The psychological inventory of financial scarcity (PIFS) a psychometric evaluation

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The Psychological Inventory of Financial Scarcity (PIFS): A psychometric evaluation

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A R T I C L E   I N F O

A B S T R A C T

In nine studies (total $N = 12{,}249$), we evaluated the psychometric properties of the Psychological Inventory of Financial Scarcity (PIFS). The PIFS assesses experienced financial scarcity and captures four aspects of this subjective experience: an appraisal of insufficient financial resources, an appraisal of lack of control over one's financial situation, financial rumination and worry, and a short-term focus. Results showed that the PIFS has a good internal consistency (Studies 1-5) and a good test-retest reliability (Study 6). Factor analyses indicated that, as intended, the PIFS can be used both as a one-factor scale and a four-factor scale (Studies 1-5). The predictive and concurrent validity of the PIFS was supported by expected relations with executive functioning (Studies 7-8). Furthermore, results showed that scores on the PIFS explain variance in psychological well-being (mental health, self-esteem, and life satisfaction) over and above personality traits and demographic variables (including income) and mediate the relationship between financial problems and psychological well-being (Study 9). Together, our evaluation indicates that the PIFS is a reliable and valid measure of experienced financial scarcity, and a helpful instrument to study the impact of financial hardship on people's lives.

1. Introduction

Having fewer financial resources than needed greatly affects people's lives. When money is scarce, the impact is not only financial, but it also yields psychological consequences. Financial scarcity impedes executive functions (Mani et al., 2013), increases depression and anxiety (Fitch et al., 2011; Richardson et al., 2013; Sweet et al., 2013), and evokes over-borrowing, discounting of future payoffs, and financial avoidance – all consequences that can lead to "poverty traps" (Haushofer & Fehr, 2014; Hilbert et al., 2022a; Hilbert et al., 2022b; Shah et al., 2012, 2019). These affective and cognitive effects of financial scarcity depend not only on the financial situation per se. They are also elicited, at least in part, by the subjective perception of the situation. In the current research, we introduce the Psychological Inventory of Financial Scarcity (PIFS), a self-rating scale of subjective perceptions of one's financial situation and affective and cognitive responses to these appraisals.

In our approach, we combine a psychological stress framework (e.g., Cundiff et al., 2020) with the 'attentional focus and neglect' theory of scarcity (Mullainathan & Shafir, 2013). In the former framework, the focus lies on perceived threats and demands without adequate resources to cope, as well as on affective and cognitive responses to this stress. The latter theory posits that when resources are scarce, (potential) problems loom larger and seize attention, and because of the greater engagement in trying to solve these problems, scarcity leads to neglect of (potential) other problems. We argue that both these two lines of research are important to consider and conceptualise the experience of financial scarcity as a situation in which pressing financial concerns are appraised as exceeding available resources, that, in turn, evoke affective and cognitive responses that typify attentional narrowing and neglect.

Based on our conceptualisation, we included self-assessments of four components in the PIFS. The first concerns an appraisal of shortage of money (a perceived threat) and the second an appraisal of lack of control over one's financial situation (a perceived inability to adequately deal

with the perceived threat). The inclusion of these appraisals is consistent with psychological stress research showing that a situation appraised as a strain on financial resources predicts psychological symptoms, such as anxiety and depression (e.g., Folkman et al., 1986), and studies showing that a perceived lack of coping ability increases experienced financial threat (e.g., Marjanovic et al., 2013). As a third component, we included financial rumination – preoccupations with financial scarcity, like intrusive thoughts about pressing financial needs – and financial worrying – repeated, negative thinking about the uncertainty of a (future) financial situation (De Bruijn & Antonides, 2020; Johar et al., 2015; Shah et al., 2012, 2018). The relevance of this component for experienced financial scarcity is corroborated by findings showing that low-income individuals ruminate and worry more about their finances than those with higher incomes (Johar et al., 2015). In a (potentially) harmful situation, the 'attentional focus and neglect' mindset is often accompanied by a heightened engagement with short-term goals at the expense of more distant ones (Frankenhuis & Nettle, 2020; Mullainathan & Shafir, 2013). Thus, as a fourth component of the PIFS, we included short-term focus. The relevance of this component is corroborated by findings showing that poverty or indebtedness leads to the tendency to give more weight to payoffs that are closer in time, and subsequently, induces a focus on these more immediate payoffs (Haushofer & Fehr, 2014; Hilbert et al., 2022b; Shah et al., 2012).

Other scales have assessed negative subjective states in the financial domain, such as financial distress (Heo et al., 2020; Netemeyer et al., 2018), financial threat (Marjanovic et al., 2013), financial worry and rumination (De Bruijn & Antonides, 2020), or financial anxiety (Archuleta et al., 2013; Shapiro & Burchell, 2012). But the PIFS is the first measure to combine stress appraisals with responses to these appraisals in a financial context, thus providing a more encompassing assessment of the subjective experience of financial scarcity.

1.1. Overview of studies[1]

With a series of nine studies, we provide a psychometric evaluation of the PIFS. These studies include eight different samples with a total of 12,249 respondents. In Studies 1-4, we conduct principal components analyses and exploratory factor analyses, which are followed by a confirmatory factor analysis in Study 5 to establish the structure of the inventory and its four sub-components. In these five studies, we also examine the internal consistency of the PIFS, and how it relates to respondents' gender, age, education, and income. In Study 6, we examine the temporal stability of the PIFS over an eight-month period. In the next two studies, we validate the PIFS by relating it to executive functioning (Studies 7 and 8) – a psychological processes that have been linked to financial scarcity. Last, in Study 9, we examine the relation of the PIFS with financial problems, personality traits, and psychological well-being, and test whether scores on the PIFS explain variance in psychological well-being, over and above personality traits and demographic variables such as gender, education, age, and income. Moreover, we test whether PIFS scores mediate the relationship between financial problems and psychological well-being.

2. Studies 1-4: exploratory factor analyses

As a first examination of the underlying structure of the 12-item PIFS (for items, see Table 1), we conducted principal components analyses and exploratory factor analyses. Our methodological approach was the same in each of the four studies, but each time we included a different, existing dataset. First, we conducted a Principal Components Analysis (PCA), to help determine the number of factors that underlie the 12 PIFS items. Next, we conducted an Exploratory Factor Analysis (EFA) with

direct oblimin rotation and maximum likelihood as extraction method (with extract criterion set at eigenvalues greater than 1) to establish the PIFS structure further.

To examine the relation between the PIFS and gender, age, education, and income, we compared for each of the four datasets, the mean PIFS score of female and male respondents, and calculated correlations between this score and respondents' age, education, and income. In addition, we conducted regression analyses with the PIFS as dependent variable and the four demographic variables as predictors.

2.1. Method

2.1.1. Study 1

Respondents were 4,901 students (67% female; 33% male; 0.2% indicated other; and 0.8% preferred not to indicate their gender) of different Dutch universities of applied sciences (higher professional education). Mean age was 22.3 years ($SD = 4.6$, range = 16-69); most students (95%) were between 16 and 30 years old. There were 97 missing values for age. Data were collected by the University of Applied Sciences Utrecht.[2]

2.1.2. Study 2

Respondents were 1,129 self-employed Dutch entrepreneurs (48% female). Mean age was 53.2 years ($SD = 11.3$; range 22-90); median education category was "high" (highest of three categories); and median income category was "€33,500-€40,000" (yearly, before taxes; fourth of seven categories). There were 303 missing values for income. Data were collected by the National Institute for Family Finance Information (Nibud).

2.1.3. Study 3

Respondents were 1,559 Dutch members (51% female) of the Survey Sampling International (SSI) online panel. Mean age was 42.3 years ($SD = 13.6$; range 18-68); median education category was "senior secondary vocational education" (fifth of eight categories); and median income category was "€1,500-€2,000" (monthly, after taxes; third of nine categories). There were 7 missing values for age and 246 for income. Data were collected by Nibud.

2.1.4. Study 4

Respondents were 1,122 members (55% female) of the Longitudinal Internet Studies for the Social Sciences (LISS) panel. This panel consists of approximately 7,500 members from 5,000 different households. Households included in the panel are a true probability sample of Dutch households drawn from the population register.[3] Mean age of the respondents was 53.0 years ($SD = 17.8$; range 18-92); median education category was "intermediate vocational education" (fourth of six categories); Median net monthly income was 1,916 euros ($M = 2,258$, $SD = 7,222$).[4] There was 1 missing value for education, there were 97 missing values for income and 7 for the PIFS. Data were collected by CentERdata.

