



Comparing personal and general beliefs in a just world and in an unjust world in relation to well-being

Isabel Correia^{a,*}, Efraín García-Sánchez^{b,c}

^a Iscte - Instituto Universitário de Lisboa, CIS-Iscte, Lisboa, Portugal

^b Mind, Brain and Behaviour Research Centre (CIMCYC), University of Granada, Spain

^c Stanford SPARQ, Stanford University, Department of Psychology, USA

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ABSTRACT

The current studies aimed to advance knowledge on the relationship between injustice perceptions and well-being by investigating whether Belief in Just (BJW) and in an Unjust World (BUJW) have different associations with people's well-being. In two studies (Study 1, $N = 258$; Study 2, $N = 573$), we examined whether well-being is associated differently with just and unjust world beliefs, and we further extended the study of these distinct associations to the differentiation between personal and general beliefs in a (un) just world. In both studies, we confirmed that a one-second-order factor model of BJW was positively associated with a latent variable of well-being. Furthermore, for the first time, we examined and confirmed that a one-second-order factor of BUJW—combining General BUJW and Personal BUJW—was also significantly associated with well-being. We further compared the differences between each of the personal and general BJW compared with the BUJW. We found that the factor associated with personal beliefs, either Personal BJW or Personal BUJW, instead of general beliefs, is the one consistently linked to well-being. The current studies pave the way for further studies on just and unjust world beliefs, considering the relevance of both just/unjust and personal/general frames.

1. Introduction

The relationship between (in) justice perceptions and well-being has been acknowledged by the Social Psychology of Justice since the studies on relative deprivation (Stouffer et al., 1949) and inequity theory (Adams, 1963). These theories consider that when people perceive they are in an unjust situation, they feel less satisfied than when they perceive they are in a just situation. The justice motive theory (Lerner, 1980) went further, proposing that the drive for justice is a basic human motive, and therefore, injustice threatens this fundamental human need. Consequently, injustice perceptions decrease well-being and motivate the perceiver to reestablish justice perceptions. In Lerner's words, "People want to and have to believe they live in a just world so that they can go about their daily lives with a sense of trust, hope, and confidence in their future" (Lerner, 1980, p. 14). More recently, experimental studies confirmed the causal relationship between (in) justice perceptions and well-being (e.g., Correia et al., 2009; Schmitt et al., 2023).

Notwithstanding these theoretical and empirical advances, in studies where BJW is measured with a scale and not experimentally

manipulated, there is an enormous gap in the research addressing the relationship between injustice perceptions and well-being. This is because most scales are constituted exclusively by positively keyed justice items (e.g. BJW scale, Dalbert et al., 1987). Thus, empirical findings using BJW scales are described as higher and lower perceptions of justice associated with well-being, with no explicit reference to injustice perceptions. Indeed, justice and injustice perceptions could be considered opposite views along the same theoretical spectrum. However, Dalbert et al. (2001) argue that just and unjust world beliefs are distinct constructs. Still, justice literature research has not systematically addressed whether beliefs in a just and unjust world have different relationships with well-being.

In the present study, we will examine the difference between beliefs in a just and unjust world. We operationalized justice perceptions with measures of belief in a just world (BJW) using positive keyed justice items and injustice perceptions with measures of belief in an unjust world (BUJW) using positive keyed injustice items. We will also differentiate between *General* (GBJW, Dalbert et al., 1987) and *Personal* Belief in a *Just* (PBJW, Dalbert, 1999) and an *Unjust* world. This

* Corresponding author.

E-mail addresses: Isabel.Correia@iscte-iul.pt (I. Correia), egarcias@ugr.es (E. García-Sánchez).

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operationalization will allow us to shed light on the potential differences between just and unjust world beliefs regarding their psychometric properties, response patterns, and their correlates with sociodemographic variables and well-being. We can also delve deeper into the differences between framing justice perceptions from a general or a personal perspective by integrating insights from theoretical frameworks accounting for self-other asymmetry and positive-negative asymmetry.

1.1. The measurement of belief in a just and an unjust world

The first justice perception scales built in the 1970s (the Just World Scale, Rubin & Peplau, 1973; and the Just World Scale revised, Rubin & Peplau, 1975) included positively keyed justice and positively keyed injustice items, where justice and injustice were affirmed. The authors of the scales assumed that the sum of the score of the BJW would be obtained by averaging the sum of the scores of the BJW items plus the reversed scores of the unjust-world items. However, summing and correlating the just and unjust world items as two separate scales has shown correlations close to zero and just and unjust items loaded on different factors (see Dalbert et al., 2001; Furnham, 2003, for reviews). Most of these studies were conducted in Western countries. We only found two studies that included both Western and non-western countries (Furnham, 1993; Furnham & Karani, 1985), but the samples are very small, and the analysis of results does not allow a comparison of BJW and BUJW scores in Western and non-western countries.

