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Title: The Perceived Economic Scarcity Scale: A Valid Tool With Greater Predictive Utility Than Income

Short title: *The Perceived Economic Scarcity Scale*

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Abstract:

This article introduces the Perceived Economic Scarcity Scale (PESS), a novel instrument measuring the subjective evaluation and experience of economic scarcity (the feeling of having insufficient financial resources to meet one's needs). We conducted three high-powered preregistered studies (total $N = 1,900$) to rigorously evaluate the PESS's psychometric properties. In Study 1, we generated a pool of items and used both Principal Component Analysis and Exploratory Factor Analysis to select the most appropriate items. In Study 2, we examined the PESS's construct validity, demonstrating that it measures a distinct construct from related constructs such as subjective social class. In Study 3, we examined the PESS's predictive validity, demonstrating that it is a robust predictor of both affective outcomes (e.g., anxiety-depressive symptoms) and cognitive outcomes (e.g., economic risk-taking). Critically, we found that the PESS not only has incremental validity over and above income but also has *greater predictive utility than income*. We also found that the PESS score varies depending on the distance-to-pay and has excellent test-retest reliability. Overall, the PESS appears to be a valid and reliable instrument for assessing perceived economic scarcity, and we encourage researchers to use it to better understand the psychological consequences of "not having enough".

Keywords:

subjective economic scarcity, scale validation, income, subjective well-being, risk and time preferences.

Data availability statement:

The data that support the findings of this study are openly available in OSF at https://osf.io/3ndqr/?view_only=a5b6cf37a8bb4d96867725815f1c2d33

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Over the past century, extreme poverty has decreased globally (McNeill, 2001). However, the economic fallout from the COVID-19 pandemic may have reversed this trend, with forecasts suggesting an increase in the world population living below the poverty line for the first time since 1990 (Sumner et al., 2020). In OECD countries, 19% of people have a very low income, and 36% can be considered economically vulnerable due to their limited financial assets (Arnault et al., 2021). More than ever, poverty represents a pressing social and political issue, attracting a growing number of scientists from various fields, including economics, psychology, and behavioral sciences.

Poverty is traditionally conceived as an objective lack of resources and is often assessed with reference to a particular threshold (e.g., whether one's income is above or below an absolute or relative poverty line; Haveman, 2009) or in terms of deprivation with respect to various commodities (Hagenaars, De Vos, & Zaidi, 1998). However, social scientists have noted that poverty goes beyond a mere lack of resources and may also include a more subjective dimension whereby individuals experience the psychological effect of socioeconomic vulnerability (Paugam, 2015; Vandecasteele et al., 2021). Thus, poverty is a multifaceted and dynamic phenomenon that can be conceptually framed as an objective lack of resources *and* the subjective experience of lacking economic resources.

This means that relying solely on resource-based economic indicators of poverty may entail limited predictive utility (for a relevant meta-analysis, see Tan et al., 2020). For instance, one may imagine an individual whose income falls below the poverty line (i.e., objectively considered as “poor”) but living such a modest lifestyle that they would not fully suffer from the harmful consequences of poverty. Conversely, one may imagine an individual belonging to the middle-income group (i.e., *not* objectively considered as “poor”) who suddenly faces unexpected

expenses due to an aversive life event, thereby becoming vulnerable to the harmful consequences of lacking money (Tang et al. 2004).

Understanding poverty therefore involves acknowledging that the experience of lacking money is not solely determined by objective resources such as income. It also hinges on individuals' subjectivity, which is shaped by one's lifestyle and aspirations (Hagenaars, 2014), as well as social comparison processes (Clark & Oswald, 1996; Pravitza et al., 2006). Thus, it is crucial to operationalize poverty not merely as having *low* economic resources (from the researcher's perspective), but as perceiving *insufficient* economic resources (from the respondent's perspective). However, a reliable measure of the subjective experience of economic insufficiency that adequately captures the active ingredient of being economically vulnerable has yet to be developed. The aim of the present manuscript is to develop and validate such an instrument: the Perceived Economic Scarcity Scale (PESS).

While it may be straightforward to quantify objective aspects of poverty using an income-based threshold (although this may be the subject of debate, see Gordon, 2006), it is more challenging to measure the subjective and psychological dimension of economic vulnerability (for an example of influential research, see Singh-Manoux et al., 2003). The scarcity perspective suggests that poverty should be viewed as "the gap between one's needs and the resources available to fulfill them" (Mani et al., 2013, p. 976). According to this perspective, when an individual lacks sufficient financial resources to meet their desired needs, they may develop a scarcity mindset. This mindset can worsen over time as the individual moves further away from their last cash inflow (i.e., the distance-to-pay effect; Mani et al., 2020), and it can ultimately result in a host of detrimental psychological and behavioral outcomes (Shah et al., 2012), which reduced lower life satisfaction, increased negative affects, anxiety-depressive

symptoms, diminished sense of control, heightened preference for immediate rewards, risk aversion (Amir et al., 2018; Liu & Fu, 2022; Sommet et al., 2018; Sommet & Spini, 2022).

De Bruijn and Antonides (2022) have pointed out that most cross-sectional and quasi-experimental studies on the correlates or effects of economic scarcity have relied on income (an objective indicator measuring the quantity of resources) to assess economic scarcity (a subjective indicator measuring the sufficiency of resources). This mismatch between theory and measurement is intriguing, especially given that Mullainathan and Shafir (2013) stated that income is “at best a crude proxy for scarcity” (p. 72). Hence, it seems crucial to develop a measurement instrument that better aligns with the subjective definition of financial scarcity and enables more comprehensive research into its consequences. The present work aims to address this issue by developing a more conceptually precise measure of economic scarcity that is both distinct and related to other psychological constructs of socioeconomic disadvantage (e.g., subjective social status, personal relative deprivation, economic strain, etc.; Adler et al., 2000; Callan et al., 2015; Pearlin et al., 1981).