2.1.5. Studies 1-4

In each data collection, the PIFS was included as a 12-item measure that assesses appraisals of insufficient financial resources (three items) and lack of control over one's financial situation (three items), in addition to responses of financial rumination and worry (three items), and a short-term focus on one's finances (three items; see Table 1, for the

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[1] Data and analysis scripts of the studies are available on the Open Science Framework (https://osf.io/yzn2e/).

[2] The dataset was part of a study by Van der Veer et al. (2019).

[3] For more information, see https://www.lissdata.nl/about-panel.

[4] The LISS panel measures net monthly household income in euros. Since the needs of a household grow with each additional member, we corrected for household size. To consider economies of scales, we adjusted household income by dividing it by the square root of household size, according to OECD guidelines (OECD, 2013).

Table 1
Items, Factor Loadings, Communalities, Eigenvalues, and Explained Variance of the Exploratory Factor Analyses for Studies 1-4.

ITEM (1-12) / FACTORS (1, 2) / INITIAL COMMUNALITIES (C)	STUDY 1			STUDY 2			STUDY 3			STUDY 4	
	1	2	C	1	2	C	1	2	C	1	C
1. I often don't have enough money.	.71	.07	.57	.54	.38	.65	.88	-.03	.73	.79	.62
2. I am often not able to pay my bills on time.	.50	.25	.49	.34	.53	.55	.64	.29	.56	.73	.53
3. I often don't have money to pay for the things that I really need.	.70	.09	.58	.57	.33	.61	.84	.04	.71	.77	.59
4 I experience little control over my financial situation.	.17	.68	.57	.69	.08	.56	.67	.22	.57	.76	.57
5. I think I am (not) able to manage my finances properly.	.01	.72	.46	.32	.15	.23	.15	.37	.26	.51	.26
6. When I think about my financial situation, I feel powerless.	.53	.34	.60	.83	.03	.70	.84	-.01	.70	.83	.70
7. I am constantly wondering whether I have enough money.	.88	-.08	.63	.92	-.12	.66	.93	-.24	.74	.83	.69
8. I have a hard time thinking about things other than my financial situation.	.79	-.03	.57	.79	-.02	.58	.80	-.03	.62	.76	.57
9. I often worry about money.	.87	-.08	.64	.93	-.16	.64	.91	-.28	.71	.83	.70
10. I am only focusing on what I have to pay at this moment rather than my future expenses.	.22	.46	.41	.30	.47	.44	.50	.37	.45	.59	.35
11. I (don't) take future expenses into account.	-.11	.65	.30	-.03	.44	.18	-.07	.44	.22	.45	.20
12. Because of my financial situation, I live from day to day.	.31	.49	.53	.57	.31	.60	.66	.25	.56	.78	.61
INITIAL EIGENVALUES (PRINCIPAL COMPONENTS ANALYSIS)	6.28	1.26		6.65	1.11		6.60	1.47		6.83	
EXPLAINED VARIANCE PER FACTOR (%)	52.3	10.5		55.4	9.2		55.0	12.2		56.9	

Note. The positive wordings of Items 5 and 11 were used in Studies 1 and 2, the negative wordings in the other studies.

12 items). Items were formulated as statements, and respondents were asked to what extent they agreed with these statements on 5-point scales (Studies 1-3) or 7-point scales (Study 4), with endpoints labelled "strongly disagree" (left) and "strongly agree" (right). Studies 1-3 included two reverse-scored items (Items 5 and 11). These items were reformulated in Study 4, and thereby reverse-scoring was no longer needed (see Table 1).

2.2. Results studies 1-3

In Studies 1-3, results of the PCA yielded a first component with an eigenvalue that ranged from 6.28 to 6.65, and a second component with an eigenvalue that ranged from 1.11 to 1.47. Examination of the Kaiser-Meyer Olkin measure of sampling adequacy suggested that the three datasets were factorable (KMO_{study1} = .929; KMO_{study2} = .948; KMO_{study3} = .936). In each study, results of the EFA indicated a two-factor solution, whereby the two factors were correlated (Study 1: r = .64; Study 2: r = .61; Study 3: r = .26). The first factor explained more than 50% of the variance, whereas the second factor explained about 10% (see Table 1).

A reliability analysis indicated that the PIFS has a good internal consistency. Corrected item-total correlations ranged from .09 to .81, and from .58 to .81 when both reverse-scored items were excluded. Cronbach's α was .92 in all three studies (see Table 2).

In Study 1, independent t-tests showed that female students (M = 2.19, SD = 0.78) on average scored higher on the PIFS than male students (M = 2.08, SD = 0.79), $t(4849)$ = 4.77, $p < .001$. In Studies 2 and 3, no gender differences were found for the mean PIFS (t-values < 1). Next, we conducted correlation analyses and multiple linear regressions to estimate the relationship between the PIFS and gender, age, education, and income. Because the (student) sample of Study 1 varied little in these demographics, meaningful analyses for these variables were not feasible. Therefore, we only conducted these analyses for Studies 2 and 3. Results of the correlation analyses showed that age, education, and income were negatively related with the PIFS. Furthermore, results of the regression analyses showed that in both studies the PIFS was negatively related with income. In Study 2, the PIFS was negatively associated with age, whereas in Study 3, it was negatively associated with education.

2.3. Results study 4

Findings of Studies 1-3 indicated that most PIFS items loaded on the first extracted factor, and a few on the second, smaller factor. To examine whether the extraction of the second factor might be due to the inclusion of two reverse-scored items, we reformulated these items such that reverse-scoring was not needed (see Table 1, for the two reworded items).

In Study 4, we examined the factor structure of the PIFS in which the two adjusted items were included. The PCA yielded only one component with an eigenvalue greater than 1 (eigenvalue = 6.83). Examination of the Kaiser-Meyer Olkin measure of sampling adequacy in the EFA suggested that the dataset was factorable, KMO = .941. Results of the EFA indicated a one-factor solution, which explained 56.9% of the variance (see Table 1). Corrected Item-total correlations ranged from .46 to .80, and Cronbach's α was .93. These results indicate a good internal consistency (see Table 2) and confirmed that a one-factor solution sufficed once the reverse-coded items were reformulated.

To further examine the factor structure of the PIFS, we conducted a Parallel Analysis (Cota et al., 1993; Horn, 1965) on the data of Study 4. Parallel Analysis (PA) is based on random data simulation to determine the number of factors to retain in PCA and EFA. Using the Monte Carlo simulation technique, a random simulated (artificial) data set is generated besides the actual (real) data set and the estimated eigenvalues are calculated and then compared to one another. In PA, the number of factors to retain is determined by the number of factors that have an eigenvalue in the simulative sample that is higher than that of the actual data is. Whereas the scree plot of both the PCA and EFA suggested one factor, results of the PA indicated that the number of factors to retain is four.[5]

Female and male respondents did not differ in mean PIFS scores ($t < 1$). As in Studies 1-3, results of the correlation analyses showed that the PIFS correlated negatively with age, education, and income. Results of the regression analyses showed that the PIFS was negatively associated with age and education but was not related with income (see Table 3).

2.4. Discussion studies 1-4

Results of the principal components analyses and exploratory factor analyses of four different datasets suggest that the 12 items of the PIFS measure a unidimensional construct and that the scale has a good internal consistency reliability. Results of a Parallel Analysis, however, suggest that four different factors might underlie the PIFS. In Study 5, we address this issue further and conduct a confirmatory factor analysis to test whether the data of a new and larger dataset fits a one-factor structure, a four-factor structure, or both structures. Moreover, results showed that the PIFS was negatively related with demographic variables of age, education, and income. These findings resonate with previous research. For example, the negative relation between age and the PIFS is consistent with studies showing that younger age is accompanied by

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[5] A figure with the scree plots of the PA is available at the Open Science Framework page (https://osf.io/yzn2e/).

Table 2

Means, Standard Deviations, Corrected Item-Total Correlations (ITC) of the PIFS Items and Cronbach's Alpha for the PIFS per Study.

