The Perceived Economic Scarcity Scale: A valid tool with greater predictive utility than income

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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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All authors declare that they have no conflicts of interest.

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 – and more generally economic vulnerability – represent pressing social and political issues, attracting a growing number of scientists from various fields, including economics, psychology, and behavioral sciences.

The Study of Economic Vulnerability

Economic vulnerability refers to a situation where one is exposed to economic risks, shocks, and stress (Curatolo & Wolleb, 2010). Economic vulnerability can sometimes be conceived as an objective lack of resources to cope with one's current or future situation and is often assessed on the basis of income (Ranci, 2010). However, social scientists have noted that economic vulnerability goes beyond a mere lack of resources and may also include a more subjective dimension whereby individuals experience the psychological effect of economic hardship (Curatolo & Wolleb, 2010; Paugam, 2015; Vandecasteele et al., 2021). Therefore, economic vulnerability appears as a multifaceted and dynamic phenomenon that can be conceptually framed as an *objective* lack of resources and the *subjective* experience of lacking economic resources.

Over the last two decades, the literature on social class has increasingly focused on the subjective aspects of socioeconomic status. Subjective socioeconomic status refers to individuals' perceptions of their rank in a society in terms of valuable social and economic resources (Antonoplis, 2023). This perception is formed from the representations that individuals

make of their relative prestige, power, status, education, and/or wealth within their social environment (Adler et al., 2000; Kraus et al., 2012; Singh-Manoux et al., 2003). Subjective socioeconomic status is generally assessed by asking individuals to position themselves within the social hierarchy, relative to the most and least advantaged individuals in society (e.g., Adler et al., 2000; Kraus et al., 2009). While objective and subjective socioeconomic statuses are positively correlated (Tan et al., 2020), subjective socioeconomic status measures provide better insight into the psychological experience of affluence or deprivation (Kraus et al., 2012) and their consequences (e.g., on health, see Cohen et al., 2008; Singh-Manoux et al., 2003; Adler et al., 2000).

However, we contend that neither objective nor subjective socioeconomic indicators, even combined, capture the full essence of economic vulnerability. Indeed, one may imagine an individual belonging to the middle-income group (i.e., not objectively considered as "poor"), and perceiving themselves as having a high socioeconomic status (i.e., subjectively better off compared to others) who suddenly faces unexpected expenses due to an aversive life event thereby becoming subject to the harmful psychological consequences of economic vulnerability. Conversely, one may imagine an individual belonging to the low-income group and perceiving themselves as having a low socioeconomic status (i.e., subjectively worse off compared to others) but living such a modest lifestyle that they would not chronically psychologically suffer from the harmful consequences of economic vulnerability (Tang et al., 2004). In these cases, relying solely on income indicators and a subjective socioeconomic status measures would fail to capture the full psychological nuances of these individuals' economic experiences.

Understanding economic vulnerability therefore involves acknowledging that the experience of lacking money is not solely determined by objective resources such as income,

even when assessed alongside traditional measures of subjective status. It is also crucial to consider the subjective perception of a lack of money which is shaped by one's lifestyle, needs and aspirations (Hagenaars, 2014). It then requires to operationalize economic vulnerability 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).

The Economic Scarcity Framework

While quantifying the objective aspects of economic insufficiency may be reasonably straightforward (e.g., using an income-based threshold to characterize poverty, although this may be the subject of debate, see Gordon, 2006), capturing the perceptual and psychological dimension of economic insufficiency may prove more elusive. The scarcity perspective suggests that economic insufficiency is based on subjective needs and should then 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 an economic scarcity mindset. Importantly, 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), including reduced lower life satisfaction, increased negative affects, anxiety-depressive symptoms, a diminished sense of control, a heightened preference for immediate rewards, and risk aversion (Amir et al., 2018; Liu

& Fu, 2022; Sommet et al., 2018; Sommet & Spini, 2022).

Various scholars have explored the concept of economic scarcity (e.g., Cannon et al., 2019; Goldsmith et al., 2020; Tully & Sherma, 2022). While they have touched upon different features of this construct, two aspects stood out as particularly prevalent and critical and as we developed our scale: (i) the evaluative aspect and (ii) the experiential aspect.

