Article

Measuring Subjective Inequality: Development and Validation of the Perceived Economic Inequality Scale (PEIS)

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Abstract

The main goal of the present research is to develop and validate the Perceived Economic Inequality Scale (PEIS), an instrument measuring individuals' perceptions of economic inequality at the national level. The study was conducted on a representative sample of the Italian population ($N = 1,446$, 51% women). The factorial structure of the scale was assessed through cross-validated exploratory-confirmatory factor analyses. To inspect the PEIS psychometric properties, item and correlation analyses were performed. The results showed that the PEIS is a valid and reliable unidimensional measure of perceived economic inequality at the national level. Further support of the PEIS construct validity was provided by the correlation of the scale score with the perceived wage gap and ideological beliefs like the economic system justification, social dominance orientation, meritocratic beliefs, and participants' political orientation. Crucially, multigroup confirmatory factor analysis supported configural, metric, and scalar invariances of the scale across socio-demographic groups. The PEIS allows researchers to assess the subjective component of economic inequality by also serving as a useful tool for unpacking the psychological correlates of perceived inequality.

Keywords: economic inequality; Italian population; Perceived Economic Inequality Scale (PEIS); perceived wage gap; subjective inequality

Economic inequality is increasing in most regions of the world (Ahmed et al., 2022; Pickett & Wilkinson, 2015). Of concern is that larger income differences in a society increase the prevalence of most health and social problems that tend to occur mainly lower down the social ladder (Wilkinson & Pickett, 2017). Negative outcomes related to greater income inequality include lower well-being, higher mental illness, and mortality rates (Kondo et al., 2009; Rufrancos et al., 2013). In Italy – the context of the current research – findings showed that the negative effects of higher income inequality occur primarily in Southern areas of the country (i.e., low-income provinces), suggesting that income inequality is more detrimental for disadvantaged population categories (Materia et al., 2005). In addition, results from cross-national studies showed that, among Italian regions, income inequality has a strong negative impact on health and life expectancy (De Vogli et al., 2005; Tsimbos, 2010).

Despite the relevance of these results, it is important to note that all the studies reported above examined the impact of economic differences by focusing on the objective component of inequality, namely the macro-level indicators representing the uneven distribution of income or wealth in a population. Examples of such indicators are the Gini coefficient (i.e., an indicator of the gap in the income distribution; Gini, 1921) and the interquintile share ratio (i.e., the ratio of total income received by the richest 20% of a population to that received by the poorest 20%). Objective inequality highlights how people are impacted by having different income or wealth levels than others. However, objective conditions alone are insufficient to fully comprehend the consequences of inequality (e.g., Gimpelson & Treisman, 2018). Understanding the psychological impact of inequality requires consideration of its subjective component, which is the individual-level factor that concerns how individuals perceive economic disparities. Indeed, as previous literature demonstrated, indicators of perceived inequality are often stronger predictors of various psychological outcomes than objective indicators (e.g., Gáspár et al., 2023; Singh-Manoux et al., 2003; Vezzoli, Valtorta, et al., 2023). For example, Niehues (2014) found that the indicator of subjective inequality explained a larger fraction of the variations in judgments on income differences than objective indicators. Engelhardt and Wagener (2014) showed that the attitude toward resources redistribution in democratic regimes was significantly associated with the subjective indicator of inequality but not with the objective one. Through experimental studies with simulated public goods games, Nishi and colleagues (2015) showed that perceived inequality mattered more than objective economic inequality in determining overall cooperation. The significance of subjective instead of objective inequality in understanding a variety of social issues is not surprising. People's perception of inequality may be influenced by their personal characteristics, cultural and ideological backgrounds, which cannot be captured considering objective inequality. Thus, even though objective economic inequality can play an important role in affecting individuals' attitudes (e.g., Du et al., 2019; Payne et al., 2017; Walasek & Brown, 2015), the subjective experience of economic inequality can be more

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relevant for understanding how inequality influences people's lives and well-being (see Brown-Iannuzzi & McKee, 2019).

Despite these considerations, most of the indicators of perceived inequality used so far have often proved too difficult for respondents and prone to bias effects. Furthermore, to our knowledge, no previous research has been conducted using a measure of perceived inequality robustly validated at the national level. The study of subject inequality at the national level is particularly relevant not only for the relationship between perceived inequality and some important socio-psychological constructs (e.g., political participation and support for redistribution; see García-Sánchez et al., 2018; Vezzoli, Mari, et al., 2023) but also for the greater clarity with which people reason about this geographic unit of analysis rather than others. In this regard, Minkoff and Lyons (2019) stated that this clarity in thinking becomes opaquer as we move to lower levels of geographic analysis like the city or neighborhood, where economic contexts are less distinct, and government policies are less visible and less varied than they are between nations.

Given its relevance, the paucity of research, and the heterogeneity of the indicators used to investigate its psychological correlates (Gimpelson & Treisman, 2018; Jachimowicz et al., 2023), we believe that developing and validating a robust measure to explore perceived inequality is crucial not only for psychologists but also for anyone interested in better comprehending this complex phenomenon. Therefore, the present research aims to provide a reliable instrument to measure individuals' perceptions of national economic inequality. To reach this goal, we considered the Italian context and used a representative sample of the Italian population.

Current Measures of Perceived Economic Inequality

The most used measure of perceived inequality is that adopted by the International Social Survey Project (ISSP, 2021), a cross-national program conducting annual surveys on diverse topics, including inequality. This measure shows respondents five diagrams, with verbal descriptions, of different "types of society." Each diagram is composed of seven vertically stacked bars of different lengths. Respondents are asked which diagram and description best fit their country. The options range from "A," with small elite at the top and a large mass at the bottom, to "E," with most of the people in the upper levels of the distribution. To make this measure more interpretable, Niehues (2014) described how to compute the average perceived Gini coefficient by aggregating each bar in the five diagrams. However, this procedure has been debated for various reasons (Choi, 2019). First, the area of each bar in a diagram is designed to describe a whole picture of the perceived type of society, and thus the relative size of each bar itself is not supposed to be very meaningful. Furthermore, the diagrams illustrate different types of society, but there is little difference between them in terms of the Gini coefficient. Finally, the original measure adopted in the ISSP survey is problematic because it is unclear if it can be used as an ordinal or continuous variable.

