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Economic predictors of the subjective experience of financial stress

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ABSTRACT

The subjective experience of financial stress has profound implications for well-being, health, cognitive performance, and decision-making. In a sample of Dutch households (N = 1114), we studied the association of five economic factors - income, saving, debts, income volatility, and employment - with a four-factor measure of financial stress: 1) an appraisal of insufficient financial resources, 2) an appraisal of lack of control over one's financial situation, 3) financial worries and rumination, and 4) a short-term focus. This enabled us to examine the economic factors' relative contributions to predicting[5] financial stress. We found that the combination of economic factors predicted financial stress better than income alone. Particularly, buffer savings had a large contribution to predicting financial stress. The number of debts had a smaller relative contribution to predicting financial stress, whereas we did not find support for debt amount as a predictor of financial stress. Employment was negatively associated with financial stress, but only for households with the lowest incomes. We found no support for income volatility predicting financial stress. These results imply that research and policy on financial stress should have a broader scope than income alone and should take a more integrative approach to households' financial situation, considering savings, number of debts, and unemployment.

1. Introduction

In financially challenging circumstances, people often experience financial stress (Mullainathan and Shafir, 2013). The notion of financial stress is not limited to lower-income countries. In the third quarter of 2022, most Americans (56%) indicated that price increases were causing financial hardship for their household (Gallup, 2022). In the UK, 7.8 million people were finding it a heavy burden to keep up with their bills, and 37% of Dutch households had difficulty making ends meet (FCA, 2022; Nibud, 2022).

We define financial stress as a psychological construct that reflects a state where pressing financial concerns surpass available resources, endangering well-being (Van Dijk et al., 2022). Financial stress includes subjective appraisals of the situation and affective and cognitive responses. We incorporate two appraisals: insufficient financial resources and lack of control over one's financial situation. The first appraisal captures the (potential) harmfulness of the situation, whereas the second refers to coping potential - the perceived ability to deal with the (potentially) harmful situation adequately. We also include affective and cognitive responses, namely financial worries and rumination, and short-term focus.

Our definition of financial stress is based on existing psychological stress frameworks (Blascovich, 2008; Folkman and Lazarus, 1984). In these frameworks, a threat is defined as a state where an individual anticipates a confrontation with a stimulus they appraise as endangering essential values and goals. Research shows that a situation appraised as a strain on one's resources predicts psychological symptoms, such as anxiety and depression (Folkman et al., 1986), and that a perceived lack of coping ability increases appraised threat (Folkman and Lazarus, 1984). Our definition of financial stress is consistent with psychological stress, a response to a real or perceived threat (e.g., Cannon, 1928; Lazarus, 1966; Selye, 1936). Financial stress is the psychological stress

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[5] Throughout this article, by "prediction" we mean the statistical process of estimating the value of one variable based on the values of other variables (Hernán et al., 2019). We do not imply causal relationships.

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resulting from one's financial situation.

We now describe how financial stress, as defined above, complements other concepts used in the literature, particularly financial well-being, subjective wealth, financial vulnerability, financial fragility, and financial worry. Financial stress differs from financial well-being, defined by Brüggen et al. (2017) as "the perception of being able to sustain current and anticipated desired living standards and financial freedom." Financial stress focuses on people's current financial situation and is the inability to meet financial demands. In contrast, financial well-being includes the current and anticipated financial situation and is understood as the ability to meet financial demands. Also, financial stress is a psychological response to financial demands perceived as threatening. In contrast, financial well-being encompasses a broader spectrum of factors related to overall life satisfaction, happiness, and fulfillment. Netemeyer et al. (2017) define financial well-being as current money stress and future financial security. The first aspect - current money stress - involves being behind with one's finances, feeling that one's finances control one's life, and being obsessed with money. The second aspect of Netemeyer's definition - future financial security - resembles Hoffmann et al., (2022) definition of financial well-being as expected financial security. Our definition of financial stress resembles Netemeyer's current money stress but adds the two components of affective and cognitive responses consistent with psychological stress frameworks.

Financial stress also differs from financial vulnerability, defined as "the risk of incurring future harm, given the consumer's current access to various financial resources." Financial vulnerability resembles financial fragility, defined as households' ability to deal with financial shocks (Jappelli et al., 2013; Kleimeier et al., 2023). Clark and Mitchell (2022) developed a resilience index that reflects a household's capacity to respond to economic shocks, namely how able it is to respond to an unexpected loss of earnings, whether it has developed retirement and spending plans and tracks spending; how it perceives the impact of current debt on spending; and its level of concern regarding finances. Lusardi et al. (2020) proxied financial vulnerability with debt-to-income ratio. Hoffmann and McNair (2019) developed a measure of financial vulnerability based on risk factors that may threaten financial stability, such as age, education level, health, income, debt, and financial literacy. Thus, financial stress focuses on one's experienced inability to meet current financial requirements, whereas financial vulnerability involves the risk of being unable to meet financial demands in the future.

Finally, our conceptualization of financial stress encompasses financial worry, defined as "repeated and negative thinking about the uncertainty of one's (future) financial situation," and financial rumination, defined as "repetitive, passive, and pessimistic thinking about the possible causes and consequences of one's financial concerns" (De Bruijn and Antonides, 2021, p. 1). This definition resembles Xiao and Kim's (2022, p. 139) definition of financial stress as a "psychological state worrying about personal finance." It is similar to financial anxiety (Kim et al., 2023), defined as worrying and anxiety about current and future financial situations.

Financial stress can profoundly impact people's lives, affecting their well-being, health, cognitive performance, and behavior. The literature shows that financial stress has adverse consequences for overall well-being and mental health outcomes such as anxiety and depression (Adler and Snibbe, 2003; De Almeida et al., 2024; Hamilton et al., 2019; Haushofer and Fehr, 2014; Haushofer and Salicath, 2023; Netemeyer et al., 2017; Santiago et al., 2011; Schomburgk and Hoffmann, 2022; Simonse et al., 2022). Financial stress also affects cognitive processes by shifting the attentional focus toward the most pressing needs and away from less urgent ones (De Almeida et al., 2024; Hilbert et al., 2022b; Mani et al., 2020; Mullainathan and Shafir, 2013, but see Haushofer and Salicath, 2023). Moreover, financial stress has positive and negative consequences for cognitive performance. On the positive side, people who lack financial resources show better performance on selective attention, vigilance, detecting imminent dangers and opportunities, tracking conditions that change rapidly, persisting when procuring an immediate reward, and valuing money (Frankenhuis and Nettle, 2020; Shah et al., 2015). Although the narrowed focus that results from financial stress is arguably a necessary response to urgent economic challenges, it comes at a cost. There is increasing evidence that financial stress is negatively related to various aspects of executive functions, such as self-control, planning, working memory, and cognitive flexibility (Bernheim, 2019; Huijsmans et al., 2019; Keizer et al., 2019; Lupien et al., 2009; Mani et al., 2013; McEwen and Gianaros, 2010; Mullainathan and Shafir, 2013; Nofsinger et al., 2018; Sheehy-Skeffington, 2018; Van Dijk et al., 2022). A growing body of literature shows that financial stress elicits behaviors that sustain or even exacerbate economic hardship, such as impulse buying, gambling, overspending, suboptimal investing, decreased job search effectiveness, the use of alternative financial services, the use of buy now pay later services, and overborrowing (Cook and Sadeghein, 2018; Dalton et al., 2020; Gerards and Welters, 2020; Kim et al., 2023; Mullainathan et al., 2012; Schomburgk and Hoffmann, 2022; Shah et al., 2012).

Understanding the economic predictors of financial stress is crucial to reducing financial stress and improving downstream cognitive, affective, and behavioral outcomes, well-being, and health. The literature examining the economic predictors of financial stress has primarily focused on income as the explanatory variable. Since income substantially influences the availability of financial resources, it is an intuitive predictor of financial stress.

The literature about the relationship between income and financial stress is ambiguous, suggesting that other economic factors may also play a role. Research in mental health psychology and other fields, for example, indicates that mental well-being and stress are not only associated with income but also with economic factors such as savings, debts, income volatility, and employment. Well-being has a positive relation with savings (Rothwell and Han, 2010; Ruberton et al., 2016) and employment (Burchell, 2011; Wilson and Walker, 1993) and a negative relation with debts (Bridges and Disney, 2010; Drentea and Lavrakas, 2000; Sweet et al., 2013) and income volatility (Gennetian et al., 2021; Hannagan and Morduch, 2015). Yet, studies on the relationship between one's economic situation and stress have typically focused on one or two economic predictors in isolation without considering other economic predictors. These studies, therefore, do not reveal the relative contributions of different aspects of one's economic situation in predicting financial stress. Also, in these studies, an observed relationship between financial stress and an isolated economic predictor (e.g., income) may partly reflect a relation with an unmeasured predictor (e.g., savings or debt). Finally, it stands to reason that savings, debts, income volatility, and employment are more strongly related to financial stress for lower-income households. Although some studies corroborate this notion (Ettman et al., 2021; Gennetian and Shafir, 2015), the literature on interactions between income and other aspects of one's economic situation in predicting financial stress is scarce.

We need to take a more integrative approach to provide a better and more comprehensive account of the factors predicting financial stress. The current research examines the relative importance of five aspects of one's economic situation - income, savings, debts, income volatility, and employment status - in predicting financial stress. Also, it examines whether the associations differ between lower- and higher-income households. Finally, we statistically control for well-established confounders, such as age, education level, gender, and personality traits.

2. Conceptual framework

This paragraph describes the conceptual framework (Fig. 1). First, we provide a theoretical foundation for our conceptual model (Section 2.1). Next, we provide an overview of empirical evidence for elements or our model (Section 2.2). Finally, we introduce the hypotheses for the current study (Section 2.3).