Two measures of scarcity have been developed recently. First, DeSousa et al. (2020) developed the 24-item Perceived Scarcity Scale (PScS), which consists of three subscales: psychological resource scarcity, material scarcity, and time scarcity. Among the subscales, the 8-item material scarcity subscale is the closest to the concept of “economic scarcity.” Specifically, this subscale is grounded in the concept of financial hardship, which refers to one individual objectively measured financial deprivation resulting in difficulties in meeting basic needs (e.g., paying bills, purchasing food and clothes; Frankham, Richardson, & Maguire, 2020). In other words, this subscale measures something distinct from financial or material scarcity in that it does not involve the subjective perception of not having enough. This mismatch is well

illustrated by items from the material scarcity subscale, such as “I have had my utilities (e.g., heat, water, etc.) turned off because I could not pay my bills” or “I have not sought the health/medical care I needed because I could not afford it.” Although the PScS is useful for measuring objective resource deprivation in a fine-grained manner, it does not seem to adequately measure the subjective experience of economic scarcity.

Second, van Dijk and colleagues (2022) developed the 12-item Psychological Inventory of Financial Scarcity (PIFS) that aims to capture the subjective experience of financial scarcity by focusing on four aspects: insufficient financial resources, lack of control over one’s financial situation, financial rumination and worries, and short-term focus. While the PIFS takes into consideration individuals’ subjectivity, with items such as “when I think about my financial situation, I feel powerless” and “I am constantly wondering whether I have enough money,” it is limited by a lack of clear conceptual boundaries. Specifically, the PIFS combines items capturing the experience of economic scarcity itself (e.g., “I don’t have enough money”) with items related to close but different psychological constructs or outcomes such as lack of control (e.g., “I experience little control over my financial situation”) and short-term focus (e.g., “Because of my financial situation, I live from day to day”). In other words, the PIFS encompasses both some components of economic scarcity (i.e., feeling like one does not have enough money) and the *consequences* of those components (e.g., being short-term focused). Although the authors themselves empirically demonstrated that the PIFS contains several distinct constructs (Study 5), they still use an omnibus indicator derived from all scale items. Ultimately, although the PIFS is an interesting tool for capturing the broad correlates of financial scarcity, it does not allow for a pure and unadulterated measurement of the subjective experience of economic scarcity.

Overview of Studies

The objective of this research is to create a reliable and conceptually sound measure of economic scarcity. In line with increasing calls for a more rigorous approach to the validation of measures in psychological science (Flake & Fried, 2020; Flake et al., 2017), we followed the recommended best practices for scale development and validation, carefully testing for scale reliability and validity (Boateng et al., 2018; Hinkin et al., 1997). We conducted three high-powered preregistered studies in which all participants were U.S. residents recruited through CloudResearch for monetary compensation. All data, the preregistration, and the script to reproduce the findings can be accessed at

https://osf.io/3ndqr/?view_only=a5b6cf37a8bb4d96867725815f1c2d33

In Study 1 ($N = 300$), we draw upon conceptual work on economic scarcity (Mullainathan & Shafir, 2013) as well as qualitative work on poverty (Underlid, 2005) to generate 18 items related to both the *experiential* (i.e., the subjective or personal experience of being economically scarce) and *evaluative* (i.e., the process of assessing the economic situation) aspects of economic scarcity. We submitted this pool of items to participants, and we analyzed their responses using a principal component analysis to select the most suitable items.

In Study 2 ($N = 600$), we administered the newly created scale to participants to: (i) confirm its factorial structure using a confirmatory factor analysis, (ii) assess its discriminant validity against five “competing” constructs, namely, subjective social status, personal relative deprivation, financial satisfaction, economic strain, and financial anxiety.

In Study 3 ($N = 1,000$), we examined the predictive validity of the PESS by measuring associations with well-known outcomes of economic scarcity, such as reduced satisfaction with life, heightened negative affects, anxiety-depressive symptoms, diminished sense of control,

heightened preference for immediate rewards, and risk aversion. We compared the predictive power of the PESS to income (i.e., the most commonly used proxy for economic scarcity) and poverty (i.e., income falling below a specific threshold). We also tested whether perceived economic scarcity fluctuates with the distance to pay (Farbmacher et al., 2021; Mani et al., 2020), and we assessed test-retest validity by re-administering the scale to 435 of the 1,000 participants one month after their initial completion.

Study 1: Generation and Selection of Items

The objective of Study 1 was to build the scale. A pool of 18 items was generated and submitted to the participants, and we aimed to select the most appropriate items to capture the perceived economic scarcity construct. This study was preregistered, and we did not deviate from the preregistered plan

(https://osf.io/uzxt5?view_only=a5b6cf37a8bb4d96867725815f1c2d33)

Method

Participants

Based on Comrey and Lee (1992)'s guiding principle, we aimed to recruit a sample of 300 participants to achieve a satisfactory level of statistical power. Out of the 300 participants who started the study, $N = 298$ had non-missing values on our focal variables (for the sample characteristics pertaining to this and subsequent studies, see Table 1).

Procedure

After giving their informed consent, participants were asked to indicate how true the eighteen items we generated were for them on a 7-point scale ranging from 1 = *not at all* to 7 = *completely*. Finally, they were asked to provide demographic information, thanked for their participation, and debriefed.

Item Generation. The scarcity mindset refers to a worrying psychological state in which people feel as though they have fewer resources than they need (Shah et al., 2012). It thus involves *evaluating* one's economic situation as scarce and *experiencing* the lack of money as worrying (Haushofer & Fehr, 2014; Mani et al., 2020; Shah et al., 2018).

First, we generated 3×3 items measuring the *evaluative* aspect of economic scarcity. Specifically, we generated three items for each of the following ways in which one might evaluate their economic situation as scarce (i) by assessing the resources they have as inferior to the resources they need (an *absolute reference point*, e.g., "I do not have enough money to cover monthly expenses"), (ii) by comparing their economic situation to others (an *other-based reference point*, e.g., "My income is scarce compared to others"), and (iii) out of a general sentiment (*subjective impression*, e.g., "I have less money than I feel I need").