Another way of investigating perceived inequality is through the wage gap estimation, a measure that requires people to estimate the actual and ideal salaries of a manager and an unskilled factory worker (Jasso, 2009). When using the wage gap estimation, many people have difficulty estimating how much a person earns. Thus, uncertainty promotes biased heuristics (Knell & Stix, 2017; Page & Goldstein, 2016). In this regard, Pedersen and Mutz (2019) argued that whenever people are asked to estimate a number, they rely on an "anchoring heuristic." In other words, they arrive at the answer by starting at one value (i.e., an "anchor") and then adjusting away

from it. Thus, the answer will be biased by the initial value. In addition, it has been demonstrated that these survey questions also suffer from "ratio bias," namely the perception of ratios as larger when they are communicated in terms of large (vs. small) numbers (Pedersen & Mutz, 2019). Therefore, when the ratio between a manager and an unskilled factory worker's pay is expressed in euros (e.g., €150,000 vs. €18,000), the inequality in wages might be perceived as being larger than when the same information is described as a manager making eight times as much as an unskilled factory worker.

Furthermore, some national surveys (e.g., ISSP, 2021) use a generic indicator that consists of an item regarding the existence of inequalities in a society (i.e., "Differences in income in [country] are too large"). Despite its parsimony, it is plausible that such a single item can hardly describe a complex phenomenon like the perception of inequality. In addition, this measure seems to reflect a critical assessment of income differences rather than perceived inequality (e.g., Castillo et al., 2012; Choi, 2019).

García-Castro et al. (2019) developed the Perceived Economic Inequality in Everyday Life (PEIEL) scale, an instrument asking people to use those who are part of their everyday experience as a reference group to estimate economic inequality. Some studies (e.g., García-Castro et al., 2020; 2022) demonstrated the reliability of this measure in the Hispanic context (i.e., Spain and Chile). While the PEIEL demonstrated to be a valid and reliable instrument, it is difficult to consider it as an indicator of perceived inequality at the national level. Indeed, while people rely on what or who they know to form perceptions of inequality at regional or local levels of analysis, their perceptions of their country are generally based on less personal and more mediated sources of information than their perception of their neighborhood or city (Jachimowicz et al., 2023). Thus, despite the relevance of this measure to the topic literature, it seems that the PEIEL focuses only on part of country inequality.

In a different cultural context (i.e., the U.S.), Schmalor and Heine (2022) developed the Subjective Inequality Scale (SIS), a measure of perceived economic inequality and judgments of the (un)fairness of inequality. The authors found that higher values on the SIS were associated with higher levels of depression, stress, status anxiety, and a decreased sense of horizontal trust and subjective well-being. Although this measure seems more appropriate than the PEIEL scale to investigate perceptions of inequality at the national level, it is worthwhile noticing that the SIS was validated and used only among Amazon's Mechanical Turk (MTurk) participants, namely individuals registered on the Mturk website[1] and paid for completing online studies. Several investigations (e.g., Goodman et al., 2013; Paolacci et al., 2010) have demonstrated that these samples have various idiosyncratic characteristics and cannot be considered truly representative of the country. Of relevance considering the relationships between the SIS and the variables examined by Schmalor and Heine (2022) to test the validity of the measure, Arditte and colleagues (2016) found that Mturk participants showed more clinical symptoms than traditional non-Mturk samples, especially for depression and social anxiety symptoms. Also, the severity of the symptoms was comparable to that of individuals with clinically diagnosed anxiety disorders. Crucially, results from Goodman et al. (2013) revealed that Mturk participants have attitudes toward money that differ from community samples' attitudes. Compared with non-Mturk participants, Mturk participants reported being more "tightwads"

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[1]https://www.mturk.com

(vs. "spendthrifts") and scored higher on the Material Values Scale (Richins, 2004), a measure assessing materialism and the meaning of material goods in people's lives. Therefore, we believe that the SIS reliability is still unclear.

To overcome these issues, we drew from the SIS's items (Schmalor & Heine, 2022) to develop and test a more generalizable self-report measure assessing people's perceptions of the amount of economic inequality at the national level on a representative sample of the Italian population.

The Present Study

The Perceived Economic Inequality Scale (hereafter abbreviated as PEIS), an instrument that assesses perceived economic inequality at the national level, was developed and tested as a part of a larger project investigating economic inequality in Italy (see Vezzoli, Mari, et al., 2023; Vezzoli, Valtorta, et al., 2023)[2]. To generate the items, we applied a top-down approach based on the previous literature on this topic, with a particular focus on the scale developed by Schmalor and Heine (2022). Three authors developed the list of the items and discussed the statements with all the co-authors.

On the one hand, we appreciate Schmalor and Heine's (2022) measure because it allows researchers to distinguish people's perceptions of inequality from their (un)fairness beliefs about inequality. Indeed, while some scholars demonstrated that many people find high levels of inequality to be unfair (e.g., Dawes et al., 2007), others argued that people are not opposed to inequality per se but to unfair inequality (Starmans et al., 2017). On the other hand, we believe that some of the SIS's items are somewhat ambiguous (e.g., "Almost all the money that is earned goes to only a few people"), and the instructions of the scale make unclear the level of the analysis the participants have to focus on when rating the items. As a matter of fact, Schmalor and Heine (2022) indicated that, throughout the validation procedure, participants were presented with different information across the studies. While in Study 1, the SIS asked how much inequality participants perceived in their state of residence and how unfair they found high inequality in general, in Study 2 participants were asked to indicate how high and unfair the level of inequality in their country was. Crucially, the convergent validity of this scale was not tested with a validated indicator of perceived inequality but only with a new measure specifically created by the authors for the purpose of validation. With this in mind, we developed and validated a 7-item measure assessing perceptions of economic inequality and judgments of the (un) fairness of economic inequality with a national level focus by tapping from and refocusing some core concepts of the items developed by Schmalor and Heine (2022).