First, the evaluative aspect of economic scarcity is directly linked to the definition in the above paragraph and stems from recognizing "a discrepancy between one's current level of resources and a higher, more desirable reference point" (Cannon et al., 2019, p. 105). As such, this aspect involves a process through which individuals assess the adequacy or inadequacy of their economic resources relative to one or more reference points (e.g., Goethals & Darley, 1977). We know from the literature on achievement motivation that individuals typically assess self-attributes such as competence, economic position, or even subjective income, using one of two standards of evaluation (for theoretical work, see Elliot, 1999; for work relevant to the economic domain, see Gilbert et al., 2023; Sommet et al., 2019). On the one hand, individuals can assess their resources as sufficient or insufficient based on a task-based standard, which in our case means determining whether their resources are inferior (scarcity) or superior (abundance) to their needs (i.e., an absolute reference point). On the other hand, individuals can assess their resources as sufficient or insufficient based on an other-based standard, which in our case means determining whether they are worse-off (scarcity) or better-off (abundance) on this dimension than others (i.e., a relative reference point). However, we also know that the standards used by individuals are not necessarily cognitively accessible and may be implicit (Elliot, 1999), meaning people might also evaluate resources as sufficient or insufficient based on a general subjective sentiment.

Second, the experiential aspect of economic scarcity refers to the cognitive (e.g., thoughts) and affective (e.g., emotions) dimensions associated with economic scarcity (Haushofer & Fehr, 2014; Mani et al., 2013; Shah et al., 2018). Previous research has demonstrated that economic scarcity manifests in both intrusive (e.g., those related to money) and negative (e.g., worries) thoughts (see De Bruijn & Antonides, 2020; Johar et al., 2015; Shah et al., 2012, 2018). Individuals with low incomes tend to experience a higher frequency of rumination regarding their financial situation (Johar et al., 2015), and the pervasiveness of such rumination is considered indicative of the central role that money plays in the mental lives of those with limited financial resources (Shah et al., 2018). In this context, negative thoughts reflect both a cognitive state of uncertainty and an affective state of anxiety concerning both current and future financial situations (De Bruijn & Antonides, 2020; Netemeyer et al., 2017). Previous work has highlighted the central role of uncertainty (Lichand & Mani, 2020) and stress (Haushofer & Fehr, 2014) in the affective dimension of economic scarcity.

Developing a Measure of Perceived Economic Scarcity

While the evaluative and experiential aspects appear central to defining economic scarcity – and are inherently subjective – De Bruijn and Antonides (2022) have recently 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. 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 core subjective aspects of economic 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 et al., 2020). In other words, this subscale measures something distinct from economic or material scarcity in that it does not involve the subjective evaluation 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 economic 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 economic 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. The studies were carried out from Switzerland, where the "Federal Law on Research Involving Human Beings" requires approval from a competent ethics committee only for research collecting objective health data. Since none of our studies collected this type of data, they were, by default, exempt. However, all studies adhered to the 1964 Helsinki declaration and its subsequent amendments, and informed consent was secured from each participant.

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 *evaluative* (i.e., the process of assessing the economic situation) aspects of economic scarcity and the *experiential* (i.e., the subjective or personal experience of being economically scarce). We submitted this pool of items to participants, and we analyzed their responses using a principal component analysis and exploratory factor 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, with exceptions only in additional analyses. (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; for the PESS scores as a function of sample characteristics, see Table S1 in Supplementary Materials).

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*. Following this, 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 (Mullainathan & Shafir 2013; Shah et al., 2012). As outlined in the Introduction, scarcity involves evaluating one's economic situation as scarce (the evaluative aspect) and experiencing the lack of money as worrying (the experiential aspect). Consequently, we developed a scale with half of the items focusing on one aspect, and the other half focusing on the other aspect.

We followed Clark and Watson's (1995, 2019) recommendations on creating an item pool. To prevent our item pool from being excessively homogenous, we generated a comprehensive set of items that explored the various sub-aspects of economic scarcity. Specifically, we considered the different standards individuals might use to evaluated their finances as scarce, as well as the different manifestations of experiencing scarcity as worrying (for relevant research, see Cannon et al., 2019; De Bruijn & Antonides, 2020; Mani et al., 2013; Tully & Sherma, 2022).