Then, we generated 3×3 items measuring the *experiential* aspect of economic scarcity. Specifically, we generated three items for each of the following psychological dimensions in which one might experience their economic situation as scarce (i) by worrying about their economic situation (*emotional dimension*, e.g., "I worry about not having enough money"), (ii) by constantly thinking about their economic situation (*cognitive dimension*, e.g., "I cannot help but think about lack of money"), and (iii) by perceiving uncertainty (*uncertainty dimension*, e.g., "Having limited income and savings makes me unsure about my future"). The full scale and specific wording of each item can be found in Table 2.

Results

Preliminary Analysis - Assessing Data Suitability for Principal Component Analysis (PCA)

In preliminary analysis, we conducted tests to assess the suitability of the data for PCA. As preregistered, we first performed Bartlett's test of sphericity (Bartlett, 1950). Results

suggested a factorable matrix correlation, with the correlation matrix derived from the data differing significantly from a randomly generated correlation matrix, $\chi^2 (153, N= 298) = 6250.03$, $p < .001$. Second, we performed a Kaiser-Meyer-Olkin test (Kaiser, 1974). Results demonstrated that the data was factorable, with very strong relationships among the variables (KMO = .97). In summary, the preliminary analysis indicated that the data was suitable for PCA.

Main Analysis – Examining the Factorial Structure of the Scale

We conducted a PCA to examine the factorial structure of the scale. Given the expectation that the evaluative and experiential aspects of economic scarcity used to create the items should be correlated, we used oblique rotation. Analysis of the scree plot and Kaiser's criterion suggested a one-component solution, accounting for 72% of the variance. All items exhibited loadings greater than .80 (see Table 2). We decided to retain nine items that represented a balance of both the evaluative and experiential aspects, based on face validity and the strength of factor loadings¹. Cronbach's alpha for the scale in the present study was $\alpha = .95$, indicative of high internal consistency. The final scale, including instructions and response labels, can be found in the Appendix.

Discussion

In this first study, we generated 18 items to measure perceived economic scarcity. While the initial pool of items was built to tap into two different aspects of economic scarcity (i.e., evaluative and experiential aspects), a PCA revealed that these aspects were part of a single component. Consequently, we selected the nine most relevant items to develop the Perceived Economic Scarcity Scale.

¹ A PCA ran on the 9 item-scale showed similar results (see Table S1).

Table 1*Sociodemographic Characteristics of Participants Across Studies 1-3*

	Study 1		Study 2		Study 3	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Gender						
Female	116	38.93	263	43.83	482	48.84
Male	180	60.40	336	56.00	497	50.40
Other	2	0.67	1	0.17	7	0.71
Ethnicity						
Native American	2	0.67	4	0.67	7	0.71
Asian	14	4.70	53	8.83	91	9.23
Black / African American	48	16.10	58	9.67	77	7.81
Hispanic / Latino	13	4.36	32	5.33	71	7.20
Pacific Islander	0	0	2	0.33	2	0.20
White / Caucasian	218	73.15	439	73.16	718	72.82
Other	3	1.01	12	2.00	20	2.03
Highest educational level						
No college degree	79	26.51	216	36.00	290	29.41
University or college degree	219	73.49	384	64.00	696	70.59
Current Status						
Unemployed	15	5.03	45	7.50	45	4.56
Student or pupil	3	1.01	12	2.00	27	2.74
Working for payment or profit	246	82.55	482	80.33	781	79.21
Unable to work	6	2.01	10	1.67	16	1.62
Retired from employment	8	2.68	20	3.33	52	5.27
Looking for first regular job	7	2.35	8	1.33	4	0.40
Looking after home/family	5	1.68	16	2.67	40	4.05
Other	8	2.68	7	1.17	21	2.13
Household income						
Less than \$50,000	143	47.99	292	48.67	354	35.90
More than \$50,000	155	52.01	308	51.33	632	64.10

Note. In Study 1, the average age was 36.7 years ($SD = 10.3$). In Study 2, the average age was 39.2 years ($SD = 11.9$). In Study 3, the average age was 40.5 years old ($SD = 12.5$).

Table 2

Study 1: Factor loadings (“FL”), Communality Score (“CS”), Uniqueness Score (“US”), and Scarcity Aspect (“SA”) for the 18 Generated Items.

	FL	CS	US	SA
1. I worry about not having enough money	.84	.70	.30	EX _E
2. Having insufficient income is a source of anxiety	.80	.65	.35	EX _E
3. My struggle to pay bills stresses me out	.89	.79	.21	EX _E
4. I cannot help but think about lack of money	.90	.80	.19	EX _C
5. The burden of missed or late payment is always on my mind	.82	.68	.32	EX _C
6. Being short on money occupies my thoughts	.90	.81	.19	EX _C
7. I do not know how I will manage to make ends meet in the future	.83	.68	.32	EX _U
8. Financial scarcity makes my life uncertain	.86	.73	.26	EX _U
9. Having limited income and savings makes me unsure about my future	.86	.73	.26	EX _U
10. I do not have enough money to cover monthly expenses	.82	.67	.32	EV _A
11. My income is not sufficient to make a decent living	.84	.70	.29	EV _A
12. I am struggling to pay my bills and other essential	.85	.72	.27	EV _A
13. I have less money than I feel I need	.85	.71	.28	EV _{SI}
14. I feel the burden of missed or late payment weighing down on me	.82	.66	.33	EV _{SI}
15. I have the feeling that I am always short of money	.90	.80	.19	EV _{SI}
16. Making ends meet is more difficult for me than others	.86	.75	.25	EV _{OB}
17. My income is scarce compared to others	.84	.70	.30	EV _{OB}
18. I have limited income and savings compared to others	.85	.72	.28	EV _{OB}

Note. EX stands for “experiential aspect” with subscripts E, C, and U denoting “emotion”, “cognitive”, and “uncertainty”, respectively. EV stands for “evaluative aspect” with subscripts A, OB, and SI denoting for “absolute reference point”, “other-based reference point,”, and “subjective impression”, respectively.

