

The Subjective Inequality Scale: A New Way to Measure Economic Inequality

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Abstract

Economic inequality has become a major concern for the public and policy makers alike. Measures of objective inequality have been associated with many social and health ills, but a less investigated question is whether perceptions of inequality are associated with these same problems. Toward this end, we developed and validated the Subjective Inequality Scale (SIS): a measure of perceived inequality and judgments of the (un)fairness of inequality. We generated and reduced an initial set of items, conducted an exploratory factor analysis, evaluated convergent and divergent validity and individual differences in subjective inequality (Study 1). We further conducted a confirmatory factor analysis, showed that the SIS is associated with psychological well-being and this relation is mediated by status anxiety and low trust; and showed that perceived inequality is associated with the Gini coefficient across different US states and countries (Studies 2 and 3). We also replicated some of the key findings with an international sample of six countries (Study 3), and showed that perceptions of inequality can be influenced by manipulations of inequality (Studies 4a and 4b). The SIS can serve as a useful tool for unpacking the psychological correlates of perceived inequality.

Over the last four decades, economic inequality has increased in many nations around the world (e.g., Brandolini & Smeeding, 2011; Piketty, 2014; for Statistics of inequality worldwide see Solt, 2016). Of concern is that higher levels of economic inequality have been associated with a host of social ills and health problems. For example, higher income inequality is related to higher rates of violent crime, imprisonment, teenage pregnancy, illiteracy, mental illness, obesity, and mortality, among others (e.g., Burns, Tomita, & Kapadia, 2014; Hsieh & Pugh, 1993; Messias, Eaton, & Grooms, 2011; Pickett, 2005; Wilkinson & Pickett, 2009). But while the relationship between inequality and these social and health issues has led to growing attention by researchers and the public alike, we don't yet know whether people's *subjective perceptions* of economic inequality lead to problematic health and social outcomes.

Indeed, despite the growing interest in the effects of economic inequality, currently there remains a dearth of psychological measures to study this topic (see Buttrick & Oishi, 2017). Research on the harmful outcomes of inequality has largely relied upon objective measures of economic inequality, such as the Gini coefficient (for a review see Wilkinson & Pickett, 2010). While these objective measures are of much value at documenting societal trends, by themselves they can't speak to the reasons why inequality is so reliably linked with social ills. It could be that the correlates between social ills and objective economic inequality are solely due to structural and institutional correlates of inequality; alternatively, people's perceptions of inequality, and their psychological reactions to such perceptions, might mediate these relations. Importantly, group-based objective measures of inequality do not address the important question of how much inequality individuals actually experience and whether such perceptions are themselves associated with social and health ills. A subjective, individual level measure of

perceived inequality would aid in the study of the correlates of inequality for a number of reasons, which we outline below.

(1) Relationship Between Perceived Inequality and Social and Health Problems.

Objective measures of inequality cannot help explain *why* exactly inequality has been so reliably linked to social and health problems. A subjective inequality scale could capture the extent to which perceptions are associated with various undesirable correlates. Do people who perceive more inequality than others suffer from more social and health problems? In addition to establishing this link to the psychology of the individual, such a scale could also point to potential causal relationships that could be further investigated in experimental research.

(2) Relationship between Objective and Perceived Inequality. Is there a relation between the amount of inequality in a society and people's perceptions of it? On the one hand, people's estimates of inequality seem to be remarkably poorly calibrated with actual levels of inequality. For example, overall Americans grossly underestimate the degree of wealth inequality (Norton & Ariely, 2011), particularly at the top end of the income distribution (Osberg & Smeeding, 2006; Kiatpongsan & Norton, 2014; but see Eriksson & Simpson, 2012, 2013). On the other hand, the income distributions that people select as characterizing their own society predict their support for redistributive policies (Engelhard & Wagener, 2014; Gimpelson & Triesman, 2017). A measure of subjective inequality could further address the extent to which people's perceptions of inequality are accurate and identify individual differences in this accuracy (or lack thereof).

(3) Identifying Variations in Perceptions of Inequality Within a Specific Geographic Area. A key limitation of objective measures of inequality such as the Gini coefficient, is that the inequality being measured is based on an entire geographic area (such as a country, state, or ZIP code). It is reasonable to expect that individual's perceptions of inequality differ within any

geographic area, and relying on aggregate measures conceals this variation. Moreover, the relations between aggregate measures of objective inequality and various social and health variables could potentially be subject to the ecological fallacy, in which correlations that are observed in aggregate data differ from those observed at the level of individual data (Eberstadt & Satel, 2004; Pollet, Tybur, Frankenhuis, & Rickard, 2014).

(4) *Individual Differences and Moderating Variables Between Perceived Inequality and Social and Health Problems.* Individual differences in perceptions of inequality surely do not exist in a vacuum, and are likely predicted by other kinds of trait measures or experiences, which a self-report scale of subjective perceptions of inequality could help to identify. In addition, there are likely moderating variables (such as perhaps socioeconomic status) that influence the relations between perceived inequality and various outcomes that remain to be identified.

(5) *Separating the Effects of Perceived Inequality from Fairness Judgments.* Although people find inequality aversive (Dawes, Fowler, Johnson, McElreath, & Smirnov, 2007; Fehr, Bernhard, & Rockenbach, 2008; Kiatpongsan, & Norton, 2014; Starmans, Sheskin, & Bloom, 2017), policies to mitigate high levels of inequality do not enjoy widespread support, at least among Americans (e.g., Kelly & Enns, 2010; Kenworthy & McCall, 2008; Kuziemko, Norton, Saez, Stantcheva, 2015; Schröder, 2017; Wright, 2017; but see McCall, Burk, Laperrière, & Richeson, 2017). A key reason behind this disconnect is that people vary in how unfair they find inequality to be (e.g., Shariff, Wiwad, & Akin, 2016), and those who view inequality as fair are not particularly bothered by it (Alesina & La Ferrara, 2005; Jaime-Castillo & Marqués-Perales, 2014; Tyler, 2011). Indeed, as Starmans and colleagues (2017) suggest, people may not be bothered by economic inequality so long as it is considered fair and they further argue that it has yet to be demonstrated that humans care about economic inequality *per se*. However, even if fair

inequality doesn't concern us much in the moral sense, it is still important to consider the possibility that it could affect our psychology in other ways. Addressing this requires us to distinguish between people's perceptions of inequality and their judgments of the fairness of it.

In sum, the study of the psychological correlates and consequences of inequality would benefit by having a valid and reliable measure of people's perceptions and fairness judgments about inequality. In this paper, we describe the development and validation of such a scale.

Overview of the Present Research

The research presented here was designed with the following goals in mind: 1) to develop a self-report measure assessing people's perceptions of the amount of economic inequality in a specific geographic area and the extent to which people deem high inequality to be unfair; 2) to validate this scale psychometrically; and 3) to empirically test the extent that individual differences in perceptions of inequality are associated with different social and health problems. In a preliminary study, we administered an initial pool of 92 items to a sample on Amazon Mechanical Turk (MTurk) and reduced it to a smaller pool of 24 items. In Study 1, we further reduced the pool to a final set of 8 items, conducted an exploratory factor analysis on this set, and assessed its convergent and divergent validity. In Study 2, we conducted a confirmatory factor analysis and tested the predictive validity of the final set of items by including variables we expected to be associated with perceived inequality based on theoretical considerations. In Study 3, we replicated some of these findings across 6 different countries. We further show across Studies 1, 2 and 3 that a measure of objective inequality (i.e., the Gini coefficient) is correlated with the scale. Finally, in Studies 4a and 4b, we provide further evidence for the validity of the scale by showing that it can be affected by experimental manipulations of inequality.

Pilot Study: Initial Item Generation and Reduction

We took an inductive approach to item generation (Hinkin, 1998) whereby we developed an extensive initial set of 92 items with the goal of narrowing them down on empirical grounds. Conceptually, the items corresponded to two broad categories: perceptions of economic inequality and judgments of (un)fairness of economic inequality. The items regarding perceptions of inequality included both items that tapped into inequality of opportunity and inequality of outcome (these two categories are highly correlated; Lefranc, Pistoiesi, & Trannoy, 2008). We also created items tapping into perceptions of unfairness of inequality (regarding both the inequality of outcomes and opportunities). These items used language pertaining to the perceived fairness, justice, and morality of high levels of inequality.

We gave this initial set of 92 items to 1230 American adults on Amazon Mechanical Turk (MTurk) in exchange for \$0.50. Using two exploratory factor analyses that utilized maximum likelihood with oblimin rotations, we reduced the items to the 24 items that we used in Study 1. We selected items that loaded highly on to their respective factors, had low cross-loadings, and were not too similar in content to other items. Furthermore, we selected items that were more extreme in their wording (e.g., “Only those at the top own any wealth at all.”) over items that were less extreme (e.g., “Income differs a great deal between different economic classes.”) such that there would be more variability with respect to people’s agreement to the items.

