionally disengaged from the expense: First, we assessed the time it took participants to fixate on the area of the expense that stated the amount of money that had to be paid. Second, we assessed the total duration of all fixations on the whole expense letter. Results did not provide evidence for the hypothesis that, compared to participants in the savings condition, participants in the debts condition are more likely to direct their attention away from the expense. A potential reason for the null findings might be that participants had the option to delay paying expenses at no cost (see below). This might have given participants with debts an effective way to deal with their financial problem. In such a setting, the expenses might not have constituted a threat to participants' perception of control over their financial situation and thus not induced the need to attentionally disengage from the expenses (see also Howell et al., 2014).

In addition to the physiological responses, we also assessed behavioral responses of participants. That is, after presentation of the two letters, we measured whether they avoided to deal with their finances. Participants had to decide whether to pay the expense right away or whether to delay paying the expense until the end of the experiment at no additional cost. The behavioral data showed that, compared to participants in the savings condition, participants in the debts condition were more likely to delay paying their expenses until the end of the experiment.

Taken together, Chapter 4 shows that financial scarcity can increase the tendency to delay paying one's bills, a form of behavioral avoidance from one's finances. This finding suggests that financial scarcity can lead to an increase in avoidance behavior and is in line with the proposition from Chapter 3, stating that a causal mechanism might underlie the prospective association between financial scarcity and financial avoidance. In addition, this finding is in line with the observation that financial scarcity the increases discounting of losses in Chapter 2. Yet, there was no evidence suggesting that, in the context of the current study, such behavioral avoidance might be accompanied by attentional disengagement from negative financial information.

Chapter 5: Financial Scarcity and Perceived Control across Societies

In Chapter 5, we addressed the question whether financial scarcity is associated with lower perceived control, and whether this association differs systematically across societies. We theorized that

financial scarcity is a threat to one's sense of personal control (see also Van Dijk et al., 2022), which might generalize to the perception of having reduced control over one's life. To test this, we conducted a survey study in 51 societies across the globe where we measured financial scarcity and perceived control with self-report questionnaires.

The results showed that across societies, there was an overall negative association between financial scarcity and perceived control. Thus, the more people experience to lack needed financial resources, the less they feel in control of their life. Yet, between societies there was considerable variation in the strength of this association. While financial scarcity and perceived control were negatively associated in almost 75% of societies included in the study, in approximately 20% of societies there was no evidence for an association, while in two societies, the association was even positive.

To test whether this variation could be explained by institutional, economic, or cultural differences between societies, we combined our dataset with openly available cross-societal indicators. Compensatory control theory suggests that one type of control threat (here: lack of needed money as a threat to personal control) can be compensated by reliance on other sources of control (Landau et al., 2015). Therefore, in line with prior research (Attah et al., 2016; Chong & Calderon, 2000; Hruschka et al., 2014; Hruschka & Henrich, 2013; Israel, 2016; Kay et al., 2008, 2010; Muntaner et al., 2010), we hypothesized that certain societal qualities might buffer against the personal control threat of financial scarcity. That is, we predicted that—in societies with higher welfare provisions, better quality of institutions, and better labor conditions—experiencing financial scarcity might be less strongly associated with the perception of lower control over one's life. However, contrary to our hypotheses, we found that in societies with lower—not higher—welfare provisions, quality of institutions, and labor conditions, the association between financial scarcity and control was weaker. Here, it is important to note that these findings were correlational, and that other (unobserved) variables might cause this pattern of results. Therefore, we conducted additional exploratory analyses to test whether other societal qualities might potentially function as compensatory control sources. We found that also in societies with lower economic development, as well as more collectivistic and traditional values, the negative association between financial scarcity and control was weaker.

Taken together, Chapter 5 shows that financial scarcity is associated with a perceived lack of control over one's life. Yet, this finding is not ubiquitous across the globe, highlighting the relevance of cross-cultural research for financial scarcity theory.

Conclusion

Across four empirical chapters, the research in this thesis shows that financial scarcity increases temporal discounting and financial avoidance, and is associated with lower perceived control over one's life. To study this, we employed a wide variety of methods: We experimentally induced financial scarcity and measured its behavioral and physiological effects. Next, we combined this with longitudinal survey data of a representative sample of the Dutch population, measuring correlates of real-life financial scarcity over time. Finally, we collected survey data from across the globe to study whether the

experience of financial scarcity and its correlates vary across societies. This multi-method approach allows us to draw conclusions for psychological and behavioral mechanisms under rigorous experimental control, paired with cross-sectional and longitudinal findings on real-life financial scarcity from representative and culturally diverse samples.

