

## RESEARCH ARTICLE

# Opposing effects of income inequality on health: The role of perceived competitiveness and avoidance/approach motivation

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## Abstract

Income inequality is commonly posited to elevate concerns about social status that undermine psychological health, but the empirical evidence is inconsistent. Here we propose that these inconsistencies conceal opposing processes: Income inequality prompts perceived competitiveness, which can both *negatively* predict psychological health via avoidance motivation and *positively* predict psychological health via approach motivation. First, we conducted a two-year longitudinal study (1,700+ participants from 500+ county identifiers) and provided support for our opposing processes model. Second, we conducted three pre-registered studies using an experimental-causal-chain design. We sequentially showed that induced income inequality increased perceived competitiveness (Study 2a; 444 participants), induced perceived competitiveness increased avoidance *and* approach motivation (Study 2b; 1,018 participants), and induced avoidance/approach motivation decreased/increased psychological health (Study 2c; 562 participants). These findings suggest that scholars should shift from studying the main effects of income inequality on psychological health to studying the psychological processes involved in the inequality-health relation.

## KEYWORDS

Income inequality, perceived competitiveness, avoidance motivation, approach motivation, psychological health

## 1 | INTRODUCTION

In recent years, scholars have begun to extensively investigate questions regarding the impact of income inequality on psychological outcomes (e.g., see Jetten & Peters, 2019). An idea that has become increasingly popular in the social sciences is that residing in an economically unequal locality is corrosive to one's psychological health (Pickett & Wilkinson, 2017). Generally speaking, income inequality is purported to increase status anxiety, which can lead to feelings of hopelessness, decreased levels of happiness, or lower life satisfaction (for a review, see Buttrick & Oishi, 2017).

However, the three existing systematic meta-analytic reviews on this topic reveal that the empirical evidence is, at best, inconsistent (Ngamaba et al., 2018; Patel et al., 2018; Ribeiro et al., 2017). These works showed that the meta-analytic association between income inequality and psychological health is either null (e.g., Ngamaba et al., 2018) or very small (e.g., Ribeiro et al., 2017). Perhaps most importantly, these works also showed that the heterogeneity between existing studies is extremely high, such that the percentage of the variation in findings explained by between-study differences lays between 89% (Ribeiro et al., 2017) and 98% (Patel et al., 2018). Such levels are indicative of very important inconsistencies in the literature (Higgins et al., 2003).

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In the present research, we focus on one of the key individual mechanisms that we believe may account for the observed variation in the effects of income inequality on psychological health: perceived competitiveness. We argue that income inequality does *not* exert uniform effects on psychological health. Rather, we posit that income inequality exerts opposing effects on psychological health: (i) income inequality *negatively* predicts psychological health via an increase in perceived competitiveness and avoidance motivation (focusing on the threatening possibility of failure) while, at the same time, (ii) income inequality *positively* predicts psychological health via an increase in perceived competitiveness and approach motivation (focusing on the promising prospect of success).

## 2 | INCOME INEQUALITY AND PERCEIVED COMPETITIVENESS

Income inequality has long been argued to increase the salience of economic stratification (for foundational work, see Wilkinson, 1997). In economically unequal places, the wealthiest and poorest individuals are further away from one another on the pay scale, which increases both the relevance of economic categorization (Peters et al., 2021) and the salience of economic comparison (Frank, 2013; Kawachi & Kennedy, 2006; Schor, 1998). For instance, Cheung and Lucas (2016) showed that county-level income inequality in the U.S. is associated with stronger social comparison of income (especially for low-income individuals), whereas Payne et al. (2017, Study 3) showed that induced economic inequality in the lab specifically predicts upward income comparison. As such, it is not surprising that people from more unequal places tend to develop a preoccupation with relative standing (Präg et al., 2014), pay more attention to markers of high status such as luxury brands or expensive jewelry (Walasek & Brown, 2015), and work longer hours or borrow more money to “keep up with the Joneses” (Bowles & Park, 2005; Christen & Morgan, 2005). All of these elements are assumed to breed an ethos of positional competitiveness (for relevant reviews, see Buttrick & Oishi, 2017; Rodríguez-Bailón et al., 2020; Walasek & Brown, 2019).

Recent observational and experimental research provides evidence on the link between income inequality and perceived competitiveness. Sommet et al. (2019) conducted a series of cross-sectional studies in which they asked more than 2,500 U.S. residents from nearly 2,000 zip codes to report the extent to which they perceived that individuals in their town/city compete against one another. They found that the level of local income inequality in the area of the participant (measured using the zip code-based Gini coefficient) was a robust positive predictor of perceived competitiveness ( $\beta_s \approx .20$ ; for other, consistent correlational studies, see Blake et al., 2018; Gordils et al., 2020; Sommet et al., 2022).

Moreover, Sánchez-Rodríguez, Willis, Jetten, and Rodríguez-Bailón (2019, Experiment 3) asked approximately 200 participants to imagine that they lived in a fictitious society called Bimboola. Participants were randomly assigned to one of two conditions: They were either told that the wealthiest tertile in Bimboola earned nearly 30,000% more than the poorest tertile (the high-inequality condition) or that

the wealthiest tertile earned only 30% more than the poorest tertile (the low-inequality condition). Congruent with the observational evidence, participants in the high-inequality condition pictured that the inhabitants of Bimboola were more competitive than the participants in the low-inequality condition (for comparable experimental manipulations, see Cheng et al., 2021; Greitemeyer & Sagioglou, 2017; Sánchez-Rodríguez, Willis, & Rodríguez-Bailón, 2019).

## 3 | PERCEIVED COMPETITIVENESS AND AVOIDANCE/APPROACH MOTIVATION

Income inequality scholars often assume that the consequences of perceiving others as competitive is uniformly aversive (e.g., Wilkinson & Pickett, 2017). However, from a theoretical perspective, perceiving others as competitive is conceived as a social situation that makes normative (i.e., in comparison with others) evaluation salient (Deutsch, 1949; Mussweiler, 2003; Tesser, 1988), which can prompt both avoidance motivation and approach motivation (Murayama & Elliot, 2012).

On the one hand, perceived competitiveness can be appraised as an aversive threat and prompt *avoidance* motivation (e.g., when in a disadvantaged position; Jury et al., 2019). In this case, perceived competitiveness directs behavior away from undesirable objects or outcomes, making individuals focused on avoiding failure (e.g., the risk of falling behind the competition and incurring loss; see Covington, 1992; Johnson & Johnson, 1974). On the other hand, perceived competitiveness can be appraised as an appetitive challenge and prompt *approach* motivation (e.g., when in a advantaged position; Jury et al., 2019). In this case, perceived competitiveness directs behavior toward desirable objects or outcomes, making individuals focused on the possibility of approaching success (e.g., getting ahead of the competition and achieving gain; see Jones et al., 2009; Ten Velden et al., 2011).

Murayama and Elliot's (2012) meta-analytic work provides an empirical demonstration of the double-edged consequences of perceived competitiveness. The authors identified more than 30 studies (with over 15,000 participants) testing the relation between perceived—as well as trait and structural—competitiveness and other-based goals. First, they found that competitiveness was a positive predictor of other-*avoidance* goals, namely, aversive goals focused on *not* being outperformed by others. However, they also found that competitiveness was a positive predictor of other-*approach* goals, namely, appetitive goals focused on outperforming others. Consistent with these findings, Elliot et al. (2018) reported that the higher the perceived competitiveness in a job context (Study 2) and a classroom context (Study 3), the higher participants' other-avoidance goals *and* other-approach goals.