Study 1: Scale Creation, Construct Validity, and Individual Differences

In Study 1, we used exploratory factor analysis to further reduce the number of items generated in the pilot study down to a final 8-item version of the Subjective Inequality Scale

(SIS). We further examined the construct validity of the scale by correlating the SIS with a number of other measures.

Methods

Participants

We administered a survey to 729 Americans on MTurk in exchange for \$0.50. Those participants who indicated that they had taken the survey seriously upon a binary question posed at the end of the study were retained for further analyses. This left a final sample of 679 participants (M age = 37.21, SD = 12.53; 64% female, 35% male, 1% non-binary).

Materials

Participants responded to the 24 items that were generated in the pilot study. In addition, participants completed a number of different measures to evaluate the construct validity of the final set of items. We describe our rationale for selecting these other scales, and our predictions, in the *Results and Discussion* section.

Perceptions of Inequality and Unfairness on a Ladder Scale. To seek evidence of convergent validity, participants were asked some novel items about their perceptions of inequality and fairness on a Ladder scale. For each item, participants were provided with a depiction of five different ladders for which the rungs were stretched apart to a different extent. To tap into participants' perceptions of inequality, they had to pick the ladder that they thought best represents the distribution of the following 4 resources in their state of residence: wealth, income, education and opportunity (where 1 indicates least inequality and 5 most inequality; M = 3.52, SD = 0.95, Cronbach's alpha = .83). To tap into participants' fairness judgments, 4 additional items pertaining to the same resources asked participants to indicate which ladder they would find most fair (M = 2.54, SD = 1.08, Cronbach's alpha = .91).

Support for Economic Inequality. Also, in an effort to find evidence of convergent validity, participants completed the 5-item Support for Economic Inequality Scale (Wiwad et al., 2018) which assesses the extent to which people support the current level of economic inequality on a 7-point Likert scale ranging from “strongly disagree” to “strongly agree” ($M = 2.98$, $SD = 1.33$, Cronbach’s alpha = .89).

Belief in a Just World. Participants completed the Belief in a Just World Scale (Lucas, Zhdanova, & Alexander, 2011) on a 7-point scale from “strongly disagree” to “strongly agree” ($M = 4.38$, $SD = 1.10$, Cronbach’s alpha = .95).

Moral Foundations Questionnaire. Participants took the 20-item Moral Foundations Questionnaire (Graham et al., 2008) on a 6-point scale from “not at all relevant”/“strongly disagree” to “extremely relevant”/“strongly agree”. The Moral Foundations Questionnaire assesses to which extent harm ($M = 4.70$, $SD = 0.87$, Cronbach’s alpha = .69), fairness ($M = 4.83$, $SD = 0.82$, Cronbach’s alpha = .71), loyalty ($M = 3.55$, $SD = 1.07$, Cronbach’s alpha = .68), authority ($M = 3.71$, $SD = 1.08$, Cronbach’s alpha = .74), and purity ($M = 3.74$, $SD = 1.24$, Cronbach’s alpha = .81) are considered moral domains.

Social Dominance Orientation. We administered the 16-item Social Dominance Orientation Scale (Pratto, Sidanius, Stallworth, and Malle, 1994) to participants. Participants responded on a 7-point scale from “very negative” to “very positive” ($M = 2.34$, $SD = 1.16$, Cronbach’s alpha = .95).

Noblesse Oblige. We administered the Noblesse Oblige Scale (Form A; Pratto et al., 1994). People in many societies hold the belief that the better-off should share a larger proportion of their resources with the rest of society which is sometimes referred to as *noblesse oblige*.

Participants answered items on a 7-point scale from “strongly disagree” to “strongly agree” ($M = 5.15$, $SD = 1.09$, Cronbach’s alpha = .79).

Equal Opportunity. Participants responded to the Equal Opportunity Scale (Pratto et al., 1994) on a 7-item scale from “strongly disagree” to “strongly agree” ($M = 3.75$, $SD = 1.16$, Cronbach’s alpha = .82). Greater endorsement means greater belief that everyone has equal opportunities to succeed.

Right Wing Authoritarianism. Participants also responded to a shortened 15-item version of the Right Wing Authoritarianism Scale (Zakrisson, 2005) on a 7-point scale from “strongly disagree” to “strongly agree” ($M = 3.27$, $SD = 1.11$, Cronbach’s alpha = .90).

Demographic Variables. Participants indicated their annual household income on a scale from 1 (less than \$10,000) to 13 (over 120,000) in \$10,000 increments ($M = 5.95$, $SD = 3.42$), their subjective socioeconomic status (Adler et al., 2000) on a ladder with 10 rungs where each rung represents one’s relative standing in society ($M = 4.83$, $SD = 1.64$), their political orientation calculated as the mean of their view on social and economic issues on a 7-point scale from “very liberal” to “very conservative” ($M = 3.55$, $SD = 1.61$, $r = .74$, $p < .001$), and their religiosity on a 7-point scale from “not religious at all” to “very religious” ($M = 3.61$, $SD = 2.21$).

This study, and the others that follow, all received ethical approval from our university’s internal review board.

Results and Discussion

Exploratory Factor Analysis

We conducted an exploratory factor analysis on the 24 items with maximum likelihood and an oblimin rotation in an effort to prune down the items to a final 2-factor solution. There were 4 eigenvalues over 1. Inspection of the pattern matrix yielded 3 interpretable factors. As

expected, one factor pertained to the fairness of inequality of outcome and opportunity. However, the items tapping into perceptions of inequality were split into 2 factors: inequality of outcome and opportunity. Even though this distinction is theoretically interesting, for the purposes of this scale our goal was to tap into people’s perceptions of economic inequality encompassing both inequality of outcome and opportunity. Thus, to satisfy the dual goals of having items that cover different facets of inequality (i.e., wealth, income, and opportunity) and to have items with high loadings on their own factor and low cross-loadings, we used iterative exploratory factor analysis to merge these 2 factors into a single factor that covered both aspects of inequality. This resulted in a final set of 8 items, 4 pertaining to perceptions of inequality and 4 pertaining to fairness judgments of inequality.

A final exploratory factor analysis with an oblimin rotation using maximum likelihood on the final set of 8 items showed 2 factors consisting of 4 items each (eigenvalue 4.30 and 1.23, accounting for 53.7% and 15.4% of the variance, respectively; see SOM for scree plot and parallel analysis which indicated that a 2-factor solution fit the data best). The “Inequality” factor captures perceptions of inequality and the “Unfairness” factor assesses judgments of unfairness if inequality is high. The 2 factors were correlated with each other, $r = .64$ (the two subscales of the SIS were correlated at $r = .56$). Table 1 shows the items and their factor loadings along with the instructions that participants read.

Table 1. Results from a Factor Analysis of the 8-Item Subjective Inequality Scale (SIS)

SIS Item	Factor	
	1	2

Factor 1 (Inequality)

Almost all of the money that is earned goes to only a few people.	.67	.14
Besides those at the very top, no one else has much money at all.	.88	-.04
Real opportunities to succeed in life are only available to the wealthy.	.69	.07
Only those at the top own any wealth at all.	.85	-.03

Factor 2 (Unfairness)

It is extremely unfair if the overall amount of economic inequality is very high.	.01	.81
It is not fair at all if there are large differences in income between the rich and poor.	.05	.77
It is immoral if your income is dependent on where you grew up.	-.09	.69
It is extremely unjust if children of affluent parents get a better education.	.04	.67

Note. $N = 675$. Extraction method was maximum likelihood with an oblique (oblimin) rotation. Factor loadings above .6 are bolded.

Participants were given the following instructions: ‘Please indicate how much you disagree or agree with the following statements. We want to know how you feel about these statements. There are no right or wrong answers. When responding to these statements, please consider how well you think they describe THE STATE YOU CURRENTLY LIVE IN.’ (Note that the SIS can be adapted to any geographic region by specifying the relevant region).

Convergent and Divergent Validity

The first two columns of Table 2 show the zero-order correlations between the two subscales of the SIS and additional measures of individual differences. The next column shows the partial correlations between subjective inequality and additional measures of individual difference controlling for unfairness judgments. The rightmost column shows the partial correlations between unfairness judgments and individual difference measures controlling for

subjective inequality. Correlations of $r = .08$ or higher are significant at $p < .05$ (non-significant correlations in Table 2 are in grey).

Table 2. Correlations between SIS Inequality and SIS Unfairness with Different Variables Assessing Convergent and Divergent Validity

	<i>SIS Inequality</i>	<i>SIS Unfairness</i>	<i>SIS Inequality partialing out SIS Unfairness</i>	<i>SIS Unfairness partialing out SIS Inequality</i>
<i>SIS Inequality</i>		0.56***		
<i>SIS Unfairness</i>	0.56***			
<i>Inequality Ladder</i>	0.24***	0.23***	0.13***	0.13***
<i>Fairness Ladder</i>	-0.06	-0.23***	-0.09*	-0.24***
<i>SEIS</i>	-0.49***	-0.68***	-0.19***	-0.56***
<i>BJW</i>	-0.27***	-0.33***	-0.11**	-0.23***
<i>MFQ - Harm</i>	0.17***	0.37***	-0.05	0.34***
<i>MFQ - Fair</i>	0.13***	0.39***	-0.11**	0.38***
<i>MFQ - Loyalty</i>	-0.13***	-0.18***	-0.04	-0.13***
<i>MFQ - Authority</i>	-0.21***	-0.32***	-0.05	-0.24***
<i>MFQ - Purity</i>	-0.08*	-0.12**	-0.02	-0.09*
<i>SDO</i>	-0.15***	-0.49***	0.17***	-0.50***
<i>Noblesse Oblige</i>	0.39***	0.59***	0.09*	0.48***
<i>Equal Opportunity</i>	-0.30***	-0.50***	-0.02	-0.43***
<i>RWA</i>	-0.21***	-0.37***	0.003	-0.32***

Computed correlation used pearson-method with listwise-deletion.