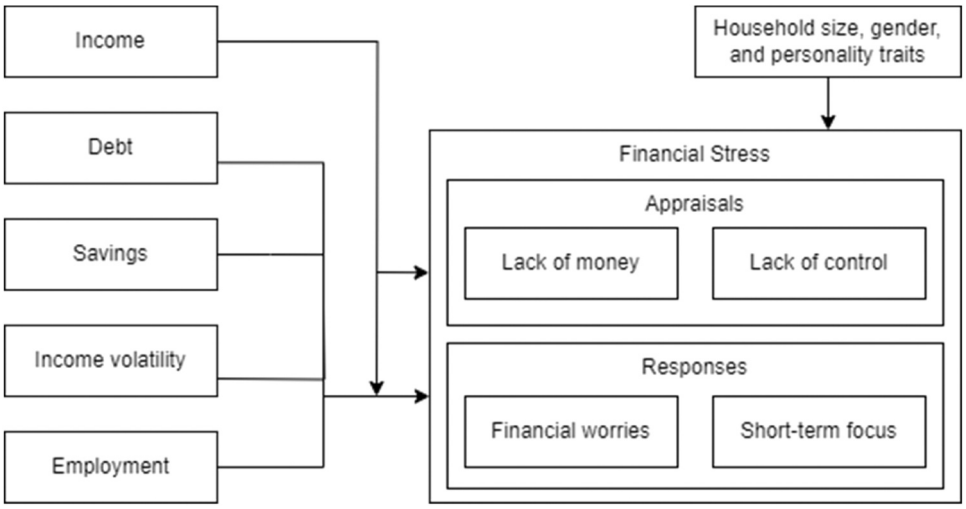

Fig. 1. Conceptual framework. Financial stress is a psychological construct involving the subjective experience of lacking financial resources to cope with demands. It consists of two appraisals (lack of money and control) and two responses (financial worries and rumination and short-term focus). Objective aspects of households' economic situations (income, debt, savings, income volatility, and employment) and other factors (household size, gender, and personality traits) are associated with financial stress. Income moderates the association between the other economic factors and financial stress. The directions of the arrows indicate that economic and other factors predict financials stress; they do not suggest causation.

2.1. Theoretical foundation

Psychological stress occurs when one experiences a perceived threat and a lack of coping potential (Blascovich, 2008; Folkman and Lazarus, 1984). Financial stress is psychological stress resulting from perceiving a lack of financial resources and a lack of control over one's financial situation. We argue that five economic factors, namely income, savings, debt, income volatility, and employment, may be associated with financial stress. Furthermore, we argue that income moderates the association between the other four aspects of one's economic situation and financial stress. Finally, we argue that household size, gender, and personality traits may be associated with financial stress.

Economic factors. Low-income households often juggle paying the bills and providing for their families. A low income may, therefore, lead to the appraisal of having a lack of money.

Savings may serve as buffers against unexpected expenditures and income shocks, and this could protect against financial stress. Savings, therefore, may positively affect perceived control over one's financial situation. Financial stress can lead to a narrowed focus on short-term priorities, potentially detracting from long-term saving endeavors. Also, under financial stress, individuals can tend to defer making financial decisions, further impeding their ability to engage in proactive savings behavior (Haushofer and Fehr, 2014; Hilbert et al., 2022b, 2022a).

The association between debt and financial stress is more complex. Debts may result in financial stress for at least three reasons. First, debts can indicate a lack of financial resources: when people have insufficient income or savings to make ends meet or pay the bills, they may resort to borrowing money (Drentea and Lavrakas, 2000). Second, debt repayments and interest decrease disposable income, potentially making it more challenging to make ends meet. Third, the thought that one needs to repay debts in the future may cause worries and rumination. Debts may also decrease financial stress because debt provides access to additional liquidity (Xiao and Yao, 2022). Thereby, debt may enable purchasing goods and services that increase life satisfaction, which is a (negative) correlate of financial stress (Van Dijk et al., 2022). The causality between debt and financial stress may also run in the opposite direction. To make ends meet today, households with financial stress may underestimate the cost of borrowing and be inclined to overborrow (Cook and Sadeghein, 2018). We argue that the positive association between debt and financial stress outweighs the negative and that debt is positively associated with financial stress.

Income volatility may also induce financial stress. If one's income changes from month to month, this may increase feelings of lack of control and financial stress. Fluctuating income can evoke financial stress due to worry over difficulty paying bills or providing for one's family. Sudden large financial shocks may also result in decreased buffers and increased debts, increasing financial stress. Also, unexpected financial shocks may result in feeling less in control of one's finances.

Finally, we argue that employment negatively relates to financial stress. Losing one's job may result in worries about being able to provide for one's family and pay the bills, especially because households' expenses are fixed to a large extent (housing, utilities, insurance, et cetera).

Income as a moderator. We argue that the association between savings and financial stress strengthens as income decreases. First, the lower a household's income, the less flexibility they may have in dealing with unexpected expenditures. Thus, lacking savings may have more impact on the stress levels of lower-income households. Second, when income is lower, it may be more challenging to make ends meet and set money aside from what is left at the end of the previous month.

The association between debt and financial stress may be stronger for lower-income households (Tay et al., 2017). For them, having debts may trigger more worries about being unable to repay the loan or pay the interest.

Income volatility may also have a stronger association with financial stress for lower-income households. An income shock more likely results in an inability to make ends meet as income decreases. In contrast, an income shock may be easier to deal with as income increases. Thus, households with fluctuating incomes may experience less control of their finances as income decreases.

Finally, we argue that unemployment may have a stronger association with financial stress as income decreases. Higher-income unemployed may have other income sources, such as investments. Also, in the Dutch context, unemployment benefits drop as time passes. The lower the income, the longer unemployment likely lasts, which may increase financial worries and rumination.

Other factors. Having a larger household may affect financial stress; being responsible for a spouse and children may increase worries about being able to provide for them. Gender may affect financial stress in at least two ways. First, women are financially more affected by life events, such as having children and divorce. Second, men and women may have different coping styles in response to perceived threats, with "women

scoring higher than men on emotional and avoidance coping styles and lower on rational and detachment coping" (Matud, 2004, p.1401). Personality traits increase financial stress through financial behavior and an individual's response to financially challenging circumstances. For example, lower emotional stability may be associated with more worry and rumination over finances, while low conscientiousness can result in poor financial planning. Extraversion and agreeableness may contribute to impulsive spending or prioritizing others' needs over financial stability. Openness may lead to unconventional financial decisions.

2.2. Empirical evidence

Income. The literature confirms that having a low income may trigger feelings of financial stress, an increased focus on the present, and a decreased perception of control. For example, Johar et al. (2015) concluded that "the poor, both when classified as having incomes below 40,000 and on a continuous scale, discounted the future more" (p. 209). Kleimeier et al. (2022) found that, during the COVID-19 pandemic, low-income households reported more objective and subjective financial fragility. Sheehy-Skeffington (2018) argued that a low income increases perceived resource scarcity, which, in turn, hampers executive functioning and decreases self-regulation. Other studies have cast some doubt on the importance of income in predicting adverse mental states and behavior. For example, De Bruijn and Antonides (2020) concluded that income had limited direct effects on financial worries and rumination. Simonse et al. (2022) found no support for income predicting financial stress during the COVID-19 pandemic. Beenackers et al. (2018) found that financial strain and self-control were associated with health behaviors but found no support for an association between income and health behavior. In sum, the evidence of the relationship between income and different aspects of financial stress (lack of control, financial worries and rumination, and short-term focus) is mixed. Most studies find a negative association, although some find limited or no support for an association.

Savings. Scholars have long recognized the importance of assets for household well-being, although there is some debate on the effect size (Meer et al., 2003; Rothwell and Han, 2010). Bernheim et al. (2015) found that having low initial assets made exercising self-control difficult, resulting in poverty-aggravating behavior. Ruberton et al. (2016) found that having a financial buffer contributed to financial well-being. They noted "the importance of holding minimal financial savings, but also the relative unimportance of having wealth above sufficiency levels" (p. 579). Alsemgeest (2019) found a negative association between stress and retirement savings.

Debts. The literature confirms a complex association between debts and financial stress. From a review of debt literature, Tay et al. (2017) concluded that debt may affect well-being through two channels. First, debt affects financial well-being, a component of overall well-being. Second, debts pose a strain on financial resources, which, in turn, lowers well-being. Results from previous studies indicated that debts have a small negative association with happiness (Xiao et al., 2021) and that debt delinquency is associated with financial stress (Xiao and Kim, 2022). If debts are out of control, consumers will face financial strains such as high debt-payment-to-income ratio, debt payment delinquency, and even bankruptcy (Xiao and Yao, 2022). The financial burden associated with debts may depend on the type of debt. Previous studies have found that mortgage debts, student loans, credit card debts, and vehicle debts have different associations with financial burdens (Xiao et al., 2021; Xiao and Yao, 2022). There is also some support for financial stress causing (over)indebtedness. To make ends meet today, households with financial stress may underestimate the cost of borrowing and be inclined to overborrow (Cook and Sadeghein, 2018). Finally, previous studies have revealed that the number of debts is more predictive of financial stress than the total debt amount (Ariely et al., 2009; Ong et al., 2019). It is argued that people keep each loan in a separate "mental account," and each debt's first few dollars create the most significant mental load (Prelec and Loewenstein, 1998). In sum, the association between debts and financial stress is complex. The literature tends towards a positive association between debts and financial stress.

Income volatility. Both experimental and longitudinal studies have found that income volatility increases financial stress, especially for lower-income households. For example, Lichand and Mani (2020) conducted a lab-in-the-field experiment using rainfall variations as natural income shocks with Brazilian farmers. They concluded that "the cognitive burden imposed by income uncertainty makes farmers 'penny wise and pound foolish'" (p. 4). Other studies have confirmed that income volatility positively relates to financial stress, especially for lower-income households (Halliday, 2008; Ridley et al., 2020). Empirical evidence suggests a negative association between financial shocks and subjective financial well-being. In a study among US households, the Consumer Financial Protection Bureau (2017) found that the financial well-being score of households that had experienced a financial shock in the past 12 months was significantly lower than that of households that had not experienced a shock. Codagnone et al. (2020), for example, found that during COVID-19, 42.8% of the respondents had a high risk of stress, anxiety, and depression based on their level of economic vulnerability and their exposure to an economic shock. Bufe et al. (2022) found that the experience of an income shock was associated with a large decline in subjective financial well-being, while the experience of an expense shock was associated with a more modest decline.

Employment. Several studies have found higher financial stress among the unemployed (Rothwell and Han, 2010; Warr and Jackson, 1984). Another study found that labor (vs. nonlabor) income contributes more to financial satisfaction (Tully and Sharma, 2022). Again, the causal relation may also run in the other direction: increased stress levels may result in more difficulty finding a job. For example, Gerards and Welters (2020, 2022) found that financial strains resulted in less effective job search and labor market outcomes.