Item	Study 1			Study 2			Study 3			Study 4		
	M	SD	ITC	M	SD	ITC	M	SD	ITC	M	SD	ITC
1.	2.75	1.19	.70	1.97	1.20	.78	2.73	1.17	.81	2.34	1.71	.74
2.	1.76	0.94	.67	1.54	0.94	.70	2.12	1.04	.72	1.55	1.16	.71
3.	2.05	1.07	.71	1.86	1.12	.76	2.51	1.15	.81	1.80	1.41	.73
4.	2.02	1.06	.69	2.00	1.18	.72	2.39	1.03	.72	1.86	1.42	.73
5.	1.82	0.94	.57	1.84	0.95	.43	2.23	0.89	.29	1.81	1.48	.51
6.	1.98	1.10	.74	1.96	1.17	.81	2.59	1.14	.80	1.85	1.46	.80
7.	2.71	1.28	.72	2.20	1.27	.77	2.76	1.16	.78	2.25	1.67	.78
8.	1.91	1.01	.68	1.78	1.06	.72	2.40	1.08	.75	1.81	1.34	.72
9.	2.55	1.23	.71	2.39	1.29	.74	2.91	1.18	.75	2.27	1.64	.78
10.	2.31	1.19	.58	2.13	1.22	.63	2.51	1.07	.61	2.22	1.66	.59
11.	1.95	1.03	.43	1.84	0.98	.30	2.35	0.94	.09	1.97	1.53	.46
12.	2.06	1.08	.70	2.08	1.24	.76	2.55	1.10	.71	1.84	1.43	.77
Total	2.16	0.79		1.96	0.84		2.50	0.78		1.96	1.12	
Cronbach's -α		.92		.92			.92			.93		

Table 3

Correlations and Standardized Regression Weights for Estimating the Relationships Between the PIFS and Gender, Age, Education, and Income for Studies 2-4.

	Study 2		Study 3		Study 4	
	r_s	β	r_s	β	r_s	β
Gender	.04	-.06	-.02	-.04	-.02	-.03
Age	-.15**	-.11**	-.06*	-.05	-.17**	-.19**
Education	-.09**	-.06	-.16**	-.11**	-.08**	-.15**
Income	-.41**	-.39**	-.32**	-.30**	-.32**	-.05

Note. First entries are Spearman's rank correlation coefficients (Spearman's ρ). Second entries are standardized betas. ** $p < .01$. * $p < .05$.

higher debts and more money-management stress (Drentea, 2000; Netemeyer et al., 2018). Furthermore, the obtained negative relation between income and the PIFS aligns with research that reports a negative relationship between income and financial worries (De Bruijn & Antonides, 2020; Johar et al., 2015). Finally, the absence of a reliable difference in PIFS scores between female and male respondents is consistent with research that has found that men and women do not differ in money-management stress (Netemeyer et al., 2018).

3. Study 5: confirmatory factor analysis

As next step in the examination of the underlying structure of the PIFS, we conducted a confirmatory factor analysis. This analysis borrows many of the same concepts from exploratory factor analysis except that instead of deriving the factor structure from the data, the factor structure is pre-determined and is fitted to the data. In Study 5, we compare two different models; a one-factor model encompassing all 12 PIFS items and a four-factor model that differentiated between each of the four sub-components.

3.1. Method

Respondents were 2,567 Dutch members (51.1% female) of the Survey Sampling International (SSI) online panel.[6] Mean age was 49.5 years ($SD = 14.9$; range 18-74); median education category was "senior secondary vocational education" (fourth highest of seven categories); and median income category was "€2,250-€2,500" (monthly, after taxes; ninth of eighteen categories). There were 475 missing values for income. Data collection of the PIFS was part of a larger survey conducted by Nibud. The 12 PIFS items could be answered on 5-point scales and were the same items as included in Study 4 (see Table 1).

[6] SSI is now part of Dynata. For more information, see https://www.dynata.com.

A Confirmatory Factor Analysis (CFA) was conducted with the Lavaan package (version 0.6-8; Rosseel, 2012) of Rsoftware (version 4.03) and using a covariance matrix with ML estimation. Results of the two models were compared; the one-factor model included all 12 PIFS items (PIFS$_{Total}$); and the four-factor model included items 1-3 (Factor 1: Shortage of Money; PIFS$_{SoM}$), items 4-6 (Factor 2: Lack of Control; PIFS$_{LoC}$), items 7-9 (Factor 3: Rumination and Worry; PIFS$_{RW}$), and items 10-12 (Factor 4: Short-Term Focus; PIFS$_{STF}$). The four-factor model allowed for intercorrelations.

3.2. Results and discussion

Results as reported conform to recommendations by Jackson and colleagues (2009). The χ^2-value expresses how similar the model-implied covariance matrix and the observed covariance matrix are. Higher values indicate stronger deviations of the observed from the implied covariance matrix. Note that for large sample sizes (as the current one), Chi-square statistics are typically significant and in themselves do not reliably indicate the model fit. We therefore also report the Comparative Fit Index (CFI), a measure of the fit of a hypothetical model in relation to a more restricted (i.e., nested) baseline model (for which covariance is set to zero), and the Standardized Root Mean Square Residual (SRMR), which denotes the average discrepancy between the observed covariance matrix and the model-implied covariance matrix. According to Hu and Bentler (1999), threshold values indicating good model fit are > .95 for CFI, and < .11 for SRMR. Note though, that others have warned against a strict application of such thresholds (Heene et al., 2011) because they are affected by sample size or factor loadings. Hence, we report several fit measures to provide a more complete assessment (cf. Jackson et al., 2009). Additionally, we report the range of factor loadings for each model, with ranges of 0.50-0.67 indicating medium loadings, and > 0.70 high loadings (Heene et al., 2011).

The one-factor model ($\chi^2[54] = 2395, p < .001$) had a CFI of .91, and an SRMR of .05. Factor loadings ranged from 0.66 to 0.96. The statistics for the four-factor model indicated the best fit ($\chi^2[48] = 1093, p < .001$), with a CFI of .96, and an SRMR of .03, and factor loadings that ranged from 0.75 to 1.04. Thus, both models showed adequate factor loadings and fit statistics. An additional ANOVA Chi-Squared Difference Test confirmed that the four-factor model had a statistically significant better fit than the one-factor model (χ^2 dif [1] = 327.00, $p < .001$).

Overall, results of the first 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. In the next five studies, we tested the temporal stability of the PIFS and its concurrent and predictive validity. In these studies, we conducted the relevant analyses separately for the total scale (PIFS$_{total}$) and its four sub-components (PIFS$_{SoM}$; PIFS$_{LoC}$; PIFS$_{RW}$; PIFS$_{STF}$).

4. Study 6: temporal stability

In Study 6, we examined the temporal stability of the PIFS by calculating test-retest reliabilities for six measurements over an eight-month period (July 2016 to February 2017).

4.1. Method

Respondents were 470 participants (79.8% female) in a longitudinal study on savings conducted by Nibud.[7] Mean age was 43.1 years ($SD = 12.0$; range 18-79) and median income category was "€2000-€2500" (monthly, after taxes; fourth of twelve categories). During the test period, respondents completed the PIFS six times: July ($n = 470$), August ($n = 419$), September ($n = 178$), October ($n = 365$), November ($n = 353$), and February ($n = 259$).[8] There were 104 participants who completed all six assessments. The PIFS included the same 12 items as in Studies 1-3 (for Cronbach's α's, see Tables 4a and 4b).

4.2. Results and discussion

To establish whether the number of participants who completed all six assessments ($n = 104$) was sufficient for the reliability analysis, we calculated the required sample size for an expected ICC of .75 with a minimum acceptable ICC of .65 for a one-sided significance test at an α-level of .95 and a power level of $\beta = .80$ (Walter et al., 1998).[9] The required sample size was 76 and our sample size was therefore sufficient to proceed with the reliability analysis. The test-retest reliability was calculated with the intraclass correlation coefficient (ICC[3,1]) using the two-way mixed-effects model based on single measures ($k = 6$) and absolute agreement (Shrout & Fleiss, 1979). According to Koo and Li's (2016) rule of thumb, ICC values between .50 and .75 indicate moderate, and values between .75 and .90 indicate good reliability.

Results indicated that in most cases the test-retest reliability of the PIFS was good, and that it was somewhat higher for the total PIFS than for each of its four sub-components. Overall, rank order correlation coefficients (Spearman's ρ) for two measurements ranged from .56 to .89 (i.e., shared variance of 31% to 79%) and the intraclass correlation

Table 4a
Correlations between Measurements and Intraclass Correlation Coefficient (ICC) for the Six Repeated Assessments of the Total PIFS Scores.

| | PIFS$_{Total}$ | | | | |
	2	3	4	5	6
1 July	.84	.81	.75	.78	.78
1 August		.86	.80	.80	.82
1 September			.89	.85	.86
1 October				.82	.81
1 November					.87
1 February					–
ICC					.86

Note. Entries for TEST-RETEST RELIABILITIES are Spearman's rank correlation coefficients (Spearman's ρ). All correlation coefficients were statistically significant at $p < .001$. In the different months of the test period, means ranged from 1.80 to 1.94; standard deviations ranged from 0.63 to 0.69; and Cronbach's αs ranged from .89 to .92.

coefficient (ICC) for the six measurements ranged from .70 to .86 (see Tables 4a and 4b).