Study 2: Confirming the Factorial Structure and Assessing Discriminant Validity

Study 2 aimed to confirm the factorial structure of the newly created 9-item PESS and assess its discriminant validity against five “competing” constructs: subjective social status, personal relative deprivation, financial satisfaction, economic strain, and financial anxiety. This study was preregistered, and we did not deviate from the preregistered plan (https://osf.io/cegkp?view_only=a5b6cf37a8bb4d96867725815f1c2d33)

Method

Participants

Kline (2015) suggested that the $n:q$ ratio of the number of observations (n) to the number of parameters (q) should range between 10:1 and 20:1 to achieve a satisfactory level of statistical power when running confirmatory factor analysis. We chose a $n:q$ ratio of 15:1, and since Study 2 involved 39 parameters, we aimed to recruit $39 \times 15 = 585$ participants. We oversampled and opened the study to $N = 600$ participants to anticipate the exclusion of missing values. Out of the 601 participants who started the study, $N = 600$ had non-missing values on our focal variables.

Procedure

After giving their informed consent, participants first took the nine items of the PESS, followed by the measures of the five competing constructs presented in randomized order. Finally, they were asked to provide demographic information, thanked for their participation, and debriefed.

Measures

Unless otherwise noted, all measures used a Likert response scale from 1 = *not at all* to 7 = *completely*, and items were presented in random order.

Perceived Economic Scarcity. We used the nine-item scale developed in Study 1 ($\alpha =$

.96, $M = 4.13$, $SD = 1.76$).

Subjective Social Status. We used a three-item adaptation of the MacArthur Scale (Adler et al., 2000). Participants indicated their position on a ten-rung ladder relative to their community in terms of economic status, education, and occupation ($\alpha = .65$, $M = 6.94$, $SD = 1.83$). Responses range from 0 = *bottom of the ladder* to 10 = *top of the ladder*.

Personal Relative Deprivation. We used the five-item Personal Relative Deprivation Scale (Callan et al., 2015). Participants indicated their level of agreement with statements comparing their financial situation to others (e.g., “I feel resentful when I see how prosperous other people like me seem to be”; $\alpha = .85$, $M = 3.89$, $SD = 1.43$).

Financial Satisfaction. We adapted the six-item scale Satisfaction with Financial Situation Scale (Hira & Mugenda, 1998). Participants indicated their degree of satisfaction with different aspects of their financial life as money management, long-term goals, and debt level ($\alpha = .93$, $M = 3.61$, $SD = 1.67$).

Economic Strain. We adapted the nine-item Economic Strain Scale (Pearlin et al., 1981). Participants indicated their capacity to acquire essential items (e.g., food) or more optional goods (e.g., car) for themselves and their families ($\alpha = .85$, $M = 4.08$, $SD = 1.31$).

Financial Anxiety. We used the seven-item Financial Anxiety Scale (Shapiro et al., 2012). Participants indicated their level of agreement with statements about their anxious disposition vis-à-vis their finances ($\alpha = .92$, $M = 3.34$, $SD = 1.61$).

Results

Preliminary Analysis – Confirming the Factorial Structure of the Scale

We conducted a confirmatory factor analysis (CFA) to validate the structure of the newly developed scale. We employed the Maximum Likelihood estimator, using the variance-

covariance matrix as input, with all items loading into a single factor (cf. Figure 2). All factor loadings can be considered strong ($> .60$; Garson, 2010).

The Chi-square test for model fit yielded inconclusive results $\chi^2(2, N = 600) = 643.23, p < .001$. However, it should be kept in mind that this test is not necessarily informative, as it is heavily sensitive to large sample sizes, such as ours (Babyak & Green, 2010). Therefore, we focused on the interpretation of three fit indices: The comparative fit index (CFI), the root mean squared error of approximation (RMSEA), and the *standardized* root mean square residual (SRMR).

The CFI, which estimates whether the model fit is better than that of a null model, was satisfactory, $CFI = 0.90$ (i.e., above our preregistered cutoff of $CFI \geq .90$). The RMSEA, which measures the discrepancy between the predicted and the observed values, was not satisfactory, $RMSEA = .20$ (i.e., outside of the range of acceptable values). However, the SRMR, which basically measures the same thing, was acceptable, $SRMR = .05$ (Hu & Bentler, 1999).

It is not uncommon for fit indices to disagree in structural equation modeling, and when confronted with such a situation, researchers should attempt to explain these discrepancies (McDonald & Ho, 2002, Lai & Green, 2016). In our case, the RMSEA value is clearly above the traditional cutoff of $.08$ (Hair et al., 1998). We believe this can be attributed to the paradoxical effect of high reliability (Prudon, 2015), which occurs when scale items exhibit strong correlations (e.g., in a single-factor scale) and reliability is extremely high (in our case, $\alpha = .96$). Under such circumstances, the difference between the user model and the saturated model (i.e., a model with all the inter-items correlation) is large, which in turn results in an apparently unsatisfactory RMSEA. This is supported by the fact that when the strongest inter-item correlations are added to the user model (as suggested by modifications indices), the RMSEA

value is substantially improved (see Supplementary Materials). However, it is worth noting that the SRMR, which also gauges the discrepancy between the predicted and the observed values but using a standardized approach, yielded satisfactory results. In sum, despite discrepancies between indices, the model generally showed an acceptable fit based on the preregistered cutoffs.

Main Analysis – Assessing the Discriminant Validity of the Economic Scarcity Scale

We conducted five two-factor CFAs to compare perceived economic scarcity with each of the “competing” constructs. For each construct, we built a model that included the items from our scale and the items from the competing scale. We then compared (a) a model where items from both scales were associated with a single latent variable and (b) a model where items from each scale were associated with a distinct latent variable. To do so, we performed a Likelihood ratio test comparing the single-factor model (i.e., the constrained model) to the two-factor model (the extended model, which also included the covariance path). The null hypothesis states that the constrained model does not fit the data better than the extended model, suggesting that the items of the PESS do not measure a different construct than the items of the other scale (i.e., unsatisfactory discriminant validity). Rejection of the null hypothesis implies that the extended model fits the data better than the constrained model, suggesting that the items of the PESS measure a specific construct (i.e., satisfactory discriminant validity).

In all five model comparisons, results supported the rejection of the null hypothesis, indicating that the PESS measures a distinct construct from subjective social status, $\chi^2(1, N = 600) = 251.80, p < .001$, personal relative deprivation, $\chi^2(1, N = 600) = 425.19, p < .001$, financial satisfaction, $\chi^2(1, N = 600) = 893.17, p < .001$, economic strain, $\chi^2(1, N = 600) = 634.89, p < .001$, and financial anxiety, $\chi^2(1, N = 600) = 773.39, p < .001$ (see Table 3 for a summary of the results). This provides evidence of discriminant validity.