As an experimental paradigm, the Household Task (Chapters 2 and 4) forms a valuable contribution to the literature on financial scarcity. It can be used to induce a scarcity mindset in a laboratory or an online experiment. This is not a trivial task. A recent empirical audit and review of experimental research on financial scarcity showed that many studies with scarcity manipulations fail to replicate (O'Donnell et al. 2021; but see Shah et al., 2023 for a response). To reliably study effects of an induced financial scarcity mindset in the laboratory or online, a scarcity manipulation needs to be sufficiently strong that the psychological reality of participants mirrors the threatening real-life experience of having insufficient financial resources to meet demands. The Household Task achieves this by having participants work for their income, and over time, repeatedly experience that they are not able to earn enough to pay their expenses. This stressful experience is further intensified by the incentivized payoffs for participants, leading to a reliable induction of a scarcity mindset that consistently influences behavior (Chapters 2 and 4). Importantly, the Household Task is versatile and can be used to study related concepts of financial scarcity in the future. For example, with relatively small adaptations, it could be used to study the effects of precarious working conditions and job insecurity, income volatility, or the effectiveness of social security interventions. Moreover, it can be used to study a broad variety of outcomes, like work performance during the task, depletion of cognitive resources, or emotional effects. The openly available Household Task (implemented in Qualtics and E-Prime, see Chapters 2 and 4) can thus be a valuable tool for other researchers aiming to study a broad range of causal effects of financial scarcity and related concepts.

At the same time, it is essential to corroborate whether the psychological mechanisms we study in the laboratory are also present in people who experience financial scarcity in daily life. Next to field experiments, longitudinal studies such as conducted in Chapter 3 can help to get closer to understanding the mechanisms how real-life financial scarcity influences decisions and behavior. Last, it is crucial to address the point that the experience of financial scarcity and its effects might differ considerably across cultures. A strength of the scarcity literature is that it includes a variety of field studies that were conducted in non-WEIRD samples (e.g., Dalton et al., 2020; Haushofer & Shapiro, 2016; Mani et al., 2013; Ong et al., 2019). More recently, cross-cultural studies have also started to investigate the potential cultural diversity in the effects of financial scarcity (e.g., Ruggeri et al., 2022, 2023; To et al., 2023; Sommet & Spini, 2022). Chapter 5 contributes to this growing literature by showing that the association between financial scarcity and perceived control varies considerably across societies.

The thesis highlights the role of perceived control for decision-making under financial scarcity. It shows that the experience of lacking needed resources is accompanied by lowered perceived control over one's finances (Chapters 2-5), which might explain why people tend to avoid dealing with their

finances altogether (Chapters 3 and 4), and that might generalize to an increased perception that life as a whole is out of control (Chapter 5; see also Van Dijk et al., 2022). While the relevance of control for financial scarcity has been noted before (e.g., Sheehy-Skeffington & Haushofer, 2014), current theorizing on financial scarcity mainly describes two different mechanisms through which a scarcity mindset affects decisions, namely the shift in attentional focus and the impairment of cognitive resources (De Bruijn & Antonides, 2022). Yet, in line with other recent work (To et al., 2023), the thesis points towards a more prominent role of perceived control for decision-making under financial scarcity.