Most pertinent to the present research, Sommet et al. (2019) showed that residing in an economically unequal locality was associated—through higher perceived competitiveness—with both avoidance *and* approach motivation. Consistent with the proposition that competitiveness can bring about aversive motivational processes, the perceptions of competitiveness stemming from income inequality

were found to elicit other-avoidance economic goals, fear of failure, and a general avoidance orientation focused on preventing negative events in one's life. However, consistent with the more counterintuitive idea that competitiveness can bring about appetitive motivational processes, the perceptions of competitiveness stemming from income inequality were also found to elicit other-approach economic goals, need for achievement, and a general approach orientation focused on achieving positive outcomes in one's life. However, this study was limited in that it used cross-sectional data and did not investigate the downstream consequences of income inequality; in the present research, we combined longitudinal and experimental data to investigate the downstream consequences of income inequality on psychological health.

#### 4 | AVOIDANCE/APPROACH MOTIVATION AND PSYCHOLOGICAL HEALTH

The idea that avoidance and approach motivation are important determinants of one's ability to function effectively can be found in various branches of the psychology of motivation (Cacioppo & Gardner, 1999; Carver & White, 1994; Elliot & Covington, 2001). Avoidance motivation is thought to entail perceptual vigilance with regard to undesirable possibilities and potential punishments, whereas approach motivation is thought to entail perceptual vigilance with regard to desirable possibilities and potential rewards (for reviews, see Corr & Krupić, 2017; Elliot & Thrash, 2002). As such, avoidance motivation tends to evoke aversive psychological processes such as threat appraisals, distraction and rumination, anticipatory anxiety, obligation-based volition, and self-protective behavior focused on surviving, whereas approach motivation tends to evoke appetitive processes such as challenge appraisals, task absorption, eagerness, opportunity-based volition, and exploratory behavior focused on thriving (Carver et al., 2000; Derryberry & Reed, 2013; Murray et al., 2008; Oertig et al., 2013; Warm et al., 2008; Williams et al., 2014). Avoidance motivation can be necessary and functional in certain circumstances, but overall it prompts processes that tax individuals' resources, particularly over time (Roskes et al., 2014; Scholer et al., 2019).

Given the processes they evoke, it is not surprising that avoidance motivation has been linked to negative psychological health outcomes and approach motivation to positive psychological health outcomes. Specifically, avoidance motivation has been shown to predict greater susceptibility to anxiety and depression, more negative affect, lower vitality, and lower life satisfaction, whereas approach motivation has been shown to predict less susceptibility to depression, more positive affect, greater vitality, and higher life satisfaction (Chen, 2015; Elliot & Sheldon, 1997; Lafrenière et al., 2016; Spielberg et al., 2011; Struijs et al., 2017; Thomsen et al., 2011; Van Dijk et al., 2013; see also Scholer et al., 2019). These links have been documented for both general orientations (e.g., temperaments, Briki, 2018; behavioral systems, Li et al., 2019) and more concrete motives and goals (e.g., sex motives, Impett et al., 2005; personal goals, Dickson & MacLeod, 2004), and have been found both across domains and within specific domains

(e.g., achievement, Tian et al., 2017; affiliation, Nikitin & Freund, 2008).

#### 5 | OVERVIEW AND HYPOTHESES

We conducted an observational study and a series of experimental studies to test the following: Income inequality is a positive predictor of perceived competitiveness, which itself is (i) an indirect negative predictor of psychological health via avoidance motivation and (ii) an indirect positive predictor of psychological health via approach motivation.

Specifically, we used two types of studies as complementary ways of testing our opposing processes model: In a first observational study, we relied on a longitudinal measurement-of-mediation approach (Spencer et al., 2005; see also Newsom, 2015) in which we simultaneously measured income inequality, perceived competitiveness, and motivations; in a follow-up series of three preregistered experiments, we relied on an experimental-causal-chain-approach (Spencer et al., 2005) in which we sequentially manipulated income inequality, perceived competitiveness, and motivations.

Regarding our observational study (Study 1), we aimed to test the complete opposing processes model at once. To overcome the shortcomings typically encountered in studies using observed measures of income inequality, we took two methodological precautions. First, we operationalized income inequality at the most local level of geographic aggregation available (thus increasing higher-level sample size). Second, we used a longitudinal design rather than a single-point cross-sectional design (thus increasing internal validity). Specifically, our study combined county-level economic data with responses from a two-year longitudinal study ( $\approx 1,700$  participants from 500+ county identifiers) to test the longitudinal effects of income inequality on perceived competitiveness, avoidance/approach motivation, and psychological health (assessed using a measure of hopelessness).

Regarding our experimental studies (Studies 2a-2c), we aimed to test each part of the opposing processes model one by one. To do so, we adopted an experimental-causal-chain design, which uses sequential experiments to investigate mediational process while establishing causality (Spencer et al., 2005). In its original form, this type of design uses a sequence of two experiments: A first experiment manipulates the predictor and measures the mediator, and a second experiment manipulates the mediator and measures the downstream outcome. Given the complexity of our model, we expanded this design and used a sequence of *three* experiments that manipulated and/or measured each of the predictor and mediator variables in an iterative manner. Specifically, in Study 2a (444 participants), we manipulated income inequality to test its causal effect on perceived competitiveness; in Study 2b (1,018 participants), we manipulated perceived competitiveness to test its causal effects on avoidance/approach motivation; and in Study 2c (562 participants), we manipulated avoidance/approach motivation to test its causal effects psychological health (assessed using two measures: the affective experience of well-being the cognitive evaluation of well-being).

**TABLE 1** Study 1: Sample demographic characteristics and descriptive statistics

Individuals	Percentage of women	79.41%
	Median Age	48.0 (14.0)
	Percentage of Whites participants	88.52%
	Percentage having a 4-year college degree or higher	78.71%
	Median annual household income (USD, thousands)	55.0 (33.0)
	Percent of workers (part- or full-time)	64.08%
Counties	Median population (in hundreds of thousands)	3.06 (1.85)
	Poverty headcount ratio	12.79%
	Unemployment rate	5.33%
	Median household income (USD, thousands)	58.8 (85.4)
	Percentage of poorly educated (below 9 <sup>th</sup> grade)	3.79%

Note: Median absolute deviations (MAD) are given in parentheses; time-varying demographic characteristics are from the Wave 1 sample.

For all four studies, all data were gathered before any analyses were conducted. Analyses were planned a priori, and all data exclusions and variables analyzed are reported. Preregistration documents, complete materials, raw data (the economic raw data, the de-identified two-year longitudinal data set, and the experimental data sets), and syntax files (Stata.do files) are available via the OSF (<https://osf.io/b4q9t/>).

## 6 | STUDY 1. RESEARCHMATCH LONGITUDINAL STUDY

The goal of our observational study was to test the full sequence of hypothesized relations, that is, whether income inequality increases perceived competitiveness over time, which both negatively predicts psychological health via avoidance motivation and positively predicts psychological health via approach motivation. This study was not preregistered.

### 6.1 | Method

Table 1 presents the sample demographic characteristics, and Table 2 presents the descriptive statistics and zero-order correlation matrix.

#### 6.1.1 | Sample and Procedure

We recruited participants using ResearchMatch, a U.S. national volunteer research registry. We carried out two waves of data collection. In the fall of the first year (Wave 1), we invited *all* ResearchMatch members to complete an online survey. In the fall of the second year (Wave 2), we invited respondents who agreed to provide their email address to complete a similar follow-up survey (the response rate was 74.73%).

In both waves, participants were asked to provide their zip code. We converted zip code identifiers into county identifiers (the most local

level of geographic aggregation for which the *annual* economic estimates provided by the U.S. Census Bureau were available<sup>1</sup>). When the zip code was located within a single county (80.25% of the cases), participants were assigned the relevant county identifier; when the zip code straddled multiple counties (19.75%), we concatenated all county identifiers.

We used two inclusion criteria. First, we retained participants with non-missing values for both waves. Second, we retained cases pertaining to participants who did *not* move out of their county from Wave 1 to Wave 2 (90.43% of the sample). The final sample comprised 1,701 participants from a total of 531 county identifiers.