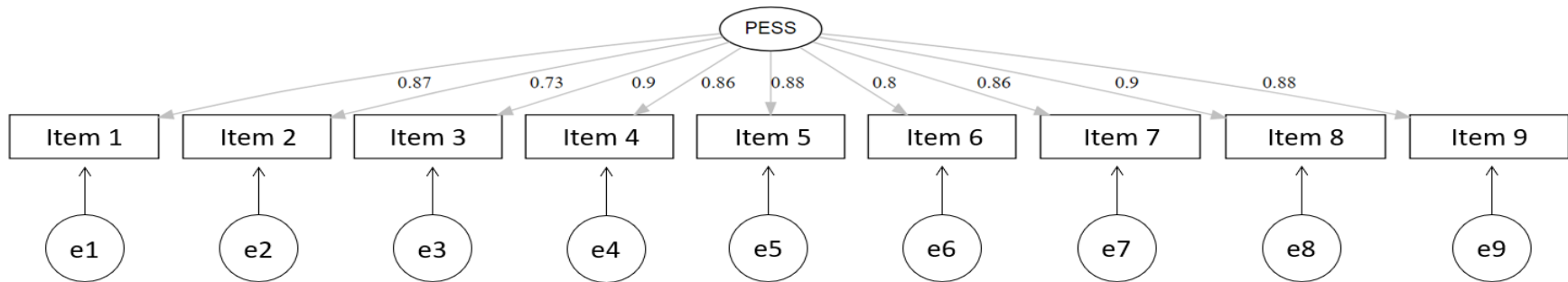
It is important to note that, although the PESS measures a construct different from the aforementioned scale, the PESS score was significantly correlated with four of the five competition constructs, that is, with personal relative deprivation, $r(598) = .72, p < .001$, financial satisfaction, $r(598) = -.80, p < .001$, economic strain, $r(598) = .77, p < .001$, and financial anxiety, $r(598) = .77, p < .001$, but not subjective social status, $r(598) = -.07, p = .10$. This provides evidence of convergent validity.

Discussion

In Study 2, a CFA yielded satisfactory fit indices when considering the paradoxical effect of high reliability (Prudon, 2015), confirming the factorial structure of the PESS (i.e., internal validity). Then, model comparison analysis showed that the PESS measured a construct distinct from subjective social class, personal relative deprivation, financial satisfaction, economic strain, and financial anxiety (i.e., discriminant validity), albeit it was also correlated to four of these measures (i.e., convergent validity).

Figure 2.

Factorial Structure of the Perceived Economic Scarcity Scale with Factor Loadings



Note. “ e_n ” corresponds to the error term associated with the n^{th} item. Item 1: “My income is scarce compared to others”; Item 2: “I feel the burden of missed or late payment weighing down on me”; Item 3: “I have less money than I feel I need”; Item 4: “I am struggling to pay my bills and other essentials”; Item 5: “My income is not sufficient to make a decent living”; Item 6: “I do not have enough money to cover monthly expenses”; Item 7: “Having limited income and savings makes me unsure about my future”; Item 8: “I cannot help but think about lack of money”; Item 9: “I worry about not having enough money”.

Table 3

Study 2: Likelihood Ratio Test Comparing the Constrained Models to the Extended Models and Testing Discriminant Analysis for Each of the Five Competing Constructs

Competing Construct	Δdf	χ^2	<i>p</i>
Subjective Social Status	1	251.80	< .001
Personal Relative Deprivation	1	425.19	< .001
Financial Satisfaction	1	893.17	< .001
Economic Strain	1	634.89	< .001
Financial anxiety	1	773.39	< .001

Note. A significant *p*-value leads to the rejection of the null hypothesis and indicated that the extended model (i.e., two factors) should be used rather than the constrained one (i.e., one factor).

Study 3: Predictive Validity of the PESS

Study 3 had four objectives. First and foremost, we aimed to assess the predictive validity of the PESS, by replicating the effects of economic scarcity on six affective and cognitive outcomes: reduced satisfaction with life (Liu & Fu, 2022), increased negative affects, heightened anxiety-depressive symptoms (Sommet et al., 2018), diminished sense of control (Sommet & Spini, 2022), heightened preference for immediate rewards (Amir et al., 2018), and increased risk aversion (Amir et al., 2018). Second, we aimed to compare the predictive power of the PESS with the more commonly used indicator of income, as well as poverty status. Third, we aimed to test whether distance to payday affected perceived economic scarcity, serving as an additional assessment of construct validity. Fourth and finally, we aimed to assess the test-retest reliability of the PESS at a one-month interval, serving as an additional assessment of measurement accuracy. This study was preregistered, and we did not deviate from the preregistered plan (https://osf.io/jkyta?view_only=a5b6cf37a8bb4d96867725815f1c2d33)

Method

Participants

In Study 3, we aimed to test six effects and achieve a *global* power of .90 (i.e., 90% chance of detecting the effects of economic scarcity on the six outcomes). Thus, each of the six tests required an individual *power* of $.90^{1/6} = .9826$. Based on the typical effect sizes in psychology, which range from Cohen's $d = 0.2$ and $d = 0.4$ (Brysbaert, 2019), we anticipated a $d = 0.3$ ($f^2 = 0.02$). Using G*Power (Faul et al., 2009), we conducted a power analysis and determined that we needed 831 participants to observe an effect size of $f^2 = 0.02$ with a power $1 - \beta = .9826$, that is, a cumulated power of $.9826^6 = .90$ ($\alpha = .05$). We oversampled and opened the study to 1,000 participants to anticipate for the exclusion of missing values. Out of the 1000

participants who started the study, $N = 986$ had non-missing values on our focal variables and passed the attention check (for sociodemographic details, see Table 1).