2.3. The current study

The theoretical arguments and empirical evidence summarized above suggest that different aspects of one's economic situation may be associated with financial stress, defined as the psychological construct that reflects a state where pressing financial concerns surpass available resources. Studies of the economic correlates of financial stress often consider one or two aspects of households' financial situation in isolation. The associations found in these studies may, therefore, be overemphasized. Other variables not included in these studies may partly explain the associations found. There is no coherent picture of how different elements - in conjunction - correlate with financial stress. The current research, therefore, takes a more integrative perspective on households' economic situations by including five aspects: income, savings, debts, income volatility, and employment. Our hypotheses are as follows:

Hypothesis 1. A low income, insufficient savings, more debts, income volatility, and unemployment all contribute to predicting more financial stress

Hypothesis 2. Income moderates the relationships of savings, debts, income volatility, and employment on the one hand and financial stress on the other; we hypothesize the associations to become stronger as income decreases.

3. Methods

3.1. Data

We employed cross-sectional data administered by Centerdata (Scherpenzeel and Das, 2010). The panel is based on a probability sample of households drawn from the population register by Statistics Netherlands. We linked survey data on financial stress with economic,

demographic, and psychological variables. While we were thus able to establish correlations, the cross-sectional data did not allow us to make causal claims. Table 1 contains an overview of the variables relevant to our study. Our sample consisted of respondents to a questionnaire in April 2018 that included a measure of financial stress. After removing eight empty surveys, the sample contained 1114 respondents. Detailed steps needed to obtain the data and perform the analyses and the accompanying R-scripts used to create the dataset, perform the analyses, and produce the output are available in the online supplemental materials.

3.2. Dependent variable

We used the 12-item Psychological Inventory of Financial Scarcity (PIFS) developed by Van Dijk et al. (2022) to measure financial stress ($M = 1.96$, $SD = 1.12$, Cronbach's $\alpha = .93$). Their psychometric evaluation shows that the PIFS is a reliable and valid measure. It combines scarcity theory with frameworks of financial stress. The PIFS consists of four components (Table 2). The first two components capture appraisals of insufficient financial resources and lack of control over one's financial situation. The third component captures financial worries and rumination, whereas the fourth component captures a focus on the short term. The appraisal of insufficient resources represents a perceived threat. The lack of control over one's financial situation represents the inability to adequately deal with such a perceived threat. Financial worries and rumination, and short-term focus are affective and cognitive responses to the perceived threat.

The PIFS is consistent with psychological stress research, showing that the appraisal of lacking financial resources predicts psychological symptoms, such as anxiety and depression (Folkman et al., 1986), and

Table 1
Operationalizations and descriptive statistics of the variables in our model. The numbers (N) and percentages (%) are provided for the categorical variables. For the numerical variables, means, standard deviations (SD), minimum (Min), and maximum (Max) values are provided.

Variable	*Operationalization*	*Categorical*			*Numerical*			
		Category	***N***	***%***	***Mean***	***SD***	***Min***	***Max***
Dependent variable								
Financial stress	The subjective experience of lacking financial resources to cope with demands (Table 2).				1.96	1.12	1.00	7.00
Independent variables								
Net income	Monthly household income remaining after deductions such as taxes, contributions, and other mandatory withholdings have been subtracted from the gross household income.				3048	1645	0	12,114
Income	Adjusted income: net income divided by the square root of household size.				2051	916	0	6994
Savings	The total balance of banking accounts, savings accounts, term deposit accounts, savings bonds or savings certificates, and bank savings schemes on 31 December 2018.				30,458	67,978	-8000	662,957
Buffer	A dichotomous variable equaling one if a household's liquid assets exceeded a threshold depending on income and household size and zero otherwise. The threshold was calculated as follows: € 600 + monthly income + € 400 * household size. (based on the Buffer Calculator provided by the National Institute for Family Financial Information (Nibud)).	No Yes	131 369	26% 74%				
Number of debts	The number of positive responses to the question whether respondents had (a) one or more personal loans, revolving credit arrangement(s), or financing credit(s) based on a hire-purchase or installment plan, (b) a loan or credit arrangement based on a pledge, (c) overdue payments on one or more credit cards (d) money loaned from family, friends, or acquaintances, and (e) any other credits, loans, or debts.	0 1 2 3 5	872 99 8 1 2	88.8% 10.1% .8% .1% .2%				
Debt Amount	The total amount of loans, credits, and debts on 31 December 2017.				2213.59	18,100.36	0	320,000
Income volatility	Number of months in which net income was lower than in the previous month, calculated of the last twelve months.	0 1 2 3 4 6	921 156 28 7 1 1	82.7% 14.0% 2.5% .6% .1% .1%				
Employed	A dichotomous variable that equaled zero if the responded "Job seeker following job loss," "First-time job seeker," "Has (partial) work disability," or "Performs unpaid work while retaining unemployment benefit," and one otherwise.	No Yes	73 1042	6.5% 93.5%				
Control variables								
Gender		Male Female	495 607	45% 55%				
Age	Calculated from the date of birth.				53.26	17.78	18	92
Household size	Number of members in the household.				2.33	1.25	1	9
Education level	As defined by Statistics Netherlands.	primary school vmbo havo/vwo mbo hbo wo	62 218 130 267 281 143	5.6% 19.8% 11.8% 24.3% 25.5% 13.0%				
Openness to experience	Measured with Goldberg's (1992) Big-Five index on a 7-point Likert Scale (50 items in total).				4.23	.47	3.20	5.20
Conscientiousness					4.54	.49	2.80	5.70
Agreeableness					4.65	.55	3.10	5.80
Extraversion					3,80	.62	2.10	5.50
Emotional stability					5.03	.62	3.60	6.60

Table 2
Items of the Psychological Inventory of Financial Scarcity (PIFS) and its subscales.

Below are some statements about your financial situation. Use the scale below to indicate how much you disagree or agree with each statement. There are no right or wrong answers. (1 = *totally disagree*; 7 = *totally agree*).
Subscale 1 (Lack of money, α =.82)
- I am often short of money.
- It's common for me not to be able to pay my bills on time.
- I often don't have money for the things I really need.

Subscale 2 (Lack of control, α =.88)
- I feel like I have little control over my financial situation.
- I am not able to manage my financial affairs myself.
- When I think about my financial situation, I feel powerless.

Subscale 3 (Financial worries and rumination, α =.73)
- I wonder all the time if I have enough money.
- I often find it difficult to think about anything other than my financial situation.
- I often worry about money.

Subscale 4 (Short-term focus, α =.79)
- I'm only concerned with what I have to pay now. I'll see the rest later.
- Because of my financial situation, I live from day to day.
- I don't consider things I'll have to pay for in a while.

research showing that a perceived lack of control increases experienced financial threat (Marjanovic et al., 2013). Results of exploratory and confirmatory factor analyses of the PIFS based on five studies indicated that the PIFS has a high internal consistency and captures a construct that fits both a one-factor structure and a four-factor (sub)structure (Van Dijk et al., 2022, p. 4). In our study, the correlations between the subscales of the PIFS were high (between.61 and.78; Table 3), in line with previous findings that they form a coherent overall scale.

3.3. Independent Variables

Income. Centerdata measures net monthly household income in euros. We corrected for household size because the needs of a household grow with each additional member. To consider economies of scale, we adjusted household income by dividing it by the square root of household size, according to OECD (2013) guidelines. One respondent had an extraordinarily high net monthly income of € 231,262, which we replaced with a missing value.

Savings may serve as buffers against unexpected expenditures and income shocks. Ruberton et al. (2016) stressed the importance of a minimal buffer in the form of liquid wealth for well-being. We defined buffer as a dichotomous variable equaling one if a household's liquid assets exceeded a threshold depending on income and household size and zero otherwise. We argue that higher-income families need a higher buffer because they have more fixed expenditures and own more property. Based on the Buffer Calculator provided by Nibud (n.d.) (National Institute for Family Finance Information), we used the following formula to define the threshold for having sufficient buffer: € 600 + [monthly income] + € 400 * [household size]. We included the amount of household liquid savings in our analyses and excluded other types of wealth, such as real estate and long-term investments. Respondents were asked: "What was the total balance of your banking account, savings accounts, term deposit accounts, savings bonds or savings certificates, and bank savings schemes on 31 December 2018?". If they responded, "I don't know," the questionnaire asked, "To what category did the total balance (total value) belong on 31 December 2018 (positive or negative)?" and given 15 categories (less than € 50 to € 25.000 or more). We used the category midpoints to calculate savings. We performed a robustness check with the amount of liquid savings instead of buffer as an independent variable.

Table 3
Spearman's correlations between the four subscales of the PIFS.

Subscales	2	3	4
1. Money shortage	.78	.67	.70
2. Lack of control		.61	.71
3. Financial worries and rumination			.65
4. Short-term focus			

Debts. Given that the number of debts is more predictive of financial stress than the total debt amount (Ariely et al., 2009; Ong et al., 2019), we included the number of debts as an independent variable in our analysis. We also argue that, for most households, having a mortgage contributes less to financial stress than other types of debt since the home's value usually amply compensates the mortgage loan's value. Student loans in the Netherlands have favorable conditions and are waived if one has difficulties repaying them. We, therefore, excluded mortgages and student loans from our analyses. The survey asked respondents to indicate whether they had (a) one or more personal loans, revolving credit arrangement(s), or financing credit(s) based on a hire-purchase or installment plan, (b) a loan or credit arrangement based on a pledge, (c) overdue payments on one or more credit cards (d) money loaned from family, friends, or acquaintances, and (e) any other credits, loans, or debts. We expect these types of debts to predict financial stress, although they are not necessarily problematic. We regard debts as problematic when people fail to repay them or for which people default (see, e.g., Roos et al., 2021). We performed two robustness checks with alternative operationalizations of debt, namely debt amount and debt-to-income ratio, defined as the debt amount divided by adjusted monthly income - as an alternative measure of debt. Respondents with one or more of the types of debt above were asked: "What was the total amount of the loans, credits, and debts that you had on 31 December 2017?" This survey item excluded mortgages and student loans. If they responded, "I don't know," they were asked, "To what category did the loans, credits, and debts belong on 31 December 2017?" and given 14 categories (less than € 500 to € 100.000 or more). We used the category midpoints in our calculations.

Income volatility. Two possible indices of income volatility are the relative size and the number of adverse income shocks in a given period. Prause et al. (2009) found that the latter was a better predictor of psychological depression than the former; an income loss results in the need to cut expenditures and may cause difficulty paying the bills. When income in one month was lower than income in the previous month, we regarded that as an adverse income shock. We used the number of adverse income shocks in the twelve months preceding the financial stress measurement as the primary measure of income volatility. We performed a robustness check with the relative size of income shocks as a measure of income volatility. For this measure, we calculated the absolute differences in income changes from one month to the other, added them together, and divided the outcome by income.