Although no consensus on the meaning of the Belief in an Unjust World (BUJW) was reached (Furnham, 2003), researchers concluded there was a need to measure and study just world belief and unjust world belief separately (e.g. Furnham & Procter, 1989). Probably, as a result, from then on, the BJW scales built had only positively keyed justice items with no references to injustice. This was the case for the two widely used BJW scales (for reviews, see Bartholomaeus et al., 2023; Chobthamkit et al., 2025; Hafer & Bègue, 2005): the General Belief in a Just World Scale (GBJW, Dalbert et al., 1987) and the Belief in a Just World Scale for others (BJW—O, Lipkus et al., 1996). Furthermore, a BJW for the self has been proposed and new scales with only positively keyed justice items referring to the self have been developed: the Personal Belief in a Just World Scale (PBJW, Dalbert, 1999) and the BJW for the Self (BJW—S, Lipkus et al., 1996). The GBJW or the BJW—O for others (Lipkus et al., 1996) reflect the belief that, overall, events are just, and the PBJW or the BJW—S reflect the belief that, overall, events in one's life are just.

1.2. Correlates of belief in just world

Within the study of the BJW correlates, the relationship between BJW and well-being has been by far the most studied relationship. BJW has been conceived as an important personal resource and coping resource that promotes the well-being of people (see Correia, Carvalho, Otto, et al., 2024 for a review). The underlying mechanisms between BJW and well-being have been theorized as “Belief in a Just World functions” (Dalbert, 2001): (1) BJW compels people to act fairly themselves (Hafer, 2000); (2) BJW enables people to trust in being treated fairly by others (Zuckerman & Gerbasi, 1977), and to invest in long-term goals (Otto & Dalbert, 2005); and (3) BJW promotes the assimilation of injustices (see Hafer & Bègue, 2005, for a review). Recent research has found that these underlying mechanisms can occur simultaneously (Correia, Carvalho, Romão et al., 2024).

Studies have also reported the correlations between BJW and socio-demographic (gender, age, and socio-economic status) and ideological variables (religiosity, political conservatism). The results are mixed (see Bartholomaeus, 2024, for a revision), but the fact that in some studies these variables significantly correlate with BJW, highlights the importance of controlling these variables in the present study.

Although GBJW may be a better predictor of well-being than PBJW

in collectivistic cultures (e.g. Wu et al., 2011), most of the previous research found that the PBJW compared to the GBJW is a better predictor of well-being both in western (e.g., Correia & Dalbert, 2007) and non-western countries (Chobthamkit et al., 2025). Indeed, in a recent meta-analysis Hafer et al. (2020) found a positive correlation between GBJW and PBJW in 76 samples from 19 countries. Moreover, Hafer et al. (2020) proposed that GBJW and PBJW compose a second-order latent BJW factor, suggesting that GBJW and PBJW can be conceptualized as two dimensions that convey the same underlying (latent) BJW. This finding is an important one because, as Hafer et al. (2020) state, the justice motive theory (Lerner, 1980) conceives belief in a just world as encompassing beliefs about the self and others, rather than either one in isolation, and it is precisely the integration of both beliefs that provides a coherent sense of whether the world is just. These results highlight the relevance of examining the shared aspects of an underlying BJW factor in relation to well-being. Still, we will examine whether PBJW and GBJW have unique contributions to understanding people's well-being.

In the present study, we will test both approaches. On the one hand, we analyze the influence of a second-order factor for BJW to confirm results from Hafer et al. (2020) that BJW is positively associated with people's well-being. We extend this approach by testing whether a second-order factor for BUJW will show the opposite effect, namely, that BUJW will be negatively associated with well-being. On the other hand, we test the unique effect of PBJW and GBJW on people's well-being. Similarly, we examine whether the effects of PBUJW and GBUJW were consistently and negatively related to participant's well-being. This approach allows us to disentangle unique and differentiated effects of BJW from a personal or general perspective, and using just and unjust frames.