Procedure

After giving their informed consent, participants first took the PESS, followed by the measures of six potential outcomes presented in randomized order. Subsequently, they were asked to provide demographic information, thanked for their participation, and debriefed. Participants who agreed to take part in the second part of the study ($N = 807$) were invited to retake the PESS one month later to assess test-retest reliability. We collected responses from $N = 435$ participants (53.90% response rate) with no missing values on our focal variables.

Measures

Unless otherwise noted, all measures used a Likert response scale from 1 = *not at all* to 7 = *completely*, and scale items were presented in random order.

Perceived Economic Scarcity. We used the nine-item scale validated in Study 2. We removed item 2 *before* preregistering the study because of its lack of face validity (i.e., “I feel the burden of missed or late payment weighing down on me,” which measures the presence of debts more than economic scarcity *per se*; $\alpha = .95$, $M = 4.20$, $SD = 1.68$).

Satisfaction with Life. We used the five-item measure of satisfaction with life (Diener et al., 1985). Participants indicated their level of agreement with statements about their satisfaction in life (e.g., “I am satisfied with my life”; $\alpha = .93$, $M = 3.95$, $SD = 1.59$).

Positive and Negative Affects. We used the ten-item International Positive and Negative Affect Schedule Short Form (Thompson, 2007). Participants indicated the frequency with which they generally experience positive affects (e.g., “inspired”) and negative affects (e.g., “nervous”). As preregistered, we subtracted the latter from the former to create a measure of affect balance.

Responses were measured using a 5-point response scale (1 = *never*, 5 = *always*; $\alpha = .81$, $M = 1.31$, $SD = 1.24$).

Anxiety-Depression Symptoms. We used the fourteen-item Hospital Anxiety and Depression Scale measure (Zigmond & Snaith, 1983). Participants indicated the frequency of experiencing anxiety-depressive symptoms (e.g., “I feel as if I am slowed down”). Responses were measured using a 4-point response scale (1 = *not at all*; 4 = *most of the time*; $\alpha = .91$, $M = 3.24$, $SD = 1.18$).

Sense of Control. We used the twelve-item Sense of Control scale (Lachman & Weaver, 1998). Participants indicated their level of agreement with statements about their perception of control (e.g., “There are many things that interfere with what I want to do”; $\alpha = .92$, $M = 3.28$, $SD = 1.12$).

Preference for Immediate Rewards. We used the measure of preference for immediate rewards (Amir & Rand, 2018). Participants were presented with choices between a smaller, immediate reward and a larger, delayed reward, and they indicated their preference (e.g., Imagine you are asked to choose between getting \$100 tomorrow or getting \$140 90 days from now. What would you prefer?). The choices were presented in increasing order of the delayed reward amount, and the number of immediate reward choices served as an indicator of an individual’s preference for immediate rewards ($M = 3.32$, $SD = 2.59$).

Preference for Risky Choice. We used the measure of preference for risky choice (Amir & Rand, 2018). Participants were presented with choices between a risky but more rewarding option or a safer but less rewarding option, and they indicated their preference (e.g., Imagine you are asked to choose between a 50% chance of getting \$800 and getting \$500 for sure. What would you prefer?). The choices were presented in increasing order of the safer option amount,

and the number of risky choices served as an indicator of an individual's preference for risky choices ($M = 1.79$, $SD = 1.45$).

Distance to payday. Participants were asked to indicate their pay frequency (i.e., weekly or monthly) and the number of days between the date they completed the survey and their upcoming payday.

Results

Main Analysis – Predictive validity of the PESS.

Predictive Power [Aim #1]. Our first aim was to assess the predictive validity of the PESS. As preregistered, we conducted six regression analyses, using the PESS score as a predictor, and each of the outcomes of interest as a dependent variable (i.e., satisfaction with life, affect balance, anxiety and depressive symptoms, sense of control, preference for immediate reward, and preference for risky choice). In each analysis, we controlled for age, sex, ethnicity, log equivalized household income, educational attainment, and current status.

Consistent with our predictions, the PESS score significantly predicted all outcome variables (see Table 4). Specifically, higher levels of economic scarcity were associated with lower satisfaction with life, $\beta = -0.54$, $t = -18.45$, $p < .001$, fewer positive affects, $\beta = -0.41$, $t = -13.05$, $p < .001$, more anxiety and depressive symptoms, $\beta = 0.54$, $t = 18.42$, $p < .001$, lower sense of control, $\beta = -0.53$, $t = 17.69$, $p < .001$, higher preference for immediate rewards, $\beta = 0.17$, $t = 4.91$, $p < .001$, and lower preference for risky choices, $\beta = -0.10$, $t = -2.81$, $p < .01$. Importantly these effects were observed when including our preregistered set of control variables, demonstrating the incremental predictive validity of the PESS over and above income. Equally important, income was not significantly associated with any of the outcomes ($ps > .05$). Results remained identical when categorical control variables were not dichotomized (e.g.,

workers vs. others; see Table S2), when using untransformed rather than log-transformed household equivalized income (Table S3), and when no variables were controlled for (Table S4).

Table 4

Study 3: Standardized Coefficients (β) and Effect Sizes (f^2) From the Six Regressions Testing the Effect of the PESS, Income, and our Control Variables on the Outcomes of Interest

	Life Satisfaction		Affect Balance		Sense of Control		Immediate Reward		Risk Preference		Anxiety-Depression	
	β	f^2	β	f^2	β	f^2	β	f^2	β	f^2	β	f^2
PESS	-0.54***	0.36	-0.41***	0.18	-0.53***	0.33	0.17***	0.03	-0.10**	0.01	0.54***	0.35
Income	0.03	-	0.00	-	0.03	-	-0.07	-	0.03	-	0.02	-
Sex	-0.12***	0.02	0.01	-	-0.01	-	-0.09**	0.01	0.11***	0.01	0.01	-
Ethnicity	0.07*	0.01	-0.03	-	-0.03	-	-0.08**	0.01	-0.04	-	0.06*	0.01
Status	-0.03	-	0.07*	0.01	-0.02	-	0.06	-	0.02	-	-0.05	-
Education	0.08**	0.01	-0.07*	0.01	-0.11***	0.02	-0.16***	0.03	0.03	-	0.07*	0.01
Age	0.03	-	0.26***	0.08	0.08**	0.01	-0.02	-	-0.15***	0.02	-0.21***	0.06

Note. Income refers to Log-Equivalized Household Income. Categorical variables are dichotomized with men coded 0.5, women coded -0.5, workers coded 0.5 and other coded -0.5, and whites coded 0.5 and other coded -0.5.