Furthermore, to determine the construct validity of our scale, we examined the association between the PEIS and a different measure of perceived inequality and some constructs that have a theoretical link with economic inequality. More specifically, in addition to the actual and ideal wage gap estimation, namely the most used indicators to measure subjective inequality (see Pedersen & Mutz, 2019), we considered economic system justification, social dominance orientation, meritocratic beliefs, and political orientation. Economic system justification is the tendency to justify the economic disparities between society's members (Jost & Thompson, 2000). People high in system justification believe that the economic

system is fair (see Jost et al., 2004). Social dominance orientation refers to an individual's preference for inequality among social groups. Individuals who score high on the scale prefer hierarchical relations among groups instead of equality (Pratto et al., 1994). Finally, meritocracy refers to the belief that resources are assigned based on individual merit and that anyone can get ahead in society if they work hard (Major et al., 2007).

Previous research (e.g., Wiwad et al., 2019) has shown that people's motivations to legitimize aspects of the societal status quo (i.e., economic system justification), preferences for social hierarchy (i.e., social dominance orientation), and beliefs that hard work leads to success (i.e., meritocratic beliefs) are negatively associated with the perception of economic inequality. A consistent finding is that people who believe in the importance of meritocratic mechanisms and justify their own social and economic systems are more likely to hold positive attitudes about themselves and the systems they are embedded in, by thus perceiving inequalities as natural and necessary (Du & King, 2021; Kuhn, 2019). Furthermore, several studies indicated that people with right-wing political ideology tend to have lower inequality perceptions than left-wing individuals because they are more satisfied with the system (see García-Castro et al., 2019). Economic inequality on the national level is difficult for citizens to perceive accurately. Underestimation of true levels of inequality is commonplace (Gimpelson & Treisman, 2018; Kraus et al., 2019) and varies by demographic characteristics, ideological beliefs, and political orientation of the perceiver (Kuhn, 2019). As demonstrated by Kteily and colleagues (2017), even when they have access to identical information, individual dispositions such as the social dominance orientation and system justification affect how much inequality people perceive, with those who are motivated to defend the existence of hierarchies or the status quo perceiving less inequality. Similarly, a cross-cultural study conducted among 41 countries indicated a strong association between desired levels of economic inequality, perceptions of existing inequality, and system-justifying and meritocratic beliefs (García-Sánchez et al., 2019).

Building from these arguments, after examining the PEIS factorial structure through exploratory and confirmatory factor analyses, we explored the relationships between our scale and wage gap estimation, economic system justification, social dominance orientation, meritocratic beliefs, and political orientation. We assumed that perceived inequality would be positively associated with the actual wage gap estimation. Instead, a weak association of the ideal wage estimation with our scale of perceived inequality was expected. Indeed, a recent investigation demonstrated that the ideal wage inequality predicts attitudes toward inequality only when respondents are made aware of the actual pay ratio (i.e., a shared anchor; Pedersen & Mutz, 2019). Furthermore, to seek further evidence of validity, we expected economic system justification, social dominance orientation, meritocratic beliefs, and political orientation to be negatively linked to perceived economic inequality.

Finally, to verify whether the PEIS elicited similar responses across gender, age, regional area of residency, education, and working status groups, we tested measurement invariance through multigroup confirmatory factor analysis (multigroup CFA; Byrne et al., 1989).

Method

Sample and Procedure

A cross-sectional design was used. A representative sample of 1,497 Italians, recruited in January 2021 from an Ipsos panel, consented

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[2]Overall, the survey was composed of 36 scales and took 25 minutes to complete. All the measures, data relevant to the present study and R syntax for the analyses are available on the project's OSF page https://osf.io/q9vxm/.

to participate. Of these, we excluded respondents who did not complete the survey in its entirety (n = 51). The final sample comprises 1,446 participants (51% women; M_{age} = 42.42, SD = 12.87). The variables used for stratifying the sample were gender, age, regional area of residency (main Italian macro-areas: North-West, North-East, Center, South, Islands), education, and working status.

The study was conducted after receiving ethical approval from the Commission of the Department of Psychology for minimal risk studies (Approval No. RM–2020–346). Participation was voluntary. Informed consent was obtained before data collection. Respondents who completed the questionnaire were reimbursed for their collaboration by the external agency, according to national rules. In particular, Ipsos panel respondents earn points that can be converted into prizes, vouchers, or donations. Those who completed our questionnaire gained 150 points.

Measures

Data were collected online using the Qualtrics survey web system[3]. The order of the scales was fixed (the complete survey flow is available on the OSF webpage; see Footnote 2). The item order within each scale was randomized. Following, we provide a brief description of the measures considered in this study (the full list of the items is reported in Table S1 in the Supplementary Material on the OSF webpage; see Footnote 2).

Socio-Demographic Information

We collected information about participants' gender, age, and regional area of residency. Participants' education was assessed from 1 (*less than high school*) to 6 (*doctorate*). Households' net annual income was measured on a 5-point scale (1 = *less than €13,522*; 5 = *more than €48,255*; see Istituto Nazionale di Statistica [ISTAT], 2020). Finally, working status and job prestige were assessed using the recommendations provided by Istituto Carlo Cattaneo (Gentili, 2018). Working status was measured by asking participants to indicate their status among six options (i.e., *employed, unemployed and in search, unemployed and not in search, retired, full-time university student*, and *never worked*). Instead, job prestige was assessed on a scale ranging from 1 (*Low*) to 3 (*High*). Table 1 summarizes the sample characteristics.