First, we generated 3 × 3 items measuring the evaluative aspect of economic scarcity. Drawing on the achievement motivations literature on the standards of evaluation (Elliot & Murayama, 2008; Gilbert et al., 2023; Sommet et al., 2019), we generated three items for each of

the standards one might use to 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. Drawing from the literature on the affective dimension scarcity (Haushofer & Fehr, 2014; Mani et al., 2020; Shah et al., 2018), we generated three items for each of the ways 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, χ^2 (153, N= 298) = 6250.03, $p < .001$. Second, we performed a Kaiser-Meyer-Olkin test (Kaiser, 1960). Results provided evidence 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

Factorial Structure [Aim #1]. As pre-registered, we first 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).

To further assess the structure of the scale, we conducted a non-preregistered Exploratory Factor Analysis (EFA) complemented by Horn's Parallel Analysis (Horn, 1965; Lim & Jahng, 2019). Although the practical differences between PCA and EFA are often negligible (Thompson 2004), EFA are sometimes preferred (Nájera et al., 2023). Similar to the results from the PCA, analysis of the scree plot and eigenvalues from the EFA indicated a one factor-solution (see Figure S1 in Supplementary Materials). Horn's Parallel Analysis also supported a one-factor solution, with only the first factor surpassing the 95% percentile cutoff of randomly generated data.

Item selection [Aim #2]. Our next step involved selecting items to retain from our initial pool. Among the various selection criteria used for scale development (for a detailed review, see Carpenter, 2018), we focused on the following: (i) retaining items with scores above the pre-registered cutoff of 0.65, (ii) avoiding redundancy in wording (e.g., Items 8 and 9[1] were found to be highly redundant, and only Item 8 was retained due to its shorter formulation), (iii) preventing redundancy in meaning, with the goal of capturing the unifactorial construct of economic

[1] Items 8 and 9 read as follow "My income is scarce compared to others" and "I have limited income and savings compared to others", respectively.

scarcity as comprehensively as possible, (iv) limiting the number of items to keep the scale as concise as possible. Importantly, we deliberately refrained from selecting items solely based on the strongest loadings, aiming to prevent the development of an overly narrow scale (Clark & Watson, 2019). Equally important, since the analysis revealed that participants did not discriminate between the different aspects of the original pool of items, a balanced selection was not deemed necessary. However, to adhere to criterion (iii) and ensure a comprehensive assessment of economic scarcity, we decided to retain at least one item for each of the 2 × 3 sub-aspects[2] (see Table 2). The scale demonstrated high internal consistency, with a Cronbach's alpha of .95. The final scale, including the 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 all items loaded on a single component. An EFA further corroborated this unifactorial structure. Consequently, we selected the nine most relevant items to develop the Perceived Economic Scarcity Scale.

[2] A PCA ran on the 9 item-scale showed similar results (see Table S2 in Supplementary Materials).

Table 1

Sociodemographic Characteristics of Participants Across Studies 1-3

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

Note. EV stands for "evaluative aspect" with subscripts A, OB, and SI denoting for "absolute reference point", "other-based reference point,", and "subjective impression", respectively. EX stands for "experiential aspect" with subscripts E, C, and U denoting "emotion", "cognitive", and "uncertainty", 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, unless otherwise indicated. (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 × 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 (α =

.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 (α = .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"; α = .85, *M* = 3.89, *SD* = 1.43).

Financial Satisfaction. We used the six-item scale Satisfaction with Financial Situation Scale (Hira & Mugenda, 1998). We changed the word "skills" to "ability" to ensure consistent wording throughout the items. Participants indicated their degree of satisfaction with different aspects of their financial life as money management, long-term goals, and debt level (α = .93, M = 3.61, SD = 1.67).

Economic Strain. We used 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 (α = .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 (α = .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 1). All factor loadings can be considered strong (> .60 ; Garson, 2012).

The Chi-square test for model fit yielded inconclusive results χ^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 near-satisfactory, CFI = 0.896 (i.e., just below our preregistered cutoff of CFI ≥ .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 is a standardized measure yielding more accurate empirical rejection (Shi et al., 2020), indicated adequate fit, 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 analysis, the RMSEA value is clearly above the traditional cutoff of .08 (Hair et al., 2010). A post-hoc, non-preregistered Henze-Zirkler test revealed that the multivariate normality assumption required for the Maximum Likelihood (ML) estimator was violated (Satorra, 1990), with HZ = 6.20, p < .001 (Henze & Zirkler, 1990). This finding indicated a clear non-multivariate normality at the observed variable level (i.e., individual items; see Figure S2 in Supplementary Materials), which, if overlooked, may lead to

misleading conclusions (Li, 2016). In such circumstances, it is recommended, to use the "least square" estimation method, which is designed to deal with ordinal data (Mîndrilă, 2010; Lubke & Muthén, 2004). Using the diagonally weighted least squares (DWLS) method, we observed improved fit indices[3]. Specifically, the CFI, was improved, the RMSEA became acceptable, and the SRMR remained unchanged, CFI = .99, RMSEA = .05, SRMR = .05.