Results indicated that the 12-item PIFS – as one-factor scale and as four-factor scale – is a temporally stable measure, and thereby support the reliability of the PIFS. The calculated test-retest reliabilities were obtained for an eight-month period. The temporal stability of the PIFS will probably be lower when these reliabilities are calculated over a longer period, when financial changes – for better or worse – are more likely to happen. In our view, this would lend further support to the validity of the PIFS, as the scale is intended to pick up on changes in financial circumstances.

5. Studies 7-8: relationship with executive functions

In Studies 7-8, we test the concurrent validity of the PIFS by examining its relationship with executive functions – top-down cognitive control processes from which higher mental processes are built (e.g., reasoning, problem solving, and planning). These processes are essential for goal-directed behaviour and many important aspects of life, such as mental health, close relationships, and quality of life (Diamond, 2013). Scholars have posited that financial scarcity has a negative impact on cognitive control processes (Krosch & Amodio, 2019; Mani et al., 2013; Schilbach et al., 2016; Shah et al., 2012; but see also Carvalho et al., 2016; Sheehy-Skeffington, 2020; Wicherts & Zand Scholten, 2013). In short, it is argued that when money is scarce, preoccupations with pressing financial concerns consume cognitive resources, and thereby impede executive functions. Within this theoretical framework, experienced financial scarcity, that is, the perceived shortage of money and lack of control, ruminations and worries, and a short-term focus, would be negatively related with executive abilities. Thus, to support the concurrent validity of the PIFS, we should find a significant negative correlation between scores on the PIFS and a measure of executive functions.

5.1. Method

Respondents of Study 7 were 300 US members (51.9% female) of the Prolific participant pool.[10] Mean age was 34.0 years ($SD = 12.0$; range 18-78) and median income category was "$30,000-$39,999" (yearly, after taxes; fourth of twelve categories); level of education was not assessed. Three respondents indicated 'other' on the gender question and two indicated that they preferred not to indicate their gender. In the analyses, these responses were coded as missing values.

Respondents of Study 8 were 201 UK members (49.8% female) of the Prolific participant pool. Mean age was 33.9 years ($SD = 13.1$; range 18-80); median education category was "higher education" (fourth of six categories); Median net yearly income was £8,660 ($M = 13,703$, $SD = 14,456$).[11] There were 3 missing values for education and 22 for income.

In both studies, the PIFS included the same 12 items as in Study 5 (response scales ranged from 1 to 7). Due to an oversight, one item needed to be reverse scored in Study 8 (Item 11, see Table 1). Means, standard deviations, and Cronbach's α's for the total PIFS and its four sub-components are displayed in Table 5.

5.1.1. Executive functions

Executive functions were measured with the Amsterdam Executive Function Inventory (AEFI), a validated 13-item self-rating scale that assesses three core executive abilities: selecting and sustaining attention (Attention), initiating and planning of behaviour (Planning and Initiative), and working memory and not acting impulsively or prematurely

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[7] The study included an experimental manipulation in which respondents received different feedback on their savings. This manipulation had no effect on PIFS scores and therefore we combined the (three) conditions for the current analyses. For more details on the study, see Van der Werf et al. (2019).

[8] The number of observations in September was reduced due to a technical error. In consequence for about half of the respondents, their responses on the PIFS items were not recorded. Over time, participation in the study decreased, and thereby also the number of observations for the PIFS.

[9] Calculator: https://ptenklooster.nl/psychometric-sample-size-calculators/icc-reliability-hypothesis-testing-2/

[10] www.prolific.co.uk

[11] Income was corrected for household size. To consider economies of scales, we adjusted household income by dividing it by the square root of household size, according to OECD guidelines (OECD, 2013).

Table 4b

Correlations between Measurements and Intraclass Correlation Coefficient (ICC) for the Six Repeated Assessments of each of the four sub-components of the PIFS.

	PIFS_SoM					PIFS_LoC					PIFS_RW					PIFS_STF				
	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6	2	3	4	5	6
1 July	.69	.71	.65	.63	.58	.72	.72	.59	.70	.66	.72	.74	.67	.70	.75	.64	.66	.59	.56	.57
1 August		.76	.70	.69	.64		.72	.61	.65	.71		.75	.72	.71	.71		.67	.64	.61	.63
1 September			.78	.76	.73			.74	.76	.70			.81	.81	.83			.74	.71	.75
1 October				.69	.69				.65	.62				.77	.76				.66	.61
1 November					.74					.74					.79					.65
1 February					–					–					–					–
ICC					.77					.77					.79					.70

Note. Entries for TEST-RETEST RELIABILITIES are Spearman's rank correlation coefficients (Spearman's ρ). All correlation coefficients were statistically significant at $p < .001$. In the different months of the test period, means ranged from 1.57 to 1.70 (PIFS_SoM), 1.83 to 1.94 (PIFS_LoC), 2.11 to 2.35 (PIFS_RW), and 1.67 to 1.85 (PIFS_STF); standard deviations ranged from 0.72 to 0.77 (PIFS_SoM), 0.71 to 0.78 (PIFS_LoC), 0.91 to 0.97 (PIFS_RW), and 0.61 to 0.76 (PIFS_STF); and Cronbach's α's ranged from .80 to .86 (PIFS_SoM), .67 to .80 (PIFS_LoC), .82 to .90 (PIFS_RW), and .54 to .70 (PIFS_STF). PIFS_SoM: Shortage of Money; PIFS_LoC: Lack of Control; PIFS_RW: Rumination and Worry; PIFS_STF: Short-Term Focus.

Table 5

CORRELATIONS AND STANDARDIZED REGRESSION WEIGHTS FOR ESTIMATING THE RELATIONSHIPS BETWEEN THE PIFS AND each of the Three AEFI-subscales, and MEAN, STANDARD DEVIATION, AND CRONBACH'S α FOR EACH SUBSCALE, AND ITS ASSOCIATION WITH THE PIFS (STUDY 7 AND STUDY 8).

Execution Function	PIFS_Total		PIFS_SoM		PIFS_LoC		PIFS_RW		PIFS_STF	
	r_s	β	r_s	β	r_s	β	r_s	β	r_s	β
Attention (Study 7)	-.30**	-.33***	-.22**	-.25***	-.29**	-.30***	-.29**	-.30***	-.24**	-.25***
Attention (Study 8)	-.36**	-.34***	-.31**	-.25***	-.37**	-.35***	-.37**	-.35***	-.22**	-.19*
Planning/Initiative (Study 7)	-.15**	-.10	-.10	-.05	-.22**	-.17**	-.06	-.04	-.15**	-.09
Planning/Initiative (Study 8)	-.19**	-.17*	-.11	-.07	-.23**	-.20*	-.16*	-.14	-.20**	-.20*
Self-control/Self-monitoring (Study 7)	-.36**	-.39***	-.29**	-.36***	-.33**	-.34***	-.33**	-.34***	-.27**	-.26***
Self-control/Self-monitoring (Study 8)	-.31**	-.33***	-.26**	-.25***	-.35**	-.37***	-.31**	-.32***	-.16**	-.15
Study	7	8	7	8	7	8	7	8	7	8
M	3.62	3.37	3.49	3.07	3.51	3.30	4.18	3.91	3.30	3.22
(SD)	(1.35)	(1.38)	(1.66)	(1.62)	(1.55)	(1.55)	(1.56)	(1.67)	(1.47)	(1.36)
α	.93	.93	.87	.86	.83	.82	.83	.85	.76	.69

Note. r_s = Spearman's rank correlation coefficient (Spearman's ρ); β = standardized beta (controlled for age, education, and income). Higher scores indicate better executive abilities. * $p < .05$, ** $p < .01$ with Holm-Bonferroni correction. *** $p < .001$, with Holm-Bonferroni correction. Degrees of freedom (total) for the regression analyses were 294 (Study 7) and 172 (Study 8).

(Self-Control and Self-Monitoring; Van der Elst et al., 2012; for items, see Appendix). Responses were averaged per AEFI-subscale to yield a separate index score for each of the three subscales that could range from 1 to 3: Attention (Study 7: $M = 2.14$, $SD = 0.60$, α =.78; Study 8: $M = 2.04$, $SD = 0.60$, α = .80), Planning and Initiative (Study 7: $M = 2.31$, $SD = 0.43$, α = .65; Study 8: $M = 2.26$, $SD = 0.41$, α = .62), and Self-Control and Self-Monitoring (Study 7: $M = 2.39$, $SD = 0.49$, α = .71; Study 8: $M = 2.25$, $SD = 0.50$, α = .72). Higher scores were indicative for better executive abilities.