Employment. Centerdata asks respondents to select their primary occupation from 14 options. We defined employment as a dichotomous variable that equaled zero if the responded "Job seeker following job loss," "First-time job seeker," "Has (partial) work disability," or "Performs

unpaid work while retaining unemployment benefit," and one otherwise.

3.4. Control Variables

Our model included nine control variables: gender, age, education level, household size, and five personality traits. Our theoretical framework suggests that household size, gender, and personality traits may be associated with financial stress. Income tends to have an inverse-U relationship with age and rise with education level. Therefore, age and education may confound the association between income and financial stress. We included Goldberg's (1992) Big Five personality traits: openness to experience, conscientiousness, agreeableness, extraversion, and emotional stability (α =.78,.78,.81,.88, and.89, respectively).

3.5. Multiple regression

To examine the contribution of different aspects of one's economic situation in predicting financial stress, we performed a multiple regression analysis with income, savings, debts, income volatility, and employment as predictors and financial stress as independent variables. Our model included the interactions between income and other economic predictors (savings, debts, income volatility, and employment). The demographic variables age, education level, household size, and the personality traits openness to experience, conscientiousness, agreeableness, extraversion, and emotional stability served as control variables. Following Friedrich's (1982) and Aiken's (1991) guidance, we standardized the numerical variables before calculating the interaction terms: for each observation, we subtracted the mean and divided the result by the standard deviation. As a result, the regressions gave us standardized coefficients, enabling us to compare the relative contributions of each independent variable to predicting financial stress.

The data set presented us with two challenges. First, as indicated above, many observations had missing data on one or more variables. Second, an inspection of diagnostics from the OLS regression showed that they contained a considerable proportion of influential observations (see supplemental materials, Tables S1 and S2, Figure S1). We addressed the challenges by performing multiple imputations and choosing a robust regression method for influential observations. We found no multicollinearity between the independent variables in our model (see supplemental materials, Tables S3 and S4).

3.6. Multiple imputation

Deleting observations with missing values on one or more variables would leave 49% of the data unused, resulting in inflated standard errors (Van Buuren, 2018). The preferred methods for dealing with missing data fall into two broad groups: maximum likelihood estimation and multiple imputation (Allison, 2002). Maximum likelihood estimation has the disadvantage of requiring the estimation of a model for the joint distribution of all the variables, and results may not be robust to model choice. A downside of multiple imputation is that the imputation model must be congenial with the analysis. In the case of our study, the assumption is that the imputation model poses a lighter restriction than the assumption of a joint (normal) distribution of all variables. We, therefore, chose to use multiple imputation to address missing values. We applied multivariate imputation by chained equations (*mice*) because, in contrast to other available techniques, this method does not require a joint distribution of all the variables in the model (Allison, 2009). We used Van Buuren and Groothuis-Oudshoorn (2011) *mice* package in R, which iteratively imputes values for all variables with missing data and uses the imputed values to estimate a posterior distribution for the model parameters. The mechanism randomly draws parameters to generate predictions. It uses these predictions to impute values in the next iteration. To increase the plausibility of missingness at random, we included the control variables (gender, age, education level, household size, and personality traits) in the imputation process (Allison, 2009). We used *mice* combined with a random forest mechanism, a prediction method from machine learning constructed by recursively partitioning a data set and fitting a simple model to each partition (Breiman, 2001). Random forests can retain interactions between variables with missing values and are, therefore, well suited for our model and reduce the possibility of erroneous results (Allison, 2009; Doove et al., 2014).

The fraction of missing information, *lambda*, represents the proportion of the total variance in the parameter estimates due to missingness (Heymans and Eekhout, 2019). *Lambda* can be calculated as $(1+m) * VB / VT$, where m is the number of imputed datasets, and VB and VT are the between and total variance, respectively. A test run with 20 imputations resulted in a maximum *lambda* of.64. Based on Von Hippel's (2020) guidance, we set the number of imputations at 93, corresponding with *lambda* =.05. We, therefore, created 93 imputed data sets, each representing a plausible completion of the missing values. These 93 imputed data sets gave us 93 different versions of the complete data, accounting for uncertainty in the missing data.

3.7. Robust regression

It is well established that ordinary least squares (OLS) estimation can give highly unreliable outcomes in the presence of influential observations. OLS minimizes the sum of the squared residuals, which gives "unusual" observations an unduly large weight. Because our data contained many outliers and heavy tails, we applied the MM-estimator developed by Yohai (1987), which goes through three stages to estimate a regression model. The first stage uses an S-estimator to minimize the percentage bend midvariance of the residuals. The percentage bend midvariance is less sensitive to outliers than the variance; it gives robust but not necessarily efficient estimates. The second stage calculates an M-estimate of the errors. The third stage computes M-estimates of the regression parameters based on the outcomes of the first two stages. This process gives regression estimates that compare well with other estimators in terms of robustness while maintaining efficiency (Wilcox, 2012; Yu and Yao, 2017). We used the *lmrob* function in the R-package *robustbase* to perform the calculations, with parameters proposed by Koller and Stahel (2017).

We performed robust regression for each imputed dataset, resulting in 93 regression analyses. Next, we applied Rubin's (1987) rules to pool the results of these individual regressions. We averaged the estimates of the 93 individual regressions to obtain the parameter estimates. The pooled standard errors are derived from two distinct components: the within imputation variance and the between imputation variance. Within imputation variance represents the precision of the parameter of interest within each imputed dataset. On the other hand, between imputation variance reflects the additional variance arising due to missing data. It is estimated by considering the variance of the parameter of interest across all imputed datasets. The pooled standard errors are calculated as the square root of the sum of the within-imputation variance and the between-imputation variance.

4. Results

4.1. Descriptive statistics and correlations

Of the 1114 respondents, 55% were female (see Table 1). The respondents' ages were between 18 and 92 ($M = 53.26$ years, $SD = 17.78$). Their mean net monthly income was 2800 euros (*Median* = 2258, SD = 7226). Inspection revealed considerable numbers of outliers, skewness, and heavy tails (supplemental materials, Tables S1 and S2, and Figure S1). We also observed a relatively large proportion of missing data for some variables, with a maximum of 41% missing values for savings. Although the total percentage of missing values was moderate (9%), 550 (49%) respondents had missing values on at least one

variable.

We calculated Spearman's correlations between the continuous variables in our model and point-biserial correlations for dichotomous variables (supplemental materials Table S5).[6] Financial stress moderately correlated with buffer savings ($r_{PB} = -.37$) and income ($r_S = -.30$). The negative signs indicated that insufficient savings and lower incomes were associated with more financial stress. The number of debts ($r_S = .25$) and employment ($r_{PB} = -.18$) weakly correlated with financial stress. More debts and unemployment were associated with more financial stress. We found a very weak correlation between income volatility ($r_S = .05$) and financial stress. Of the control variables, age ($r_S = -.17$), conscientiousness ($r_S = -.20$), and emotional stability ($r_S = -.20$) had weak negative correlations with financial stress. The other control variables had very weak or no correlation with financial stress. We found that income correlated weakly with buffer ($r_{PB} = -.26$) and employment ($r_{PB} = .17$) and very weakly with number of debts ($r_S = -.06$) and income volatility ($r_S = .08$).

4.2. Main analysis

We ran the robust MM-regression analyses for the 93 imputed data sets in three steps. First, we specified a model with only the economic predictors: income, savings, debts, income volatility, and employment (Model 1). Next, we added the control variables: the five personality traits, education level, age, gender, and household size (Model 2). Finally, we added the interactions of income with the other economic predictors (Model 3). Table 4 contains the results for the three models.

Results from Model 1 ($R^2 = .29$) showed that income, buffer savings, number of debts, and employment predicted financial stress. In all cases, signs of the associations were as expected, indicating that lower income, insufficient buffer savings, more debts, and unemployment were associated with more financial stress. We found no support for income volatility being a predictor of financial stress. A comparison of the standardized regression parameters shows that buffer savings had the largest relative contribution to explaining financial stress, followed by employment, number of debts, and income. We used the *pool.compare* function that is part of the R *mice* package to compare model fits. This function is based on the method proposed by Meng and Rubin (1982) and uses an adapted version of the Wald statistic (W). The fit for Model 2 ($R^2 = .34$) was significantly higher compared to Model 1 ($W = 4.90$, $p < .001$). The conclusions did not change compared to Model 1. From both models, therefore, we conclude that sufficient buffer savings, employment, and number of debts had stronger associations with financial stress than income.

The fit for Model 3 ($R^2 = .36$) was significantly higher compared to Model 2 ($W = 2.97$, $p = .019$). In this model, the relative contribution of buffer savings and income was comparable. The number of debts had a smaller but significant contribution to predicting financial stress. On average, the results did not show employment contributes to financial stress. However, we did find an interaction between income and employment. We estimated the marginal effects of different income levels, from two standard deviations below the mean to two standard deviations above the mean (supplemental materials, Table S6). Results showed a negative association between employment and financial stress for an income level two standard deviations below the mean; for all other income levels, results did not show an association between employment and financial stress. We found no significant interaction between income on the one hand and buffer and the number of debts on the other. This finding indicates that having sufficient buffer savings and having fewer debts was associated with less financial stress, independent of household income.

[6] We reported Spearman's correlations because the assumptions for Pearson's correlations were violated, given the considerable number of outliers, skewness, and heavy tails for the variables of interest.

The control variables education level, age, gender, and household size were significant covariates, whereas psychological traits were not. In line with previous findings, age and education level had a negative association with financial stress. Other things being equal, males experienced more financial stress than females, contrasting with earlier findings. Household size was negatively associated with financial stress.

4.3. Additional analyses

We tested how our model performed compared to a model with only income as an independent variable. Moreover, we tested our findings' robustness to how financial stress, savings, debts, and income volatility were operationalized (see supplemental materials). Also, we examined how economic predictors were associated with the four different subscales of financial stress.

Results from the model with only income as an independent variable showed that income predicted financial stress (see Table S7). However, explanatory power was much lower than the model, including buffer savings, debts, income volatility, and employment ($R^2 = .06$ and.29, respectively). The results of a model with the logarithm of financial stress (R2 =.33) showed results similar to the main model: buffer had the largest standardized coefficient, followed by income and debts (see Table S8). In contrast to the main model, employment was not a predictor in the model, with the logarithm of financial stress as the dependent variable.