Bold indicates significant effects.

* $p < .05$; ** $p < .01$; *** $p < .001$

Comparative Analysis Between PESS and Income [Aim #2]. Our second aim was to compare the predictive power of the PESS to that of income. As preregistered, we used post-estimation tests to compare the standardized coefficients of the PESS and income for each of the six models conducted in the previous analysis (i.e., controlling for age, sex, ethnicity, educational attainment, and current status).

As shown in Table 5 (left part), we rejected the null hypothesis that the coefficient of income is equal to the coefficient of PESS for the six outcomes. Specifically, the standardized coefficient estimates associated with the PESS were systematically stronger than those associated with the log-transformed equivalized household income. The effect of the PESS was stronger for satisfaction with life, $F(1, N = 966) = 282.45, p < .001$, affect balance, $F(1, N = 966) = 124.64, p < .001$, anxiety and depressive symptoms, $F(1, N = 966) = 228.60, p < .001$, sense of control, $F(1, N = 966) = 259.09, p < .001$, preference for immediate reward, $F(1, N = 966) = 35.64, p < .001$, and preference for risky choice, $F(1, N = 966) = 11.44, p < .001$. This demonstrate that the PESS not only have incremental predictive validity over and above income, but also has a higher predictive validity than income. Results remained identical when dichotomizing the categorical control variables (e.g., workers vs others; see Table S5) was not used, when using untransformed rather than log-transformed household equivalized income (Table S6), and when no variables were controlled for (Table S7).

For exploratory purposes, we sought to directly compare the predictive utility of the PESS to that of poverty status, operationalized as a state where one's income falls below a specific poverty threshold. The threshold was defined using US census data and computed for each participant based on their reported income and household size (i.e., participants were categorized as poor if their annual equivalized income fell below USD 15,225 as a single-

member household). We conducted the same analysis but replaced income with the poverty status as the focal competing predictor variable. As shown in Table 5 (right part), the conclusions from the analysis were consistent with our previous findings, showing that the PESS has higher predictive validity than poverty status.

Table 5

Study 3: Focal Post-Estimation Tests Demonstrating the Stronger Standardized Effects of the PESS Compared to Income (Left Part) and Poverty Status (Right Part) for the Six Outcomes of Interest

Outcome	Comparison with Income			Comparison with Poverty Status		
	df	<i>F</i>	<i>p</i>	df	<i>F</i>	<i>p</i>
Satisfaction with life	1	282.45	< .001	1	288.09	< .001
Affect balance	1	124.64	< .001	1	133.1	< .001
Sense of control	1	233.75	< .001	1	259.09	< .001
Immediate rewards	1	26.03	< .001	1	35.64	< .001
Risk preference	1	11.22	< .001	1	11.44	< .001
Anxiety-depression	1	238.71	< .001	1	228.60	< .001

Note. Income refers to Log-Equivalized Household Income, whereas poverty status refers to a dichotomous variable (below or above the poverty line). Comparison in post-estimation tests of β (household income) and β (PESS) and β (poverty status) and β (PESS), respectively. Rejection of the null hypothesis means higher predictive power of PESS over household income.

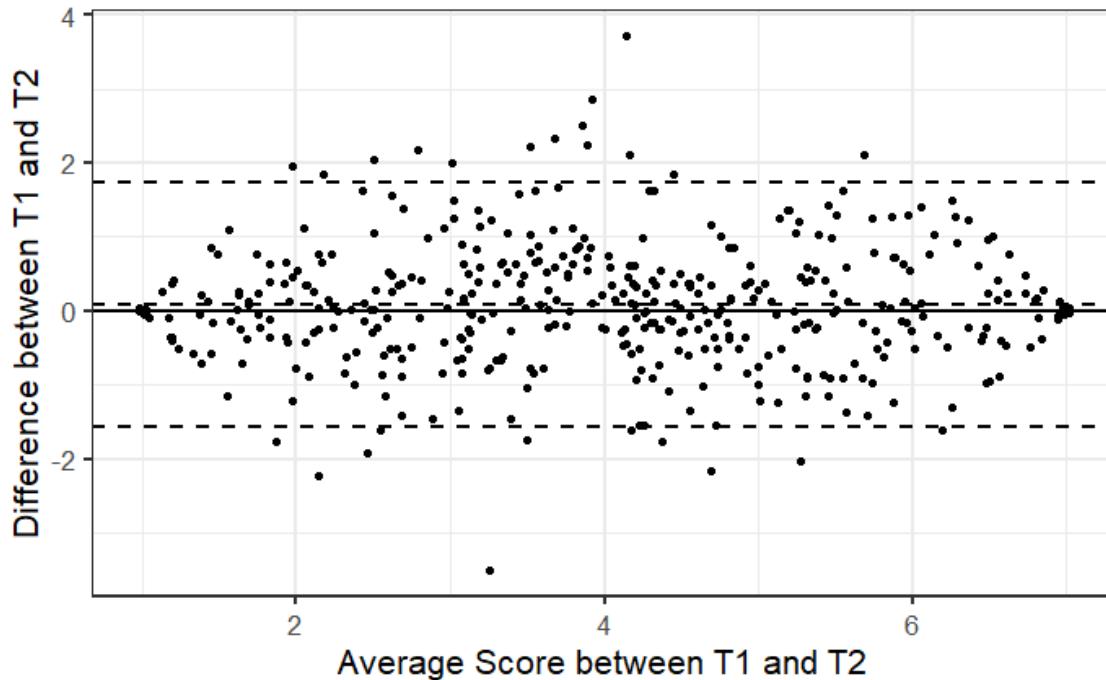
Supplementary Analysis – Further Assessment of Construct Validity and Reliability

Using the Distance To Payday to Predict the PESS score [Aim #3]. We aimed to further examine the construct validity of our scale by testing the effect of distance to payday on perceived economic scarcity. To do so, we built two regression models focusing on weekly paid individuals on the one hand, and monthly paid individuals on the other hand. In both models, we used distance to payday as the focal predictor and perceived economic scarcity as the dependent variable. Concerning weekly paid individuals, greater distance to payday was associated with a higher level of perceived economic scarcity, $\beta = 0.05$, $t = 2.07$, $p = .04$. Concerning monthly paid individuals, greater distance to payday was also associated with a higher level of perceived economic scarcity, $\beta = 0.03$, $t = 2.45$, $p = .01$. This provides further evidence of the construct validity of the PESS.