The thesis also adds to the question whether financial scarcity leads to more biased and dysfunctional decisions or more rational and adaptive decisions (Frankenhuis & Nettle, 2019; Sheehy-Skeffington, 2020). Early work was mostly concerned with potential negative consequences of financial scarcity on decision-making (e.g., Haushofer & Fehr, 2014; Shah et al., 2012). For example, the tendency to prioritize present outcomes over future outcomes (i.e., temporal discounting) was initially studied in the context of overborrowing, showing that scarcity might lead to depletion of future resources (Shah et al., 2012). Also, some work showed that financial scarcity might lead to present bias (Carvalho et al., 2016; Haushofer & Fehr, 2019), which describes a focus on the present while also displaying irrational choice patterns (i.e., inconsistent time preferences). Yet, other work did not find support for an effect of financial scarcity on irrational choice patterns in temporal decisions (Ruggeri et al., 2022) or decision-making in general (Plantinga et al., 2018; Ruggeri et al., 2023), or even found evidence for reduced bias under financial scarcity (Shah et al. 2015). In Chapter 2, we found that a scarcity mindset increased temporal discounting only in situations where current or predicted resources were lacking, but not when sufficient resources were available. These findings suggest that financial scarcity only increases discounting when it indeed could be optimal but not when it would be clearly suboptimal. In line with this, evolutionary work argued that a focus on the present might be an adaptive response to a harsh environment (Fennemann & Frankenhuis, 2020). When people have too little resources to meet current demands, prioritizing to gain money as well as not to lose money at present can make sense, even if it comes with high interest in the future. Also for the finding that financial scarcity increases financial avoidance (Chapters 3 and 4), one could argue that it is an a adaptive response to a problematic situation. Without control over one's finances, one might feel unable to improve one's financial situation by taking action. While avoiding one's financial problems usually also does not help to improve the situation, it might at least be a way to emotionally cope with it.

Taken together, financial scarcity might lead to decisions that at the same time can be adaptive in the current financial situation of the decision-maker and yet negatively affect the attainment of future goals (Sheehy-Skeffington, 2020). As such, financial scarcity might lead to decisions that make sense from the perspective of the decision-maker, but at the same time exacerbate existing financial problems. The findings of the current thesis contribute to understanding these mechanisms, describing how decision-making under financial scarcity can constitute a psychological poverty trap.

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Chapter 7

Summary, Samenvatting, Acknowledgements, CV

Summary: Decisions under Financial Scarcity

Worldwide, hundreds of millions of people live in poverty. Even in the richest countries in the world, a substantial part of the population has difficulties to pay their regular expenses. Such financial problems can have a myriad of negative consequences, ranging from worse mental and physical health to impaired child development and educational outcomes, as well as to reduced social connections and political participation. These consequences of financial hardship can further exacerbate financial problems, a concept known as poverty traps. To better understand psychological poverty traps, scarcity theory aims to describe the psychological experience and consequences of having insufficient financial resources to meet demands. In the context of scarcity theory, the research in this thesis investigates how financial scarcity affects decisions that might have relevant outcomes to one's financial situation.

In **Chapter 2**, we developed the Household Task in which participants manage the finances of a household. During the task, we induced financial scarcity by manipulating whether participants accumulated debts or savings. Across five experiments, we investigated the effect of financial scarcity on temporal discounting. Temporal discounting describes the tendency to devaluate outcomes that are realized in the future. We found that participants who experienced financial scarcity showed stronger discounting of gains and losses. Yet, we did not find evidence for the hypothesis that a scarcity mindset increases discounting when controlling for available resources. Last, we found that when participants experienced financial scarcity and could expect available resources to be lacking in the future, discounting increased even when available resources were controlled for. Chapter 2 thus provide evidence that financial scarcity increases temporal discounting as a response to current or predicted insufficient resources. This suggest that people who experience financial scarcity might adjust their temporal preferences in a sensible way according to the problematic circumstances of their financial situation.

In **Chapter 3**, we investigated whether financial scarcity might be associated with financial avoidance, which is the tendency to avoid dealing with one's finances. To do so, we conducted a longitudinal panel study with a large and representative sample of the adult Dutch population. Across a period of almost 2 years, we used self-report questionnaires to measure participants' experience of financial scarcity and their financial avoidance behavior. We found that higher initial levels of financial scarcity were associated with an increase of subsequent levels of financial avoidance. Likewise, we found that higher initial levels of financial avoidance were associated with an increase in subsequent levels of financial scarcity. Chapter 3 thus shows that financial scarcity and financial avoidance increase alongside each other. While these findings were not causal, they are in line with the concept of a psychological poverty trap.

In **Chapter 4**, we used the Household Task from Chapter 2 to investigate whether financial scarcity is also a causal predictor of financial avoidance. To do so, during each round of the Household Task, we presented participants with an expense letter. As an attentional measure of financial avoidance, we assessed participants' gaze patterns with an eye-tracker. In addition, we gave participants

the option to delay paying these expenses until the end of the experiment. Results did not show support for our hypothesis that participants who experienced financial scarcity would attentionally disengage from (i.e., not look at) the expense letters. We did find, however, that participants who experienced financial scarcity were more likely to delay paying the expenses. These findings suggest that financial scarcity can increase the tendency to delay paying one's bills, a form of behavioral avoidance from one's finances. Yet, in the context of this study, there was no evidence suggesting that such behavioral avoidance might be accompanied by attentional disengagement from negative financial information.