#### 6.1.2 | Variables

**County Income Inequality (Predictor).** The 1-year annual estimates of the county-level Gini coefficient from the U.S. Census Bureau were used. These estimates represent the distributions of household income for a given county in a given year. They may range from 0 (perfect equality: Each household in the county has an equal share of income) to 1 (perfect inequality: Only one household in the county has *all* of the income).

**Perceived Income Inequality (Accuracy Check Variable).** The three-item perceived income inequality scale from Sommet et al. (2019) was used (e.g., “In my town/city, there is a huge gap between rich and poor”; 1 = *not at all*, 7 = *completely*).

**Psychological Health (Focal Outcome Variable).** The four-item version of the Beck Hopelessness Scale from Forintos et al. (2013) was used (e.g., “I feel that the future is hopeless and that things cannot improve [reverse coded]”; 1 = *not at all*, 7 = *completely*).<sup>2</sup>

<sup>1</sup> Five-year estimates (not one-year estimates) are available at lower levels of aggregation (e.g., ZIP codes) but they were not useable in the context on a two-year longitudinal study.

<sup>2</sup> Our questionnaire also included a single-item measure of physical health. Repeating the main analysis using physical health as the focal outcome variable led to the same conclusion. The description of the measure and the full results are presented in *Supplementary Materials*, including Figure S1 (pp. 4-5).

**TABLE 2** Study 1: Descriptive statistics and zero-order correlation matrix

	Descriptive statistics			Zero-order correlation matrix										
	$\alpha$	M	SD	1	2	3	4	5	6	7	8	9	10	
Wave 1 county income inequality (Gini coefficient) (1)	n/a	.45	.03	1.00										
Wave 2 county income inequality (Gini coefficient) (2)	n/a	.45	.03	.93***	1.00									
Wave 1 perceived inequality (3)	.91	5.02	1.51	.26	.26***	1.00								
Wave 2 perceived inequality (4)	.91	5.09	1.45	.26***	.27***	.66***	1.00							
Wave 1 psychological health (5)	.91	4.97	1.24	.18***	.17***	.34***	.25***	1.00						
Wave 2 psychological health (6)	.91	4.94	1.25	.18***	.17***	.28***	.37***	.64***	1.00					
Wave 1 perceived competitiveness (7)	.90	3.89	1.45	.05*	.04	.07**	.09***	.18***	.21***	1.00				
Wave 2 perceived competitiveness (8)	.90	3.94	1.42	.04	.04	.09***	.12***	.13***	.18***	.15***	1.00			
Wave 2 avoidance motivation (9)	.90	3.48	1.30	.02	.03	-.03	.00	-.12***	-.08***	-.48***	.09***	1.00		
Wave 2 approach motivation (10)	.91	4.45	1.28	.03	.03	-.03	-.01	-.11***	-.12***	-.53***	.13***	.70***	1.00	

Notes: n/a means “not applicable.”

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

**Perceived Competitiveness (Intervening Variable 1).** Four items from the perceived competitiveness scale from Sommet et al. (2019) were used (e.g., “In my town/city, it seems that people are competing with each other”; 1 = *not at all*, 7 = *completely*).<sup>3</sup>

**Avoidance and Approach Motivation (Intervening Variables 2).** The General Regulatory Focus measure from Lockwood et al. (2002) was used to assess avoidance motivation (nine items, e.g., “I frequently think about how I can prevent failures in my life”) and approach motivation (nine items, e.g., “I often think about how I will achieve success; 1 = *not true of me*; 7 = *completely true of me*). Summerville and Roese (2008) established this reference-point-based measure as an assessment of approach and avoidance motivation. Most of the items in the assessment are domain general; the few items that focus specifically on the academic domain were adjusted to focus on the (more relevant) work domain.

## 6.2 | Results

Figures 1–2 presents the main findings and model structures, whereas Table S1–S2 presents the full set of results.

### 6.2.1 | Overview of the cluster-adjusted cross-lagged panel modeling strategy

With two waves of data, a cross-lagged panel model represents the best possible option for investigating directionality (Newsom, 2015). To test the Wave 1 to Wave 2 within-county effects of income inequality, we therefore built a series of cross-lagged panel models with SEs adjusted for county clustering (to relax the assumption of independence of residuals and make it possible to use lower-level variables as predictors of higher-level variables).

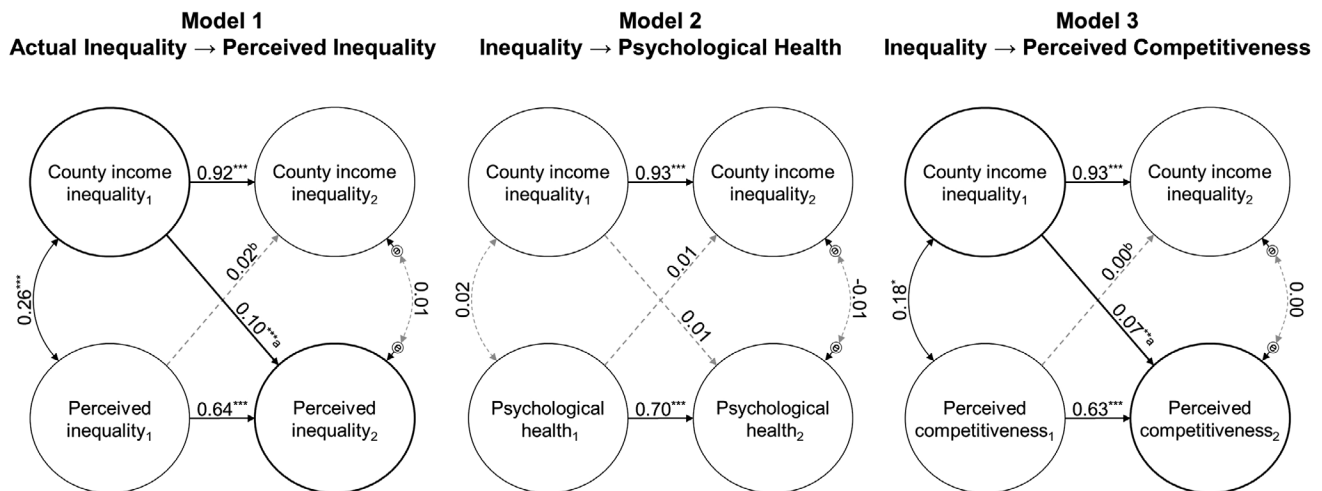
For each cross-lagged panel model, we estimated three types of paths: (i) the path between Wave 1 county income inequality and Wave 2 outcome (the directional path,  $\beta_{dir}$ ), (ii) the path between Wave 1 outcome and Wave 2 county income inequality (the reciprocal path,  $\beta_{rec}$ ), and (iii) the paths between Wave 1 and Wave 2 outcome, as well

<sup>3</sup> The original item “In my town/city, it seems that I am competing with others” was omitted from the data collection because it was deemed conceptually unclear.