Note. *** < .001, ** < .01, * < .05, non-significant correlations in grey color. Abbreviations: SEIS = Support for Economic Inequality Scale, BJW = Belief in a Just World, MFQ = Moral Foundations Questionnaire, SDO = Social Dominance Orientation, RWA = Right Wing Authoritarianism.

Perceptions of Inequality and Unfairness. We had anticipated that people's choices of which ladders best captured their society would converge with the 2 subscales of the SIS. As expected, indicating that one perceived inequality to be high on the SIS was positively correlated with participants' average score on the Ladder scale ($r = .24$). Likewise, the more unfair participants found inequality as measured by the SIS, the less unequal the ladders they indicated to represent the fairest society ($r = -.23$).

Support for Economic Inequality. We had predicted that the 2 factors of the SIS would correlate with the Support for Economic Inequality scale because this scale asks how much people support inequality given that it exists (Wiwad et al., 2018). As hypothesized, perceiving high levels of inequality was negatively correlated with support for economic inequality ($r = -.49$) and judging high levels of inequality as unfair was also negatively correlated with support for economic inequality ($r = -.68$).

Belief in a Just World. We had expected that judging high levels of inequality to be unfair would be associated with less of a belief in a just world. For subjective inequality, we had no *a priori* expectations. The results showed that a belief in a just world was indeed negatively correlated with the Unfairness factor ($r = -.33$), and it was also negatively correlated with the Inequality factor of the SIS ($r = -.27$). The more inequality participants perceived and the more unfair they considered high inequality to be, the less likely they were to believe the world is just.

Moral Foundations Questionnaire. We had expected that judging high inequality to be unfair would be positively correlated with both harm and fairness moral domains, as inequality would intuitively be perceived as harmful and unfair. In addition, we expected that judging high

inequality to be unfair would be negatively associated with having moral concerns about respect for authority because people who view hierarchy as more morally justifiable would be expected to view inequality to be less unfair. We had no *a priori* expectations for the correlations between unfairness judgments and loyalty and purity, nor for any of the correlations between perceived inequality and these five moral domains. The results revealed that judgments of the unfairness of inequality was indeed positively correlated with considerations of harm ($r = .37$) and fairness ($r = .39$), and was negatively correlated with considerations of authority ($r = -.32$) as important moral domains. Unfairness of inequality was also negatively correlated with considering loyalty ($r = -.18$), and purity ($r = -.12$) as important moral domains. On the other hand, higher perceived inequality was positively correlated with considerations of harm ($r = .17$) and fairness ($r = .13$), and was negatively correlated with authority ($r = -.21$), loyalty ($r = -.13$), and purity ($r = -.08$). Hence, both perceptions of inequality and judging the unfairness of inequality are associated with all of the moral foundations, and especially with harm, fairness, and authority.

Social Dominance Orientation. We had expected that unfairness judgments would correlate negatively with social dominance because the more unfair economic inequality was considered to be, the less acceptable it would seem to be for some social groups to dominate others. While these 2 constructs concern separate domains (the individual's material circumstances vs. a social group's circumstances in general in society), they are related in that both tap into the unequal treatment of different people. We had no *a priori* expectations for the correlation between perceived inequality and social dominance. The results revealed that finding high inequality to be unfair was negatively correlated with social dominance orientation ($r = -.49$), and a similar (but smaller) negative correlation emerged between higher subjective inequality and social

dominance orientation ($r = -.15$). However, once fairness judgments were partialled out, perceptions of inequality correlated *positively* with social dominance orientation ($r = .17$).

Noblesse Oblige. We had anticipated that judging high inequality to be unfair would be associated with endorsing more of a noblesse oblige. We reasoned that one way to reduce economic inequality would be through a greater relative contribution of economic resources by people who are financially better off. We were less certain about how perceptions of inequality would correlate with the endorsement of a noblesse oblige. The results revealed that both the Inequality ($r = .39$) and the Unfairness ($r = .59$) subscales of the SIS correlated positively with this scale. The more subjective inequality participants reported, and the more unfair they considered high inequality to be, the more they endorsed the idea of a noblesse oblige.

Equal Opportunity. We had anticipated that both judging high inequality to be unfair and perceiving a lot of inequality would be negatively correlated with the belief that everyone has equal opportunities to succeed. The results revealed that both the Unfairness ($r = -.50$) and the Inequality ($r = -.30$) subscales of the SIS correlated negatively with this scale. The more subjective inequality participants reported, and the more unfair they considered high inequality to be, the more they doubted that opportunities are equal for everyone.

Right Wing Authoritarianism. Last, we expected that unfairness judgments would correlate negatively with right wing authoritarianism because this construct predicts support for a “tough” leader who would suppress any dissenting voices in society. People who judge high inequality to be unfair would seem to be unlikely to support right wing authoritarianism. We had no *a priori* expectation for the correlation between perceived inequality and Right Wing Authoritarianism. The results revealed that perceiving high inequality to be unfair was indeed negatively related with Right Wing Authoritarianism ($r = -.37$), as was subjective inequality ($r = -.21$).

Demographics and Perceptions of Inequality

Table 3 shows the correlations between the 2 factors of the SIS and different demographic variables. The table reports zero-order correlations. The results indicated that participants of lower income ($r = -.18$) and subjective socioeconomic status ($r = -.28$) perceived inequality to be higher and also tended to find high inequality to be more unfair ($r_s = -.14$ and $-.22$, respectively). This relationship is not surprising insofar as economically more vulnerable people stand to lose more from living in an unequal society, and thus may be more attuned to perceiving inequality compared with those who are economically better off. The results also revealed that people who identify as politically conservative perceived less inequality ($r = -.33$) and found higher levels of inequality to be less unfair ($r = -.55$). Age also related to the SIS, in that older participants perceived less inequality ($r = -.11$) and found inequality to be less unfair ($r = -.09$). There was no correlation between gender and subjective inequality ($r = -.03$), but women marginally tended to find high levels of inequality to be more unfair than men ($r = .07$). Last, people who are more religious perceived less inequality ($r = -.24$) and found inequality to be less unfair ($r = -.20$). Together, these results suggest that perceptions of inequality and judgments of unfairness differ based on one's position and role in society.

Table 3. Correlation SIS Inequality and SIS Unfairness with Different Demographic

Variables

	<i>SIS Inequality</i>	<i>SIS Unfairness</i>
<i>SIS Inequality</i>		0.57***
<i>SIS Unfairness</i>	0.57***	
<i>Income</i>	-0.18***	-0.14***
<i>Subjective socioeconomic status</i>	-0.28***	-0.22***

<i>Conservatism</i>	-0.33***	-0.55***
<i>Age</i>	-0.11**	-0.09*
<i>Gender</i>	-0.03	0.07 [†]
<i>Religiosity</i>	-0.24***	-0.20***

Computed correlation used pearson-method with listwise-deletion.

Note. *** < .001, ** < .01, * < .05, † < .10, non-significant correlations in grey color. Conservatism was coded as 1 = very liberal, 7 = very conservative. Gender was coded 1 = male, 2 = female.

Study 2: The SIS and Social and Health Problems

In Study 2, we conducted a confirmatory factor analysis on the SIS to determine its model fit and we tested whether perceived inequality is associated with a number of different psychological constructs that previous work has linked with objective levels of inequality.

One construct that has often been discussed in the context of economic inequality is psychological well-being. A variety of researchers have made the case that living in a more unequal society leads to lower psychological well-being (e.g., Wilkinson & Pickett, 2010). Evidence for this relation comes from a few sources: For example, economic inequality has been found to be associated with decreased happiness both in the United States (Oishi, Kesebir and Diener, 2011) and in Japan (Oshio and Kobayashi, 2011), and longitudinal analyses across 84 countries reveal a negative association between life satisfaction and inequality (Verme, 2007; but see Berg & Veenhoven, 2010; Clark, 2003; Haller & Hadler, 2006; Hirschman & Rothschild, 1973). Furthermore, objective inequality is associated with an increased risk for depression (Patel et al., 2018; see also Ahern & Galea, 2006; Cifuentes et al., 2008; Fan et al., 2011; Muramatsu, 2003; Pabayo, Dunn, Gilman, Kawachi, & Molnar, 2016; but see for example Patel et al., 2018 for a review of studies that found no association). There is also some evidence that objective measures of economic inequality are associated with an increase in anxiety disorders

(e.g., Wilkinson & Pickett, 2010), although evidence for this relationship is mixed, and some studies have failed to find an association between inequality and anxiety (e.g., Filho, Kawachi, Wang, Viana, & Andrade, 2013; Sturm & Gresenz, 2002). Furthermore, inequality has been associated with an increase in health issues more generally (e.g., Kondo, Sembajwe, Kawachi, van Dam, Subramanian, & Yamagata, 2009; Wilkinson & Pickett, 2007; 2010; see Wilkinson & Pickett, 2006; and Pickett & Wilkinson, 2015 for a review) and increased mortality (e.g., Biggs, King, Basu, & Stuckler, 2013; Elstad, 2011; Marmot & Bobak, 2000; Zheng, 2012). One potential pathway linking inequality with these health issues could be heightened stress (e.g., Pickett & Wilkinson, 2015; Wilkinson & Pickett, 2007, 2010).