In **Chapter 5**, we investigated whether financial scarcity is associated with lower perceived control, and whether this association varies across the globe. To do so, we conducted a survey study in 51 societies across the globe. Results showed that across societies, the more people experience financial scarcity, the less they feel in control over their lives. There was, however, a large variance in this association between societies. To further investigate this variance, we combined our dataset with societal-level indicators from existing datasets. In opposite direction of our hypotheses, we found that the association between financial scarcity and perceived control was weaker in societies with lower (instead of higher) welfare provisions, quality of institutions, and labor condition. To better understand these findings, we explored whether other societal indicators might help to explain the variance in associations between financial scarcity and perceived control. We found that in societies with lower economic development, as well as in societies with more collectivistic and traditional values, the negative association between financial scarcity and control was weaker. These findings suggest that people who experience financial scarcity are more likely to feel lower control over their lives, but that this association differs considerably across societies and cultures.

Taken together, the research in this thesis shows that financial scarcity increases temporal discounting and financial avoidance, and is associated with lower perceived control over one's life. As such, this thesis contributes to our understanding of psychological poverty traps.

Samenvatting: Beslissingen bij financiële schaarste

Wereldwijd leven honderden miljoenen mensen in armoede. Zelfs in de rijkste landen van de wereld heeft een aanzienlijk deel van de bevolking moeite om de dagelijkse uitgaven te betalen. Dergelijke financiële problemen kunnen een groot aantal negatieve gevolgen hebben, variërend van een slechtere geestelijke en lichamelijke gezondheid tot een verminderde ontwikkeling en slechtere schoolprestaties bij kinderen, maar ook tot maatschappelijke uitsluiting en minder politieke participatie. Deze gevolgen van financiële tegenslag kunnen de financiële problemen verder verergeren, een fenomeen dat bekend staat als een armoedefuik. Om psychologische armoedefuiken beter te begrijpen, beschrijft de schaarste-theorie de subjectieve ervaring dat je te weinig geld hebt om alle dingen die betaald moeten worden ook echt te betalen. In de context van deze theorie bestudeert het onderzoek in dit proefschrift hoe financiële schaarste beslissingen beïnvloedt die relevante gevolgen kunnen hebben voor iemands financiële situatie.

In **Hoofdstuk 2** ontwikkelden we de *Huishoudtaak* waarin deelnemers de financiën van een huishouden beheren. Tijdens de taak induceerden we financiële schaarste door te variëren of deelnemers schulden of spaargeld opbouwen. In vijf experimenten onderzochten we het effect van financiële schaarste op *temporal discounting*–de neiging om toekomstige uitkomsten te devalueren. Deelnemers in de financiële schaarste conditie lieten sterkere temporal discounting zien bij zowel winst (geld ontvangen) als verlies (geld betalen). We vonden echter geen bewijs voor de hypothese dat een schaarste-*mindset* tot sterkere temporal discounting leidt als de beschikbare middelen in de financiële schaarste en controle conditie hetzelfde waren. Deelnemers in de financiële schaarste conditie lieten wel sterkere temporal discounting zien als ze in de toekomst een tekort aan beschikbare middelen konden verwachten. De vijf experimenten laten zien dat financiële schaarste temporal discounting versterkt als reactie op huidige of verwachte onvoldoende middelen. Dit suggereert dat mensen die financiële schaarste ervaren hun temporele voorkeuren op een verstandige manier kunnen aanpassen aan de problematische omstandigheden van hun financiële situatie.

In **Hoofdstuk 3** hebben we onderzocht of financiële schaarste samenhangt met financiële vermijding, oftewel de neiging om de eigen geldzaken uit de weg te gaan. Hiervoor hebben we een longitudinaal panelonderzoek uitgevoerd bij een grote representatieve steekproef van de volwassen Nederlandse bevolking. Over een periode van bijna 2 jaar gebruikten we vragenlijsten om de ervaring van financiële schaarste en het financiële vermijdingsgedrag van deelnemers te meten. We vonden dat meer initiële financiële schaarste samenhing met een toename van financiële vermijding op een later tijdstip. Ook vonden we dat meer initiële financiële vermijding samenhing met een toename van financiële schaarste op een later tijdstip. Hoofdstuk 3 laat dus zien dat financiële schaarste en financiële vermijding samen toenemen. Hoewel deze bevindingen geen oorzakelijke verbanden aantonen, sluiten ze wel aan bij het fenomeen van een psychologische armoedefuik.