Next, we repeated the main analysis with different operationalizations of some independent variables. First, we estimated a model with the amount of liquid savings instead of buffer as an independent variable (Table S9, $R^2 = .29$). Results showed that savings were a significant predictor of financial stress in this model. In this case, we did find a significant interaction between income and savings. The interaction's positive sign indicates that the negative association between financial stress and income was weaker as income increased. Put differently, there was a stronger negative association between financial stress and savings when income was lower. This finding was in line with our hypotheses. Second, we replaced the number of debts with two alternative operationalizations of debt: total debt amount (Table S10, $R^2 = .30$) and debt-to-income ratio (Table S11, $R^2 = .30$). In both cases, results showed that debts did not significantly predict financial stress. Third, replacing the number of adverse income shocks with the relative size of negative income shocks (Table S12, $R^2 = .35$) did not change the results; we found no support for an association between income volatility and financial stress. However, the results did show that income positively moderated the association between employment and financial stress. There was a negative association between employment and financial stress for lower-income households (income one standard deviation below the mean). The robustness check largely confirmed our main analysis: savings and income consistently predicted financial stress. For debts, the picture was more complicated. The number of debts predicted financial stress, whereas debt amount and debt-to-income ratio did not.

Finally, we explored how the five aspects of one's economic situation predicted each of the four aspects of financial stress (the appraisal of money shortage and lack of control, financial worries and rumination, and short-term focus, Table S13). The results showed that different aspects of individuals' economic situation predict various aspects of financial stress. The patterns were comparable for appraisal of money shortage, lack of control, and financial worries and rumination. For these three aspects of financial stress, the key predictors were income, buffer savings, and number of debts. Income had the largest contribution to money shortage, followed by buffer savings. For lack of control and financial worries and rumination, the order was reversed: buffer savings had the largest contribution.

Income moderated the relationship between buffer savings on one hand and money shortage and financial worries and rumination on the other. This suggests that larger buffers have a stronger protective effect on lower-income individuals. Notably, the fourth aspect of financial

Table 4
Results of the pooled robust regressions for the base model (including only the predictor variables, Model 1), the model with control variables (Model 2), and the model with control variables and interactions (Model 3). For each model, the standardized regression parameters (β), standard errors (σ), t-statistic (t), and p-value (p) are provided. Significance is indicated with *** (p <.001), ** (p <.005), * (p <.05), and. (p <.10).

	Model 1: Base (R^2 =.29)					**Model 2: Control variables (R^2 =.34)**					**Model 3: Control variables + interactions (R^2 =.35)**				
	β	**σ**	***t***	***p***		**β**	**σ**	***t***	***p***		**β**	**σ**	***t***	***p***	
Intercept	0.915	0.112	8.206	<.001	***	1.236	0.150	8.254	<.001	***	0.962	0.185	5.204	<.001	***
Income	-0.154	0.026	-5.858	<.001	***	-0.150	0.028	-5.367	<.001	***	-0.612	0.168	-3.636	<.001	***
Buffer	-0.709	0.077	-9.216	<.001	***	-0.682	0.076	-8.920	<.001	***	-0.653	0.077	-8.476	<.001	***
Number of debts	0.238	0.029	8.332	<.001	***	0.232	0.028	8.190	<.001	***	0.224	0.030	7.572	<.001	***
Income volatility	0.010	0.025	0.394	0.694		-0.018	0.025	-0.700	0.484		-0.013	0.025	-0.511	0.609	
Employed	-0.506	0.104	-4.852	<.001	***	-0.431	0.103	-4.202	<.001	***	-0.230	0.138	-1.663	0.097	.
Openness to experience						0.045	0.035	1.264	0.208		0.045	0.035	1.267	0.207	
Conscientiousness						-0.064	0.036	-1.796	0.074	.	-0.063	0.035	-1.773	0.078	
Agreeableness						-0.018	0.035	-0.502	0.616		-0.018	0.035	-0.503	0.615	
Emotional stability						-0.051	0.037	-1.384	0.168		-0.051	0.037	-1.397	0.164	
Extraversion						0.025	0.035	0.708	0.48		0.024	0.035	0.666	0.506	
Education level 1						-0.377	0.121	-3.123	0.002	**	-0.345	0.122	-2.836	0.005	**
Education level 2						-0.385	0.130	-2.951	0.003	**	-0.340	0.131	-2.588	0.01	**
Education level 3						-0.290	0.120	-2.424	0.016	*	-0.264	0.120	-2.191	0.029	*
Education level 4						-0.370	0.120	-3.098	0.002	**	-0.339	0.120	-2.814	0.005	**
Education level 5						-0.345	0.132	-2.605	0.009	**	-0.309	0.133	-2.320	0.021	*
Age						-0.127	0.028	-4.515	<.001	***	-0.120	0.028	-4.286	<.001	***
Gender						-0.137	0.055	-2.503	0.013	*	-0.125	0.054	-2.311	0.021	*
Household size						-0.056	0.026	-2.155	0.031	*	-0.052	0.026	-2.000	0.046	*
Income * savings											0.127	0.076	1.666	0.097	.
Income * debt amount											-0.009	0.034	-0.258	0.797	
Income * income volatility											0.051	0.026	1.959	0.05	.
Income * employed											0.370	0.162	2.288	0.023	*

stress, short-term focus, was primarily influenced by the number of debts. While this model had lower explanatory power than others, it underscores the unique contribution of debt to short-term focus.

5. Discussion

The present research examined the intricate relationship between households' economic situations and the subjective experience of financial stress. By considering adjusted income, buffer savings, debts, income volatility, and employment simultaneously, we provided a more integrated analysis than traditional models. We used an existing, psychometrically evaluated measure of financial stress consisting of four components: 1) an appraisal of insufficient financial resources, 2) an appraisal of lack of control over one's financial situation, 3) financial worries and rumination, and 4) a short-term focus. This measure of financial stress is consistent with theories of psychological stress, a response to a real or perceived threat. Our model allowed us to assess the relative contributions of different aspects of households' economic situations to predicting financial stress. Our findings supported the hypothesis that adjusted income, buffer savings, and number of debts are predictors of financial stress. Specifically, lower-income households, those with insufficient buffer savings, and those with higher debt levels experienced higher levels of financial stress. Also, we found no support for income moderating the association between buffer savings and debt on the one hand and financial stress on the other. This indicates that buffer savings and debts predict financial stress, regardless of income.

Moreover, our results indicated that employment status plays a role in predicting financial stress, but only among households at the lowest end of the income spectrum. Contrary to our hypotheses, we did not find support for income volatility and debt amounts as predictors of financial stress. We found that the model including all five economic factors had more explanatory power than a model containing only income as an independent variable.

Income. Our results corroborated previous research, indicating that lower-income households are more likely to experience having too few financial resources. We observed that adjusted income correlated strongly with all four components of financial stress (money shortage, lack of control, financial worries and rumination, and short-term focus).

Savings. As expected, insufficient buffer savings was associated with increased financial stress. We did not find income to moderate the association between buffer savings and financial stress. This finding suggests a buffer is essential for both lower- and higher-income households to prevent financial stress. A model with savings amounts instead of buffer showed that savings amounts also negatively predicted financial stress. In this case, we did find income to be a moderator of the association between savings and financial stress. A potential explanation for this finding is that higher-income households often have higher fixed expenditures, requiring a higher buffer. Income shocks and unexpected expenditures are also likely to increase as income increases.

Debts. We found that the number of debts, but not debt amounts, predicted financial stress. This finding confirms that the number of debt accounts impacts psychological outcomes more than debt amounts per se (Ariely et al., 2009; Ong et al., 2019; Prelec and Loewenstein, 1998). We did not find support for income moderating the association between the number of debts and financial stress, suggesting that more debts are stressful regardless of income level. A post hoc explanation for the absence of an association between debt amounts and financial stress could be that higher debts may not necessarily increase financial stress as long as one can pay the interest and repayment (measures not available in the current data).

Income volatility. In contrast to previous findings (e.g., Gennetian and Shafir, 2015), we found no support for a positive association between income volatility and financial stress for two different measures of income volatility. Our data did not distinguish between anticipated income changes - such as the receipt of employee holiday allowances or regular volatility of turnover for entrepreneurs - and unanticipated income changes - such as the loss of income due to sickness or becoming unemployed. The specifics of the income volatility may determine the strengths of its association with financial stress; predictable income shocks may have a weaker association with financial stress than unpredictable income shocks. There is ample evidence that unforeseen life events are associated with stress and mental well-being (Adler and Snibbe, 2003; McLeod and Kessler, 1990).

Employment. We found that employment only predicted financial stress for the lowest-income groups. For these income groups, there was a negative association between employment and financial stress. This

result partly corroborates earlier studies that have found negative associations between unemployment and psychological well-being (Burchell, 2011; Wilson and Walker, 1993). Being unemployed may be associated with insecurity and worrying about being able to pay the bills and provide for one's family, only for lower-income households.

5.1. Strengths and limitations

We examined how five aspects of one's economic situation (income, savings, debts, income volatility, and employment) predicted financial stress in one empirical model. We assessed the relative contribution of each aspect to predicting financial stress. We also examined if income moderated the association of financial stress with the other four aspects of one's economic situation. To our knowledge, our study is the first to examine all these aspects together in predicting financial stress. This approach allowed the examination of the relative contributions of economic factors in predicting financial stress. We studied the relationships of economic correlates with financial stress using different operationalizations of the predictor variables, enabling us to test our findings' robustness. Also, we used state-of-the-art multiple imputation methods to deal with missing data and robust estimation techniques to overcome influential observations. This further enhanced our confidence in the results.

Our study focused on the economic predictors of financial stress. We included several demographic variables (age, gender, education level, and household size) and psychological traits as control variables. However, other factors may contribute to financial stress, such as financial literacy, financial attitudes, and self-efficacy (Dare et al., 2021; Lusardi and Mitchell, 2014). It would be worthwhile to examine how these factors, in combination with economic factors, predict financial stress.

Because we used cross-sectional data, one evident limitation of the current study is that we could not draw causal inferences. Experiments or quasi-experimental longitudinal studies could increase confidence in causal relationships. Experiments require developing paradigms to manipulate income, savings, debts, and income volatility in a laboratory environment. As an alternative, longitudinal studies may provide a viable route. A second limitation is that we used self-reported economic data. Future research could include administrative data instead.

Financial stress is relevant in a developed country such as the Netherlands because financial stress can have profound consequences for people's well-being, health, cognitive performance, and behavior. It is, therefore, important to understand the association between households' objective economic situation and subjective financial stress in the Dutch context. Future studies could examine the associations between economic factors and financial stress in other economic and cultural contexts.