1.3. Comparing correlates of belief in just and belief in unjust world

In a systematic investigation “of the distinctions and similarities between the belief in a just and an unjust world” (Dalbert et al., 2001, p. 562), it was found that although the BUJW and the BJW were negatively correlated, only the BJW correlated positively with religiosity, well-being (i.e., mood level, life satisfaction, and affect), and preference for a well-established political party. The BUJW did not significantly correlate with any of these variables. Dalbert et al. (2001) interpreted these results as evidence that BJW and BUJW are not bipolar dimensions of the same continuum but different constructs. Therefore, in contrast to BJW, BUJW would then not have the same adaptive functions and, therefore, would not promote the same underlying processes that explain the relationship between BJW and well-being: namely, promoting the obligation of fair behavior, promoting trust in others and investment in long-term goals, and promoting the assimilation of injustices.

In our view, the Dalbert et al. (2001) study has some methodological constraints regarding the measurement of BJW and BUJW. First, the authors measured GBJW using previously validated scales but measured GBUJW with a 4-item indicator that had not been previously validated. Second, the content of the items used to measure GBJW and GBUJW differed, bringing distinct elements to represent each construct. For instance, GBUJW included elements such as “fate” (“a lot of people suffer an unjust fate”), which are not mentioned in GBJW measures.

In the same line, Lench and Chang (2007) also used scales to measure BJW and BUJW that have items that brought different contents to represent each construct: BJW was measured with the GBJW (Dalbert et al., 1987), and BUJW was measured with a newly developed 5-item scale, the Unjust World Views Scale (Lench & Chang, 2007).

Moreover, the fact that PBJW is a better predictor of well-being compared to GBJW (e.g. Correia & Dalbert, 2007) was not considered either by Dalbert et al. (2001), or by Lench and Chang (2007). Therefore, in our view the question of whether BJW and BUJW have different associations with well-being is still waiting for further investigation. Furthermore, in the present study, besides including the measures of

GBJW and GBUJW, we will also consider the measures of PBJW and PBUJW.

1.4. Well-being and belief in just and belief in unjust world: a new theoretical framework

Two lines of research may help to explain the relation between well-being with PBJW and GBJW and PBUJW and GBUJW: research on positive-negative asymmetry effect (Kahneman & Tversky, 1979; see Baumeister et al., 2001, for a review) and research on egocentric bias on justice perception (see van Prooijen, 2008; for a review). With regard to the positive-negative asymmetry effect (see Baumeister et al., 2001, for a review), it has been shown that evil is stronger than good, as a general principle across a broad range of psychological phenomena. This idea has been theorized by Kahneman and Tversky (1979) in their prospect theory, who argue that people weight losses more than gains, exacerbating risk aversion and influencing their evaluations and decisions. A recent meta-analysis including hundreds of studies and thousands of participants illustrates this positive-negative asymmetry as the authors found that negative intergroup contact had a stronger effect in exacerbating prejudice toward outgroups than positive contact had in reducing it (Paolini et al., 2024). Furthermore, research has shown that perceiving societal unfairness undermines people's subjective well-being (García-Sánchez et al., 2024; Vezzoli et al., 2022). As such, we extend these findings to justice literature to argue that BUJW may evoke more negative than positive feelings and therefore would display a stronger association with well-being compared to BJW.

With regard to egocentric bias on justice perceptions (Epley et al., 2004; Ross & Sicoly, 1979), it has been found that what people consider (un) just is influenced by egocentric motives. According to egocentric motives theorizing, people think they deserve more than others, and they perceive the injustices happening to them as stronger compared to injustices happening to other people (Lind et al., 1998; Messick & Sentsis, 1979). Furthermore, two other theoretical accounts may also contribute to the self-other asymmetry, in line with the same effect produced by the egocentric bias, that is the higher association between PBJW and PBUJW with well-being, compared to GBJW and GBUJW. One of these theoretical accounts is related to the specificity matching (i.e., the principle that attitudes or beliefs are more predictive of outcomes when both constructs are measured at similar levels of specificity; Ajzen & Fishbein, 1977). Given that the criterion here is a personal-level variable (one's own well-being), specificity matching on its own could account for why personal-level beliefs (PBJW) are more predictive of well-being. The other one is Construal Level Theory of Psychological Distance (Trope & Liberman, 2010). This theory would produce a similar prediction, wherein more psychologically close constructs (like personal beliefs) are cognitively represented in more concrete, experiential terms, thus being more likely to influence immediate feelings, behaviors and outcomes more strongly. In sum, justice judgments referring to the self may have a stronger association with well-being than justice judgments referring to other people.

From these lines of research, it can be expected that the perceived injustice will be more strongly associated with well-being than the perceived justice (PBJW). This difference of association will be higher when we compare perceived *injustice* that happened to the self (PBUW) with perceived *justice* that happened to the self (PBJW). Conversely, the difference will be smaller when comparing perceived *injustice* that happened to people in general (GBUJW) with perceived *justice* that happened to people in general (GBJW). Thus, in the present study we will conceptualize the relationship between Belief in a Just and an Unjust World with well-being accounting for a theoretical framework that considers the interaction of positive-negative asymmetry with self-other asymmetry.