5.2. Results and discussion

Results showed that in both studies the total PIFS and its four sub-components were negatively associated with the three AEFI subscales that measured executive functions of Attention, Planning and Initiative, and Self-Control and Self-Monitoring (see Table 5). Next, for both Study 7 and Study 8, separate regression analyses (OLS, method enter) were conducted for each of the three AEFI-subscales (with Holm-Bonferroni corrections applied to each set of three tests). In these analyses, the AEFI-subscale was the dependent variable and the PIFS or one of its four sub-components was the predictor variable. In each analysis, age, education, and income were included as control variables. Results of these regression analyses were very similar to the obtained Spearman's correlations in the first series of analyses.[12,13] It should be noted that for the AEFI-subscale Planning and Initiative not all relations were statistically significant in both samples. Moreover, the relations of this subscale with the PIFS were weaker than those for the subscale Attention and the subscale Self-Control and Self-Monitoring. Overall, these findings are in line with studies that have shown that financial scarcity has a negative impact on cognitive control processes (Krosch & Amodio, 2019; Mani et al., 2013; Schilbach et al., 2016, and thereby support the concurrent validity of the PIFS.

6. Study 9: relationships with financial problems, personality traits, and psychological well-being

In Study 9, we provide additional (unique and concurrent) validity tests of the PIFS by examining its relations with financial problems, personality traits, and psychological well-being. Based on previous research, the PIFS should be significantly related with these three variables. For example, it has been shown that when a financial situation worsens, perceived financial threat increases (Marjanovic et al., 2013). Studies also have shown that personality is related to various aspects of stress (Carver & Connor-Smith, 2010; Vollrath, 2001). More specifically,

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[12] Education was not assessed in Study 7, and therefore only included in the analyses of Study 8.

[13] In Study 7, we used the endpoint of the household income category (in US Dollars) in the analyses. In Study 8, we used in the analyses, the category midpoints and calculated adjusted net yearly household income (in British Pound Sterling) by dividing household income by the square root of household size.

conscientiousness has been negatively associated with stress exposure, whereas extraversion, conscientiousness, emotional stability, and intellect/imagination have been shown to lower the likelihood of threat appraisals and enhance perceived stress-coping abilities (Bolger & Zuckerman, 1995; Gunthert et al., 1999; Penley & Tomaka, 2002; Suls & Martin, 2005; Vollrath, 2001). Furthermore, financial adversities have been found to contribute to a broad array of negative psychosocial outcomes (e.g., Brown et al., 2005; Fitch et al., 2011; Richardson et al., 2013; Sweet et al., 2013).

These validity tests were conducted in three lines of investigation. First, we examined the direct relations of the PIFS with financial problems, personality, and psychological well-being. Second, we investigated whether the PIFS explains variance in psychological well-being that is not accounted for by personality or demographic variables such as gender, education, age, and income. In the third and final line of investigation, we tested whether the PIFS mediates the relationship between financial problems and psychological well-being.

6.1. Method

Respondents were 1,122 LISS panel members.[14] These members complete online questionnaires every month of about 15 to 30 min in total. Part of this time is reserved for the LISS Core study, a longitudinal study that is repeated yearly and is designed to follow changes in the life course and living conditions of the panel members. Respondents completed the PIFS in April 2018 (Cronbach's α = .93; $PIFS_{Total}$: M = 1.96; SD = 1.12; $PIFS_{SoM}$: M = 1,90; SD = 1.24; $PIFS_{LoC}$: M = 1.84; SD = 1.22; $PIFS_{RW}$: M = 2.11; SD = 1.40; $PIFS_{STF}$: M = 2.01; SD = 1.24). In addition to the assessment of the PIFS, we included in the current study, also assessments of financial problems, personality traits, and psychological well-being. We consider financial problems and personality traits as antecedents of experienced financial scarcity, and psychological well-being as a consequence of this experience. Therefore, we included measurements of financial problems and personality traits that were assessed before the PIFS was completed. Whereas we included measurements of psychological well-being that were collected after the PIFS was assessed (see below, for more details.

6.1.1. Financial problems

Financial problems were operationalized by respondents' answers (yes or no) to the question which of six financial issues they were confronted with at that moment. The financial issues concerned: (1) having trouble making ends meet; (2) being unable to quickly replace things that break; (3) having to borrow money for necessary expenditures; (4) running behind in paying rent/mortgage or general utilities; (5) having debt collector/bailiff at the door in the last month; and (6) having received financial support from family or friends in the last month. The number of yes-responses (0-6) were used as an index score for financial problems. Higher scores indicated more financial problems (M = 0.26, SD = 0.69). Data for the included assessment of financial problems were collected in June/July 2017.

6.1.2. Personality traits

Respondents' answers on the 50-item International Personality Item Pool (IPIP) were used as assessments of five personality traits (n = 997).[15] Responses were averaged to yield an index score for each personality trait that could range from 1 to 5. Higher scores indicated a stronger personality trait. The 50-item IPIP includes five 10-item scales: extraversion (M = 3.23, SD = 0.66; α = .87), agreeableness (M = 3.90,

SD = 0.53; α = .83), conscientiousness (M = 3.76, SD = 0.52; α = .77), emotional stability (M = 3.47, SD = 0.72; α = .90), and intellect/imagination (M = 3.49, SD = 0.51; α = .77). Data for the included assessment of personality traits were collected in May/June 2017.

6.1.3. Psychological well-being

6.1.3.1. Mental health. Respondents' answers on the 5-item Mental Health Inventory were used as assessment of mental health (Ware et al., 1996; for items, see Appendix). Responses were averaged to yield an index score for mental health that could range from 1 to 6. Higher scores indicated better mental health (n = 854, M = 4.73, SD = 0.85, α = .88). Data for the included assessments of mental health were collected in November/December 2018.

6.1.3.2. Self-esteem. Respondents' answers on the 10-item Rosenberg's (1965) Self-esteem Scale were used as assessment of self-esteem (for items, see Appendix). Responses were averaged to yield an index score for self-esteem that could range from 1 to 7. Higher scores indicated higher self-esteem (n = 918; M = 5.58, SD = 0.98; α = .90). Data for the included assessments of self-esteem were collected in May/June 2019.[16]

6.1.3.3. Life satisfaction. Respondents' answers on the 5-item Satisfaction with Life Scale were used as an assessment of life satisfaction (Diener et al., 1985; for items, see Appendix). Responses were averaged to yield an index score for life satisfaction that could range from 1 to 7. Higher scores indicated higher life satisfaction (n = 1046, M = 5.08, SD = 1.14, α = .90). Data for the included assessments of life satisfaction were collected in May/June 2018.

6.2. Results and discussion

In the first line of investigation, we calculated correlations between the PIFS (the total PIFS and its four sub-components) and financial problems, the five assessed personality traits, and the three psychological well-being measures. Next, we conducted separate regression analyses (OLS, method enter) for the total PIFS and each of its four sub-components. In these analyses, the PIFS-score was the dependent variable and financial problems, one of the five personality traits, or one of the three psychological well-being measures was the predictor variable. In each of these analyses, age, education, gender, and income were included as control variables. Results of these regression analyses were very similar to the obtained Spearman's correlations in the first series of analyses (see Table 6).

Results showed statistically significant relations between financial problems and the PIFS, which indicate that respondents who encounter more financial problems have a more intense subjective experience of financial scarcity. Results concerning the five assessed personality traits showed statistically significant relations between conscientiousness and emotional stability, and the PIFS. These relations indicate that respondents who are less organized, systematic, and thorough, and those who are more anxious, easily upset, and moody experience more financial scarcity. Furthermore, results showed that the PIFS had statistically significant relations with all three psychological well-being measures. These relations indicate that respondents who experience more financial scarcity are in worse mental health, have lower self-esteem, and are less satisfied with life.

In the second line of investigation, we conducted hierarchical regressions (OLS) with the five assessed personality traits and the PIFS as predictor variables (the total PIFS or one of its four sub-components),

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[14] Respondents were the same 1,122 LISS panel members as were included in Study 4. There were 7 missing values for the PIFS.
[15] The IPIP is a personality inventory that measures the Big Five personality factor markers reported in Goldberg (1992). See https://ipip.ori.org, for a description of the 50 items and the IPIP scoring keys.

[16] We report the results for the self-esteem assessment in 2019, because in 2018 too few respondents (i.e., 101) completed both the PIFS and the self-esteem questionnaire to perform meaningful analyses.