Our findings also provide some suggestions for sharper conceptualizations of several aspects of households' economic situations when studying their association with stress and well-being. Discretionary income may be a stronger predictor of financial stress than net income. Likewise, future studies could look at the effects of interest and repayment of debts in addition to the debt amount. Finally, future studies could use a more fine-grained distinction between different types of (un) employment, such as being unemployed, working for an employer, being self-employed, and being retired.

5.2. Implications for research and policy

This study's central message is that income is too narrow to conceptualize one's economic situation to predict financial stress. Future studies could incorporate other indicators, like savings, (number of) debts, and employment, when explaining financial stress and financial well-being. Future studies might incorporate discretionary income, defined as net income minus fixed expenses, as a predictor. Disposable income may have a stronger correlation with financial stress because it considers the amount of "slack" households experience (Mullainathan and Shafir, 2013). Regarding the relationship between debts and financial stress, future studies could incorporate interest payments and redemption in their analyses to address this possibility. Also, future research could examine how different types of debts affect financial stress. Most studies focused on one type of debt (particularly credit card debt). Few studies have examined the distinctive influence of different kinds of debt on stress or mental health, and their findings are inconclusive. In a review of the literature on the health effects of indebtedness, Turunen and Hiilamo (2014), for example, found that "The source of debt had little effect on the prevalence of common mental disorders, though some types of debt were reported more often than others among people with a mental disorder" (p. 6). Other studies have found that different types of debts had different associations with financial burdens (Xiao et al., 2021; Xiao and Yao, 2022). We also suggest examining whether unexpected income shocks resulting from life events - as opposed to monthly income volatility - predict financial stress. Furthermore, we encourage examining the associations between economic variables and financial stress in other countries. Finally, examining if there is a temporal association between one's current economic situation and future financial stress is worthwhile, especially in the aftermath of COVID-19.

Policymakers could target other groups beyond low-income households when developing social policies to address financial stress. By targeting households with low levels of wealth, high numbers of debt, and those without a job, policymakers can better tailor interventions to address the diverse needs of populations in financially dire circumstances. This approach may facilitate impactful policy measures better tailored to the specific needs of people with different characteristics and circumstances. Improving the take-up of social welfare support among eligible households is vital to addressing financial stress. Policymakers could prioritize strategies that have proven effective in increasing participation in social welfare programs. Such strategies include providing personalized information about available benefits (Bhargava and Manoli, 2015; Manoli and Turner, 2016; Matikka and Paukkeri, 2022), simplifying application procedures (Auray and Fuller, 2020; Cha and Escarce, 2022; Fuchs et al., 2020), and offering proactive outreach and assistance to eligible households (Boost et al., 2021; Finkelstein and Notowidigdo, 2019). While behaviorally informed interventions, such as 'nudges,' have shown limited effectiveness (Bird et al., 2021; Engstrom et al., 2019; Linos et al., 2022), targeted outreach efforts and streamlined processes have demonstrated better results. By implementing these measures, policymakers can ensure that low-income households receive the financial support they need to achieve a basic standard of living and alleviate financial stress (Dubois and Ludwinek, 2015; Immervoll et al., 2022; Department for Work and Pensions, 2022; Portela, 2022).

Ensuring households have a financial buffer by promoting rainy-day savings may be another effective way to reduce financial stress. Previous studies have found that effective ways to promote buffer savings include automatically enrolling workers into an employer-sponsored savings account funded by payroll deduction (Beshears et al., 2015), commitment accounts with withdrawal restrictions (Beshears et al., 2020), promoting savings habits (Newmeyer et al., 2020), stimulating to think about their savings goal (Burke et al., 2018), sending reminders to make deposits, prompting to save a portion of their tax return (Grinstein-Weiss et al., 2017), and prize-linked saving, which offers lottery-like payouts instead of fixed interest rates (Cole et al., 2014). Promoting savings can also reduce the need for debt (Kast and Pomeranz, 2014).

Finally, our research suggests that consolidating multiple small debts into one larger debt may reduce financial stress. This aligns with previous findings from a debt relief program in Singapore. Waiving multiple debts positively affected cognitive performance, including short-term focus, rather than waiving a single large debt (Ong et al., 2019). Another study suggests that paying off the smallest debt first and then paying off the rest of their debts from smallest to largest may be

beneficial despite being economically suboptimal (Brown and Lahey, 2015).

5.3. Conclusion

To conclude, the present research took a more integrative approach to predicting the psychological construct of financial stress than previous studies. The results showed that less buffer savings, more debts, and unemployment also predicted more financial stress. Taking a more integrative view of households' economic situations opens new routes for future research. It also provides opportunities for developing policy interventions to reduce financial stress and increase financial well-being.

CRediT authorship contribution statement

Lotte F. Van Dillen: Conceptualization, Writing – review & editing. **Eric Van Dijk:** Conceptualization, Writing – review & editing. **Olaf Simonse:** Conceptualization, Formal analysis, Methodology, Software, Writing – original draft. **Wilco W. Van Dijk:** Conceptualization, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare no conflicts of interest.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.jbef.2024.100933.

References

Adler, N.E., Snibbe, A.C., 2003. The role of psychosocial processes in explaining the gradient between socioeconomic status and health. Curr. Dir. Psychol. Sci. *12* (4), 119–123 https://doi.org/10/frtsft.

Allison, P.D., 2009. Missing data. In: Millsap, R., Maydeu-Olivares, A. (Eds.), The SAGE Handbook of Quantitative Methods in Psychology. SAGE Publications Ltd, pp. 72–90.

Alsemgeest, L., 2019. The relationship between job satisfaction, financial stress and sufficient retirement savings of near-retirement pastors in Southern Africa. Rev. Relig. Res. *61* (2), 119–133. https://doi.org/10.1007/s13644-019-00366-1.

Ariely, D., Gneezy, U., Loewenstein, G., Mazar, N., 2009. Large stakes and big mistakes. Rev. Econ. Stud. *76* (2), 451–469. https://doi.org/10.1111/j.1467-937X.2009.00534.x.

Auray, S., Fuller, D.L., 2020. Eligibility, experience rating, and unemployment insurance take-up. Quant. Econ. *11* (3), 1059–1107 https://doi.org/10.3982/QE940.

Beenackers, M.A., Groeniger, J.O., Lenthe, F.J.V., Kamphuis, C.B.M., 2018. The role of financial strain and self-control in explaining health behaviours: the GLOBE study. Eur. J. Public Health *28* (4). Article 4. https://doi.org/10/gg9pvm.

Bernheim, B.D., 2019. Handbook of Behavioral Economics—Foundations and Applications, *Volume 2*. Elsevier. *2*.

Bernheim, B.D., Ray, D., Yeltekin, Ş., 2015. Poverty and self-control. Econometrica *83* (5), 1877–1911 https://doi.org/10.3982/ECTA11374.

Beshears, J., Choi, J., Harris, C., Laibson, D., Madrian, B., Sakong, J., 2015. Self Control and Commitment: Can Decreasing the Liquidity of a Savings Account Increase Deposits? (w21474; p. w21474) National Bureau of Economic Research. https://doi.org/10.3386/w21474.

Beshears, J., Choi, J.J., Iwry, J.M., John, D.C., Laibson, D., Madrian, B.C., 2020. Building emergency savings through employer-sponsored rainy-day savings accounts. Tax. Policy Econ. *34*, 43–90 https://doi.org/10.1086/708170.

Bhargava, S., Manoli, D., 2015. Psychological frictions and the incomplete take-up of social benefits: evidence from an IRS field experiment. Am. Econ. Rev. *105* (11), 3489–3529 https://doi.org/10.1257/aer.20121493.

Bird, K.A., Castleman, B.L., Denning, J.T., Goodman, J., Lamberton, C., Rosinger, K.O., 2021. Nudging at scale: experimental evidence from FAFSA completion campaigns. J. Econ. Behav. Organ. *183*, 105–128. https://doi.org/10.1016/j.jebo.2020.12.022.

Blascovich, J., 2008. Challenge and threat. In: Elliot, A.J. (Ed.), Handbook of Approach and Avoidance Motivation. Psychology Press, pp. 449–464.

Boost, D., Raeymaeckers, P., Hermans, K., Elloukmani, S., 2021. Overcoming non-take-up of rights: a realist evaluation of integrated rights-practices. J. Soc. Work *21* (4), 831–852. https://doi.org/10.1177/1468017320948332.

Breiman, L., 2001. Random forests. Mach. Learn. *45* (1), 5–32.

Bridges, S., Disney, R., 2010. Debt and depression. J. Health Econ. *29* (3), 388–403 https://doi.org/10/dvt36p.

Brown, A.L., Lahey, J.N., 2015. Small victories: creating intrinsic motivation in task completion and debt repayment. J. Mark. Res. *52* (6), 768–783 https://doi.org/10.1509/jmr.14.0281.

Brüggen, E.C., Hogreve, J., Holmlund, M., Kabadayi, S., Löfgren, M., 2017. Financial well-being: a conceptualization and research agenda. J. Bus. Res. *79*, 228–237 https://doi.org/10/gbvrjs.

Bufe, S., Roll, S., Kondratjeva, O., Skees, S., Grinstein-Weiss, M., 2022. Financial shocks and financial well-being: what builds resiliency in lower-income households? Soc. Indic. Res. *161* (1), 379–407. https://doi.org/10.1007/s11205-021-02828-y.

Burchell, B., 2011. A temporal comparison of the effects of unemployment and job insecurity on wellbeing. Sociol. Res. Online *16* (1), 66–78. https://doi.org/10.5153/sro.2277.

Burke, J., Luoto, J., Perez-Arce, F., 2018. Soft versus hard commitments: a test on savings behaviors. J. Consum. Aff. *52* (3), 733–745. https://doi.org/10.1111/joca.12170.

Cannon, W., 1928. The mechanism of emotional disturbance of bodily functions. N. Engl. J. Med. *198* (17), 877–884 https://doi.org/10/b6psmc.

Cha, P., Escarce, J.J., 2022. The Affordable Care Act Medicaid expansion: a difference-in-differences study of spillover participation in SNAP. PLOS ONE *17* (5). https://doi.org/10.1371/journal.pone.0267244.

Clark, R.L., Mitchell, O.S., 2022. Americans' financial resilience during the pandemic. Financ. Plan. Rev. *5* (2–3) https://doi.org/10.1002/cfp2.1140.

Codagnone, C., Bogliacino, F., Gómez, C., Charris, R., Montealegre, F., Liva, G., Lupiáñez-Villanueva, F., Folkvord, F., Veltri, G.A., 2020. Assessing concerns for the economic consequence of the COVID-19 response and mental health problems associated with economic vulnerability and negative economic shock in Italy, Spain, and the United Kingdom. PLOS ONE *15* (10), e0240876. https://doi.org/10.1371/journal.pone.0240876.