1.5. The current research

The aim of this paper is to contribute to the discussion of whether BJW and BUJW are differently correlated with well-being, and if such differences can be extended to framing beliefs from personal and general perspectives. This approach addresses some limitations of previous studies examining unjust world beliefs. First, we used the same items to measure BJW and BUJW, adjusting exclusively by the just or unjust terms used in the writing. This writing allows us to control for potential sources of variance due to the content of the items, and thus, the differences between items will exclusively reflect the use of just or unjust frames. Second, we distinguished between personal and general beliefs in a just and unjust world, which provides a fine-grained analysis of specific components that may exert a stronger influence on well-being. Third, we used an exploratory-confirmatory strategy, such that we replicated our preliminary results with a different and larger sample and with alternative outcome variables of well-being.

Our analytical strategy is two-fold. On the one hand, we examined the effect of a general second-order latent factor for BJW on a latent variable of well-being to replicate the result of Hafer et al. (2020). Then, we analyzed the effect of a second-order latent factor for BUJW on well-being to determine if this association differs from the one with BJW. On the other hand, we delve deeper into the correlates of each factor on well-being. That is, we tested a two-factor model to determine whether there are differences between PBJW and GBJW and well-being. We followed the same procedure to test whether PBUJW and GBUJW had different effects on well-being. This two-factor model allowed us to know which perspective (personal vs. general) or justice frame (just vs. unjust) may exert a more influential effect on well-being.

Finally, we examined which sociodemographic factors are consistently associated with GBJW and PBJW, as well as GBUJW and PBUJW, respectively. In both studies, we controlled for the potential influence of sociodemographic variables such as financial well-being, religiosity, and political ideology on general and personal BJW and BUJW. Separate analysis for observed indicators of subjective well-being included in Study 1 and 2 are available in the supplementary material (see Tables S3 and S4).

2. Study 1

Study 1 aims to examine the psychometric properties of BJW and BUJW, both personal and general, and their association with participants' well-being.

3. Method

3.1. Participants

The sample comprised 258 salaried workers (aged between 21 and 74 years, $M = 36.53$; $SD = 11.46$; 77.91 % female and 22.09 % male). The sample size was determined by resource constraints and heuristic guidelines for conducting factor analysis (Lakens, 2022). Resource constraints included organizational permissions and participant availability; and we targeted a heuristic of a minimum of 200 participants for conducting factor analysis (MacCallum et al., 1999). Most participants reported working in the following types of occupations: administrative, commercial, health care, educational, financial and IT sectors.

3.2. Procedure

An online survey was created using Qualtrics® (Qualtrics, Inc.; Provo, UT, USA), and participants were recruited mainly via Facebook and LinkedIn. The link for this study was also available on the website of the Portuguese Psychologists Association (Ordem dos Psicólogos Portugueses).

Participants were provided information about the general purpose of

the study. They were informed that it was non-invasive research, that there were no physical, financial, social, legal, or other risks connected with the study, that their participation would be anonymous, and all results would be analyzed anonymously. It was also explained that they could withdraw from the study by closing the web browser without recording their responses. Contact information for the research team was provided to all participants if they wanted additional information or had any questions about the study. After informed consent and agreement to participate, participants were then presented with the survey.

Participants started by answering measures about well-being (i.e., happiness, life satisfaction, positive and negative affect). Then, participants were randomly assigned to respond to either Beliefs in a Just World or Beliefs in an Unjust World, both personal and general. At the end of the questionnaire, participants were asked about socio-demographic information, thanked for their participation, and provided contact information of the research team. The study received approval (including ethical approval) from the Portuguese Psychologists Association.