Table 6
Relations of the PIFS with Assessments of Financial Problems, PERSONALITY TRAITS, AND PSYCHOLOGICAL WELL-BEING.

	PIFS$_{Total}$		PIFS$_{SoM}$		PIFS$_{LoC}$		PIFS$_{RW}$		PIFS$_{STF}$	
	r_s	β	r_s	β	r_s	β	r_s	β	r_s	β
Financial Problems	.44*	.49*	.40*	.48*	.37*	.41*	.40*	.46*	.35*	.36*
Extraversion	-.07	-.08	-.04	-.04	-.07	-.08	-.08	-.10*	-.06	-.05
Agreeableness	-.09*	-.03	-.06	-.02	-.07	-.03	-.05	-.01	-.11*	-.05
Conscientiousness	-.26*	-.23*	-.24*	-.20*	-.26*	-.24*	-.21*	-.17*	-.24*	-.21*
Emotional stability	-.33*	-.33*	-.25*	-.24	-.32*	-.32*	-.37*	-.36*	-.22*	-.22*
Intellect/Imagination	-.08	-.05	-.05	-.01	-.06	-.07	-.06	-.06	-.08	-.03
Mental Health	-.40*	-.38*	-.33*	-.29*	-.39*	-.37*	-.40*	-.37*	-.30*	-.28*
Self-esteem	-.33*	-.33*	-.26*	-.24*	-.33*	-.35*	-.33*	-.33*	-.25*	-.22*
Life Satisfaction	-.34*	-.39*	-.29*	-.34*	-.32*	-.35*	-.33*	-.35*	-.28*	-.30*

Note. r_s = Spearman's rank correlation coefficient (Spearman's ρ); β = standardized beta (when controlled for age, education, gender, and income). * $p < .005$.

and mental health, self-esteem, and life satisfaction as criterion variables, respectively. In each regression, the personality traits and control variables (gender, age, education, and income) were entered in the first block of the model, and the PIFS added in the second block. Results showed that for the three psychological well-being measures, the PIFS explained variance over and above the assessed personality traits and control variables. The PIFS accounted for an extra 2% to 4% of the variance in mental health assessed about a month later. Moreover, the PIFS accounted for an extra 1% to 6% in self-esteem assessed about a year later, an extra 5% to 9% in life satisfaction assessed about a month later (see Tables 7a-7c).

In the third and final line of investigation, we test whether the PIFS mediates the relationship between financial problems and psychological well-being. To test this indirect relation, we used Model 4 in PROCESS with 5,000 bootstraps (Hayes, 2017). We conducted the analyses separately for the different assessments of mental health, self-esteem, and life satisfaction. In each of these analyses, the total PIFS or one of its four sub-components was included as a mediator (see Fig. 1).

For all analyses, results showed that financial problems were positively related with the PIFS (path a), which in turn, was negatively related to mental health, self-esteem, and life satisfaction (path b). Importantly, the expected indirect relation via the PIFS (path ab) was significant – as indicated by the 95% confidence intervals (CI, see Tables 8a-8c).

6.3. Summary and discussion

Three lines of investigation further supported the validity of the PIFS. Results of the first line of enquiry showed that the PIFS was related to: (i) financial problems, (ii) personality traits, and (iii) mental health, self-esteem, and life satisfaction. These findings clearly resonate with previous research that has shown that financial threat increases when a financial situation worsens (Marjanovic et al., 2013); that personality traits are related to stress exposure, threat appraisals, and stress-coping abilities (Bolger & Zuckerman, 1995; Carver & Smith, 2010; Gunthert

et al., 1999; Penley & Tomaka, 2002; Suls & Martin, 2005; Vollrath, 2001); and that financial adversities contribute to a broad array of negative psychosocial outcomes (e.g., Brown et al., 2005; Fitch et al., 2011; Richardson et al., 2013; Sweet et al., 2013). The predictive validity of the PIFS was supported by the results of our second line of investigation. These results showed that the PIFS explained variance in mental health, self-esteem, and life satisfaction that was not accounted for by personality traits or demographic variables, such as gender, education, age, and income. This indicates that in addition to personality and demographic variables, including one's income, the experience of financial scarcity – as assessed by the PIFS – is a reliable predictor of psychosocial outcomes.

The importance of the subjective perception of a financial situation, and the accompanying affective and cognitive responses fit well with the 'attentional focus and neglect' theory of scarcity (Mullainathan & Shafir, 2013) and established frameworks of psychological stress (e.g., Blascovich, 2008; Cundiff et al., 2020; Lazarus & Folkman, 1984). Results of our third line of investigation further supported the predictive validity of the PIFS by showing that scores on this scale and its sub-components mediate the relation between financial problems and mental health, self-esteem, and life satisfaction. These findings corroborate the notion that experienced financial scarcity can serve as a pathway between dire financial circumstances (e.g., poverty, debts) and negative psychosocial outcomes (Cundiff et al., 2020; Haushofer & Fehr, 2014). It should be noted that causal inferences cannot be made from our mediation analyses, and further research would be needed to establish the causal ordering of such a pathway.

7. Overall summary and conclusion

The present research provides a psychometric evaluation of the Psychological Inventory of Financial Scarcity (PIFS). The PIFS assesses experienced financial scarcity and captures four aspects of this experience: appraisals of insufficient financial resources and lack of control over one's financial situation, in addition to responses concerning

Table 7a
Hierarchical Regressions of Assessments of Demographics, Personality Traits, and the PIFS on Mental Health ($n = 707$)

CRITERION	PREDICTOR	MODEL 1	PIFS$_{Total}$ MODEL 2	PIFS$_{SoM}$ MODEL 2	PIFS$_{LoC}$ MODEL 2	PIFS$_{RW}$ MODEL 2	PIFS$_{STF}$ MODEL 2
MENTAL HEALTH	GENDER	-.05	-.06	-.06	-.08*	-.07*	-.07*
	AGE	.06	.04	.07*	.06*	.06*	.08*
	EDUCATION	.00	-.02	-.01	-.01	-.01	-.02
	INCOME	-.00	-.01	.01	.01	.01	.01
	EXTRAVERSION	.07*	.07*	.09*	.09*	.08*	.09*
	AGREEABLENESS	.04	.04	.05	.04	.05	.04
	CONSCIENTIOUSNESS	.10*	.07*	.10*	.10*	.10*	.10*
	EMOTIONAL STABILITY	.54*	.48*	.47*	.44*	.44*	.47*
	INTELLECT/IMAGINATION	-.06	-.04	-.03	-.03	-.03	-.03
	PIFS	–	-.20*	-.16*	-.22*	-.22*	-.17*
	ADJUSTED R^2 / R$^2_{CHANGE}$	.33	.03	.02	.04	.04	.02

*$p < .05$

Table 7b

Hierarchical Regressions of Assessments of Demographics, Personality Traits, and the PIFS on Self-esteem ($n = 918$)

Criterion	Predictor	Model 1	PIFS_Total Model 2	PIFS_SoM Model 2	PIFS_LoC Model 2	PIFS_RW Model 2	PIFS_STF Model 2
Self-esteem	Gender	.00	-.01	.00	-.02	.03	-.00
	Age	.08*	.05	.06	.05	-.08*	.07*
	Education	.04	.02	.03	.02	-.01	.03
	Income	-.02	-.03	-.02	-.03	.01	-.02
	Extraversion	.17*	.17*	.17*	.16*	.13*	.17*
	Agreeableness	.05	.05	.05	.05	.02	.04
	Conscientiousness	.11*	.08*	.09*	.08*	.04	.09*
	Emotional Stability	.42*	.36*	.39*	.36*	.31*	.40*
	Intellect/Imagination	.06	.06	.06	.06	-.05	.06
	PIFS	–	-.19*	-.13*	-.22*	-.27*	-.10*
	Adjusted R^2 / R^2_change	.28	.03	.01	.04	.06	.01

*$p < .05$

Table 7c

Hierarchical Regressions of Assessments of Demographics, Personality Traits, and the PIFS on Life Satisfaction ($n = 866$)