Perceived Economic Inequality Scale (PEIS)

The scale assesses perceived economic inequality at the national level through seven items, some of which were drawn from previous research (i.e., Schmalor & Heine, 2022). Three items aimed to measure the perception of economic inequality (e.g., "In Italy, there are few very rich people and many very poor people"). The left four items aimed to measure perceived (un)fairness of inequality (e.g., "It is not at all fair that there are large differences in income between rich and poor people"). All items were answered on a 5-point Likert scale (1 = *strongly disagree*; 5 = *strongly agree*).

Wage Gap Estimation

The actual wage gap estimation was measured by asking participants to indicate the average's monthly salary of the person on the highest rung of a typical Italian company as opposed to the employee on the lowest rung of the same company (see Jasso, 2009). The score of perceived actual wage inequality was computed

[3]https://www.qualtrics.com

Table 1. Sample Description by Socio-Demographic Characteristics

Variable	Value
Gender	
Female	742 (51.31%)
Male	701 (48.48%)
Other	3 (0.21%)
Mean age (*SD*)	
From 18 to 65 y/o	42.42 (12.87)
Education	
Less than high school	116 (8.02%)
Professional diploma	106 (7.33%)
High school diploma	973 (67.29%)
Bachelor's degree	104 (7.19%)
Master's degree	131 (9.06%)
Doctorate	16 (1.11%)
Regional area of residency	
North-West	383 (26.48%)
North-East	281 (19.43%)
Centre	289 (19.99%)
South	334 (23.10%)
Islands	159 (11.00%)
Working status	
Employed	760 (52.56%)
Unemployed and in search	251 (17.36%)
Unemployed and not in search	132 (9.13%)
Retired	123 (8.51%)
Full-time university student	142 (9.82%)
Never worked	38 (2.62%)
Job prestige	
High	196 (13.55%)
Medium	630 (43.57%)
Low	438 (30.29%)
Missing [a]	182 (12.59%)
Income	
Less than 13,522 €/year	341 (23.58%)
Between 13,522 and 20,425 €/year	368 (25.45%)
Between 20,425 and 29,739 €/year	336 (23.24%)
Between 29,739 and 48,255 €/year	307 (21.23%)
More than 48,255 €/year	82 (5.67%)
Missing	12 (0.83%)

Note. [a] The data for 180 participants is missing because full-time university students and those who have never worked were not asked for additional job information.

as the logarithmic ratio between these two magnitudes (see Jasso, 2009; Willis et al., 2015). Complete equality is represented by a ratio of 0 (M = 1.27, SD = 0.43; manager: min = €1,000, max = €9,500; unskilled worker: min = €750, max = €1,600). The ideal wage gap

estimation evaluated the average monthly salary that the person on the highest rung of a typical Italian company should ideally receive as opposed to what a person on the lowest rung of the same company should ideally receive. The score was computed following the same procedure described above (Jasso, 2009; Willis et al., 2015) (M = 0.62, SD = 0.36; manager: min = €1,000, max = €5,000; unskilled worker: min = €1,000, max = €2,400). Outliers were identified using the Median Absolute Deviation method (i.e., a case with a MAD higher than three is considered an outlier) as the wage estimations do not normally distribute (Leys et al., 2013). In total, 429 (29%) responses were removed from the actual wage gap estimation and 346 (24%) from the ideal wage gap estimation[4].

Economic System Justification

The Italian version of the economic system justification scale (Caricati, 2008) was used in an abridged form, as we only used the six items with the highest factor loadings. Items (e.g., "Social class differences reflect differences in the natural order of things") were answered on a 5-point scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Following preliminary analysis (see the Supplementary Material on the OSF webpage; see Footnote 2), we removed two items because they worsened the psychometric properties. Unlike the original version of the scale, the results of the PCA indicated a two-factor solution. Based on the meaning of the items, the first factor was related to the fairness of the actual economic system (explained variance 37%; M = 2.32, SD = 0.84). Instead, the second factor comprised those items that refer to the perceived difference between the rich and the poor (explained variance 36%; M = 2.81, SD = 0.86). The factors, named "fairness" and "rich vs. poor," reached a discrete level of reliability (α =. 65 and. 61, respectively). The higher scores on the "fairness" factor, the more individuals believe that the actual system is fair. The higher the score on the "rich vs. poor" factor, the more individuals believe that class differences are natural.

Social Dominance Orientation

The short version of the social dominance orientation scale was used (Pratto et al., 2013). The measure comprised four items (e.g., "We must not push for equality for all groups") which were answered using a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Results of the PCA confirmed the unifactorial solution (explained variance 54%; see the Supplementary Material on the OSF webpage; see Footnote 2). In our sample, the scale showed good reliability (α =. 72). The social dominance orientation score was computed by averaging the items (M = 2.23, SD = 0.74).

Meritocratic Beliefs

The beliefs about how much hard work is rewarded and how much people are perceived to deserve their success were measured by using items developed from prior research (e.g., Day & Norton, 2020; Jost & Hunyady, 2005). The scale comprised six items (e.g., "Getting ahead is a matter of working hard and relying on you"). Participants responded using a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Results of the PCA confirmed the unifactorial solution (explained variance 48%; see the Supplementary Material on the OSF webpage; see Footnote 2). The scale showed good reliability (α =. 78). The score of meritocratic beliefs was computed by averaging the items (M = 3.25, SD = 0.67).

[4]We conducted correlation analysis also considering the outliers. The results are roughly the same as reported here.

Political Orientation

Political orientation was measured on a single-item scale ranging from 1 (*extreme left*) to 9 (*extreme right*) borrowed from previous research (Kroh, 2007) (M = 4.92, SD = 1.72).

Analytical Approach

The analyses that involved variables with missing data were performed using the list wise deletion, as the percentage of missing data is very low (i.e., less than 2.84% in each variable with missing) and, thus, inconsequential on the goodness of the results (Bennet, 2001).