3.3. Measures

3.3.1. Well-being

We estimated a latent variable based on four indicators that capture cognitive and affective components of subjective well-being conceptualized in the literature (Diener et al., 2018). The cognitive indicator included one item for life satisfaction, and the affective indicators included one item for self-reported happiness and the Positive and Negative Affect Scale. Life satisfaction and happiness were measured with indicators reflecting people's evaluation of their lives (i.e., "All things considered, how satisfied are you with your life as a whole nowadays?" on a scale from 1 "extremely dissatisfied" to 5 "extremely satisfied", $M = 3.55$, $SD = 0.80$); and "Taking all things together, how happy would you say you are?" on a scale from 1, "Extremely unhappy," to 5, "Extremely happy." ($M = 3.52$, $SD = 0.75$). Positive and negative affect was measured using the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), in which people were asked to indicate on a scale ranging from 1, "not at all," to 5 "extremely," to what extent they feel five positive emotions (i.e., active, determined, inspired, excited, enthusiastic) ($M = 3.47$, $SD = 0.66$, $\omega_{\text{McDonald}} = 0.85$) and five negative emotions (i.e., nervous, fearful, scared, guilty, tormented) ($M = 1.95$, $SD = 0.73$, $\omega = 0.88$). Negative affect was reverse-scored to reflect associations in the same direction as other indicators of well-being. All variables were rescaled to a range of zero to one and used as indicators of a latent variable of well-being. The reliability of this indicator showed an appropriate fit statistics ($\omega_{\text{Total Scale}} = 0.88$, $\chi^2(2) = 1.375$, $p = .503$, $CFI = 1.00$, $TLI = 1.00$, $RMSEA < 0.01$, 90 % $CI [0.01, 0.10]$, $SRMR = 0.02$).

3.3.2. Personal belief in a just world

We used the Personal BJW Scale (Dalbert, 1999). The scale comprises seven items designed to capture the belief that, overall, events in one's life are fair ($\omega = 0.91$; sample item: 'I think most of what happens to me is fair.')

3.3.3. General belief in a just world

We used the General Belief in a Just World scale (Dalbert et al., 1987). The scale comprises six items designed to capture the belief that, overall, events are fair ($\omega = 0.80$; sample item: "I believe that, by and large, people get what they deserve").

3.3.4. Personal belief in an unjust world

We adapted the items of the PBJW by reframing them to reflect injustice ($\omega = 0.92$, "I think most of what happens to me is unfair.", on a 5-point scale ranging from 1 ("totally disagree") to 5 ("totally agree"). We reverse-scored the items to facilitate comparison with PBJW. As such, higher scores indicate lower beliefs in an Unjust World (or higher

just belief).

3.3.5. General belief in an unjust world

We adapted the items of the GBJW scale, using injustice frames ($\omega = 0.92$, e.g., "I believe that, by and large, people don't get what they deserve") and a 5-point scale range from 1 ("totally disagree") to 5 ("totally agree"). We reverse-scored the items to facilitate comparison with GBJW. As such, higher scores indicate lower belief in an Unjust World (or higher just beliefs).

3.3.6. Political ideology

A single item asked individuals to place themselves on a scale ranging from 1 "Left" to 5 "Right."

3.3.7. Self-rated religiosity

People were asked to rank themselves, regardless of their particular religion, by saying how religious they would say they were, using an 11-point scale ranging from 1, "Not at all religious," to 5, "Very religious."

3.3.8. Financial well-being

We measured subjective income using the question, "How do you feel about your household's income nowadays?" on a scale of 1 ("It is very difficult to live on current income") to 4 ("My current income allows me to live comfortably").

4. Results

4.1. Descriptive results

Table 1 shows descriptive statistics and Pearson correlations between observed variables included in the study. We found that Beliefs in a Just World and an Unjust World correlated similarly to other variables.

Interestingly, a Welch Two Sample *t*-test indicates that people scored higher in belief in a Unjust World ($M = 3.36$, $SD = 0.57$) than belief in a Just World ($M = 2.82$, $SD = 0.54$), $\text{difference} = -0.55$, 95 % $CI [-0.68, -0.41]$, $t(255.29) = -7.88$, $p < .001$; $\text{Cohen's } d = -0.98$, 95 % $CI = [-1.24, -0.72]$. The same pattern was found when we compared personal and general beliefs in a just and unjust world. Likewise, the score of GBUW ($M = 3.11$, $SD = 0.6$) was higher than the score of GBJW ($M = 2.59$, $SD = 0.56$), $\text{difference} = 0.52$, 95 % $CI [0.38, 0.66]$, $t(254.64) = 7.28$, $p < .001$; $\text{Cohen's } d = 0.91$, 95 % $CI = [0.65, 1.16]$. Similarly, PBUW ($M = 3.62$, $SD = 0.64$) was higher than PBJW ($M = 3.05$, $SD = 0.65$), $\text{difference} = 0.57$, 95 % $CI [0.41, 0.73]$, $t(255.96) = 7.06$, $p < .001$; $\text{Cohen's } d = 0.88$, 95 % $CI = [0.62, 1.13]$.