To provide evidence of measurement invariance, we conducted a series of non-preregistered analyses. Specifically, we followed Putnick and Bornstein's (2016) guidelines and Chen's (2007) recommendations and examined configural, metric, scalar, and residuals invariance relative to the most commonly used demographic variables. First, we used Multiple Group Confirmatory Factor Analysis to assess scale invariance relative to key demographic categorical variable: working status and gender. The results supported the psychometric invariance properties of the scale across all four levels of invariance for participants of different genders (see Table S3 in Supplementary Materials), and working statuses (see Table S4). Second, we used Local Structural Equation Models (Olaru et al., 2020; Robitzsch, 2020) to assess scale invariance relative to two additional key continuous demographic variables: age and subjective-socioeconomic status. Results supported the psychometric invariance properties of the scale across all four levels of invariance for participants across ages (see Table S5), and subjective socio-economic status (see Table S6 and Figure S3).

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

We conducted five two-factor CFAs to compare perceived economic scarcity with each

[3] When different fit indices are obtained using various estimation methods, methodologists recommend prioritizing the use of the SRMR (e.g., Xia & Yang, 2019). This is because the SRMR depends solely on the parameter estimates, not on the fit function used, making it a more robust fit index (Shi & Maydeu Olivares, 2019). Importantly, in our study, the SRMR was satisfactory using both the ML and DWLS estimators.

of the "competing" constructs (Baggozi and Philips 1982; Rönkkö & Cho, 2020). 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, χ^2 (1, N = 600) = 251.80, p <.001, personal relative deprivation, χ^2 (1, N = 600) = 425.19, p < .001, financial satisfaction, χ^2 (1, N = 600) = 893.17, p <.001, economic strain, χ^2 (1, N = 600) = 634.89, p <.001, and financial anxiety, χ^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) = .67, p <.001, financial satisfaction, r(598) = -.79, p <.001, economic strain, r(598) = .77, p <.001, and financial anxiety, r(598) = .79, p <.001, but not subjective social status, r(598) = -.07, p = .10. This provides

evidence of convergent validity (see Table 4 for the full correlation matrix).

Discussion

In Study 2, a CFA confirmed the factorial structure of the PESS. While the indices were only partially adequate with the ML estimator, they were fully adequate when using the DWLS estimator to account for the violation of the multivariate normality assumption. It is important to note that the non-multivariate normality of the individual items does not equate to non-normality of the overall Perceived Economic Scarcity scores. Moreover, model comparison analysis indicated that the PESS measured a construct distinct from subjective social class, personal relative deprivation, financial satisfaction, economic strain, and financial anxiety (i.e., providing evidence of discriminant validity).

However, the PESS was significantly correlated to four of these measures. On the one hand, the large size of some of these associations could be understood as partial construct overlaps. Given that the PESS captures both evaluative and experiential aspects, it seems reasonable that both financial anxiety (i.e., reflecting the evaluation of one's financial situation as worrisome) and economic strain (i.e., reflecting the experience of difficulties in making ends meet) strongly correlate with our measure of perceived economic scarcity ($r \approx .75$-$.80$). On the other hand, these associations could be interpreted as evidence of convergent validity. In essence, while the strong associations between the perception of economic scarcity and other constructs may indicate shared conceptual ground, these associations also indicate that the PESS is coherently correlated with scales that effectively capture both the evaluative and experiential aspects of one's financial situation