While this research points to an association between objective levels of inequality and these problematic outcomes, they are unable to speak to the exact reason why they exist. Are they fully accounted for by structural changes in unequal societies or are they a psychological response to the perception of inequality? It could be that if people *perceive* more inequality, they may realize that it will be harder to climb up the ladder of the social hierarchy, and also be aware that falling down will have more negative implications. Such perceptions that the world is a more challenging and threatening place, would seem to be associated with lower levels of psychological well-being. In the present study, we explored the relations between subjective inequality and psychological well-being using a composite measure of subjective well-being, depression, anxiety, and stress.

Higher levels of economic inequality have also been linked to lower trust (e.g., Alesina & LaFerrera, 2000; Delhey & Dragolov, 2014; Rothstein & Uslander, 2005; Uslander & Brown, 2005; although see Fairbrother & Martin, 2013; Steijn & Lancee, 2011). Again, however, objective measures cannot address whether such an effect is a response to the perception of

inequality and so we tested whether subjective perceptions of inequality are similarly associated with lower trust. One possible psychological explanation concerns the potential meaning of perceiving high levels of inequality. When the rungs of the status ladder are further apart, the gains of one person come increasingly more at the cost of others (everything else being equal); that is, society becomes more of a zero-sum competition. Indeed, when inequality is higher, people compete more (Krupp & Cook, 2018). It is thus possible that trust in others would decrease when inequality is perceived to be high.

A further question we wanted to address is the relationship between perceived inequality and worries about one's place in the hierarchy. Objective levels of economic inequality and status anxiety are positively correlated (e.g., Layte & Whelan, 2014; Paskov, Gërkhani, & van de Werfhorst, 2013). Status anxiety is the preoccupation of one's position relative to others (e.g., Delhey & Dragolov, 2014). It follows that if one perceives a greater amount of inequality, then the relative differences between others are more consequential, and thus people should be more concerned about their relative status (Wilkinson & Pickett, 2010). We thus hypothesized that subjective impressions of inequality will be associated with higher levels of status anxiety.

Moreover, these three variables of psychological well-being, trust, and status anxiety would seem to be related. Both trust and status anxiety have been found to mediate the relationship between objective levels of inequality and subjective-well-being in 30 European countries (Delhey and Dragolov, 2014; see also Buttrick & Oishi, 2017; Layte & Whelan, 2014). Given these relations, we tested whether trust and status anxiety would mediate the relationship between subjective inequality and well-being. We had no clear *a priori* expectations for perceptions of unfairness of inequality for psychological well-being, status anxiety, or trust. But to account for the possibility of confounding the effects of judging inequality as unfair with

perceiving inequality, we wanted to test whether the relations between perceived inequality and these variables emerge in the predicted directions after controlling for perceived unfairness¹.

Finally, we wanted to assess whether perceived inequality as measured by the SIS would correlate with an objective inequality measure. We compared scores on the SIS with the Gini coefficient for each US state. As the number of participants for some of the states was quite low, we combined the data from Studies 1 and 2 to boost the sample size for these analyses.

Methods

Participants

American participants were recruited from MTurk and were compensated with \$0.60. A total of 1064 participants took part in the study, and those who indicated to a binary question that they had taken the survey seriously were retained for further analyses. This resulted in a final sample of 1014 participants (M age = 39.19, SD = 13.27; 62% female, 38% male).

Materials

Psychological Well-being. We created a composite variable of psychological well-being which was the average of participants' standardized responses to a measure of subjective well-being, depression, anxiety, and stress (the latter 3 were reverse scored; Cronbach's alpha = .95). The results of the individual variables that made up this composite are provided in the SOM.

To measure subjective well-being, participants were given two items adapted from the World Values Survey (Inglehart, Basañez, & Moreno, 1998): 1) 'Taking all things together, how happy would you say you are these days?' 2) 'All things considered, how satisfied would you say you are with your life these days?' Participants responded on a 10-item scale from "very unhappy/dissatisfied" to "very happy/satisfied" and responses were averaged across both items (M = 6.37, SD = 2.26, Cronbach's alpha = .93). Depression, anxiety, and stress were measured

with the 21-item Depression, Anxiety, Stress Scales (Henry & Crawford, 2005). Participants responded how much each statement had applied to them over the past week on a 4-point scale from “never” to “almost always”. The scale has a factor assessing self-reported depressive symptoms ($M = 1.72$, $SD = 0.71$, Cronbach’s alpha = .93), anxious symptoms ($M = 1.54$, $SD = 0.56$, Cronbach’s alpha = .87), and stress ($M = 1.85$, $SD = 0.62$, Cronbach’s alpha = .88).

Status Anxiety. Participants completed 2 items taken from the European Quality of Life Survey (Boehnke, 2005), which have been used in previous research on status anxiety and inequality (e.g., Delhey & Dragolov, 2014): 1) ‘I don’t feel the value of what I do is recognized by others.’ 2) ‘Some people look down on me because of my job situation or income.’ Responses were recorded on a 5-point scale from “strongly disagree” to “strongly agree” and were averaged across both items ($M = 2.93$, $SD = 1.04$, Cronbach’s alpha = .69).

Trust. Participants responded to one item from the World Values Survey (Inglehart, Basañez, & Moreno, 1998): ‘Generally speaking, would you say that most people can be trusted, or that you can’t be too careful in dealing with people?’ Responses were recorded on an 11-point scale from “can’t be too careful” to “most people can be trusted” ($M = 5.60$, $SD = 2.64$).

Subjective Socioeconomic Status. Participants chose their subjective socioeconomic status (Adler et al., 2000) on a ladder with 10 rungs where each rung represents one’s relative standing in society ($M = 5.01$, $SD = 1.77$).

Income. Participants indicated their annual household income on a scale from 1 (“less than \$10,000”) to 13 (“over 120,000”) in \$10,000 increments ($M = 6.04$, $SD = 3.42$).

Conservatism. Participants indicated their political orientation separately for social ($M = 3.37$, $SD = 1.75$) and economic issues ($M = 3.81$, $SD = 1.76$) on a 7-point scale from “very liberal” to

“very conservative.” As these were highly correlated ($r = .79, p < .001$), we combined them to create a single measure of conservatism ($M = 3.59, SD = 1.66$).

Gini. The Gini coefficient from 2016 was assigned to each state (data from the United States Census Bureau).

Results

Confirmatory Factor Analysis

We conducted a confirmatory factor analysis (CFA) using the 2 factors obtained in the previous EFA and calculated the Root Mean Square Error of Approximation (RMSEA) and the Comparative Fit Index (CFI), 2 indices of model fit. Values below .08 for the RMSEA (Browne & Cudeck, 1993) and above .90 for the CFI (Hu & Bentler, 1999) are deemed acceptable. We obtained a RMSEA of .07 and CFI of .98 suggesting adequate model fit. Furthermore, the standardized root mean square residual (SRMR) was .03. Values below .08 are considered to indicate good fit (Hu & Bentler, 1999). Thus, on average, the differences between the estimated and proposed model were small. We also calculated model fit with a chi-square test, which was significant indicating a lack of model fit, $\chi^2(19) = 107.28, p < .001$. However, with such a large sample size the difference between covariance matrix and model is expected to be significant and it is now widely recognized that other indices are better suited to assess model fit (e.g., Byrne, 2005; Revelle, 2018). Next, we computed the reliability of the scale as a whole as well as for each of the subscales. Both subscales demonstrated good reliability (Cronbach’s alpha for Inequality = .89, Cronbach’s alpha for Unfairness = .85). Since Cronbach’s alpha tends to underestimate reliability estimates when the underlying construct is not unidimensional (Revelle, 2018), we used omega in calculating reliability of the scale as a whole. Omega was .92 indicating good reliability.