Criterion	Predictor	Model 1	PIFS_Total Model 2	PIFS_SoM Model 2	PIFS_LoC Model 2	PIFS_RW Model 2	PIFS_STF Model 2
Life Satisfaction	Gender	.03	.01	.02	.01	.02	.01
	Age	-.08*	-.12*	-.12*	-.11*	-.11*	-.09*
	Education	.01	-.03	-.02	-.01	-.01	-.03
	Income	.03	.02	.02	.02	.02	.02
	Extraversion	.13*	.13*	.13*	.13*	.12*	.13*
	Agreeableness	.02	.03	.03	.02	.03	.02
	Conscientiousness	.10*	.06	.06	.07*	.08	.07
	Emotional Stability	.36*	.28*	.31*	.29*	.28*	.32*
	Intellect/Imagination	-.02	-.02	-.01	-.02	-.03	-.02
	PIFS	–	-.31*	-.28*	-.27*	-.28*	-.23*
	Adjusted R^2 / R^2_change	.17	.09	.07	.06	.07	.05

*$p < .05$
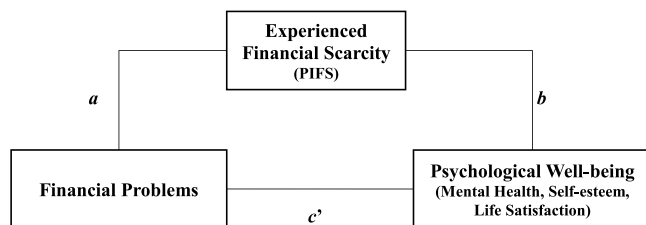
Fig. 1. Mediation Model with Financial Problems as Independent Variable, Psychological Well-Being (Mental Health, Self-esteem, and Life Satisfaction) as Dependent Variable, and the PIFS as Mediator.

Table 8a

Results for the Mediation Model with Financial Problems as Independent Variable, Mental Health as Dependent Variable, and the PIFS as Mediator.

	a	b	c'	ab	95% CI
FP – PIFS_Total – Mental Health	.78	-.27	-.12	-.21	[-.27, -.16]
FP – PIFS_SoM – Mental Health	.85	-.17	-.18	-.15	[-.20, -.10]
FP – PIFS_LoC – Mental Health	.73	-.22	-.16	-.16	[-.21, -.12]
FP – PIFS_RW – Mental Health	.90	-.21	-.14	-.19	[-.24, -.14]
FP – PIFS_STF – Mental Health	.65	-.16	-.22	-.11	[-.15, -.07]

Note. FP = Financial Problems; $N = 854$. Coefficients for *a, b,* and *c'* > .10 are statistically significant ($p < .05$).

Table 8b

Results for the Mediation Model with Financial Problems as Independent Variable, Self-esteem as Dependent Variable, and the PIFS as Mediator.

	a	b	c'	ab	95% CI
FP – PIFS_Total – Self-esteem	.85	-.31	.00	-.26	[-.33, -.20]
FP – PIFS_SoM – Self-esteem	.92	-.20	-.08	-.18	[-.25, -.12]
FP – PIFS_LoC – Self-esteem	.76	-.28	-.05	-.21	[-.27, -.16]
FP – PIFS_RW – Self-esteem	.99	-.24	-.02	-.23	[-.30, -.17]
FP – PIFS_STF – Self-esteem	.73	-.16	-.14	-.12	[-.16, -.07]

Note. FP = Financial Problems; $N = 1024$. Coefficients for *a, b,* and *c'* > .10 are statistically significant ($p < .05$).

Table 8c

Results for the Mediation Model with Financial Problems as Independent Variable, Life Satisfaction as Dependent Variable, and the PIFS as Mediator.

	a	b	c'	ab	95% CI
FP – PIFS_Total – Life Satisfaction	.79	-.31	-.22	-.25	[-.33, -.18]
FP – PIFS_SoM – Life Satisfaction	.86	-.23	-.28	-.20	[-.27, -.13]
FP – PIFS_LoC – Life Satisfaction	.71	-.25	-.29	-.18	[-.24, -.12]
FP – PIFS_RW – Life Satisfaction	.93	-.22	-.27	-.21	[-.28, -.14]
FP – PIFS_STF – Life Satisfaction	.67	-.20	-.34	-.13	[-.19, -.08]

Note. FP = Financial Problems; $N = 1024$. Coefficients for *a, b,* and *c'* > .10 are statistically significant ($p < .05$).

financial rumination and worry, and a short-term focus. Results of nine studies supported the reliability and validity of this instrument. Studies 1 to 5 showed that the PIFS has a good internal consistency reliability and captures a construct that fits both as a one-factor scale and a four-factor scale. Moreover, Study 6 showed that both the total PIFS and its four sub-components have good test-retest reliabilities. Studies 7 to 9 support the concurrent and predictive validity of the PIFS. Results

showed the expected negative relation between the PIFS and executive functions (Studies 7 and 8). Study 9 showed that the PIFS is positively related to financial problems, and negatively related to the "Big Five" personality traits (most strongly with conscientiousness and emotional stability). Moreover, results showed that the PIFS is negatively related to core aspects of psychological well-being (mental health, self-esteem, and life satisfaction) and that it accounts for variance in the psychological well-being measures over and above the assessments of personality traits

and demographic variables, including one's income. Finally, results showed that the PIFS mediates the relationship between financial problems and psychological well-being.

To conclude, the present research indicates that the PIFS is a reliable and valid instrument for assessing experienced financial scarcity. Building on the literatures of stress research (e.g., Blascovich, 2008; Cundiff et al., 2020; Lazarus & Folkman, 1984) and research on financial scarcity (e.g., Frankenhuis & Nettle, 2020; Haushofer & Fehr, 2014; Mullainathan & Shafir, 2013; Shah et al., 2012), it is the first measure to combine stress appraisals with their concurrent responses within a financial context, and thereby goes beyond other scales that primarily assessed negative subjective states in the financial domain, such as financial distress (Heo et al., 2020; Netemeyer et al., 2018), financial threat (Marjanovic et al., 2013), financial worry and rumination (De Bruijn & Antonides, 2020), or financial anxiety (Archuleta et al., 2013; Shapiro & Burchell, 2012). We argue that the combination of the four different aspects together provide a fuller assessment of the phenomenology of the experience of financial scarcity, which involves both appraisals of one's coping potential as well as more basic cognitive changes, such as intrusive thinking and restricted focus. Examining these components separately, as well as in concert, allows for more fine-grained analyses of which of these are affected in specific contexts or populations, and how they affect one another. Also, it allows for testing the effects of interventions targeted at different aspects of experienced financial scarcity.

Data availability

Data and analysis scripts of the studies are available on the Open Science Framework (https://osf.io/yzn2e/).

Appendix

The Amsterdam Executive Function Inventory (Van der Elst et al., 2012)

(Response categories: 1 = not true, 2 = partly true, 3 = completely true)

Attention

1 I am not able to focus on the same topic for a long period of time (R)
2 I am easily distracted (R)
3 My thoughts easily wander (R)

Planning and initiative

1 I can make fast decisions (e.g., during work)
2 I am well organized. For example, I am good at planning what I need to do during a day
3 It is easy for me to come up with a different solution if I get stuck when solving a problem
4 I am full of new ideas
5 I am curious, I want to know how things work

Self-control and self-monitoring

1 I often react too fast. I've done or said something before it is my turn (R)
2 It is difficult for me to sit still (R)
3 It takes a lot of effort for me to remember things (R)
4 I often forget what I have done yesterday (R)
5 I often lose things (R)

The 5-item Mental Health Inventory (MHI-5; Ware, Kosinski, & Keller, 1996)

(Response categories: 1 = never, 2 = seldom, 3 = sometimes, 4 = often, 5 = mostly, 6 = continuously)

1 During the past month, how much of the time were you a happy person?
2 During the past month, how much of the time have you felt calm and peaceful?
3 During the past month, how much of the time have you been a very nervous person? (R)
4 During the past month, how much of the time have you felt down-hearted and blue? (R)
5 During the past month, how much of the time have you felt so down in the dumps that nothing could cheer you up? (R)

Rosenberg Self-esteem scale (Rosenberg, 1965)
(Scale anchors: *1 = totally disagree; 7 = totally agree*)

1 I feel that I'm a person of worth, at least on an equal plane with others
2 I feel that I have a number of good qualities
3 All in all, I am inclined to feel that I am a failure (R)
4 I am able to do things as well as most other people
5 I feel I do not have much to be proud of (R)
6 I take a positive attitude towards myself
7 On the whole, I am satisfied with myself
8 I wish I could have more respect for myself (R)
9 I certainly feel useless at times (R)
10 At times, I think I am no good at all (R)

The 5-item Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 1985)
(Scale anchors: 1 = *totally disagree*; 7 = *totally agree*)

1 In most ways my life is close to my ideal
2 The conditions of my life are excellent
3 I am satisfied with my life
4 So far, I have gotten the important things I want in life
5 If I could live my life over, I would change almost nothing

References

Archuleta, K. L., Dale, A., & Spann, S. M. (2013). College students and financial distress: Exploring debt, financial satisfaction, and financial anxiety. *Journal of Financial Counseling and Planning, 24*, 50–62.