An exploratory-confirmatory cross-validation strategy was applied to evaluate the PEIS factorial structure (Hoyle & Panter, 1995). We randomly divided the sample into two halves. One sub-sample (n = 723, 50% women, M_{age} = 42.42, SD = 13.04) was employed to examine PEIS dimensionality through exploratory factor analysis (EFA). The other sub-sample (n = 723, 53% women, M_{age} = 42.43, SD = 12.72) was used to test the replicability of the factor model through a confirmatory factor analysis (CFA). Gorsuch (1983) recommended never including less than 100 participants and a minimum of five participants per measured variable for factor analysis. Based on these guidelines, the sample size within the split-half sample was more than adequate.

Before conducting the EFA, preliminarily Kaiser-Meyer Olkin test (KMO) and the Bartlett test of sphericity were used to examine data factorability. For the EFA, the scree-plot examination and parallel analysis (Keeling, 2000) were used to select factors. Parallel analysis plots the eigenvalues computed from the actual data against the eigenvalues extracted from random data that matches key characteristics of the actual data. The factorial structure resulting from the EFA was validated through a CFA. Given the ordinal nature of the PEIS items, we used the Diagonal Weighted Least Squares (DWLS) for estimating model parameters (see Mîndrilă, 2010). To assess CFA model fit, we considered the Comparative Fit Index (CFI), Tuker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The CFI and TLI are both incremental fit indices that assess the improvement in the fit of a model over that of a baseline model with no relationship among the model variables; larger values indicate better model fit (> .90 good fit and > .95 excellent fit; van de Schoot et al., 2012). The RMSEA provides information about "badness of fit," with lower RMSEA values indicating good model fit (< .05 good fit, between .05 and .08 acceptable model fit, > .10 poor model fit; Hu & Bentler, 1999). The SRMR is a measure of the mean absolute correlation residual, with smaller values suggesting good model fit (< .08 good fit; Hu & Bentler, 1999) (see also Kline, 2010).

Internal consistency was computed using omega and Cronbach's alpha coefficients. As additional indicators of internal consistency, we computed the Alpha if Dropped (AiD) and Omega if Dropped (OiD) indices. The Corrected Item-Total Correlations (CITC) were computed as indicators of item discrimination. CITCs with a value greater than .30 were considered acceptable (Wang et al., 2007).

Potential ceiling and floor effects were measured by calculating the percentage of participants indicating the minimum and maximum possible scores on the PEIS. Ceiling and floor effects are considered to be absent if less than 15% of respondents achieved the lowest or highest possible total score (Streiner et al., 2015; Terwee et al., 2007).

The PEIS construct validity was evaluated by correlating its score with the scores of the actual and ideal wage estimations, the
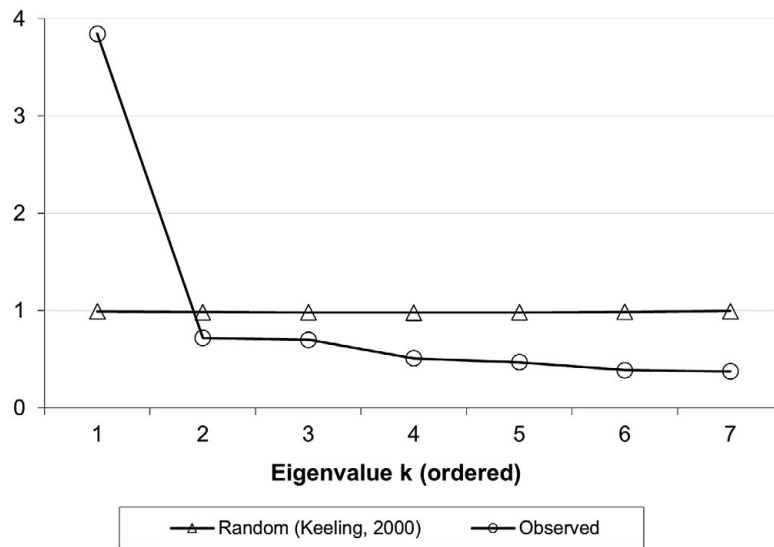
Figure 1. Parallel Analysis of Factor Components of the Perceived Economic Inequality Scale (PEIS).

two factors of the economic system justification (i.e., "fairness" and "rich vs. poor"), social dominance orientation, meritocratic beliefs, and political orientation. Correlations between these variables were estimated using Pearson's correlation.

Also, we investigated the relationship between socio-demographic variables and the PEIS score. Specifically, we performed a Pearson correlation between the PEIS score and participants' age; Spearman correlations between the PEIS score and participants' education, income, and job prestige; and Point-Biserial correlations between the PEIS score, gender, and regional area of residency, considered as a dummy variable for Southern Italy, namely the poorest macro-region of the country (see ISTAT, 2021).

Finally, to test whether our scale elicited similar responses across socio-demographic groups, we conducted a multigroup CFA, a covariance-based modeling technique that tests for the observed heterogeneity in a measurement model, or measurement invariance (Byrne et al., 1989). The first step to test measurement invariance is configural invariance, a model that tests whether the items load on the same latent factor. An RMSEA between .08 and .10 indicates marginal configural invariance (Fischer & Karl, 2019). The second step is metric invariance, a model in which the factor loadings are forced to be equal across groups. If metric invariance is met, correlation coefficients can be compared across groups. The third step is the scalar invariance, a model that constrains the item intercepts to be equal across groups. Metric and scalar invariances are reached if the change in CFI and RMSEA between models is smaller than .01 and .015, respectively (Cheung & Rensvold, 2002).

Data analyses were performed using R Version 4.1.2 (2019). We utilized the nFactors package (Raiche & Magis, 2020) for the EFA, lavaan package (Rosseel, 2012) for the CFA, and epmr package (Talbano, 2018) for item analysis.