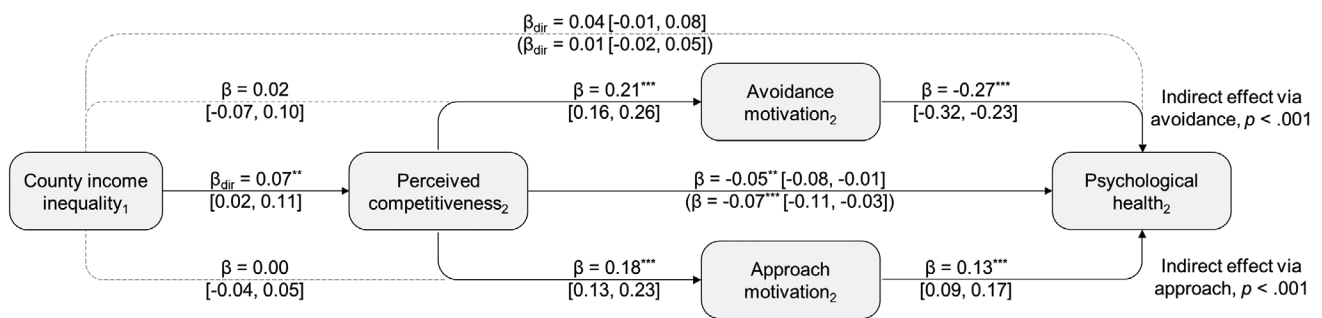


Preliminary Analyses

Main Analyses



**FIGURE 1** Study 1, preliminary and main analyses: Two-wave cross-lagged panel models testing the Wave 1 to Wave 2 within-county effect of income inequality on perceived inequality (Model 1, left panel), psychological health (Model 2, middle panel) and perceived competitiveness (Model 3, right panel). Notes: \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; different superscripts indicate significant differences between the directional and reciprocal path ( $ps < .011$ ); subscripts indicate the wave number; all variables are standardized; thicker black lines represent significant paths of interest; dashed gray lines represent nonsignificant paths; Wave 2 covariance parameters pertain to residuals (the fact that the links are null means that there is no residual covariance to be accounted for when the other paths are taken into account)



**FIGURE 2** Study 1, extended cross-lagged panel model: Opposing processes of county income inequality on psychological health (Model 4) and via perceived competitiveness and avoidance motivation (negative indirect effect) or perceived competitiveness and approach motivation (positive indirect effect). Notes: \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; total effects are given in parentheses; subscripts indicate the wave number; all variables are standardized; dashed gray lines represent nonsignificant paths; the relevant autoregressive path (i.e., Wave 1-to-Wave 2 income inequality, Wave 1-to-Wave 2 perceived competitiveness, and Wave 1-to-Wave 2 psychological health) and reciprocal path (i.e., Wave 2 perceived competitiveness to Wave 1 income inequality and Wave 2 psychological health to Wave 1 income inequality) were included in the analyses but are not shown

as Wave 1 and Wave 2 county income inequality (the auto-regressive paths,  $\beta_{\text{auto}}$ ).

than the reciprocal path,  $\chi^2(1, N = 1,701) = 11.55, p < .001$ , suggesting a directional effect of actual inequality on perceived inequality.

6.2.2 | Preliminary analyses: Actual and perceived inequality

Our first cross-lagged panel model examined the links between actual and perceived inequality (see Model 1 in Figure 1). Wave 1 county income inequality was found to predict Wave 2 perceived inequality,  $\beta_{\text{dir}} = 0.10, p < .001$ , whereas Wave 1 perceived inequality did not clearly predict Wave 2 county income inequality,  $\beta_{\text{rec}} = 0.02, p = .051$ . A post-estimation test revealed that the directional path was stronger

6.2.3 | Main analyses: The opposing effects of income inequality on psychological health

**Income Inequality → Psychological Health.** Our second cross-lagged panel model examined the links between income inequality and psychological health (see Model 2 in Figure 1). Wave 1 county income inequality was not found to predict Wave 2 psychological health,  $\beta_{\text{dir}} = 0.01, p = .480$ , and Wave 1 psychological health did not predict Wave 2 county income inequality,  $\beta_{\text{rec}} = 0.01, p = .511$ , suggesting

a null association between income inequality and psychological health.

**Income Inequality → Perceived Competitiveness.** Our third cross-lagged panel model used perceived competitiveness as the outcome (see Model 3 in Figure 1). Wave 1 county income inequality was found to predict Wave 2 perceived competitiveness,  $\beta_{dir} = 0.07, p = .006$ , whereas Wave 1 perceived competitiveness did not predict Wave 2 county income inequality,  $\beta_{rec} = 0.00, p = .897$ . A post-estimation test revealed that the directional path was stronger than the reciprocal path,  $\chi^2(1, N = 1,701) = 6.48, p = .011$ , suggesting a directional effect of actual income inequality on perceived competitiveness.

**Process Analysis: Income Inequality → Perceived Competitiveness → Avoidance/Approach Motivation → Psychological Health.** Next, we extended the third cross-lagged panel model and tested whether the null within-county association between Wave 1 income inequality and Wave 2 psychological health concealed opposing processes (see Figure 2). In the context of an opposite processes model (also known as “inconsistent mediation”), one observes a weak, often nonsignificant total effect (in our case, the effect of income inequality on psychological health), and then one estimates whether such a null effect may conceal indirect effects of different signs (see Murayama et al., 2021).<sup>4</sup>

First, at Wave 2, perceived competitiveness was positively associated with avoidance motivation,  $\beta = 0.21, p < .001$ , and approach motivation,  $\beta = 0.18, p < .001$ . Second, still at Wave 2, avoidance motivation was *negatively* associated with psychological health,  $\beta = -0.27, p < .001$ , whereas approach motivation was *positively* associated with psychological health,  $\beta = 0.13, p < .001$ . Third, we calculated the indirect effects between income inequality, perceived competitiveness, avoidance/approach motivation, and psychological health using the percentile bootstrap method with 10K resamples (Yzerbyt et al., 2018). Congruent with the Opposing Processes Hypothesis, the analysis revealed: (i) a *negative* indirect effect of income inequality through perceived competitiveness and avoidance motivation on psychological health,  $p < .001$ ; (ii) a *positive* indirect effect of income inequality through perceived competitiveness and approach motivation on psychological health,  $p < .001$ .

## 6.2.4 | Supplementary analyses

**Repeating the Analyses While Including Control Variables.** We repeated the analyses while controlling for a priori-selected participant-based demographics (sex, age, race, education, income, work status) and county-based contextual variables (population, poverty headcount ratio, unemployment rate, median household income in the area, percentage of poorly educated inhabitant in the area). The conclusions of the analyses remained the same. The full results are presented in *Supplementary Materials*, pp. 6–7.

<sup>4</sup> Although our main cross-lagged panel models focused on the prospective effects of income inequality, we ran additional models testing the prospective effects of competitiveness and motivation: Our additional models testing the cross-lagged effects of competitiveness on motivation were inconclusive, whereas our additional models testing the cross-lagged effects of motivation on psychological health lead to the same conclusion reached in the main analysis (see *Supplementary Materials*, p. 8).

**Alternative Intervening Variables.** Our questionnaire also included two alternative intervening variables, namely, other-avoidance and other-approach economic goals. We repeated our analyses substituting our general motivation measures with the more specific goal measures. Consistent with existing meta-analytic evidence (Murayama & Elliot, 2012), perceived competitiveness was positively associated with both other-avoidance and other-approach economic goals. However, neither of the two goals was a predictor of psychological health, suggesting that broader assessments of avoidance/approach motivation may have better predictive utility than specific assessments of avoidance/approach goal with regard to health-related outcomes. The description of the measures and the full results are presented in *Supplementary Materials*, pp. 9–10, including Figure S2.

## 6.3 | Moderation analyses

**Income.** From a theoretical perspective, individuals with low and high income may not stand on an equal footing as they face the stressor of income inequality (Van Deurzen et al., 2015). Specifically, individuals with low income are likely to feel more threatened by the perceived competitiveness elicited by income inequality, thereby endorsing avoidance-based motivation; conversely, individuals with high income are likely to feel more challenged by the perceived competitiveness elicited by income inequality, thereby endorsing approach-based motivation (for similar reasoning, see Sommet et al., 2019). Hence, we tested whether equalized income (i.e., household size-adjusted income) moderated the effects of income inequality (in a first series of models) or perceived competitiveness (in a second series of models) on avoidance and approach motivation. The description of the measure and the full results are presented in *Supplementary Materials*, pp. 11–13, including Table S3.