Subjective Inequality and Psychological Well-being, Status Anxiety, and Trust

Even though the instructions of the SIS asked participants to consider how well the statements describe their current state of residence, we used a regression treating state as a fixed effect (as opposed to a multi-level model) because the Intraclass Correlations were essentially zero. The intercepts did not vary across the different states and for 2 of the 3 models presented below a multilevel model analysis yielded a singular fit. Even though we present the results as a OLS regression, we note that they do not differ when a multilevel model is used instead. We included perceived unfairness as covariate because we wanted to test whether any relationship between perceived inequality and the variables of interest (viz. psychological well-being, status anxiety, and trust) would remain after controlling for the perceived unfairness of inequality. We also included SES as a covariate because the effects of perceived inequality may not be equally distributed across people from different socioeconomic backgrounds and we included political orientation because attitudes toward inequality are politically charged. Finally, we also included age as covariate because it correlated both with perceived inequality and the different criterion variables. We present the zero-order correlations in the SOM.

Psychological Well-being. To test our hypothesis that more perceived inequality is associated with less psychological well-being, we regressed the composite psychological well-being score on perceived inequality, perceived unfairness, subjective SES, age, and political orientation (Table 4; see SOM for zero-order correlations of all outcome variables with the SIS). As hypothesized, the more inequality people perceived to be in their state the worse was their mental health, $\beta = -0.13$, $p < .001$, 95% CI [-0.18, -0.08], whereas perceived unfairness was not associated with mental health, $\beta = -0.03$, $p = .340$, 95% CI [-0.08, 0.03].

Table 4. Regression Predicting Psychological Well-being, Status Anxiety, and Trust from Perceptions of Inequality and Different Covariates

<i>Predictors</i>	Psychological Well-being			Status Anxiety			Trust		
	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>
(Intercept)	0.02	-0.02 – 0.06	0.437	2.93	2.86 – 2.99	<0.001	5.54	5.38 – 5.71	<0.001
Perceived Inequality	-0.13	-0.18 – -0.08	<0.001	0.19	0.11 – 0.27	<0.001	-0.25	-0.45 – -0.04	0.019
Perceived Unfairness	-0.03	-0.08 – 0.03	0.340	0.09	0.01 – 0.17	0.029	-0.16	-0.37 – 0.06	0.154
SES	0.14	0.10 – 0.18	<0.001	-0.30	-0.36 – -0.24	<0.001	0.32	0.15 – 0.49	<0.001
Age	0.27	0.21 – 0.34	<0.001	-0.19	-0.29 – -0.09	<0.001	0.56	0.29 – 0.84	<0.001
Conservatism	-0.01	-0.05 – 0.04	0.832	0.10	0.03 – 0.17	0.008	-0.38	-0.58 – -0.19	<0.001
Observations	944			944			944		
R ² / adjusted R ²	0.182 / 0.178			0.171 / 0.167			0.055 / 0.050		

Note. Psychological Well-being: $F(5, 938) = 41.76, p < .001$. Status Anxiety: $F(5, 938) = 38.76, p < .001$. Trust: $F(5, 938) = 10.85, p < .001$. SES = subjective socioeconomic status. Conservatism; higher scores indicate more conservative political orientation.

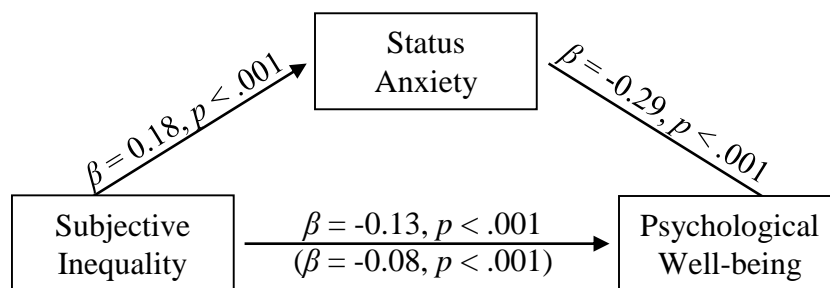
Status Anxiety. To test our hypothesis that more perceived inequality is associated with more status anxiety, we regressed status anxiety on perceived inequality, perceived unfairness, subjective SES, age, and political orientation. As hypothesized, the more inequality people perceived to be in their state the more concerned they were about status, $\beta = 0.19, p < .001, 95\%$ CI [0.11, 0.27]. People were also more concerned about status when they judged high inequality to be more unfair, $\beta = 0.09, p = .029, 95\%$ CI [0.01, 0.17].

Trust. To test our hypothesis that more perceived inequality is associated with less trust, we regressed trust on perceived inequality, perceived unfairness, subjective SES, age, and political orientation. As hypothesized, the more inequality people perceived to be in their state the less trusting they were of others, $\beta = -0.25, p = .019, 95\%$ CI [-0.45, -0.04], whereas perceived unfairness was not associated with trust, $\beta = -0.16, p = .154, 95\%$ CI [-0.37, 0.06].

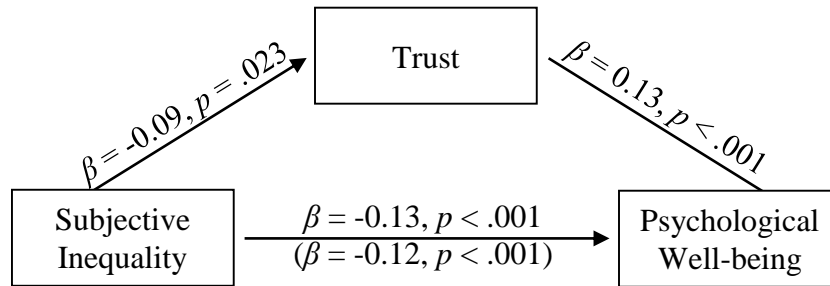
Status Anxiety and Trust as Mediators between Subjective Inequality and Psychological Well-being.

To test whether status anxiety and trust mediate the relationship between perceived inequality and psychological well-being, we ran separate analyses for each mediator. We used the SPSS macro Process version 3.3 (Model 4; Hayes, 2018) to conduct the mediation analysis. For the first mediator, status anxiety, we entered perceived inequality as predictor, psychological well-being as outcome variable, status anxiety as mediator, and perceived unfairness, SES, age, and political orientation as covariates. People who perceived more inequality worried more about their status, $\beta = 0.18, t(936) = 4.85, p < .001, 95\% \text{ CI } [0.11, 0.26]$, and people who worried more about their status reported lower well-being, $\beta = -0.29, t(935) = -14.34, p < .001, 95\% \text{ CI } [-0.33, -0.25]$. The indirect effect was significant, $\beta = -0.05, 95\% \text{ CI } [-0.08, -0.03; \text{ using } 10,000 \text{ bootstraps}]$. With the indirect effect included the relationship between perceived inequality and subjective well-being remained significant, $\beta = -0.08, t(935) = -3.48, p < .001, 95\% \text{ CI } [-0.13, -0.04]$ suggesting that status anxiety partly mediated the relationship (see Figure 1, top panel).

Figure 1. Models for the Relationship between Subjective Inequality and Psychological Well-being as Mediated by Status Anxiety and Trust



Indirect Effect: $\beta = -0.05, 95\% \text{ CI } [-0.08, -0.03]$



Indirect Effect: $\beta = -0.01$, 95% CI [-0.024, -0.001]

Note. Models for the relationship between subjective inequality and psychological well-being as mediated by status anxiety (top panel) and trust (bottom panel). Direct Effect in parentheses. Coefficients in the mediation model differ slightly from the regression models because all variables were standardized in the mediation models (whereas the outcome variables status anxiety and trust were unstandardized in the regression analyses).

For the second mediator, trust, we entered perceived inequality as predictor, psychological well-being as outcome variable, trust as mediator, and perceived unfairness, SES, age, and political orientation as covariates. People who perceived more inequality were less trusting of others, $\beta = -0.09$, $t(936) = -2.27$, $p = .023$, 95% CI [-0.17, -0.01], and people who were less trusting reported less well-being, $\beta = 0.13$, $t(935) = 6.33$, $p < .001$, 95% CI [0.09, 0.17]. The indirect effect was significant, $\beta = -0.01$, 95% CI [-0.024, -0.001; using 10,000 bootstraps]. With the indirect effect included the relationship between perceived inequality and subjective well-being remained significant, $\beta = -0.12$, $t(935) = 4.87$, $p < .001$, 95% CI [-0.17, -0.07] suggesting that trust partly mediated the relationship (see Figure 1, bottom panel).

The Gini Coefficient and Subjective Inequality

To assess whether perceptions of inequality could, in part, be predicted by the Gini coefficient, we correlated perceived inequality with the state level Gini coefficients. To have a large enough sample size for most of the states, we combined the data sets from Studies 1 and 2. We calculated these correlations in 2 different ways. First, we calculated a correlation using each

individual data point. This means that each person's score of perceived inequality is correlated with the Gini of the state the person lives in. Second, we calculated the mean level of perceived inequality for each state using the responses from all individuals living in the same state. Then these mean state scores were correlated with the Gini coefficients of the state and weighted by sample size (using the R function 'statsBy' from the 'psych' package). As shown by the correlations between perceived inequality and demographic variables, many factors influence perceptions of inequality, so if we assume that individuals within a given state are estimating the amount of inequality that exists in their state, then each individual introduces measurement error which is reduced by taking the mean of perceived inequality. The correlation between perceived inequality and the state level Gini coefficient when using all individual data points separately was $r = .075, p = .002$. When calculating the correlation from the mean level of perceived inequality per state it was $r = .35, p = .011$. Although small in magnitude, these correlations demonstrate that perceptions are partly informed by the actual levels of inequality in the environment. It is an open question what other variables account for the difference between the Gini and SIS.