Results

Cross-Validated Exploratory and Confirmatory Factor Analysis

To examine the PEIS factor structure, we first performed an EFA to identify the number of factors and the items factor loadings. Bartlett's test of sphericity was significant ($\chi^2 = 2635.92$; $df = 21$, $p < .001$), and the KMO index of sampling adequacy was 0.90, indicating that the data were suitable for factor analysis. Based on the scree-plot of eigenvalues (the seven eigenvalues were: 3.85, 0.72, 0.70, 0.51, 0.47, 0.39, and 0.37), the EFA suggested a one-factor solution. Parallel analysis was conducted and confirmed a single factor structure was appropriate (see Figure 1). The factor explained 55% of the total variance, which exceeded the recommended 50% for a meaningful factor solution (Floyd & Widaman, 1995). Items' factor loadings ranged from .64 to .80 and communalities between .41 and .64 (see Table 2), all exceeding the recommended threshold for an acceptable solution (Child, 2006; Guadagnoli & Velicer, 1988).

The CFA, carried out on the second half, found that the one-factor model produced a good fit to the data (CFI = .998; TLI = .997; RMSEA = .022, 90% CI [0.00, 0.045]; SRMR = .037). Factor loadings were all high and consistent: All items exceeded the factor loading cut-off value of .40 (Stevens, 2012) (see Table 2). Following these analyses, we computed an overall score of perceived economic inequality by averaging the PEIS items ($M = 3.95$; $SD = 0.71$). Higher scores indicated a greater perception of economic inequality at the national level.

Reliability

The omega and Cronbach's alpha coefficients of PEIS for internal consistency were very good ($\alpha = .86$; $\omega = .86$). The elimination of items did not result in neither an increase in alpha nor omega, and the CITCs were all above the considered threshold, further suggesting good internal consistency and, also, good item discrimination (see Table 3).

Ceiling and Floor Effects

Ceiling and floor effects were examined for the PEIS total score. No significant floor and ceiling effects were observed as both the percentages (0.0007% and 0.06%, respectively) were far below the recommended thresholds (i.e., 15%; Streiner et al., 2015; Terwee et al., 2007).

Construct Validity

Correlation analysis was performed to examine the PEIS construct validity (see Table 4). The PEIS score was found to have a positive correlation with the actual wage gap estimation ($r = .21$, $p < .001$),

Table 2. Exploratory and Confirmatory Factor Analysis of the Perceived Economic Inequality Scale (PEIS)

	Exploratory analysis	
	Factor loading	Communality
1	.80	.64
2	.75	.56
3	.64	.41
4	.77	.59
5	.72	.53
6	.79	.62
7	.71	.51
Explained variance	55%	
Confirmatory analysis		
Factor loading		
1	.76	
2	.69	
3	.57	
4	.73	
5	.66	
6	.75	
7	.65	
Model fit indices		
TLI	.997	
CFI	.998	
RMSEA [90% CI]	.022 [.00, .045]	
SRMR	.037	

which suggests that individuals who perceived more economic inequality at the national level also perceived larger differences in wages. Instead, the PEIS score was weakly associated with ideal wage inequality ($r = .06$, $p = .050$).

In line with our assumptions, the PEIS score was negatively associated with the fairness of the economic system ($r = −.57$, $p < .001$), social dominance orientation ($r = −.50$, $p < .001$), and, to a smaller extent, meritocratic beliefs ($r = −.11$, $p < .001$) (Table 4). These results indicate that the more individuals perceived economic inequality, the less they considered the existing economic system as

fair and group hierarchies as legitimate. Furthermore, the more participants perceived economic inequality, the less they believed that hard work leads to success. In addition, the PEIS was found to have low-to-moderate negative relationships with the "rich vs. poor" dimension of the economic system justification scale ($r = −.23$, $p < .001$) and the political orientation ($r = −.26$, $p < .001$). These results indicate that, on the one hand, the more individuals perceived economic inequality at the national level, the less they considered the rich vs. poor differences as justifiable. On the other hand, individuals who perceived lower economic inequality showed a political ideology more oriented toward the right-wing.

Relationship between the PEIS and Socio-Demographic Information

As shown in Table 4, we found that the PEIS score had a small positive relationship with participants' age ($r = .09$, $p < .001$) and a weak association with the dummy variable for Southern Italy ($r = .05$, $p = .050$). Furthermore, the PEIS score was found to have a small negative relationship with job prestige ($r = −.07$, $p = .019$). Although the correlations are low, these results indicate that older individuals and those who live in the Southern areas of the country perceived more economic inequality. In addition, our results indicate that respondents engaged in more skilled jobs perceived less economic inequality. Participants' gender, education, and income did not correlate with the PEIS score (all $ps > .05$).

Multigroup Confirmatory Factor Analysis

To test measurement invariance across socio-demographic groups, we considered the variables used by Ipsos for stratifying our sample (i.e., gender, age, regional area of residency, education, and working status). As shown in Table 5, results of this analysis showed overall support for configural, metric, and scalar invariances, supporting the use of the PEIS, the comparison of correlations, and the comparison of means across each of our sample group.

Discussion

Although the literature on economic inequality is growing, most empirical studies has focused on the impact of objective economic inequality (e.g., Rufrancos et al., 2013; Wilkinson & Pickett, 2017). Only recently, psychologists and economists have considered the role of perceived economic inequality (e.g., Kuhn, 2019; Vezzoli, Valtorta, et al., 2023; Vezzoli, Mari, et al., 2023). The present study sought to contribute to this new line of research by developing and

Table 3. Analysis of the Items of the Perceived Economic Inequality Scale (PEIS)

Item	M (SD)	Skewness	Kurtosis	CITC	AiD	OiD
1. Today, in Italy, there is a lot of economic inequality.	4.16 (0.85)	−0.90	0.55	.704	.830	.832
2. In Italy, there are few very rich people and many very poor people.	4.01 (0.95)	−0.79	0.16	.609	.842	.845
3. In Italy, the real opportunities for success in life are available only to rich people.	3.63 (0.99)	−0.48	−0.24	.541	.852	.855
4. A high level of economic inequality is extremely unfair.	4.15 (0.94)	−1.05	0.77	.665	.834	.838
5. It is unfair that the chances of success depend on where a person grew up.	3.92 (0.97)	−0.81	0.33	.603	.843	.847
6. It is not at all fair that there are large differences in income between rich and poor people.	3.90 (1.00)	−0.72	0.02	.683	.831	.835
7. It is extremely unfair that children of wealthy parents get a better education.	3.87 (1.01)	−0.65	−0.08	.592	.845	.849