4.2. One latent factor of belief in a just world and well-being

We found that a model with one latent factor for Belief in a Just World fit poorly the data (see M1a in Table 2), as per regular standards ($CFI > 0.90$, $TLI > 0.90$, $RMSEA < 0.08$, $SRMR < 0.06$) (Kline, 2023). Therefore, we inspected sources of local misfit (i.e., modification indices) and controlled for the correlation between two items of the General belief factor and between two items of the Personal belief factor. We controlled for the correlation between these items because they were highly correlated and had relatively overlapping wording. After implementing these adjustments, we found that the model fit improved substantially. We maintained the same specifications for modeling BJW and BUJW to be consistent across models.

We found that BJW ($\beta = 0.57$, $p = .02$) and BUJW ($\beta = 0.49$, $p = .006$) are positively associated with well-being (see Fig. 1 or Table S1 in the supplementary material for details). However, BJW and BUJW regression coefficients were not statistically different from zero

Table 1
Descriptive statistics and correlations of beliefs in a just and unjust world and well-being variables.

	Descriptives		Belief in a Just World			Beliefs in an Unjust World			Outcome variables			Sociodemographics			
	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. BJW (total)	2.82	0.54													
2. P-BJW	3.05	0.65	0.88**												
3. G-BJW	2.59	0.56	0.91***	0.61***											
4. BUJW (r)	3.36	0.57													
5. P-BUJW (r)	3.62	0.64				0.91***									
6. G-BUJW (r)	3.11	0.6				0.93***	0.69***								
7. Life Satisfaction	3.55	0.8	0.50***	0.39***	0.51***	0.45***	0.37***	0.45***							
8. Self-reported happiness	3.52	0.75	0.48***	0.39***	0.47***	0.37***	0.32***	0.37***	0.70***						
9. Positive affect	3.47	0.66	0.22*	0.19*	0.20*	0.30***	0.32***	0.24**	0.45***	0.38***					
10. Negative affect	1.95	0.73	-0.28**	-0.18*	-0.30***	-0.35***	-0.32***	-0.32***	-0.34***	-0.30***	-0.26***				
11. Financial wellbeing	2.56	0.89	0.38***	0.26**	0.42***	0.36***	0.31***	0.34***	0.35***	0.26***	0.23***	-0.27***			
12. Political Ideology (left-right)	2.95	0.89	0.07	0.09	0.04	0.12	0.13	0.1	0.07	0.03	0.11	-0.07	0.09		
13. Religiosity	2.51	1.02	0.03	0.1	-0.03	0.21*	0.21*	0.17	0.13*	0.09	0.15*	-0.11	0.04	0.16**	
14. Sex (female)	0.78 [†]		-0.12	-0.07	-0.14	-0.03	-0.03	-0.02	0.02	-0.01	0.08	0.11	-0.14*	-0.1	0.11

Note: Pearson correlations between observed variables included in Study 1. *** $p < .001$, ** $p < .01$, * $p < .05$; † = Proportion; PBJW = Personal Belief in a Just World; GBJW = General Belief in a Just World; PBUJW = Personal Belief in an Unjust World; GBUJW = General Belief in an Unjust World; (r) = Items are reversed score to facilitate comparison with BJW, which means that higher BUJW scores indicate lower belief in an Unjust World.

(difference = 0.08, $z = 0.53$, $p = .59$ ¹). We also found that political orientation, financial well-being, age, religiosity, and gender were not significantly associated with well-being (see Table S1 in the supplementary material).

4.3. Two latent factors for belief in a personal and general just/unjust world and well-being

We found that modeling Personal and General Beliefs in a Just World in a two-factor model obtained appropriate fit statistics, $\chi^2(284) = 247.63$, $p < .001$, CFI = 0.93, TLI = 0.94, RMSEA = 0.05, RMSEA 90 % CI = [0.4, 0.7], SRMR = 0.07. In this model, we found that PBJW was positively related to well-being ($\beta = 0.37$, $p = .03$). On the contrary, GBJW was positively, but not significantly, related to well-being ($\beta = 0.20$, $p = .22$) (see Fig. 2 or Table S2 in the supplementary material for details).

Regarding Personal and General Beliefs in an Unjust World, the model obtained optimal fit statistics, $\chi^2(189) = 189.66$, $p = .47$, CFI = 0.99, TLI = 0.99, RMSEA = 0.01, RMSEA 90 % CI = [<0.01 , 0.04], SRMR = 0.06. We found that PBUJW was positively associated with well-being ($\beta = 0.48$, $p = .09$), yet it was not statistically significant under $p < .05$. On the other hand, GBUJW was unrelated to well-being ($\beta = -0.02$, $p = .96$), after accounting for financial well-being, religiosity, age, and sex (see Table S2 in the supplementary material for details). Furthermore, the difference between PBJW and PBUJW predicting subjective well-being was not statistically significant (difference = 0.11, $z = 0.34$, $p = .73$).