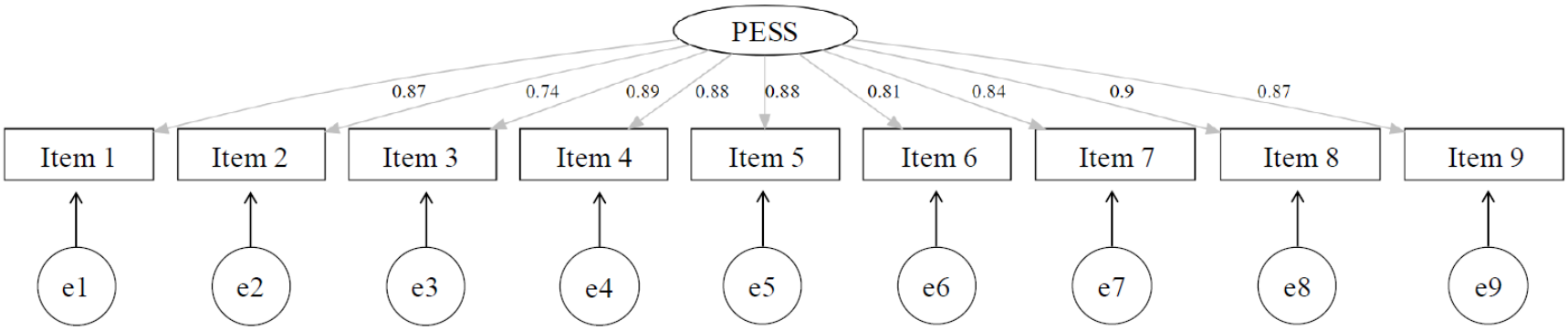
In addition, the absence of a statistically significant correlation between perceived economic scarcity and subjective social status is intriguing, especially given the intertwined

relations between different social status measures (Galvan et al., 2023; Tan et al., 2020). One plausible explanation might lie in two key factors (1) the centrality of comparative processes in the MacArthur scale, as opposed to the PESS, where only one of the eight items invokes social comparison (i.e., “My income is scarce compared to others”), and (2) the specific nature of the target of comparison, which is defined as the “community” in the present version of the MacArthur scale, whereas it is unspecified in the PESS).

Prior to conducting Study 3, we preregistered the a priori decision to exclude item 2 ("I feel the burden of missed or late payment weighing down on me") from the final scale (for evidence of the preservation of factorial validity, see Table S6 in Supplementary Materials). While the item exhibited a slightly suboptimal factor loading (i.e., .73) compared to the average loading of .87 among the other 8 items, our primary concern revolved around its relevance in capturing perceived economic scarcity among emerging adults. Emerging adults, typically aged between 20 and 30, often experience heightened financial concerns as they transition to financial independence from their parents (Otto & Serido, 2017). However, even when experiencing economic scarcity, they typically do not find themselves in situation involving missed instalments or serious payment arrears, especially during their student years. This suggest that Item 2 may have limited diagnostic value for this demographic group.

Figure 1.

Factorial Structure of the Perceived Economic Scarcity Scale with Factor Loadings



Note. The DWLS estimator was used to address issues related to non-multivariate normality; the fit indices are CFI = .99, RMSEA = .05, SRMR = .05; "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	***p***
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).

Table 4

Correlations Matrix Between the Six Variables of Interest

Variable	1	2	3	4	5
Perceived Economic Scarcity (1)	1.00				
Financial Anxiety (2)	.79***	1.00			
Personal Relative Deprivation (3)	.67**	.64***	1.00		
Subjective Social Status (4)	-.07	-.05	-.08*	1.00	
Financial Satisfaction (5)	-.79***	-.68***	-.54***	-.02	1.00
Economic Strain (6)	.77***	.60***	.54***	.04	-.77***

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

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). The analytical sample size was sufficient to detect as effect as small as $\beta = .07$ with a power of .80 (for the sensitivity analysis, see Figure S4 in Supplementary Materials).

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 scale as validated in Study 2, except for item 2 that was removed *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*; α = .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*; α = .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”; α = .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 et al., 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

Preliminary Analysis – Confirming the Factorial Structure of the Scale

As in Study 2, we conducted a CFA to validate the structure of the scale. The Henze-Zirkler test once again revealed that the multivariate normality assumption was violated, HZ = 9.00, $p < .001$. As before, while a CFA yielded mixed results when using the ML estimator, all fit indices were acceptable when using the DWLS estimator to account for the violation of the assumption, CFI = .99; RMSEA = .06; SRMR = .05. This confirms the factorial structure of the PESS scale excluding the conceptually problematic item 2 used in the previous studies (see Table S8 in Supplementary Materials).

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-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. The assumptions of

linear regression were met (see the markdown script for visual inspection and details in OSF). Importantly, multicollinearity between PESS and income was not a concern in the six analyses (VIFs < 3).