Note. AiD = Alpha if the item is Dropped; OiD = Omega if the item is Dropped; CITC = Corrected Item-Total Correlations. The items in Italian are available on the project's OSF page: https://osf.io/q9vxm/

Table 4. Relations between the Perceived Economic Inequality Scale (PEIS) and the Other Variables Included in the Study

Variable	N	1	2	3	4	5	6	7	8	9	10	11	12	13
1. PEIS		–												
2. Actual wage gap	1156	.21***	–											
3. Ideal wage gap	1156	.06*	.54***	–										
4. ESJ Fairness	1446	−.57***	−.15***	−.02	–									
5. ESJ Rich vs. poor	1446	−.23***	−.04	−.008	.26***	–								
6. SDO	1446	−.50***	−.13***	−.03	.47***	.38***	–							
7. Meritocratic beliefs	1446	−.11***	.001	.06**	.09***	.30***	.11***	–						
8. Political orientation	1405	−.26***	−.04	−.005	.26***	.26***	.34***	.17***	–					
9. Gender[a]	1443	.04	−.04	−.13***	.01	.004	−.02	−.01	.02	–				
10. Age	1446	.09***	.12***	.10***	−.08**	−.10***	−.11***	−.03	−.02	−.06*	–			
11. Regional area [South][b]	1446	.05*	−.02	−.07**	−.02	.01	.001	.04	.001	−.03	−.05	–		
12. Education	1446	.003	.03	.13***	.005	−.05*	.03	.001	−.06*	.001	−.09***	.007	–	
13. Income	1434	−.01	.07**	.20***	−.0006	−.02	−.04	.13***	−.03	−.13***	.12***	−.13***	.23***	–
14. Job prestige	1246	−.07*	.04	.13***	.06*	−.03	.07*	.04	−.02	−.14***	.17***	−.08	.35***	.28***

Note. ESJ = Economic System Justification; SDO = Social Dominance Orientation.
[a]0 = Male, 1 = Female. Those who identified themselves as "Other" (*n* = 3) were discarded from the analysis.
[b]0 = Other, 1 = South.
* *p* ≤ .05. ** *p* < .01. *** *p* < .001

Table 5. PEIS Measurement Invariance

Type of invariance	CFI	RMSEA	ΔCFI	ΔRMSEA
Gender				
Configural invariance	.970	.074		
Metric invariance	.969	.069	0.002	0.005
Scalar invariance	.963	.069	0.005	0.000
Age				
Configural invariance	.956	.091		
Metric invariance	.951	.087	0.005	0.004
Scalar invariance	.948	.084	0.003	0.004
Regional area of residency				
Configural invariance	.960	.087		
Metric invariance	.949	.085	0.011	0.002
Scalar invariance	.946	.079	0.004	0.006
Education				
Configural invariance	.969	.076		
Metric invariance	.967	.071	0.002	0.005
Scalar invariance	.965	.068	0.003	0.003
Working status				
Configural invariance	.969	.077		
Metric invariance	.971	.067	0.002	0.009
Scalar invariance	.967	.066	0.004	0.002

Note. For age, we used the median (43 years) as the cut-off value to create two groups: "young" and "adults." Instead, for education and working status, we created sample groups using the coding scheme adopted by Ipsos. For education, we created two groups (i.e., "high" vs. "low-medium") distinguishing between respondents with a university degree (bachelor's degree, master's degree, doctorate) or not (less than high school, professional diploma, high school diploma). For working status, we differentiated "active" respondents (employed, full-time university student) from "inactive" respondents (unemployed and in search, unemployed and not in search, retired, never worked).

validating a revised scale that aims to measure individuals' perception of economic inequality with a focus at the national level. Importantly, this validation study was conducted on a representative sample of the population. Previous research (e.g., García-Castro et al., 2019; Schmalor & Heine, 2022) used different and often context-specific measures to investigate the subjective experience of economic inequality. As a result, research has produced several conflicting findings regarding subjective perceptions of inequality. Depending on how researchers operationalize this construct, people have been shown to both underestimate (e.g., Kiatpongsan & Norton, 2014) and overestimate its scope (e.g., Chambers et al., 2014). This variety of findings reflects a lack of consensus regarding the conceptualization of subjective perceptions of inequality, highlighting the need to develop a scale examining how people perceive national economic disparities. Through this research, we provided a reliable instrument that allows researchers to assess the subjective component of economic inequality and unpack the psychological correlates of perceived inequality.

Contrary to other existing measures (e.g., wage gap estimation; see Pedersen & Mutz, 2019), the PEIS was developed to be free of bias effects – such as the anchoring heuristic – and less prone to producing outliers. It is worth noting that, in the current research, we had to remove several responses from the actual and ideal wage gap estimates because these evaluations did not distribute normally. This result confirms the problematic nature of the wage gap indicator and the difficulty many respondents have in estimating how much a person earns. Crucially, unlike other scales whose items were created for the specific cultural context in which the measures originated, the PEIS was developed to be less context-dependent to make its use easier in other cultural contexts beyond the Italian one. Other measures used to investigate perceived economic inequality have often considered specific country-related aspects (e.g., health services; see García-Castro et al., 2019), thus making the scales not fully applicable to other cultural contexts. Even if a cross-cultural validation is needed, we believe that our items, with their wording

and focus on the national level of analysis, can be considered an important tool to reliably investigate the subjective experience of economic inequality. These characteristics make our measure an important starting point for a greater understanding of national perceived inequality. By better comprehending the social and behavioral causes and consequences of subjective perceptions of inequality, researchers can contribute to a higher degree to ongoing public discussions regarding inequality and how we can best address it.