5. Discussion

In Study 1, we confirmed the theoretical model from Hafer et al. (2020) that a latent factor of Personal and General Beliefs in a Just World was positively related to a latent variable of well-being. We also found a similar pattern for BUJW, such that the lower the BUJW, the better the well-being reported by participants. The association between BJW and BUJW with well-being was similar.

However, this one-factor model does not enable us to identify which BJW dimension has a more significant effect on well-being. Therefore, we tested a model reflecting Personal and General Beliefs in a Just and Unjust World. This two-factor model provides several pieces of information to consider. First, the two-factor model fitted the data better than the one-factor model, and the two-factor model for BUJW provided a better fit than the two-factor model for BJW. Second, the factor related to personal beliefs was positively correlated with well-being, whereas the factor representing general beliefs was not significantly associated with well-being. Third, although the effect size of PBUJW appears to be larger than that of PBJW, the differences were not statistically significant. Furthermore, the association between PBUJW and wellbeing was non-statistically significant under $p < .05$. This lack of statistical significance may be due to a lack of statistical power ($N = 129$ in each group). Therefore, our results need to be replicated using a larger sample and alternative indicators of well-being to validate our findings.

6. Study 2

In Study 2, we aimed to replicate the findings from Study 1, confirming the measurement model of Beliefs in a Just and Unjust World with a different sample and using alternative measures of well-being that capture not only general evaluations and affects but also specific symptoms of psychological and physical distress.

¹ We used the test proposed by Paternoster et al. (1998) that aims to test differences between regression coefficients.

Table 2

Fit statistics for the measurement model of Beliefs in a Just and Unjust World.

Model	X2	df	p	CFI	TLI	RMSEA	RMSEA 90 % CI	SRMR
BJW	289.84	191	<0.01	0.89	0.87	0.07	0.05	0.08
BJW (adjusted)	252.62	189	<0.01	0.93	0.92	0.05	0.03	0.07
BUJW	219.85	191	0.07	0.96	0.95	0.04	<0.01	0.06
BUJW (adjusted)	189.66	189	0.47	1	1	0.01	<0.01	0.04

Note: BJW = Belief in a Just World; BUW = Belief in an Unjust World; CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.

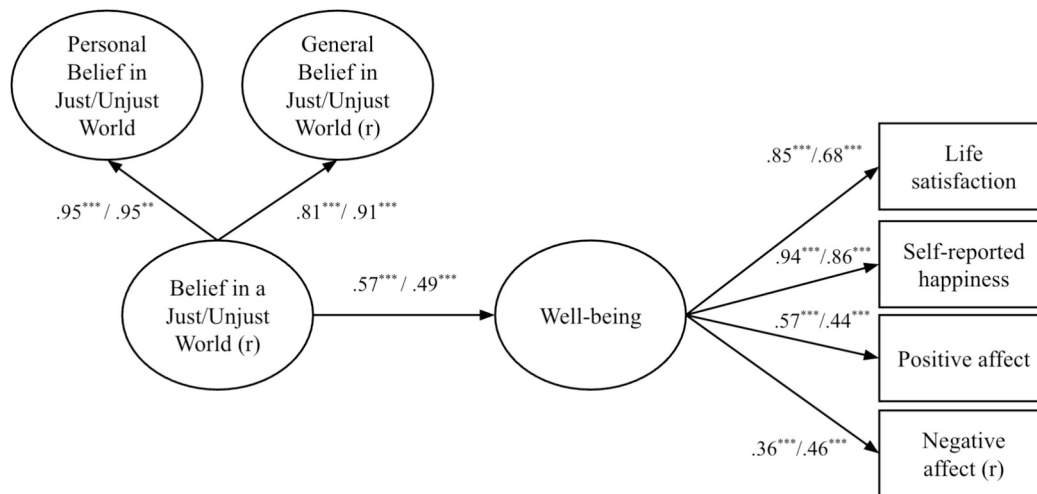


Fig. 1. Path diagram depicting standardized regression coefficients for structural equation model testing a one-factor model for belief in a Just and Unjust World related to a latent factor of well-being. Note: *** $p < .001$, ** $p < .01$, * $p < .05$; (r) = indicates that the variable is reverse scored, such that higher values reflect lower levels of the construct; Factor loadings for indicators comprising BJW and BUJW are omitted to facilitate visualization; coefficients are displayed indicating justice above injustice frames.