**Other Moderator Candidates.** In Study 1, we included additional moderator variables pertaining to constructs that could limit one's ability to cope with the stressor of income inequality: (i) low financial self-efficacy (Lown, 2011), (ii) high belief that life is a zero-sum game (Różycka-Tran et al., 2015), and (iii) high perceived legitimacy of income inequality (Schneider, 2016; for related research on perceived income mobility and meritocracy, see Day & Fiske, 2017; Morris et al., 2022). Again, we tested whether each of these measures moderated the effects of income inequality (in a first series of models) and perceived competitiveness (in a second series of models) on avoidance and approach motivation. The description of the measures and the full results are presented in *Supplementary Materials*, p. 11–14, including Table S4. Taken together with the former results, this leaves open the question of the conditions under which perceived competitiveness predicts avoidance and approach motivation (and vice versa).

## 6.4 | Discussion

Study 1 documented three basic sets of findings. Consistent with the first part of the Opposing Processes Hypothesis, local income inequality increased perceived competitiveness over time, while the reverse

was not true. Consistent with the second part of the Opposing Processes Hypothesis, perceived competitiveness was then associated with both (general) avoidance *and* approach motivation, and consistent with the third part, avoidance and approach motivation were then negatively and positively associated with psychological health, respectively.

Importantly, the longitudinal sample used in Study 1 was large enough to offer a reliable test of the full Opposing Processes Hypothesis. It is usually recommended to use a conservative ratio of  $n:q = 20:1$  (20 participants per parameter) to test the type of model used in our study (Kline, 2015). This means that our sample size of  $N = 1,701$  was about 2.5 times as large as a sample size based on this recommended ratio, given that our most complex model included  $q = 35$  parameters (i.e.,  $1,701 \div (20 \times 35) = 2.43$ ). The sample size was likely sufficient to detect a small effect of  $\beta < 0.10$  with a power above .80 (for relevant simulation work, see Wang & Rhemtulla, 2021).

Although the cross-lagged panel model used in Study 1 is the most appropriate analytical tool to infer causality with two-wave nonexperimental data, this type of model has received some methodological criticisms. In particular, it has been shown that cross-lagged panel models do not enable one to properly distinguish within-person dynamics from between-person trait-like differences, thereby threatening the quality of causal inferences (Hamaker et al., 2015). In addition, the fact that our study involved two waves of data while our opposing processes model involved four sets of variables (inequality, competitiveness, motivation, and health) meant that only the inequality-related paths were tested longitudinally (i.e., Wave 1 inequality  $\rightarrow$  Wave 2 competitiveness; Wave 1 inequality  $\rightarrow$  Wave 2 health), while the rest of the model had to be tested cross-sectionally (i.e., Wave 2 competitiveness  $\rightarrow$  Wave 2 motivation, and Wave 2 motivation  $\rightarrow$  Wave 2 health).

The next three studies aimed to address this limitation and conceptually replicate Study 1's findings using an experimental-causal-chain design (Spencer et al., 2005) based on a sequence of three preregistered experiments: (i) in Study 2a, we manipulated income inequality to causally test the first part of the hypothesis (the "inequality  $\rightarrow$  competitiveness hypothesis"); (ii) in Study 2b, we manipulated perceived competitiveness to causally test the second part of the hypothesis (the "competitiveness  $\rightarrow$  motivation hypotheses"); and (iii) in Study 2c, we manipulated avoidance/approach motivation to causally test the third part of the hypothesis (the "motivation  $\rightarrow$  health hypotheses").

## 7 | STUDY 2A. CAUSAL EFFECT OF INCOME INEQUALITY

The goal of our first experiment was to test whether an induction of income inequality increases perceived competitiveness (the "inequality  $\rightarrow$  competitiveness hypothesis"). The experiment was preregistered on the OSF (see <https://bit.ly/3dz3Yv7>).<sup>5</sup>

<sup>5</sup> In the OSF page of the project, the former labels of Experiment 2a and 2b were Experiment 3a and 3b, respectively. The reason is that the OSF project originally included another study placed before the experiments. This original study focused on the effect of income inequality on psychological health but did not assess perceived competitiveness or avoidance/approach motivation. Because this original study was very different from the ResearchMatch longitu-

### 7.1 | Method

Table 3 (first column) presents the sample demographic characteristics, and Table 4 (upper part) presents the descriptive statistics and zero-order correlation matrix.

### 7.2 | Sample

A priori power analyses with  $1 - \beta = .80$  and  $\alpha = .05$  revealed that 395 participants were needed to detect a small-sized effect of income inequality on perceived competitiveness ( $f^2 = .02$ ). We oversampled by 10% to account for the exclusion of missing data.

We recruited U.S. residents using CloudResearch's MTurk Toolkit. We used the MicroBatch feature to recruit participants gradually across U.S. time zones over the course of several weeks (thus increasing sample diversity). Respondents received USD 0.75 for participating. A total of 444 participants completed the study.

### 7.3 | Procedure

We used an adapted version of the "Bimboola paradigm," in which participants are told that they will become citizen of a fictional society called "Bimboola" (Wang et al., 2020).

Participants were told that just like any other society, Bimboola consists of "several groups that differ in wealth and status," and they were randomly assigned to one of two conditions. In the *low-inequality condition*, they were told that the richest 20% of Bimboolean society earns 1.5 times more than the poorest 20% ( $n = 216$ ). In the *high-inequality condition*, they were told that the richest 20% of Bimboolean society earns 30 times more than the poorest 20% ( $n = 228$ ). In both conditions, participants were assigned to the middle 20% of society and, at the end of each page, an instructional check asked them to report the correct income distribution ratio in Bimboola in order to move to the next page.

Then, participants were told that to begin their new life in Bimboola, they had to purchase a house, a car, and a holiday. When choosing an item, they saw three pictures of items that could only be afforded by the top 20%, three pictures of items that could also be afforded by the middle 20%, and three pictures of items that could also be afforded by the bottom 20% (we used Wang et al.'s [2020] pictures). In the low-inequality condition, the differences between the first and last three pictures were small (e.g., mid/low-priced vs. mid/high-priced houses). In the high-inequality condition, the differences were large (e.g., very low-priced vs. very high-priced houses). In both conditions, the three middle pictures were identical. Following the decision task, we used Blake and Brooks' (2019) manipulation refresher, repeating information about the income distribution in Bimboola and showing the pictures of the typical items chosen by the bottom 20% and top 20%.

dinal study and the causal-chain experiments, we eventually decided to save it for a different paper (i.e., Sommet & Elliot, 2022).



**TABLE 3** Studies 2a-2c: Sample demographic characteristics

	Study 2a	Study 2b	Study 2c
Percentage of women	32.28%	41.00%	51.07%
Median age	36.2 (10.5)	38.0 (11.3)	40.7 (12.8)
Percentage of White participants	67.49%	68.89%	74.02%
Percentage having a 4-year college degree	67.72%	73.16%	59.96%
Annual household income (USD, thousands)	63.7 (40.0)	59.4 (36.5)	68.1 (45.8)
Percent of workers (part- or full-time)	91.42%	92.35%	81.85%

Note: Median absolute deviations (MAD) are given in parentheses; time-varying demographic characteristics are from the Wave 1 sample.

**TABLE 4** Studies 2a-2c: Descriptive statistics and zero-order correlation matrix

	Descriptive statistics			Zero-order correlation matrix					
	$\alpha$	M	SD	Ineq	Compet				
<b>Study 2a</b>									
Perceived inequality [Ineq]	.95	5.28	1.71	1.00					
Perceived competitiveness [Compet]	.98	5.10	1.25	.51***	1.00				
<b>Study 2b</b>									
Perceived competitiveness [Compet]	.96	5.03	2.06	1.00					
Avoidance motivation [Avoid]	.95	4.92	1.44	.66***	1.00				
Approach motivation [Approach]	.93	5.58	1.02	.38***	.39***	1.00			
<b>Study 2c</b>									
Avoidance motivation [Avoid]	.77	5.06	1.80	1.00					
Approach motivation [Approach]	.96	5.52	1.71	-.46***	1.00				
Positive affect [PA]	.87	5.19	1.37	-.44***	.80***	1.00			
Negative affect [NA]	.96	3.42	1.87	.72***	-.60***	-.57***	1.00		
Affect balance [PA - NA]	n/a	1.77	2.88	-.68***	.77***	.84***	-.92***	1.00	
Life satisfaction [Sat]	.95	5.03	1.64	-.59***	.77***	.80***	-.80***	.90***	1.00

Notes: n/a means "not applicable";

\*\*\* $p < .001$ .