Consistent with our predictions, the PESS score significantly predicted all outcome variables (see Table 5). Specifically, higher levels of economic scarcity were associated with lower satisfaction with life, $\beta = -0.54$, $t = -18.45$, $p < .001$, lower affect balance, $\beta = -0.41$, $t = -13.05$, $p < .001$, more anxiety-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 S9 in Supplementary Materials), when using untransformed rather than log-transformed household equivalized income (Table S10 in Supplementary Materials), and when no variables were controlled for (Table S11 in Supplementary Materials).

Table 5

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 6 (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-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 indicates 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 categorical control variables were not dichotomized (e.g., workers vs others; see Table S12 in Supplementary Materials), when using untransformed rather than log-transformed household equivalized income (Table S13 in Supplementary Materials), and when no variables were controlled for (Table S14 in Supplementary Materials).

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 6 (right part), the conclusions from the analysis were consistent with our previous findings, indicating that the PESS has higher predictive validity than poverty status.

Table 6

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

	Comparison with Income			Comparison with Poverty Status		
Outcome	df	*F*	*p*	df	*F*	*p*
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.

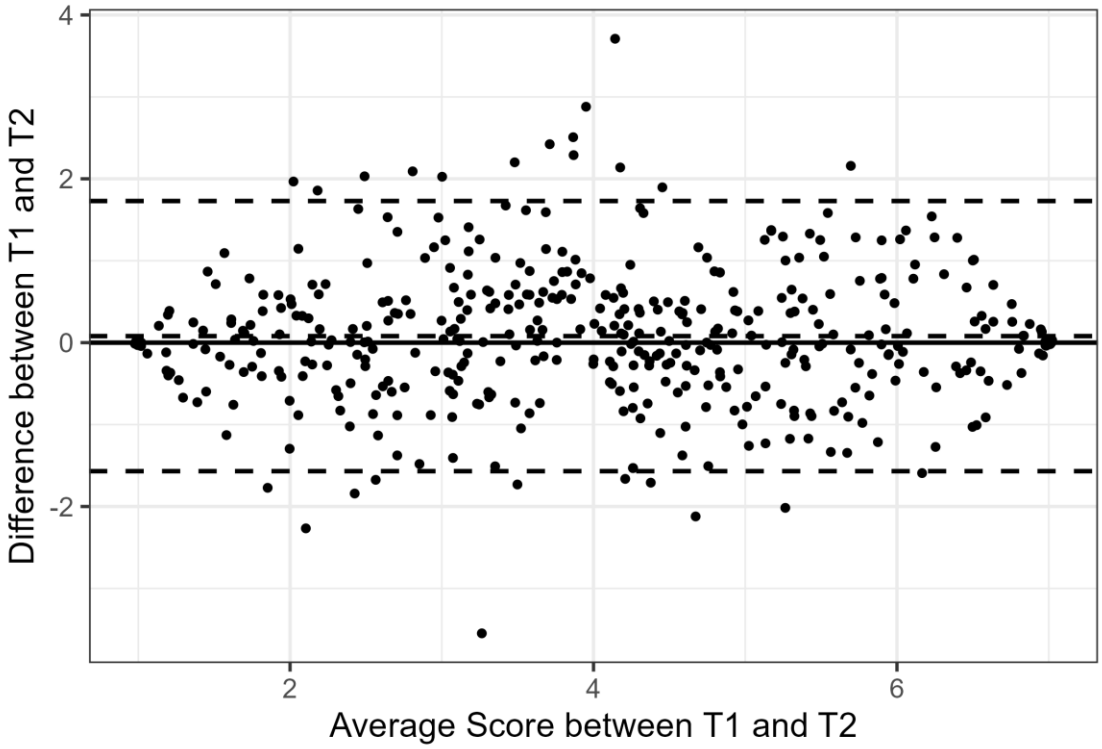
Supplementary Analysis – Further Assessment of Construct Validity and Reliability

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. As preregistered, we built two regression models, one focusing on weekly paid individuals (N = 411), and another focusing on monthly paid individuals (N = 258). Participants who were retired, unemployed, studying, or had unorthodox payment frequency (i.e., bi-weekly) were dropped from this analysis (N = 317). 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 2 for the Bland-Altman plot). This provides further evidence of the reliability of the PESS.

Figure 2.

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 +/- 1.96 SD).