Consumer Financial Protection Bureau. (2017). Financial Well-being in America. Consumer Financial Protection Bureau (CFPB). ⟨https://files.consumerfinance.gov/f/documents/201709_cfpb_financial-well-being-in-America.pdf⟩.

Cole, S.A., Iverson, B.C., Tufano, P., 2014. Can gambling increase savings? Empirical evidence on prize-linked savings accounts. SSRN Electron. J. https://doi.org/10.2139/ssrn.2441286.

Cook, L.A., Sadeghein, R., 2018. Effects of perceived scarcity on financial decision making. J. Public Policy Mark. *37* (1), 68–87. https://doi.org/10.1509/jppm.16.157.

Dalton, P.S., Nhung, N., Rüschenpöhler, J., 2020. Worries of the poor: the impact of financial burden on the risk attitudes of micro-entrepreneurs. J. Econ. Psychol. *79*, 102198 https://doi.org/10/gg62rd.

Dare, S., Van Dijk, W.W., Van Dijk, E., Van Dillen, L.F., Gallucci, M., Simonse, O., 2021. The road to financial satisfaction: testing the paths of knowledge, attitudes, sense of control, and positive financial behaviors. J. Financ. Ther. *11* (2) https://doi.org/10.4148/1944-9771.1240.

De Almeida, F., Scott, I.J., Soro, J.C., Fernandes, D., Amaral, A.R., Catarino, M.L., Arêde, A., Ferreira, M.B., 2024. Financial scarcity and cognitive performance: a meta-analysis. J. Econ. Psychol., 102702 https://doi.org/10.1016/j.joep.2024.102702.

De Bruijn, E.-J., Antonides, G., 2021. Determinants of financial worry and rumination. J. Econ. Psychol. *76*, 102233 https://doi.org/10.1016/j.joep.2019.102233.

Department for Work & Pensions. (2022). Income-related Benefits: Estimates of Take-up: Financial Year 2019 to 2020. Gov.uk. ⟨https://www.gov.uk/government/statistics/income-related-benefits-estimates-of-take-up-financial-year-2019-to-2020/income-related-benefits-estimates-of-take-up-financial-year-2019-to-2020⟩.

Doove, L.L., Van Buuren, S., Dusseldorp, E., 2014. Recursive partitioning for missing data imputation in the presence of interaction effects. Comput. Stat. Data Anal. *72*, 92–104.

Drentea, P., Lavrakas, P.J., 2000. Over the limit: the association among health, race and debt. Soc. Sci. Med. *50* (4), 517–529 https://doi.org/10/fm74v3.

Dubois, H., Ludwinek, A., 2015. Access to social benefits: Reducing non-take-up. Publications Office of the European Commission.

Engstrom, P., Forsell, E., Hagen, J., Stefánsson, A., 2019. Increasing the take-up of the housing allowance among Swedish pensioners: a field experiment. Int. Tax. Public Financ. *26* (6), 1353–1382. https://doi.org/10.1007/s10797-019-09538-9.

Ettman, C.K., Abdalla, S.M., Cohen, G.H., Sampson, L., Vivier, P.M., Galea, S., 2021. Low assets and financial stressors associated with higher depression during COVID-19 in a nationally representative sample of US adults. J. Epidemiol. Community Health *75* (6), 501–508.

FCA. (2022). Millions of Britons struggling with bills, warns regulator. FCA. ⟨https://www.fca.org.uk/news/press-releases/millions-britons-struggling-bills-warns-regulator⟩.

Finkelstein, A., Notowidigdo, M.J., 2019. Take-up and targeting: experimental evidence from SNAP. Q. J. Econ. *134* (3), 1505–1556. https://doi.org/10.1093/qje/qjz013.

Folkman, S., Lazarus, R.S., 1984. Stress, Appraisal, and Coping. Springer Publishing Company.

Folkman, S., Lazarus, R.S., Gruen, R.J., DeLongis, A., 1986. Appraisal, coping, health status, and psychological symptoms. J. Personal. Soc. Psychol. *50* (3), 571–579. https://doi.org/10.1037/0022-3514.50.3.571.

Frankenhuis, W.E., Nettle, D., 2020. The strengths of people in poverty. Curr. Dir. Psychol. Sci. *29* (1), 16–21 https://doi.org/10/ggf5d6.

Fuchs, M., Gasior, K., Premrov, T., Hollan, K., Scoppetta, A., 2020. Falling through the social safety net? Analysing non-take-up of minimum income benefit and monetary social assistance in Austria. Soc. Policy Adm. *54* (5), 827–843. https://doi.org/10.1111/spol.12581.

Gallup. (2022). Inflation Now Causing Hardship for Majority in US. ⟨https://news.gallup.com/poll/400565/inflation-causing-hardship-majority.aspx⟩.