## 7.4 | Variables

The self-report measures used the same response scale used in Study 1.

**Perceived Income Inequality (Manipulation Check Variable).** The perceived income inequality scale used in Study 1 was adapted (e.g., "In Bimboola, there is a huge gap between rich and poor").

**Perceived Competitiveness (Focal Outcome Variable).** The perceived competitiveness scale used in Study 1 was adapted (e.g., "In Bimboola, people are competing with each other.").

## 7.5 | Results

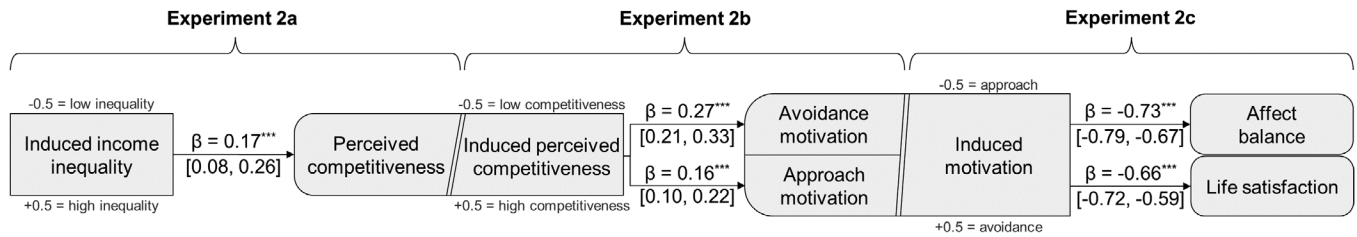
Figure 3 (left panel) presents the main findings and Table S5 presents the full set of results and the regression equations while excluding and including control variables.

### 7.5.1 | Preliminary analyses: Manipulation check

Perceived inequality was higher in the high-inequality condition,  $M = 6.19$  [6.01, 6.38], than in the low-inequality condition,  $M = 4.31$  [4.12, 4.50],  $\beta = 0.55$  [0.48, 0.63],  $p < .001$ ,  $\eta^2_p = .31$ , indicating that our manipulation was effective.

### 7.5.2 | Main analyses: Income inequality $\rightarrow$ perceived competitiveness

As planned in the preregistration, we regressed perceived competitiveness on induced income inequality. Congruent with the "inequality  $\rightarrow$  competitiveness hypothesis" and replicating Study 1's findings, perceived competitiveness was higher in the high-inequality condition than in the low-inequality condition,  $\beta = 0.17$ ,  $p < .001$ ,  $\eta^2_p = .03$ .



**FIGURE 3** Studies 2a-2c: Experimental-causal-chain design testing the causal effects of income inequality → perceived competitiveness (Study 2a), perceived competitiveness → avoidance/approach motivation (Study 2b), and avoidance/approach motivation → psychological health (Study 2c). Notes: \*\*\* $p < .001$ ; \*\* $p < .01$

### 7.5.3 | Supplementary analyses: Repeating the analyses while including control variables

We repeated the analyses while controlling for the same a priori-selected participant-based variables used in Study 1. The conclusions of the analyses remained the same.

## 7.6 | Discussion

Study 2a conceptually replicated Study 1's findings. Consistent with the first part of the Opposing Processes Hypothesis, induced income inequality increased perceived competitiveness. Also noteworthy, Study 2a conceptually replicated three existing studies using the same experimental paradigm and comparable outcome measures (i.e., Cheng et al., 2021, Experiment 2; Sánchez-Rodríguez, Willis, Jetten, et al., 2019, Experiments 2–3).

Studies 2b and 2c aimed to continue experimentally “unpacking” the Opposing Processes Hypothesis, with Study 2b inducing perceived competitiveness to test the second part of the hypothesis (the “competitiveness → motivation hypotheses”), and Study 2c inducing avoidance/approach motivation to test the third part of the hypothesis (the “motivation → health hypotheses”).

## 8 | STUDY 2B. CAUSAL EFFECT OF PERCEIVED COMPETITIVENESS

The goal of our second experiment was to test whether an induction of perceived competitiveness increases avoidance and approach motivation (the “competitiveness → motivation hypotheses”). The experiment was again preregistered on the OSF (see <https://bit.ly/36Z4ReS>).<sup>6</sup>

<sup>6</sup> In Study 2b, we additionally included the same measures of psychological health used in Study 3b, and tested whether the induction (i) decreases psychological health via avoidance motivation and (ii) increases psychological health via approach motivation. The results—which were consistent with the Opposing Process Hypothesis—are presented in *Supplementary Materials*, pp. 16–17.

## 8.1 | Method

Table 3 (second column) presents the sample demographic characteristics, and Table 4 (middle part) presents the descriptive statistics and zero-order correlation matrix.

### 8.1.1 | Sample

A priori power analyses with  $1 - \beta = .80$  and  $\alpha = .05$  revealed that 907 participants were needed to detect two small-sized indirect effects of perceived competitiveness on approach and avoidance motivation (with  $\beta$ s = .15; see Perugini et al., 2018). As in Study 2a, we oversampled by 10%.

We again recruited U.S. residents using CloudResearch's MTurk Toolkit with the MicroBatch feature. Respondents received USD 0.75 for participating. A total of 1,018 participants completed the study.

### 8.1.2 | Procedure

As in Study 2a, we used an adapted version of the “Bimboola paradigm.”

This time, participants were told that just like any other society, Bimboola has “its own culture, identity, and values,” and they were randomly assigned to one of two conditions. In the *low-competitiveness condition*, they were told that a recent poll revealed that Bimbooleans report an average score of 1.73 out of seven to the question “In Bimboola, we value competition” ( $n = 507$ ). In the *high-competitiveness condition*, participants were told that the poll revealed that Bimbooleans report an average score of 6.27 to the same question ( $n = 511$ ). At the end of each page, an instructional check asked participants to report the correct average score in Bimboola in order to move to the next page.

Then, participants were told that as they begin their new life in Bimboola, they meet and talk with other citizens. In the low-competitiveness condition, participants read three extracts of conversations with Bimbooleans saying: “It seems that Bimbooleans never compete with each other,” “In Bimboola, we share the feeling that competing with each other is not desirable,” and “In Bimboola, we never compare people to each other.” In the high-competitiveness condition, these extracts were: “It seems that Bimbooleans always

compete with each other,” “In Bimboola, we share the feeling that competing with each other is important,” and “In Bimboola, we always compare people to one another.”

### 8.1.3 | Variables

The self-report measures used the same response scale used in Study 1.

**Perceived Competitiveness (Manipulation Check Variable).** The perceived competitiveness scale used in Study 1 was used (e.g., “In Bimboola, it seems that people are competing with each other”).

**Avoidance and Approach Motivation (Intervening Variables).** The scales used in Study 1 were adapted (e.g., avoidance motivation: “In Bimboola, I would frequently think about how I could prevent failures in my life”; approach motivation: “In Bimboola, I would often think about how I will achieve success”). The order of presentation of the avoidance and approach scales was counterbalanced (avoidance first,  $n = 510$ ; approach first,  $n = 508$ ).

## 8.2 | Results

Figure 3 (middle panel) presents the main findings and Table S6 presents the full set of results and the regression equations while excluding and including control variables.

### 8.2.1 | Preliminary analyses: Manipulation check

Perceived competitiveness was higher in the high-competitiveness condition,  $M = 6.21 [6.06, 6.35]$ , than in the low-competitiveness condition,  $M = 3.84 [3.70, 3.99]$ ,  $\beta = 0.57 [0.52, 0.62]$ ,  $p < .001$ ,  $\eta^2_p = .33$ , indicating that our manipulation was effective.