Discussion

In Study 2, we conducted a CFA on the final 8-item scale and found good model fit. Furthermore, perceived inequality was associated with less psychological well-being, trust, and more status anxiety. Both status anxiety and trust partly mediated the relationship between perceived inequality and psychological well-being. These findings replicate past research that found similar associations between the Gini and well-being, status anxiety, and trust.. Furthermore, perceived inequality correlated with the Gini suggesting that people's perceptions are affected by inequality in the environment while substantial inter-individual variability exists.

Finally, fairness judgments were associated with status anxiety, but not with psychological well-being or trust in the regression models described above (although they were in zero-order correlations; see SOM).

Study 3: The SIS in 6 Different Countries

In Study 3, we replicated the relationship between perceived inequality and status anxiety and well-being across 6 different, culturally distinct countries with different levels of economic inequality. We selected matched pairs of countries from around the world. We selected high and low inequality countries, respectively, from within North America (USA and Canada), Western Europe (England and Sweden), and from countries outside of the West (South Africa and Japan). We further conducted a second confirmatory factor analysis across the total sample. Finally, we investigated whether the Gini coefficient of these countries predicts differences in perceived inequality.

Methods

Participants

A total of 842 participants from 6 different countries participated in this survey in exchange for a small amount of money (varying between 2.50 and 4.75 USD). After excluding participants who failed an attention check question (where they were asked to choose a specific response option)ⁱⁱ, the final sample consisted of 106 American participants (M age = 50.26, SD = 16.95; 52% female, 48% male), 111 Canadian participants (M age = 49.39, SD = 15.09; 50% female, 50% male), 120 English participants (M age = 48.27, SD = 15.21; 46% female, 54% male), 110 Swedish participants (M age = 33.96, SD = 12.44; 48% female, 52% male), 116 South African participants (M age = 31.65, SD = 10.89; 43% female, 57% male), and 120 Japanese participants (M age = 33.37, SD = 10.98; 46% female, 52% male, 2% non-binary).

Participants from Sweden were recruited through the online survey provider Clickworker, participants from all other countries were recruited through TurkPrime Panels.

Materials

All materials were translated and back translated by professional translators for the Swedish and Japanese samples. In all other countries, the survey was administered in English. Furthermore, in contrast to Studies 1-3, we changed the wording of the SIS instructions such that participants were asked to state how high the level of inequality/how unfair high inequality was in their country (rather than their state of residence).

Subjective Well-being. Participants responded to 2 items adapted from the World Values Survey (Inglehart, Basañez, & Moreno, 1998): 1) ‘Taking all things together, how happy would you say you are these days?’ 2) All things considered, how satisfied would you say you are with your life these days? Responses were recorded on a 10-item scale from “very unhappy/dissatisfied” to “very happy/satisfied” and averaged across both items ($M = 6.43$, $SD = 2.18$, Cronbach’s alpha = .93).

Status Anxiety. Participants completed 2 items taken from the European Quality of Life Survey (Boehnke, 2005): 1) I don’t feel the value of what I do is recognized by others. 2) Some people look down on me because of my job situation or income.’ Responses were recorded on a 5-point scale from “strongly disagree” to “strongly agree” and averaged across both items ($M = 3.03$, $SD = 1.04$, Cronbach’s alpha = .71).

Income. Participants indicated their annual household income on a scale from 1 (“less than \$10,000”) to 13 (“over 120,000”) in \$10,000 increments ($M = 4.92$, $SD = 3.21$; note that the currency and increments were adjusted for each country).

Subjective Socioeconomic Status. Participants chose their subjective socioeconomic status (Adler et al., 2000) on a ladder with 10 rungs where each rung represents one's relative standing in society ($M = 5.40$, $SD = 1.85$).

Conservatism. Participants indicated their political orientation on a 7-point scale from "very liberal" to "very conservative" ($M = 3.79$, $SD = 1.48$)ⁱⁱⁱ.

Gini. The Gini coefficient for the most recent year that was available (varying from 2015 to 2017) was assigned to each country (data from the OECD).

Results

Confirmatory Factor Analysis

We again conducted a confirmatory factor analysis using Inequality and Unfairness factors. The RMSEA was .06 and the CFI was .98, indicating adequate model fit. Furthermore, the SRMR was .03 suggesting that the error variances were small enough that there were no major differences between the estimated and proposed models. Again, the chi-square test was significant indicating a lack of model fit, $\chi^2(19) = 64.15$, $p < .001$, although we again note the limitations of this test with large samples. Both subscales had good reliability (Cronbach's alpha for Inequality = .86, Cronbach's alpha for Unfairness = .81). Omega for the entire scale was .89, thus also indicating good reliability.

Subjective Inequality, Well-being and Status Anxiety

Because the instructions of the SIS asked participants to consider how well the statements describe their country, participants are nested within country. But since we have data from only 6 countries, we treated country as a fixed effect (Bryan & Jenkins, 2016). To test whether the relationship between perceived inequality and the 2 outcome variables, well-being and status anxiety, varies by country, we included an interaction between perceived inequality and effect

codes for the different countries. We again also included perceived unfairness as a covariate because we wanted to test whether any relationship between perceived inequality and subjective well-being would remain after controlling for the perceived unfairness of inequality. We also again included SES as a covariate because the effects of perceived inequality may not be equally distributed across people from different socioeconomic backgrounds and we included political orientation because inequality is such a politically charged topic. Finally, we again included age as covariate because age varied across the different samples.

Subjective Well-being. To test whether perceived inequality is associated with less subjective well-being we regressed subjective well-being on perceived inequality, perceived unfairness, SES, age, and political orientation. We also included effect codes for 5 of the 6 countries (see Table 6 for 2 models where we change the reference group to provide an effect code for all 6 countries) and the interaction term between the effect codes and perceived inequality. As hypothesized, people who perceive more inequality were lower in subjective well-being, $\beta = -0.24, p = .006, 95\%CI [-0.41, -0.07]$ (Table 6; see SOM for zero-order correlations of all outcome variables with the SIS). The negative association between perceived inequality and subjective well-being was even more pronounced in the US than it was across all 6 countries ($\beta = -0.45, p = .006, 95\%CI [-0.77, -0.13]$) while it was statistically significantly less pronounced in England ($\beta = 0.34, p = .035, 95\%CI [0.03, 0.66]$). Perceived unfairness was not associated with subjective well-being, $\beta = 0.14, p = .098, 95\%CI [-0.03, 0.31]$.

Table 6. Regression Predicting Subjective Well-being from Perceptions of Inequality and Different Covariates

<i>Predictors</i>	Subjective Well-being Model 1			Subjective Well-being Model 2		
	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>

(Intercept)	6.39	6.25 – 6.54	< 0.001	6.39	6.25 – 6.54	< 0.001
Perceived Inequality	-0.24	-0.41 – -0.07	0.006	-0.24	-0.41 – -0.07	0.006
Perceived Unfairness	0.14	-0.03 – 0.31	0.098	0.14	-0.03 – 0.31	0.098
SES	0.94	0.80 – 1.09	< 0.001	0.94	0.80 – 1.09	< 0.001
Age	0.28	0.12 – 0.44	0.001	0.28	0.12 – 0.44	0.001
Conservatism	0.07	-0.08 – 0.22	0.363	0.07	-0.08 – 0.22	0.363
Canada	-0.06	-0.38 – 0.27	0.734			
England	0.51	0.19 – 0.83	0.002	0.51	0.19 – 0.83	0.002
Sweden	-0.31	-0.68 – 0.06	0.097	-0.31	-0.68 – 0.06	0.097
Japan	-0.38	-0.70 – -0.05	0.023	-0.38	-0.70 – -0.05	0.023
South Africa	-0.19	-0.53 – 0.15	0.276	-0.19	-0.53 – 0.15	0.276
United States				0.42	0.08 – 0.77	0.015
Perceived Inequality*Canada	-0.29	-0.63 – 0.05	0.090			
Perceived Inequality*England	0.34	0.03 – 0.66	0.035	0.34	0.03 – 0.66	0.035
Perceived Inequality*Sweden	0.12	-0.26 – 0.50	0.543	0.12	-0.26 – 0.50	0.543
Perceived Inequality*Japan	0.28	-0.02 – 0.57	0.068	0.28	-0.02 – 0.57	0.068
Perceived Inequality*South Africa	0.01	-0.33 – 0.34	0.976	0.01	-0.33 – 0.34	0.976
Perceived Inequality*United States				-0.45	-0.77 – -0.13	0.006
Observations	671			671		
R ² / adjusted R ²	0.305 / 0.290			0.305 / 0.290		

Note. $F(15, 655) = 19.20, p < .001$. SES = subjective socioeconomic status. Conservatism = higher scores indicate more conservative political orientation. Model 1: Effect codes for different countries with the US as reference group; Model 2: Effect codes for different countries with Canada as reference group; the intercept represents the unweighted grand mean, the betas for the different countries represent the mean difference in subjective well-being from the grand mean, and the interaction terms represent the difference in the slope for perceived inequality for each of the countries from the slope across all countries.