Gennetian, L.A., Shafi, E., Aber, J.L., de Hoop, J., 2021. Behavioral insights into cash transfers to families with children. Behav. Sci. Policy *7* (1), 71–92.
Gennetian, L.A., Shafir, E., 2015. The persistence of poverty in the context of financial instability: A behavioral perspective. J. Policy Anal. Manag. *34* (4), 904–936. https://doi.org/10.1002/pam.21854.
Gerards, R., Welters, R., 2020. Liquidity constraints, unemployed job search and labour market outcomes. Oxf. Bull. Econ. Stat. *82* (3), 625–646. https://doi.org/10.1111/obes.12345.
Gerards, R., Welters, R., 2022. Job search in the presence of a stressor: Does financial hardship change the effectiveness of job search? J. Econ. Psychol. *90*, 102508 https://doi.org/10.1016/j.joep.2022.102508.
Goldberg, L.R., 1992. The development of markers for the Big-Five factor structure. Psychol. Assess. *4* (1), 26–42 https://doi.org/10/cd8.
Grinstein-Weiss, M., Russell, B.D., Gale, W.G., Key, C., Ariely, D., 2017. Behavioral interventions to increase tax-time saving: evidence from a national randomized trial. J. Consum. Aff. *51* (1), 3–26. https://doi.org/10.1111/joca.12114.
Halliday, T. (2008). Income volatility and health (IZA Working Paper No. 3234). https://doi.org/10.1111/j.0042-7092.2007.00700.x.
Hannagan, A., Morduch, J., 2015. Income gains and month-to-month income volatility: household evidence from the us financial diaries. SSRN Electron. J. https://doi.org/10/ggscn8.
Haushofer, J., Fehr, E., 2014. On the psychology of poverty. Science *344* (6186), 862–867. https://doi.org/10.1126/science.1232491.
Haushofer, J., & Salicath, D. (2023). The Psychology of Poverty: Where Do We Stand? (Working Paper 31977). National Bureau of Economic Research. https://doi.org/10.3386/w31977.
Hernán, M.A., Hsu, J., Healy, B., 2019. A second chance to get causal inference right: A classification of data science tasks. CHANCE *32* (1), 42–49. https://doi.org/10.1080/09332480.2019.1579578.
Heymans, M.H., & Eekhout, I. (2019). Applied Missing Data Analysis with SPSS and R. ⟨https://bookdown.org/mwheymans/bookmi/⟩.
Hilbert, L.P., Noordewier, M.K., Van Dijk, W.W., 2022a. Financial scarcity increases discounting of gains and losses: experimental evidence from a household task. J. Econ. Psychol. *92*, 102546 https://doi.org/10.1016/j.joep.2022.102546.
Hilbert, L.P., Noordewier, M.K., Van Dijk, W.W., 2022b. The prospective associations between financial scarcity and financial avoidance. J. Econ. Psychol. *88*, 102459 https://doi.org/10.1016/j.joep.2021.102459.
Hoffmann, A., McNair, S.J., 2019. How does consumers' financial vulnerability relate to positive and negative financial outcomes? The mediating role of individual psychological characteristics. J. Consum. Aff. *53* (4), 1630–1673 https://doi.org/10/ghgc88.
Hoffmann, A., Plotkina, D., Broihanne, M.-H., Göritz, A., Kleimeier, S., 2022. Differences in and drivers of mental, social, functional, and financial well-being during COVID-19: Evidence from Australia, France, Germany, and South Africa. PLoS ONE *17* (10), e0276077. https://doi.org/10.1371/journal.pone.0276077.
Huijsmans, I., Ma, I., Micheli, L., Civai, C., Stallen, M., Sanfey, A.G., 2019. A scarcity mindset alters neural processing underlying consumer decision making. Proc. Natl. Acad. Sci. *116* (24), 11699–11704. https://doi.org/10.1073/pnas.1818572116.
Immervoll, H., Fernandez, R., Hyee, R., Lee, J., Pacifico, D., 2022. De-facto gaps in social protection for standard and non-standard workers. OECD Soc., Employ. Migr. Work. Pap. 271. https://doi.org/10.1787/48e282e7-en.
Jappelli, T., Pagano, M., Maggio, M.D., 2013. Households' indebtedness and financial fragility. J. Financ. Manag., Mark. Inst. *1*, 23–46. https://doi.org/10.12831/73631.
Johar, G., Meng, R., Wilcox, K., 2015. Thinking about financial deprivation: Rumination and decision making among the poor. ACR North Am. Adv. *43*, 208–211.
Kast, F., Pomeranz, D., 2014. Saving more to borrow less: experimental evidence from access to formal savings accounts in Chile. Natl. Bur. Econ. Res. 51.
Keizer, A.-G., Tiemeijer, W., Bovens, M., 2019. Why Knowing What to Do Is Not Enough: A Realistic Perspective on Self-Reliance. Springer Netherlands. https://doi.org/10.1007/978-94-024-1725-8.
Kim, K.T., Cho, S.H., Xiao, J.J., 2023. Is ignorance bliss? Use of alternative financial services, financial knowledge, and financial anxiety. J. Fam. Econ. Issues *44*, 956–967. https://doi.org/10.1007/s10834-022-09883-8.
Kleimeier, S., Hoffmann, A.O.I., Broihanne, M.-H., Plotkina, D., Göritz, A.S., 2023. Determinants of individuals' objective and subjective financial fragility during the COVID-19 pandemic. J. Bank. Financ. *153*, 106881 https://doi.org/10.1016/j.jbankfin.2023.106881.
Lazarus, R.S., 1966. Psychological Stress and the Coping Process. McGraw-Hill.
Lichand, G., & Mani, A. (2020). Cognitive Droughts. University of Zurich, Department of Economics, Working Paper, 341.
Linos, E., Prohofsky, A., Ramesh, A., Rothstein, J., Unrath, M., 2022. Can nudges increase take-up of the EITC? Evidence from multiple field experiments. Am. Econ. J.: Econ. Policy *14* (4), 432–452.
Lupien, S.J., McEwen, B.S., Gunnar, M.R., Heim, C., 2009. Effects of stress throughout the lifespan on the brain, behaviour and cognition. Nat. Rev. Neurosci. *10* (6), 434–445. https://doi.org/10.1038/nrn2639.
Lusardi, A., Mitchell, O.S., 2014. The economic importance of financial literacy: theory and evidence. J. Econ. Lit. *52* (1), 5–44. https://doi.org/10.1257/jel.52.1.5.
Lusardi, A., Mitchell, O.S., Oggero, N., 2020. Debt and financial vulnerability on the verge of retirement. J. Money, Credit Bank. *52* (5), 1005–1034. https://doi.org/10.1111/jmcb.12671.
Mani, A., Mullainathan, S., Shafir, E., Zhao, J., 2013. Response to comment on 'poverty impedes cognitive function. Science *342* (6163), 1169. https://doi.org/10.1126/science.1246799.
Mani, A., Mullainathan, S., Shafir, E., Zhao, J., 2020. Scarcity and cognitive function around payday: a conceptual and empirical analysis. J. Assoc. Consum. Res. *5* (4). Article 4. https://doi.org/10/ghhbv7.
Manoli, D., Turner, N., 2016. Do notices have permanent effects on benefit take-up. Tax. Law Rev. *70* (3), 439–476.
Marjanovic, Z., Greenglass, E.R., Fiksenbaum, L., Bell, C.M., 2013. Psychometric evaluation of the Financial Threat Scale (FTS) in the context of the Great Recession. J. Econ. Psychol. *36*, 1–10 https://doi.org/10/gd7f4d.
Matikka, T., Paukkeri, T., 2022. Does sending letters increase the take-up of social benefits? Evidence from a new benefit program. Empir. Econ. *63*, 3253–3287. https://doi.org/10.1007/s00181-022-02230-8.
Matud, M.P., 2004. Gender differences in stress and coping styles. Personal. Individ. Differ. *37* (7), 1401–1415. https://doi.org/10.1016/j.paid.2004.01.010.
McEwen, B.S., Gianaros, P.J., 2010. Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. Ann. N. Y. Acad. Sci. *1186* (1), 190–222. https://doi.org/10.1111/j.1749-6632.2009.05331.x.
McLeod, J.D., Kessler, R.C., 1990. Socioeconomic status differences in vulnerability to undesirable life events. J. Health Soc. Behav. 162–172 https://doi.org/10/czm3jk.
Meer, J., Miller, D.L., Rosen, H.S., 2003. Exploring the health–wealth nexus. J. Health Econ. *22* (5), 713–730 https://doi.org/10/bsjtfk.
Meng, X.-L., Rubin, D.B., 1982. Performing likelihood ratio tests with multiply-imputed data sets. Biometrika *79* (1), 103–111.
Mullainathan, S., Schwartzstein, J., Congdon, W.J., 2012. A reduced-form approach to behavioral public finance. Annu. Rev. Econ. *4* (1), 511–540. https://doi.org/10.1146/annurev-economics-111809-125033.
Mullainathan, S., & Shafir, E. (2013). Scarcity: Why Having Too Little Means So Much. Times Books, Macmillan and Henry Holt.
Netemeyer, R.G., Warmath, D., Fernandes, D., Lynch Jr., J.G., 2017. How am I doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being. J. Consum. Res. *45* (1), 68–89 https://doi.org/10/dkxc.
Newmeyer, C., Warmath, D., O'Connor, G.E., Wong, N., 2020. Is savings automation helpful to liquid savings? It depends on whether you have a savings habit. J. Public Policy Mark. *40* (2), 285–297 https://.doi.org/10.1177/0743915620950216.
Nibud. (n.d.). BufferBerekenaar. BufferCalculator. ⟨https://bufferberekenaar.nibud.nl/introductie⟩.
Nibud. (2022). Rondkomen en Betalingsproblemen (Making Ends Meet and Payment Problems). ⟨https://www.nibud.nl/onderzoeksrapporten/rapport-rondkomen-en-betalingsproblemen-2022/⟩.
Nofsinger, J.R., Patterson, F.M., Shank, C.A., 2018. Decision-making, financial risk aversion, and behavioral biases: the role of testosterone and stress. Econ. Hum. Biol. *29*, 1–16. https://doi.org/10.1016/j.ehb.2018.01.003.
OECD. (2013). OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth. https://doi.org/10.1787/9789264194830-en.
Ong, Q., Theseira, W., Ng, I.Y.H., 2019. Reducing debt improves psychological functioning and changes decision-making in the poor. Proc. Natl. Acad. Sci. *116* (15), 7244–7249. https://doi.org/10.1073/pnas.1810901116.
Portela, M., 2022. Non-take-up of minimum social benefits: quantification in Europe. A salient phenomenon still not making public policy headlines. DREES Rep. *94*.
Prause, J., Dooley, D., Huh, J., 2009. Income volatility and psychological depression. Am. J. Community Psychol. *43* (1), 57–70 https://doi.org/10/dqrfr2.
Prelec, D., Loewenstein, G., 1998. The red and the black: mental accounting of savings and debt. Mark. Sci. *17* (1), 4–28. https://doi.org/10.1287/mksc.17.1.4.
Ridley, M., Rao, G., Schilbach, F., & Patel, V. (2020). Poverty, depression, and anxiety: causal evidence and mechanisms. National Bureau of Economic Research, Working Paper w27157.
Roos, A.-F., Diepstraten, M., & Douven, R. (2021). When Financials Get Tough, Life Gets Rough? Problematic Debts and Ill Health. CBP Netherlands Bureau for Economic Policy Analysis. https://doi.org/10.34932/BPNM-1379.
Rothwell, D.W., Han, C.-K., 2010. Exploring the relationship between assets and family stress among low-income families. Fam. Relat. *59* (4), 396–407 http://www.jstor.org/stable/40864560.
Ruberton, P.M., Gladstone, J., Lyubomirsky, S., 2016. How your bank balance buys happiness: The importance of 'cash on hand' to life satisfaction. Emotion *16* (5), 575–580 https://doi.org/10/f849k5.
Rubin, D.B., 1987. Multiple Imputation for Survey Nonresponse. Wiley.
Schomburgk, L., Hoffmann, A., 2022. How mindfulness reduces BNPL usage and how that relates to overall well-being. Eur. J. Mark. *57* (2), 325–359. https://doi.org/10.1108/EJM-11-2021-0923.
Selye, H., 1936. A syndrome produced by diverse nocuous agents. Nature *138* (3479)), 32 https://doi.org/10/fchwrn.
Shah, A.K., Mullainathan, S., Shafir, E., 2012. Some consequences of having too little. Science *338* (6107), 682–685. https://doi.org/10.1126/science.1222426.
Shah, A.K., Shafir, E., Mullainathan, S., 2015. Scarcity frames value. Psychol. Sci. *26* (4), 402–412. https://doi.org/10.1177/0956797614563958.
Sheehy-Skeffington, J., 2018. Decision-making up against the wall: a framework for understanding the behavioral dimension of low socio-economic status. In: Üskül, A. K., Oishi, S. (Eds.), Socio-Economic Environment and Human Psychology: Social, Ecological, and Cultural Perspectives. Oxford University Press. https://doi.org/10.1093/oso/9780190492908.003.0005.
Simonse, O., Van Dijk, W.W., Van Dillen, L.F., Van Dijk, E., 2022. The role of financial stress in mental health changes during COVID-19. npj Ment. Health Res. *1* (1), 15. https://doi.org/10.1038/s44184-022-00016-5.
Sweet, E., Nandi, A., Adam, E.K., McDade, T.W., 2013. The high price of debt: household financial debt and its impact on mental and physical health. Soc. Sci. Med. 91, 94–100 https://doi.org/10/f467b4.

Tay, L., Batz, C., Parrigon, S., Kuykendall, L., 2017. Debt and subjective well-being: the other side of the income-happiness coin. J. Happiness Stud. 18 (3), 903–937. https://doi.org/10.1007/s10902-016-9758-5.

Tully, S.M., Sharma, E., 2022. Consumer wealth. Consum. Psychol. Rev. 5 (1), 125–143. https://doi.org/10.1002/arcp.1073.

Turunen, E., Hiilamo, H., 2014. Health effects of indebtedness: a systematic review. BMC Public Health 14 (1), 489. https://doi.org/10.1186/1471-2458-14-489.

Van Buuren, S., 2018. Flexible imputation of missing data. CRC press (https://stefvanbuuren.name/fimd/).

Van Buuren, S., Groothuis-Oudshoorn, K., 2011. mice: Multivariate Imputation by Chained Equations in R. J. Stat. Softw. 1–68. https://doi.org/10.18637/jss.v045.i03.

Van Dijk, W.W., Van der Werf, M.M.B., Van Dillen, L.F., 2022. The Psychological Inventory of Financial Scarcity (PIFS): a psychometric evaluation. J. Behav. Exp. Econ. 101, 101939 https://doi.org/10.1016/j.socec.2022.101939.

Warr, P., Jackson, P., 1984. Men without jobs: some correlates of age and length of unemployment. J. Occup. Psychol. 57 (1), 77–85. https://doi.org/10.1111/j.2044-8325.1984.tb00150.x.

Wilcox, R.R., 2012. Introduction to Robust Estimation and Hypothesis Testing, 3rd ed. Academic Press.

Wilson, S.H., Walker, G.M., 1993. Unemployment and health: a review. Public Health 107 (3), 153–162. https://doi.org/10.1016/S0033-3506(05)80436-6.

Xiao, J.J., Kim, K.T., 2022. The able worry more? Debt delinquency, financial capability, and financial stress. J. Fam. Econ. Issues 43 (1), 138–152. https://doi.org/10.1007/s10834-021-09767-3.

Xiao, J.J., Yan, C., Bialowolski, P., Porto, N., 2021. Consumer debt holding, income and happiness: Evidence from China. Int. J. Bank Mark. 39 (5), 789–809. https://doi.org/10.1108/IJBM-08-2020-0422.

Xiao, J.J., Yao, R., 2022. Good debt, bad debt: family debt portfolios and financial burdens. Int. J. Bank Mark. 40 (4), 659–678. https://doi.org/10.1108/IJBM-06-2021-0243.