The present findings revealed that our scale is a valid and reliable unidimensional measure of perceived inequality. The CFA of the seven PEIS items confirmed the one-factor solution provided by the EFA. It is noteworthy that we did not find evidence for the distinction between perceived economic inequality and the (un)fairness of inequality. One possible reason for this result might be the time when the data were collected (i.e., January 2021), namely throughout the COVID–19 pandemic. The coronavirus emergency has touched nearly every individual on the planet by exacerbating inequality perceptions and altering beliefs about poverty and support for economic inequality. Through a longitudinal study spanning April 2019 to May 2020, Wiwad and colleagues (2021) found that only those who most strongly recognized the negative impact of COVID–19 on the economic situation reported greater opposition to inequality and support for government intervention in helping the poor. Considering their and our results, it is possible that this pandemic and its effects on society have affected people's perceptions of inequality by making perceived inequality less easily distinguishable from perceived unfairness of and opposition to economic inequality. Despite this unexpected finding, item analysis demonstrated an overall good internal reliability and consistency of our scale. Crucially, through multigroup CFA, we found overall support for configural, metric, and scalar invariances across socio-demographic groups, indicating that correlation coefficients and means can be safely compared across these samples and bringing further support to the validity of our scale.

The PEIS construct validity was established through a series of correlations which showed that the PEIS score had the same patterns of associations with the economic system justification, social dominance orientation, meritocratic beliefs, and political orientation as those found in previous research involving different indicators of subjective inequality. The PEIS rating was negatively associated with the two dimensions underlying the economic system justification, namely the perceived fairness of the actual economic system and the perceived legitimacy of the difference between the rich and the poor. This finding reflects a common result reported in the literature, according to which individuals who tend to legitimize the existing social order have weaker perceptions of economic inequality and consider inequalities as necessary (e.g., Du & King, 2021; Wiwad et al., 2019). Likewise, the negative association between perceived inequality and social dominance orientation is in accordance with the findings reported by several scholars (e.g., Schmalor & Heine, 2022). Similarly, the negative link between the PEIS score and meritocratic beliefs replicates previous research demonstrating that high perceived inequality is linked with reduced beliefs that hard work can get anyone ahead (e.g., Heiserman et al., 2020). In addition, the PEIS score was negatively associated with respondents' political orientation, indicating that individuals who perceived lower economic inequality lean toward the right wing. Our finding is consistent with other investigations showing that left-wingers view the current social system more negatively (Schlenker et al., 2012) and general economic conditions more pessimistically (Chambers et al., 2014) than

conservatives. Crucially, we found that the PEIS score correlated with the actual wage gap estimation and, to a lesser extent, with ideal wage inequality, contributing to the convergent and the discriminant validity of the PEIS. The moderate correlation between our scale and the actual wage gap underlines the importance of and contributes to the debate about measurement choice in research on this topic (e.g., García-Castro et al., 2019). Recent research has shown indeed that these two facets of perceived economic inequality have differential impacts on outcomes like diverse types of political action (Vezzoli, Mari, et al., 2023).

Finally, we explored the relationship between PEIS scores and socio-demographic information. Our results indicated that respondents engaged in more skilled jobs reported a lower score of perceived inequality by replicating other studies that found negative associations between social class and perceived economic inequality. Some scholars (Evans & Kelley, 2004; Irwin, 2018) stated that the combination of reference groups and social indicators (e.g., income, education, or job prestige) form the understanding of economic inequality by also impacting how people perceive economic differences. Furthermore, although the correlations were small, we found that older individuals and those from the Southern areas of Italy reported higher perceptions of inequality. These results enrich the literature on economic inequality and its effects in the Italian context. Previous investigations demonstrated that elderly living in the South of Italy represent the subgroup most vulnerable to unequal distribution (Materia et al., 2005). Our findings add a tile to this picture by providing an understanding of inequality perceptions among the most disadvantaged segment of the Italian population (ISTAT, 2021).

The practical implications of having a measure, such as the PEIS, open the possibility of exploring the effects of perceived economic inequality and judgments of (un)fairness of inequality. By recognizing the relevance of the measure developed by Schmalor and Heine (2022) to the literature on economic inequality, we elaborated on their key concepts to develop and test a measure assessing people's perceptions of economic inequality and judgments of (un)fairness of inequality with a larger focus at the national level on a representative sample of the Italian population. Only a few investigations have examined the role of perceived (un)fairness of inequality and most of them agree that the perceived (un)fairness of economic inequality is a more powerful predictor than the objective level of inequality (e.g., Akbaş et al., 2019; Oishi et al., 2011; Vezzoli, Valtorta, et al., 2023). For example, Dare and Jetten (2021) found that those who believe inequality to be fair are less likely to endorse helping those in need. Further, perceived fairness of inequality is positively associated with life satisfaction. Despite the relevance of these findings, most of the studies have used generic indicators consisting of a single item (e.g., "Do you think the current income distribution nationwide is fair?") to assess the perceived (un)fairness of inequality. Our scale can help shed light on this complex belief by also providing in-depth insights into its effects on people's well-being (see also Vezzoli, Valtorta, et al., 2023).

Despite the relevance of this research, it is worthwhile noticing that the PEIS was validated in Italy throughout the COVID–19 pandemic. Future studies are needed to replicate the present findings and examine the generalizability of this instrument in different countries and during non-threatening times. In addition, it would be interesting to conduct experimental manipulations to test causal relationships between the PEIS and its possible psychosocial effects.

Considering that economic inequality is one of the main characteristics of current societies, this research aimed to describe the development and validation of a measure of perceived economic

inequality. When used in conjunction with objective indicators of inequality (e.g., the Gini coefficient), the PEIS can potentially illuminate the ways through which inequality affects us. Our hope is that this study can be useful in the long term not only to investigate people's perceptions of the amount of economic inequality but also to develop social programs and policies aimed at reducing economic differences and their associated effects.

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