### 8.2.2 | Main analyses: Perceived competitiveness → avoidance/approach motivation

As planned in the preregistration, we regressed avoidance and approach motivation on induced perceived competitiveness (coded  $-0.5 =$  low competitiveness and  $+0.5 =$  high competitiveness). Congruent with the “competitiveness → motivation hypothesis” and replicating Study 1, avoidance motivation and approach motivation were higher in the high-competitiveness condition than in the low-competitiveness condition,  $\beta = 0.27$ ,  $p < .001$ ,  $\eta^2_p = .07$ , and  $\beta = 0.16$ ,  $p < .001$ ,  $\eta^2_p = .02$ , respectively.

### 8.2.3 | Supplementary analyses: Repeating the analyses while including control variables

We repeated the analyses while controlling for the same a priori-selected participant-based variables used in Studies 1 and 2a. The conclusions of the analyses remained the same.

## 8.3 | Discussion

Study 2b conceptually replicated Study 1’s findings and extended Study 2a’s findings. Consistent with the second part of the Opposing Processes Hypothesis, induced perceived competitiveness increased avoidance and approach motivation.

Study 2c aimed to finish experimentally “unpacking” the Opposing Processes Hypothesis, inducing avoidance/approach motivation to test the third part of the hypothesis (the “motivation → health hypotheses”). To operationalize our downstream outcome, we used two types of subjective well-being indicators that are seen as the bedrock of psychological health: (i) the *affective* experience of well-being was measured using affect balance (the presence of positive affect and the absence of negative affect) and (ii) the *cognitive* evaluation of well-being was measured using life satisfaction (the global judgement of one’s life; Diener, 2009).

## 9 | STUDY 2C. CAUSAL EFFECT OF AVOIDANCE AND APPROACH MOTIVATION

The goal of our third experiment was to test whether an induction of avoidance (vs. approach) motivation decreases psychological health (the “competitiveness → health hypotheses”). The experiment was again preregistered on the OSF (see <https://bit.ly/39op7KI>).

### 9.1 | Method

Table 3 (third column) presents the sample demographic characteristics, and Table 4 (lower part) presents the descriptive statistics and zero-order correlation matrix.

#### 9.1.1 | Sample

A priori power analyses with  $1 - \beta = .80$  and  $\alpha = .05$  revealed that 510 participants were needed to detect two small-sized effects of avoidance/approach motivation on our two psychological health outcomes

( $f^2 = .02$ ). We oversampled by 10% to account for the exclusion of missing data.

We again recruited U.S. residents using CloudResearch's MTurk Toolkit with the MicroBatch feature. Respondents received USD 0.50 for participating. A total of 562 participants completed the study.

### 9.1.2 | Procedure

As in Studies 2a-2b, we used an adapted version of the "Bimboola paradigm." This time, participants were informed that they entered Bimboola with a particular mindset, and they were randomly assigned to one of two conditions.

In the *avoidance motivation condition*, participants read a text based on seven of the nine avoidance items used in Studies 1 and 2b. Specifically, they were told their new start in Bimboola was "a pathway to become the self they 'ought' to be—to fulfill [their] duties, responsibilities, and obligations," that their mind there was focused on "preventing negative events", and that their major professional goal was "to avoid becoming a failure."

In the *approach motivation condition*, participants read a similar text based on seven of the nine approach items used in Studies 1 and 2b. Specifically, they were told their new start in Bimboola was "an opportunity to reach [their] 'ideal self'—to fulfill [their] hopes, wishes, and aspirations," that their mind there was focused on "achieving positive outcomes," and that their major professional goal was "to achieve [their] career ambitions."

### 9.1.3 | Variables

**Avoidance and Approach Motivation (Manipulation Check Variable).** The remaining four items of the scale used in Study 1 that were *not* used to build the manipulation were adapted.

#### Psychological Health (Focal Outcome Variable).

**Affective.** The 10-item version of Positive and Negative Affect Schedule of Mackinnon et al. (1999) was used to assess the *affective* experience aspect of psychological health, namely positive affect (PA; 5 items, e.g., "[In Bimboola, I would feel] enthusiastic," "determined," "excited") and negative affect (NA; 5 items, e.g., "nervous," "distressed," "upset"; 1 = *Not at all*, 4 = *Somewhat*, 7 = *Completely*). As indicated in the preregistration, we subtracted NA from PA to obtain an index of affect balance (see Diener et al., 2010).

**Cognitive.** The five-item scale of Joseph et al. (2004) was used to assess the *cognitive* evaluation aspect of psychological health, namely, life satisfaction (e.g., "In Bimboola, I would feel that life is enjoyable.").

## 9.2 | Results

Figure 3 (right panel) presents the main findings and Table S7 presents the full set of results and the regression equations while excluding and including control variables.

### 9.2.1 | Preliminary analyses: manipulation check

Avoidance motivation was higher in the avoidance motivation condition,  $M = 6.35$  [6.20, 6.50], than in the approach motivation condition,  $M = 3.76$  [3.61, 3.90],  $\beta = 0.72$  [0.66, 0.78],  $p < .001$ ,  $\eta^2_p = .52$ , whereas approach motivation was lower in the avoidance motivation condition,  $M = 4.56$  [4.39, 4.72], than in the approach motivation condition,  $M = 6.50$  [6.34, 6.67],  $\beta = -0.57$  [-0.6, 0.50],  $p < .001$ ,  $\eta^2_p = .32$ , indicating that our manipulation was effective.

### 9.2.2 | Main analyses: Avoidance/approach motivation → psychological health

As planned in the preregistration, we regressed each of our psychological health indicators on induced motivation (coded -0.5 = approach and +0.5 = avoidance). Congruent with the "motivation → health hypotheses," both the affective and cognitive aspects of psychological health were lower in the avoidance motivation condition than in the approach motivation condition,  $\beta = -0.73$ ,  $p < .001$ ,  $\eta^2_p = .54$ , and  $\beta = -0.65$ ,  $p < .001$ ,  $\eta^2_p = .43$ , respectively.

### 9.2.3 | Supplementary analyses: Repeating the analyses while including control variables

We repeated the analyses while controlling for the same a priori-selected participant-based variables used in Studies 1, 2a, and 2b. The conclusions of the analyses remained the same.

## 9.3 | Discussion

Study 2c conceptually replicated Study 1's findings and extended Studies 2a and 2b's findings. Consistent with the third part of the Opposing Processes Hypothesis, induced avoidance motivation decreased psychological health.

## 9.4 | General discussion

In the present research, we used both a measurement-of-mediation design and an experimental-causal-chain design to test our Opposing Processes Hypothesis. In Study 1, we reported longitudinal evidence that lent support to the hypothesis while achieving high ecological validity: County-level income inequality was found to have (i) a negative indirect effect on psychological health via an increase in perceived competitiveness and avoidance motivation, and (ii) a positive indirect effect on psychological health via an increase in perceived competitiveness and approach motivation. In Studies 2a-2c, we reported sequential experimental evidence that also lent support to our hypothesis while this time achieving high internal validity: (i) induced income inequality was found to increase perceived competitiveness (Study

2a), (ii) induced perceived competitiveness was found to increase both avoidance *and* approach motivation (Study 2b), and (iii) induced avoidance/approach motivation were found to increase/decrease psychological health (Study 2c).