Blascovich, J. (2008). Challenge and threat. In A. J. Elliot (Ed.), *Handbook of approach and avoidance motivation* (pp. 431–445). New York: Psychology Press.

Bolger, N., & Zuckerman, A. (1995). A framework for studying personality in the stress process. *Journal of Personality and Social Psychology, 69*, 890–902.

Brown, S., Taylor, K., & Wheatley Price, S. (2005). Debt and distress: Evaluating the psychological cost of credit. *Journal of Economic Psychology, 26*, 642–663.

Carvalho, L. S., Meier, S., & Wang, S. W. (2016). Poverty and economic decision-making: Evidence from changes in financial resources at payday. *American Economic Review, 106*, 260–284.

S. Carver, C., & Connor-Smith, J (2010). Personality and coping *Annual Review of Psychology, 61*, 679–704

Cota, A. A., Longman, R. S., Holden, R. R., Fekken, G. C., & Xinaris, S. (1993). Interpolating 95th percentile eigenvalues from random data: An empirical example. *Educational and Psychological Measurement, 53*, 585–596.

Cundiff, J. M., Morozink Boylan, J., & Muscatell, K. A. (2020). The pathway from social status to physical health: Taking a closer look at stress as a mediator. *Current Directions in Psychological Science, 29*, 147–153.

De Bruijn, E. J., & Antonides, G. (2020). Determinants of financial worry and rumination. *Journal of Economic Psychology, 76*, Article 102233.

Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135–168.

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71–75.

Drentea, P. (2000). Age, debt and anxiety. *Journal of Health and Social Behavior, 41*, 437–450.

Fitch, C., Hamilton, S., Bassett, P., & Davey, R. (2011). The relationship between personal debt and mental health: A systematic review. *Mental Health Review Journal, 16*, 153–166.

Folkman, S., Lazarus, R. S., Gruen, R. J., & DeLongis, A. (1986). Appraisal, coping, health status, and psychological symptoms. *Journal of Personality and Social Psychology, 50*, 571–579.

Frankenhuis, W. E., & Nettle, D. (2020). The strengths of people in poverty. *Current Directions in Psychological Science, 29*, 16–21.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4*, 26–42.

Gunthert, K. C., Cohen, L. H., & Armeli, S. (1999). Role of neuroticism in daily stress and coping. *Journal of Personality and Social Psychology, 77*, 1087–1100.

Haushofer, J., & Fehr, E. (2014). On the psychology of poverty. *Science, 344*, 862–867.

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: Second edition: A regression-based approach*. New York: Guilford Press.

Heene, M., Hilbert, S., Draxler, C., Ziegler, M., & Bühner, M. (2011). Masking misfit in confirmatory factor analysis by increasing unique variances: A cautionary note on the usefulness of cutoff values of fit indices. *Psychological Methods, 16*, 319–336.

Hilbert, L. P., Van Dijk, W. W., & Noordewier, M. (2022a). The prospective associations between financial scarcity and financial avoidance. *The Journal of Economic Psychology, 88*, Article 102459.

Hilbert, L. P., Van Dijk, W. W., & Noordewier, M. (2022b). Financial scarcity increases discounting of gains and losses: Experimental evidence from a householdtask. *The Journal of Economic Psychology, 92*, 102546.

Horn, J. L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30*, 179–185.

Hu, L.-T., & Bentler, P. M. (1999). Cutoff criteria for fit indices in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.

Jackson, D. L., Gillaspy, J. A., Jr., & Purc-Stephenson, R (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14*, 6–23.

Johar, G., Meng, R, & Wilcox, K. (2015). Thinking about financial deprivation: Rumination and decision making among the poor. *Advances in Consumer Research, 43*, 208–211.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Koo, T. K., & Li, M. Y. (2016). A guideline of selecting and reporting intraclass correlation coefficients for reliability research. *Journal of Chiropractic Medicine, 15*, 155–163.

Krosch, A. R., & Amodio, D. M. (2019). Scarcity disrupts the neural encoding of black faces: A socioperceptual pathway to discrimination. *Journal of Personality and Social Psychology, 117*, 859–875.

Mani, A., Mullainathan, S., Shafir, E., & Zhao, J. (2013). Poverty impedes cognitive function. *Science, 341*, 976–980.

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. *Journal of Economic Psychology, 36*, 1–10.

Mullainathan, S., & Shafir, E. (2013). *Scarcity: Why having too little means so much*. New York, NY: Time Books.

Netemeyer, R. G., Warmath, D., Fernandes, D., & Lynch, J. G. (2018). How am I doing? Perceived financial well-being, its potential antecedents, and its relation to overall well-being. *Journal of Consumer Research, 45*, 68–89.

OECD. (2013). *OECD Framework for Statistics on the Distribution of Household Income, Consumption and Wealth*. https://doi.org/10.1787/9789264194830-en.

Penley, J. A., & Tomaka, J. (2002). Associations among the Big Five, emotional responses, and coping with acute stress. *Personality and Individual Differences, 32*, 1215–1228.

Richardson, T., Elliott, P., & Roberts, R. (2013). The relationship between personal unsecured debt and mental and physical health: A systematic review and meta-analysis. *Clinical Psychology Review, 33*, 1148–1162.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software, 48*(2), 1–36. URL http://www.jstatsoft.org/v48/i02/.

Schilbach, F., Schofield, H., & Mullainathan, S. (2016). The psychological lives of the poor. *American Economic Review, 106*, 435–440.

Shah, A. K., Mullainathan, S., & Shafir, E. (2012). Some consequences of having too little. *Science, 338*, 682–685.

Shah, A. K., Mullainathan, S., & Shafir, E (2019). An exercise in self-replication: Replicating Shah, Mullainathan, and Shafir (2012). *Journal of Economic Psychology, 75*, Article 102127. Part A.

Shah, A. K., Zhao, J., Mullainathan, S., & Shafir, E. (2018). Money in the mental lives of the poor. *Social Cognition, 36*, 4–19.

Shapiro, G. K., & Burchell, B. J. (2012). Measuring financial anxiety. *Journal of Neuroscience, Psychology, and Economics, 5*, 92–103.

Sheehy-Skeffington, J. (2020). The effects of low socioeconomic status on decision-making processes. *Current Opinion in Psychology, 33*, 183–188.

Shrout, P. E., & Fleiss, J. L. (1979). Intraclass correlations: Uses in assessing rater reliability. *Psychological Bulletin, 86*, 420–428.

Sweet, E., Nandi, A., Adam, E., & McDade, T. (2013). The high price of debt: Household financial debt and its impact on mental and physical health. *Social Science & Medicine, 91*, 94–100.

Suls, J., & Martin, R. (2005). The daily life of garden-variety neurotic: Reactivity, stressor exposure, mood spillover, and maladaptive coping. *Journal of Personality, 73*, 1485–1509.

Van der Elst, W., Ouwehand, C., Van der Werf, G., Kuyper, H., Lee, N., & Jolles, J. (2012). The Amsterdam Executive Function Inventory (AEFI): Psychometric properties and demographically corrected normative data for adolescents aged between 15 and 18 years. *Journal of Clinical and Experimental Neuropsychology, 34*, 160–171.

Van der Veer, A., Madern, T., & Maussen, E. (2019). *Studeren zonder financiële zorgen: Financiële problematiek onder hbo-studenten. [Studying without financial worries: Financial problems among students in higher professional education]*. Research group Debt and Debt Collection, University of Applied Science Utrecht, Knowledge Centre Social Innovation.

Van der Werf, M. M. B., Van Dijk, W. W., Wilderjans, T. F., & Van Dillen, L. F. (2019). The road to the piggy bank: Two behavioural interventions to increase savings. In K. Sassenberg & M. L. W. Vliek (Eds.), *Social Psychology in Action: Evidence-based Interventions from Theory to Practice* (pp. 195–204). Switzerland: Springer Nature.

Vollrath, M. (2001). Personality and stress. *Scandinavian Journal of Psychology, 42*, 132–151.

Walter, S. D., Eliasziw, M., & Donner, A. (1998). Sample size and optimal designs for reliability studies. *Statistics in Medicine, 17*, 101–110.

Ware, J., Jr, Kosinski, M., & Keller, S. D (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care, 34*, 220–233.

Wicherts, J. M., & Zand Scholten, A. (2013). Comment on "Poverty Impedes Cognitive Function. *Science, 342*, 1169.