Status Anxiety. To test whether perceived inequality is associated with more status anxiety we regressed status anxiety on perceived inequality, perceived unfairness, SES, age, and political orientation. We also included effect codes for 5 of the 6 countries (see Table 7 for 2 models

where we change the reference group to provide an effect code for all 6 countries) and the interaction term between the effect codes and perceived inequality. As hypothesized, people who perceived more inequality worried more about their status, $\beta = 0.30, p < .001, 95\% \text{CI} [0.22, 0.39]$ (Table 7). This association was significantly less pronounced in South Africa ($\beta = -0.19, p = .030, 95\% \text{CI} [-0.36, -0.02]$) compared to the overall association across all 6 countries. As in Study 2, people who judged high inequality as more unfair also worried more about their status, $\beta = 0.11, p = .010, 95\% \text{CI} [0.03, 0.19]$.

Table 7. Regression Predicting Status Anxiety from Perceptions of Inequality and Different Covariates

<i>Predictors</i>	Status Anxiety Model 1			Status Anxiety Model 2		
	<i>Estimates</i>	<i>CI</i>	<i>p</i>	<i>Estimates</i>	<i>CI</i>	<i>p</i>
(Intercept)	3.04	2.97 – 3.12	< 0.001	3.04	2.97 – 3.12	< 0.001
Perceived Inequality	0.30	0.22 – 0.39	< 0.001	0.30	0.22 – 0.39	< 0.001
Perceived Unfairness	0.11	0.03 – 0.19	0.010	0.11	0.03 – 0.19	0.010
SES	-0.24	-0.32 – -0.17	< 0.001	-0.24	-0.32 – -0.17	< 0.001
Age	-0.20	-0.28 – -0.12	< 0.001	-0.20	-0.28 – -0.12	< 0.001
Conservatism	0.06	-0.01 – 0.14	0.101	0.06	-0.01 – 0.14	0.101
Canada	0.05	-0.11 – 0.21	0.542			
England	-0.09	-0.25 – 0.07	0.249	-0.09	-0.25 – 0.07	0.249
Sweden	-0.05	-0.24 – 0.13	0.588	-0.05	-0.24 – 0.13	0.588
Japan	0.07	-0.09 – 0.23	0.375	0.07	-0.09 – 0.23	0.375
South Africa	0.03	-0.14 – 0.20	0.732	0.03	-0.14 – 0.20	0.732
United States				-0.01	-0.18 – 0.16	0.921
Perceived Inequality*Canada	0.09	-0.07 – 0.26	0.273			
Perceived Inequality*England	-0.01	-0.16 – 0.15	0.947	-0.01	-0.16 – 0.15	0.947
Perceived Inequality*Sweden	-0.03	-0.22 – 0.17	0.786	-0.03	-0.22 – 0.17	0.786

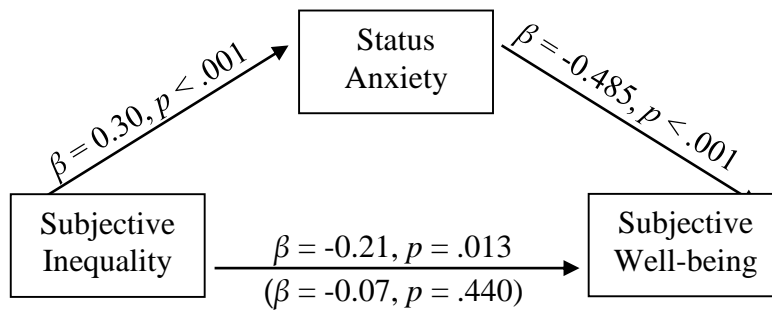
Perceived Inequality*Japan	0.09	-0.06 – 0.24	0.233	0.09	-0.06 – 0.24	0.233
Perceived Inequality*South Africa	-0.19	-0.36 – -0.02	0.030	-0.19	-0.36 – -0.02	0.030
Perceived Inequality*United States				0.03	-0.13 – 0.19	0.679
Observations	671			671		
R ² / adjusted R ²	0.250 / 0.233			0.250 / 0.233		

Note. $F(15, 655) = 14.58, p < .001$. SES = subjective socioeconomic status. Conservatism = higher scores indicate more conservative political orientation. Model 1: Effect codes for different countries with the US as reference group; Model 2: Effect codes for different countries with Canada as reference group; the intercept represents the unweighted grand mean, the betas for the different countries represent the mean difference in status anxiety from the grand mean, and the interaction terms represent the difference in the slope for perceived inequality for each of the countries from the slope across all countries.

Status Anxiety as Mediator between Subjective Inequality and Subjective Well-being

We further tested whether we can replicate the mediating role of status anxiety between perceived inequality and subjective well-being from Study 2. We used the SPSS macro Process version 3.3 (Model 4; Hayes, 2018) to conduct the mediation analysis and entered perceived inequality as predictor, subjective well-being as outcome variable, status anxiety as mediator, and perceived unfairness, SES, age, political orientation, and the effect codes for 5 countries as covariates. People who perceived more inequality worried more about their status, $\beta = 0.30, t(660) = 7.34, p < .001, 95\% \text{ CI } [0.22, 0.39]$, and people who worried more about their status reported lower well-being, $\beta = -0.48, t(659) = -6.10, p < .001, 95\% \text{ CI } [-0.64, -0.33]$. The indirect effect was significant, $\beta = -0.15, 95\% \text{ CI } [-0.21, -0.08; \text{ using } 10,000 \text{ bootstraps}]$. With the indirect effect included the relationship between perceived inequality and subjective well-being was no longer significant, $\beta = -0.07, t(659) = -0.77, p = .440, 95\% \text{ CI } [-0.24, 0.10]$ suggesting that status anxiety fully mediated the relationship (see Figure 2).

Figure 2. Model for the Relationship between Subjective Inequality and Subjective Well-being as Mediated by Status Anxiety



Indirect Effect: $\beta = -0.15$, 95% CI [-0.21, -0.08]

Note. Model for the relationship between subjective inequality and subjective well-being as mediated by status anxiety. Direct Effect in parentheses.

The Gini Coefficient and Subjective Inequality

We assessed whether perceived inequality was correlated with the Gini and we again calculated the correlation in 2 different ways (we present the mean scores below in Table 8). First, we calculated a correlation using each individual data point. This means that each person's score of perceived inequality is correlated with the Gini of the country the person lives in. Second, we calculated the mean level of perceived inequality for each country using the responses from all individuals living in the same country. Then these mean country scores were correlated with the Gini coefficients of the country and weighted by sample size (using the R function 'statsBy' from the 'psych' package). The correlation between perceived inequality and the country level Gini coefficient when using all individual data points separately was $r = .17$, $p < .001$. When calculating the correlation from the mean level of perceived inequality per country it was $r = .66$, $p = .15$. Note that the latter correlation is based on only 6 countries and needs to be replicated with a larger sample before more confident conclusions can be drawn.

Table 8. Perceived Inequality, Unfairness, and Gini Coefficients by Country

Country	Gini	Perceived Inequality	Perceived Unfairness
United States	.391	3.61	4.38
Canada	.307	3.92	4.99
England	.351	4.24	5.18
Sweden	.282	3.27	5.18
South Africa	.620	4.45	5.34
Japan	.339	4.04	5.03

The mean scores on the 2 subscales of the SIS show that Americans both perceive less inequality than other countries (with the exception of Sweden), and they also judge inequality to be less unfair. Considering that Americans tend to be psychological outliers in many respects (Henrich, Heine, & Norenzayan, 2010), it would seem important to continue to study the psychology of economic inequality across diverse cultural contexts.

Discussion

In Study 3, we replicated the results from the CFA from Study 2 across an international sample. We further showed that the relationship between perceived inequality and subjective well-being and perceived inequality and status anxiety also exists across different countries with distinct cultures. We again found that perceived inequality correlated positively with the Gini coefficient, revealing that perceptions of inequality track actual levels of inequality in the environment. However, since the above studies were all correlational, they are not able to demonstrate a causal relationship. To further explore whether perceptions of inequality are affected by information in the environment, we assessed whether people's responses to the SIS could be manipulated by presenting them with different perspectives on inequality.

Studies 4a and 4b: Manipulating Perceptions of Inequality

To investigate whether people are basing their responses to the SIS at least in part on the levels of inequality in the environment, we conducted 2 studies where participants received different experimental manipulations of inequality.