## 9.5 | Contributions

The present research makes three main contributions. First, our findings can be used to at least partially account for the inconsistencies in the literature on income inequality and psychological health. Whereas some longitudinal studies show very small negative effects of local income inequality (e.g., Wu & Li, 2017), others show effects equivalent to zero (e.g., Sommet & Elliot, 2022) or even—in a few cases—positive effects (e.g., Cheung, 2016). Our results suggest that two antagonistic psychological pathways are likely to be operative here. On one hand, the perceived competitiveness elicited by income inequality prompts avoidance motivation (focusing on the negative possibility of failure). As avoidance motivation evokes cognitive and emotional states that interfere with one's ability to function effectively (e.g., interpreting equivocal cues as threats), this tends to lead to poorer psychological health. On the other hand, the perceived competitiveness elicited by income inequality is associated with approach motivation (focusing on the positive possibility of success). As approach motivation evokes cognitive and emotional states that facilitate psychological functioning (e.g., interpreting equivocal cues as opportunities), this tends to lead to better psychological health. Interestingly, in both Study 1 (main analyses) and Study 2b (supplementary analyses), perceived competitiveness continued to exert a direct negative effect on psychological health after partialing out the variance accounted for by the motivation variables. This suggests that perceived competitiveness may exert a negative effect via mechanisms other than avoidance motivation, such as the erosion of social relationships (for relevant meta-analytical evidence, see Roethel et al., 2008).

Second, the fact that income inequality prompts perceived competitiveness can also be used to better explain why a rise in income inequality is related to a rise in health disparities (Chetty et al., 2016). Indeed, although greater income inequality does not seem to translate into substantial mean-level change in psychological health (Ngamaba et al., 2018; Ribeiro et al., 2017), it is strongly and robustly associated with a widening of the health distribution (i.e., a growing gap between rich and poor in terms of mortality and other physical and psychological health outcomes; e.g., Bor et al., 2017). Given our results, it is at least plausible that the opposing processes associated with inequality-based perceived competitiveness tend to keep avoidance-oriented people at a lower level of psychological health while bringing approach-oriented people to a higher level of psychological health, thereby broadening the divide between those in ill health and those in good health.

Third, it is worth noting that the model presented in this paper resembles other opposing processes models proffered in the literature. For instance, Murayama and Elliot (2012) showed that competitiveness does not directly predict performance; rather competitiveness predicts avoidance-based goals that reduce performance while, at the same

time, competitiveness predicts approach-based goals that facilitate performance. Likewise, Hangen et al. (2016) showed that competitiveness does not directly predict risk-taking; rather competitiveness predicts avoidance-based states that decrease risk-taking while, at the same time, competitiveness predicts approach-based states that increase risk-taking. We hope that the present opposing processes model of inequality-based perceived competitiveness, coupled with the aforementioned models, will enable scholars to acquire a better understanding of the complex relations between competitiveness and psychological outcomes.

## 9.6 | Limitations

Four limitations should be acknowledged. First, our studies were conducted in the U.S., a cultural setting where people tend to underestimate economic inequality and hold deeply-entrenched beliefs in economic mobility (Davidai, 2018). Whereas the longitudinal effects of income inequality do not seem to substantially differ from one country to another (Schröder, 2018), both the mean levels *and* the effects of approach and avoidance appear to be contingent on cultural context (see Elliot et al., 2001, and Hamamura et al., 2009, respectively). Replications in countries other than U.S. are therefore warranted.

Second, our studies used opt-in nonrepresentative samples. However, most demographics seemed not to be *systematically* over or underrepresented (e.g., women were overrepresented in Study 1, but underrepresented in Studies 2a-2b), albeit participants in all three studies seemed to be more educated than the general U.S. population ( $2/3$  had a 4-year college degree or higher vs.  $1/3$  in the general population). Replications with representative samples is therefore warranted.

Third, whereas Study 1 operationalized psychological health with an ecologically valid measure that can be used as a clinical screening tool (i.e., the Beck Hopelessness Scale; see Balsamo et al., 2020), Study 2c operationalized psychological health with two “softer” measures capturing the affective and cognitive aspects of psychological health (i.e., positive/negative emotions and life satisfaction, respectively; for research demonstrating the predictive utility of such “softer” measures, see Bray & Gunnell, 2006). This was a necessary compromise, as Study 2c used an experimental setting, in which it is not realistic to include “harder” measures of health.

Fourth, Study 1 used a two-wave sample spanning only one year. One important consequence is that the Study 1 Wave 1-to-Wave 2 income inequality, perceived competitiveness, and psychological health outcome autoregressive paths were large ( $\beta_s > 0.60$ ). Importantly, from an analytical perspective, the fact that stability dominates in a longitudinal model is known to mechanically deflate the size of the focal effects (compared with a cross-sectional model); in such a case, one should keep in mind that significant but small directional effects should *not* be dismissed as trivial (Adachi & Willoughby, 2015). Indeed, the hypothesized effects were rather small in Study 1 ( $.07 \leq |\beta| \leq .27$ ) and were about two to four times larger in Studies 2a-2c ( $.16 \leq |\beta| \leq .73$ ).



## 9.7 | Future research

One of the most critical unanswered question raised by this research is: “What are the conditions under which income inequality prompts avoidance motivation (representing a potential risk for psychological health) or, on the contrary, approach motivation (representing a potential benefit for psychological health)?”

From a theoretical perspective, both income inequality and perceived competitiveness can be conceived as social stressors, because they create uncertainty regarding one’s current and future relative position (for relevant research, see Salvador, 2005; Van Deurzen et al., 2015; Wilkinson & Pickett, 2008). According to the biopsychosocial model of challenge and threat (Blascovich, 2013; Jamieson, 2017), when individuals are confronted with such social stressors, they might respond in one of two ways: (1) When they perceive that their resources are outweighed by situational demands, they will appraise the social stressor as a threat, adopt avoidance-based motivation, and experience worse psychological health; (2) Conversely, when they perceive that their resources outweigh the situational demands, they will appraise the social stressor as a challenge, adopt approach-based motivation, and experience better psychological health (for an empirical illustration involving upward comparison as a stressor, see Mendes et al., 2001).

The most obvious way of operationalizing the concept of “perceived resources” is using income. Compared with individuals with high income, individuals with low income should logically lack the resources to cope with income inequality or perceived competitiveness (e.g., because they are viewed as insurmountable obstacles). However, studies testing income as the moderator of the psychological effects of income inequality are often inconclusive (e.g., Kelley & Evans, 2017; Layte & Whelan, 2014; Roth et al., 2017), and our own study showed that income does not moderate the effects of income inequality or competitiveness on avoidance and approach motivation.

Other ways of operationalizing the concept of “perceived resources” were included in Study 1. However, here also, the analysis revealed that feeling economically self-efficacious (moderator 1), rejecting the idea that life is like a zero-sum game (moderator 2), or perceiving income inequality as being legitimate (moderator 3) did not moderate the effects of income inequality or competitiveness on avoidance and approach motivation. Future research should try to investigate other candidates for moderation, as this holds the key to identifying who is particularly vulnerable to the negative effects of income inequality on psychological health. Promising candidates include but are not limited to: financial scarcity (Sommet et al., 2018), social capital (Rözer & Kraaykamp, 2013), and perceived economic mobility (for a relevant review, see Willis et al., 2022).

## 9.8 | Conclusion

Income inequality is a “hot topic” in both scientific and societal circles. The present paper paints a different picture than that offered by much previous research, opening up the possibility that income inequality

can exert both negative effects via avoidance motivation and positive effects via approach motivation. It is our hope that this work facilitates discussion on both methodological and conceptual fronts that eventuates in a broader and deeper understanding of this important social issue.

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### CONFLICT OF INTEREST DISCLOSURE

The authors declare no competing interests.

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### ETHICS APPROVAL STATEMENT

The research has been carried out in line with the ethical standards of APA. Study 1 received approval from the Research Subjects Review Board of the university of the second author, whereas the second set of studies received approval from the Research Ethics Board of the university of the second author.

### DATA AVAILABILITY STATEMENT

Preregistration documents, complete materials, raw data (the economic raw data, the de-identified two-year longitudinal data set, and the experimental data sets), and syntax files (Stata .do files) are available via the OSF (<https://osf.io/b4q9t/>).

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### SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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