Discussion

Study 3 yielded four key findings. First, a series of regression analyses provided evidence of 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. However, it is important to highlight that for this analysis, the sample had to be divided into two subsamples, the magnitude of the effects was modest, and the *p*-values were close to the alpha level. These factors suggest that further research, using larger and more homogeneous sample in terms of pay frequencies, is necessary to gain a better estimation of the effect in the general population. Fourth and finally, 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.

Summary of the Findings

First, Studies 1 and 2 demonstrated and confirmed the single-factor structure of the PESS. Items focusing on the evaluative aspect of economic scarcity (perceiving having not enough) and those focusing on the experiential aspect of economic scarcity (worrying about not having enough) belong to the same factor. This underscores the intertwined nature of perceiving and feeling economic insufficiency.

Second, Study 2 indicated that the PESS had excellent discriminant validity against five competing constructs. These findings underscore the unique contribution of the PESS in capturing the subjective experience of economic scarcity. In particular, the PESS stands apart from related concepts, especially the most commonly used subjective socioeconomic indicators in the literature, namely the MacArthur Scale.

Third, 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.

Fourth, the results from Study 3 indicated 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.

Fifth and finally, 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 its subjective dimension.

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).

Comparing the Predictive Utility of the PESS with Income and Poverty Metrics

The finding that perceived economic scarcity predicts psychological outcomes better than income itself carries significant conceptual and methodological implications for the economic

vulnerability research. It suggests that subjective measures focused on the core concept of economic sufficiency provide additional information to objective measures in understanding the psychological and behavioral consequences of economic vulnerability. This finding emphasizes the importance of distinguishing between the factual experience of financial hardship 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. It should be noted, however, that the superiority of the PESS over income is contingent upon the specific set of psychological variables we selected. Its superiority could also reflect the involvement of psychosocial processes different from those underlying the effects of income. Future research could more systematically compare the relative predictive utility of perceived economic scarcity to income while focusing on a more comprehensive range of outcome variables and the processes underlying the relationships.

Limitations and Conclusion

Four limitations should be acknowledged. First, all participants in this research were from the U.S. The experience and consequences of economic scarcity has been studied in multiple non-WEIRD (Western, educated, industrialized, rich, and democratic) contexts, including India (Mani et al., 2013), Colombia (González-Arango et al., 2021), and other countries in the Global South (Sommet & Spini, 2022). While we do not necessarily anticipate critical variation in the predictive utility of the PESS across cultures, further research remains important to confirm the

validity of the PESS in different cultural settings.

Second, we did not investigate the influence of the broader social context in which individuals are nested. For instance, previous works have underscored the role of income inequality in the experience of economic hardship (Jachimowicz et al., 2020), and how income inequality interacts with economic scarcity in predicting psychological outcome (Sommet et al., 2018). In addition, recent work suggests that examining how economic inequality is perceived, rather than solely focusing on objective measures, could advance our understanding of the psychology of inequality (Willis et al., 2022). For instance, just as objective economic inequality may shape individuals' perception of their position within society (e.g., see Andersen & Curtis, 2014; Kim & Sommet, 2023; Zhao, 2012), it is also possible that subjective economic inequality may influence perceived economic scarcity. Further research could investigate how environmental factors, particularly income inequality and its perception, affect the predictive utility of the PESS or the PESS itself.

Third, while we provided evidence that the PESS measures a construct distinct from other related constructs, we also observed that the PESS scores were strongly correlated with such measures. Although these correlations can be interpreted as evidence of convergent validity, it is important to note that some of them were notably high, at times exceeding .70. Hence, researchers interested in isolating the variance specifically accounted for by economic scarcity as measured by the PESS may want to control for close constructs.

Finally, upon comparing the predictive strength of the PESS with that of poverty status, we found that our scale better predicts affective and cognitive outcomes. That said, our findings should not be interpreted as signifying that economic scarcity is a sufficient condition for poverty. Scarcity may not be exclusively experienced by those at the bottom end of the economic

distribution, and might also affect – at least episodically – wealthier individuals.

Despite these limitations, our study demonstrates the validity and reliability of the PESS as a tool for assessing perceived economic scarcity. We believe this will lay the groundwork for gaining a deeper insight into the complex psychological consequences associated with feelings of economic insufficiency.

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

4. I am struggling to pay my bills and other essentials

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 was removed for Study 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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