Studies 4a: Video Manipulation

We developed 2 videos about economic inequality. The first describes that inequality has increased over the last few decades and emphasizes just how pronounced current levels of inequality are, presenting evidence based on various inequality statistics regarding levels of wealth in the US as of 2010 (Piketty, 2014). The second video described how an increase in social spending over the last century has served to decrease inequality. The videos, as well as all data and materials from the studies (including the Swedish and Japanese versions of the SIS) are publicly available on the Open Science Framework and can be accessed at <https://osf.io/vpqgb/?view>

Methods

Participants

A total of 383 American participants were recruited from MTurk in exchange for \$0.50. After excluding participants who failed any 1 of 4 attention check questions or indicated that they had not taken the study seriously, the final sample consisted of 271 participants (M age = 38.22, SD = 12.99; 56% female, 42% male, 1% non-binary).

Materials

Participants watched a short video (about 90 seconds) that either emphasized that inequality was relatively high or relatively low. Then participants responded to the SIS

considering to what extent the statements apply to ‘the society they live in’. Since the video manipulation was part of another study, not all of the measures are reported here.

Results

To test our hypothesis that a video that depicts society as more unequal leads to more perceived inequality, we regressed subjective inequality on the video condition. As in the previous studies, we included SES, age, and political orientation as covariates. The high inequality condition ($M = 4.73$, $SD = 1.38$) led to more perceived inequality than the low inequality condition ($M = 4.40$, $SD = 1.43$), $\beta = 0.40$, $p = .007$, 95% CI [0.11, 0.70]. The high inequality video ($M = 5.12$, $SD = 1.40$) also lead people to view inequality as more unfair compared with those who viewed the low inequality video ($M = 4.90$, $SD = 1.33$), $\beta = 0.29$, $p = .045$, 95%CI [0.01, 0.56].

Study 4b: Bimboola Manipulation

This study explored whether a very different kind of manipulation of economic inequality would affect people’s responses to the SIS. Since the topic of inequality is something that many people have firm beliefs about, we used a hypothetical country to see if the SIS would respond to different levels of inequality in a world free from participants’ preconceptions.

Methods

Participants

A total of 224 American participants were recruited from MTurk in exchange for \$0.50. After excluding participants who failed any 1 of 5 attention check questions or indicated that they had not taken the study seriously, the final sample consisted of 111 participants (M age = 36.10, $SD = 12.66$; 69% female, 31% male).

Materials

Participants were asked to imagine they had moved to a new society called Bimboola (the materials were obtained from Sánchez-Rodríguez, personal communication; see also Sánchez-Rodríguez, Willis, & Rodríguez-Bailón, 2017). They were told that there were 3 income groups in Bimboola. In the unequal condition these income groups were 70,000; 40,000 and 3,000 Bimboolean Dollars (BD) and in the equal condition they were 50,000; 40,000 and 30,000 BD. Thus, across both conditions the overall amount of wealth was the same while the level of inequality varied. After learning about the income structure of Bimboola, all participants were informed that they had been assigned to the middle income group (40,000 BD for each condition). To strengthen the manipulation, participants then made a number of purchasing decisions for their life in Bimboola; they had to select a house, a car and a vacation spot. For each category participants saw a total of 9 options, and these varied in their apparent quality in accordance with the average salary of the income groups. However, participants could only pick between the options they could afford (those of their own income group or the income group below them). The choices for the income group participants were assigned to were identical across the 2 conditions. Thus, the only difference between conditions were the goods that people of the higher and lower income groups could afford (there was much more variance in quality in the high inequality condition compared with the low inequality one). Then participants were given the SIS and were asked to respond to the statements considering how well they described Bimboola. We also included some other measures that were part of a different study and which are not reported here.

Results

To test our hypothesis that participants who were assigned to the high inequality condition would perceive more inequality, we regressed perceived inequality on the condition of the manipulation. As in the previous studies, we included SES, age, and political orientation as covariates. The high inequality condition ($M = 4.63$, $SD = 1.27$) led to more perceived inequality than the low inequality condition ($M = 3.59$, $SD = 1.38$), $\beta = 0.96$, $p < .001$, 95% CI [0.46, 1.47], and the high inequality condition ($M = 5.21$, $SD = 1.19$) also led to more perceived unfairness than the low inequality condition ($M = 4.54$, $SD = 1.22$), $\beta = 0.64$, $p = .005$, 95% CI [0.20, 1.08].

Discussion

In Studies 4a and 4b, we further validated the SIS. We provided evidence that the construct of perceived inequality and unfairness could be influenced by manipulations of objective levels of inequality in the environment.

General Discussion

Despite the interest in the possible effects of increasing levels of economic inequality on a variety of social ills, little is known about perceptions of economic inequality and to what extent such perceptions are associated with these social problems. Most research on the effects of economic inequality has either used aggregate objective measures of inequality or manipulated inequality (e.g., Buttrick & Oishi, 2017; Côté, House, & Willer, 2015; Payne, Brown-Iannuzzi, & Hannay, 2017; Wilkinson and Pickett, 2010). The goal of this research was therefore to develop a scale to measure people's *subjective* experience of the level of inequality present as well as the extent to which high inequality is considered unfair. As described above, the SIS has good psychometric properties: it has good model fit, and the scale and its 2 factors had high reliability in a number of different contexts. Moreover, a variety of indicators point to the

validity of the SIS: it correlates with related constructs in expected ways (Study 1), it correlates with the same variables predicted by objective markers of inequality (Studies 2 and 3), it correlates with objective indices of inequality (Gini) at both the state level and international level (Studies 1, 2 and 3), and people's perceptions of inequality are influenced by manipulations of inequality (Studies 4a and 4b). The SIS can be added to the toolbox for exploring the psychological correlates and consequences of economic inequality.

Our own investigations with the SIS revealed that 2 key reasons behind the link between perceived inequality and lower psychological well-being are status anxiety and lower trust, which both partially mediated this relation. That these 2 variables have been shown to mediate the relation between the Gini and lower subjective well-being in other research (e.g., Delhey & Dragolov, 2014) is further convergent evidence for the utility of the SIS.

One strength of the SIS is that it affords explorations of individual differences in subjective inequality *within* a given area, whereas objective measures of inequality merely assign one number to an entire area to compare the effects of inequality *between* different areas. What's more, our findings reveal that people of different demographic backgrounds perceive inequality differently. For example, people of lower income or subjective SES perceived more inequality and found high inequality to be more unfair than people of higher income. Similarly, liberals perceived more inequality than conservatives. These findings may help explain why liberals are generally in greater support of policies aimed at reducing inequality such as redistributive taxation (e.g., Fingerhut, 2017) – they literally see more inequality than conservatives. These individual differences suggest that the effects of perceiving inequality may not be equally problematic across a population with some groups bearing more of the ill effects than others.

In addition, because the SIS taps into both people's perceptions of inequality and the extent to which they view high inequality to be unfair, it allows researchers to tease apart the effects of inequality from the effects of finding inequality to be unfair. This is important insofar, as Starmans and colleagues (2017) have argued, that people are not necessarily concerned about inequality *per se*, but rather by unfair inequality. However, we found that once fairness judgments were partialled out, people's inequality perceptions still reliably predicted a variety of different outcomes. This underscores how inequality has implications for our psychology above and beyond the issue of whether it is viewed as unfair. Moreover, in the case of social dominance orientation we found that perceived inequality and perceived unfairness even pulled in opposite directions with increased social dominance orientation associated with greater perceived inequality.

Limitations

One question that our findings can't yet adequately address is what leads to increased perceptions of inequality. While the modest correlations that we obtained between Gini and perceived inequality suggest that actual levels of inequality do play a limited role, it remains unclear what else these perceptions are based on. Perhaps an increasing awareness of inequality affects the ways that people think about it. As the topic of inequality becomes more widely discussed on different forms of media, people might begin to notice more inequality. Likewise, people's perceptions of inequality may be heightened when people are exposed to more variability in it – perhaps people in more economically diverse neighborhoods are more aware of inequality than those in more homogeneous ones. The SIS may be able to shed light on these kinds of questions.

Another limitation to consider is that, as a self-report measure, the SIS is only able to tap into people's conscious awareness of inequality. It can't address the ways that inequality may affect people outside of their awareness. There may well be other key psychological effects of inequality that we can see with the Gini but that cannot be measured with the SIS. Moreover, our findings do not allow us to confidently speak about causality. While it is implausible that higher levels of depression, for example, lead to an increase in the Gini coefficient, it is certainly possible that higher levels of self-reported depression cause people to perceive more inequality because their outlook on the world is bleaker. Nonetheless, when used in conjunction with more objective kinds of dependent measures, such as performance in economic games, and with other kinds of manipulations of inequality, the SIS can potentially illuminate the ways that inequality affects us. We hope that the SIS will be a useful tool that aids researchers in the study of the effects of economic inequality.

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Footnotes

ⁱ In addition to these variables, we also wanted to explore some other variables that, to the best of our knowledge, have not yet been investigated with objective measures. These variables were hope of success and fear of failure, perspective taking and empathy, hubristic pride, authentic pride, and social dominance orientation. Since these variables were more exploratory in nature, we do not include them here.

ⁱⁱ Note that participants from Japan and Sweden were not given an attention check question.

ⁱⁱⁱ Note that we included a few more demographic variables that are not reported here. The complete dataset is available on the OSF at <https://osf.io/vpqgb/?view>