In **Hoofdstuk 4** gebruikten we de Huishoudtaak uit Hoofdstuk 2 om te onderzoeken of financiële schaarste ook een oorzaak is van financiële vermijding. Deelnemers kregen tijdens verschillende rondes

van de taak een rekening gepresenteerd. Als maat voor financiële vermijding hebben we met een *eye-tracker* gemeten waar deelnemers naar keken. Daarnaast gaven we deelnemers de optie om het betalen van deze rekening uit te stellen tot het einde van het experiment. De resultaten toonden geen ondersteuning voor onze hypothese dat deelnemers die financiële schaarste ervaren hun aandacht minder zouden richten op de rekening (dat wil zeggen er minder naar kijken). We vonden echter wel dat deelnemers die financiële schaarste ervoeren eerder geneigd waren om het betalen van de rekening uit te stellen tot het einde van het experiment. Deze bevindingen suggereren dat financiële schaarste de neiging kan vergroten om het betalen van rekeningen uit te stellen, een vorm van financiële vermijding. In de context van dit onderzoek waren er echter geen aanwijzingen dat dergelijk vermijdingsgedrag gepaard gaan met vermijding in de aandacht voor negatieve financiële informatie.

In **Hoofdstuk 5** hebben we onderzocht of financiële schaarste samenhangt met een lagere ervaren controle over het eigen leven en of dit verband verschilt per maatschappij. Om dit te onderzoeken namen we een vragenlijst af bij mensen uit in 51 verschillende samenlevingen verspreid over de hele wereld. De resultaten lieten zien dat als mensen meer financiële schaarste ervaren, ze minder controle voelen over hun leven. Er was echter een grote variatie in dit verband tussen samenlevingen. Om deze verschillen te onderzoeken, combineerden we onze dataset met maatschappelijke indicatoren uit andere bestaande datasets. In tegenstelling tot onze hypothesen vonden we dat het verband tussen financiële schaarste en ervaren controle zwakker was in samenlevingen met lagere (in plaats van hogere) sociale voorzieningen, kwaliteit van instituties en arbeidsomstandigheden. Om deze resultaten beter te begrijpen, onderzochten we of andere maatschappelijke indicatoren de variatie in het verband tussen financiële schaarste en ervaren controle konden verklaren. We vonden dat zowel in samenlevingen met een lagere economische ontwikkeling als in die met meer collectivistische en traditionele waarden het negatieve verband tussen financiële schaarste en controle zwakker was.

Samengevat toont het onderzoek in deze dissertatie aan dat financiële schaarste temporal discounting en financiële vermijding verhoogt, en samenhangt met minder ervaren controle over het eigen leven. Deze dissertatie draagt daarmee bij aan ons begrip van psychologische armoedefuik.

Positionality statement

As a white German and EU citizen, as a cis and straight man, raised by loving and educated parents, free from chronic health issues, and no first-hand experience of financial scarcity, I am aware of the privilege that facilitated this work.

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Curriculum Vitae

Leon Paul Hilbert was born in 1991 in Kassel, Germany. He finished his secondary education (Abitur) at the Jacob-Grimm-Schule Kassel in 2010. After graduating from school, Leon did his compulsory civil service at a Child and Adolescent Psychiatry in his hometown. In 2015, Leon graduated with a Bachelor in Economic Psychology from Leuphana Universität Lüneburg, Germany. Leon continued his studies at Leiden University in the Netherlands and graduated in 2017 from the (research) Master program in Psychology (cum laude). In 2018, Leon started his PhD at Leiden University under supervision from Prof. Wilco van Dijk and Dr. Marret Noordewier. In 2022, Leon worked as a Researcher and Lecturer for the Department of Social, Economic and Organisational Psychology at Leiden University and the Knowledge Centre Psychology and Economic Behaviour. Since 2023, Leon works as an Assistant Professor at the Work and Organizational Psychology group at the University of Amsterdam. Leon lives in Haarlem together with his partner Eleonore and their two kids Charlotte (*2021) and Hanne (*2023).

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