Assessing the Test-Retest Reliability of the Perceived Economic Scarcity Scale [Aim #4]. We aimed to assess the test-retest reliability of the PESS. To do so, we used a two-way-mixed effects model based on single measures ($k = 2$) and absolute agreement (Shrout & Fleiss, 1979, Koo & Li, 2016), and we calculated the intraclass correlation coefficient (ICC [3,1]). The reliability of the scale was evaluated according to Cicchetti's (1994) criteria and Koo and Li's rule of thumb (2016). The intraclass correlation indicated excellent test-retest reliability with a coefficient of ICC [3,1] = 0.87 [.85; .89] (see Figure 3 for the Bland-Altman plot). This provides further evidence of the reliability of the PESS.

Figure 3.

Bland-Altman Plot for Absolute Agreement Analysis Between the Two Times of Assessment of Perceived Economic Scarcity.



Note. Limits of agreement are depicted by the bottom and upper dashed lines (mean \pm 1.96 SD).

Discussion

Study 3 yielded four key findings. First, a series of regression analyses demonstrated the predictive validity of the PESS while using dependent variables ranging from life satisfaction and other affective outcomes to economic decision-making and other cognitive outcomes. Second, when comparing the predictive power of PESS to that of income (across various model specifications) and poverty status (in exploratory analyses), our newly developed scale exhibited a clear superiority in predicting psychological variables. Third, the study revealed that perceived economic scarcity increases as the distance to payday decreases, further supporting the construct

validity of the scale. Fourth, the PESS demonstrated excellent test-retest reliability with a one-month interval between assessments.

General Discussion

The present research provides a comprehensive psychometric evaluation of the Perceived Economic Scarcity Scale (PESS), a scale designed to assess the subjective experience of economic scarcity (i.e., the psychological experience of “not having enough”). Results from three high-powered, pre-registered studies supported the reliability and validity of this newly developed measure, highlighting its contribution to the field of economic scarcity research.

Studies 1 and 2 demonstrated and confirmed the single-factor structure of the PESS. Moreover, Study 2 showed that the PESS had excellent discriminant validity against five competing constructs, namely subjective social status, personal relative deprivation, financial satisfaction, economic strain, and financial anxiety. These findings underscore the unique contribution of the PESS in capturing the subjective experience of economic scarcity, distinct from related concepts.

Study 3 offered strong evidence for the PESS’s predictive validity, revealing that higher perceived economic scarcity was associated with various important affective outcomes (lower satisfaction with life, more negative affects, and anxiety-depressive symptoms) and cognitive outcomes (lower sense of control, a higher preference for immediate rewards, less preference for risky choices). This replicated extant findings (e.g., see Amir et al., 2018, Liu & Fu, 2022 or Sommet et al., 2018), while illustrating the broad range of consequences associated with perceived economic scarcity.

Additionally, the results from Study 3 showed that the PESS had an excellent test-retest validity at a one-month interval, while also being sensitive to more subtle day-to-day variations

as a function of the distance-to-payday (e.g., see Mani et al., 2020). This suggests that the PESS is a reliable and responsive tool for assessing changes in perceived economic scarcity over time. Most importantly, regardless of the model specifications, the predictive validity of the PESS for all measured psychological outcomes was found to be far superior to that of income and poverty status, emphasizing the value of the PESS as an effective way to capture economic vulnerability.

In sum, the PESS appears to be a reliable and valid instrument for assessing perceived economic scarcity. To our knowledge, it stands out as the first subjective measure of economic scarcity that is conceptually distinct from related constructs or consequences of economic scarcity. By adhering to the recommended procedures for developing and validating scales in the behavioral and social sciences (Boateng et al., 2018; Hinkin et al., 1997), and drawing upon the results from our three studies, we believe that this research work not only offers a reliable tool, but also refines our understanding of the perceived economic scarcity construct itself (Flake et al., 2017). Perceived economic scarcity is defined as the psychological experience of “not having enough,” which arises from a blend of experiential factors (i.e., economic worries, thoughts, and uncertainty) and evaluative factors (i.e., feelings of not having enough, be it in comparison to absolute, others-based or subjective reference-points).

The finding that perceived economic scarcity predicts psychological outcomes better than income itself carries significant conceptual and methodological implications for the poverty research. It suggests that subjective measures focused on the core concept of economic sufficiency may be more valuable than objective measures in understanding economic vulnerability and the psychological and behavioral consequences of economic vulnerability. This finding emphasizes the importance of distinguishing between the factual experience of financial deprivation from the psychological experience that may be associated with it, further supporting

the view that experience of economic vulnerability is not solely determined by limited objective resources but also by the psychological mindset accompanying one's financial situation (experienced as *insufficient*). In this regard, the Perceived Economic Scarcity Scale may be a particularly useful instrument for capturing the complexities of economic vulnerability and advance our understanding of the psychological and behavioral implications of poverty.

Appendix

Items of the Perceived Economic Scarcity Scale

1. My income is scarce compared to others
2. I feel the burden of missed or late payment weighing down on me*
3. I have less money than I feel I need
5. My income is not sufficient to make a decent living
6. I do not have enough money to cover monthly expenses
7. Having limited income and savings makes me unsure about my future
8. I cannot help but think about lack of money
9. I worry about not having enough money

*This item as removed for Studies 2 – 3 because of a low face validity.

Instructions:

“Below is a series of statements that refer to **the way you experience and evaluate your financial situation**. Please indicate how true each statement is for you.”

Response Labels

1 = *Not at all* to 4 = *Somewhat* to 7 = *Completely*

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