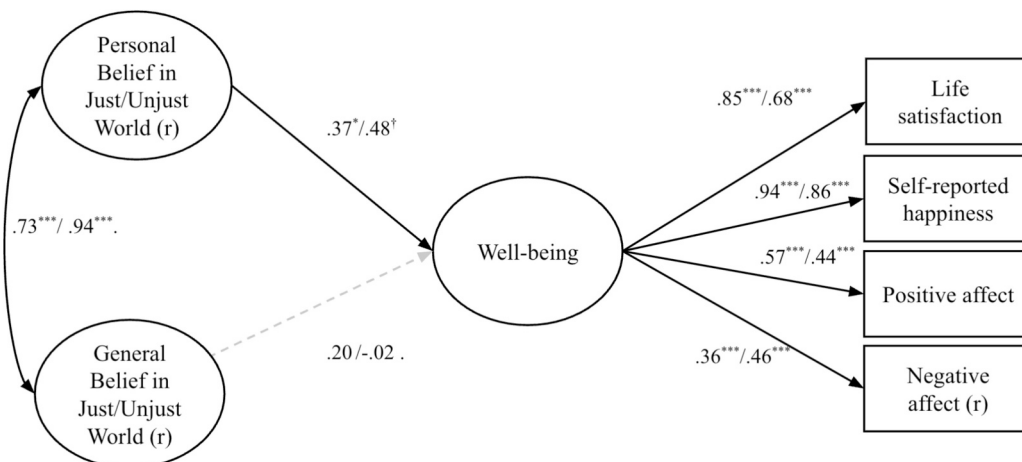


Fig. 2. Path diagram depicting standardized regression coefficients for structural equation model testing Personal and General Beliefs in a Just World related to well-being; Note: *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$; (r) = indicates that the variable is reverse scored, such that higher values reflect lower levels of the construct; solid black lines indicate statistically significant coefficients; gray dotted lines indicate non-significant coefficients; coefficients are displayed indicating justice above injustice frames.

7. Method

7.1. Participants

The present study's sample consisted of 573 police officers aged between 20 and 65 ($M = 40.03$, $SD = 7.95$), of whom 90.2 % were male. The participants were from all regions of the country. The sample was a convenience sample of police officers who belong to the Portuguese

Republican National Guard (Guarda Nacional Republicana). No a priori power analysis was conducted. Our sample size was conditional on the organization and participants' availability, recruiting as many participants as possible to get at least 200 participants for conducting two separate factor analyses on belief in a just and unjust world.

7.2. Procedure

An anonymous online survey was created using Qualtrics® (Qualtrics, Inc.; Provo, UT, USA), and the weblink was disseminated by one of the Trade Unions of the Republican National Guard (APG/GNR – Associação dos Profissionais da Guarda) through their official webpages and social networks.

Participants followed a link to the survey and viewed an information sheet very similar to the one from Study 1. Similarly to Study 1, they began by administering measures related to well-being. Then, participants were randomly assigned to respond to either Beliefs in a Just World or Beliefs in an Unjust World, both personal and general. At the end of the questionnaire, participants were asked about socio-demographic information.

At the end, the participants were thanked for their participation, debriefed, and provided with the research team's contact information again. The study received approval (including ethical approval) from the Portuguese Psychologists Association (Ordem dos Psicólogos Portugueses).

7.3. Measures

7.3.1. Well-being

Well-being was estimated as a second-order latent variable based on nine items of the medium-length version of the Copenhagen Psychosocial Questionnaire – (COPSOQ-III; Burr et al., 2019) (e.g., “How often have you been physically exhausted?”). The items captured the following five factors: sleep troubles (two items); burnout (two items); stress (two items); depressive symptoms (two items); and self-rated health (one item). All items were coded on a 5-point scale (1 = Never to 5 = Always; and for self-rated health 1 = Excellent to 5 = Poor). We estimated a second order latent factor for well-being, using the nine items and five factors ($\omega_{Total.Scale} = 0.92$, $\chi^2(23) = 50.11$, $p < .001$, $CFI = 0.99$, $TLI = 0.99$, $RMSEA = 0.05$, 90 % CI [0.03, 0.06], $SRMR = 0.02$). COPSOQ-III symptoms were reverse-scored such that higher values reflect lower frequency of psychological distress symptoms, indicating better psychological wellbeing.

Personal Belief in a Just World. Same as in Study 1 ($\omega = 0.92$).

General Belief in a Just World. Same as in Study 1 ($\omega = 0.80$).

Personal Belief in an Unjust World. Same as in Study 1 ($\omega = 0.93$).

General Belief in an Unjust World. Same as in Study 1 ($\omega = 0.82$).

8. Results

8.1. Descriptive results

Table 3 shows descriptive statistics and Pearson correlations between observed variables included in the study. We found that all measures of BJW and BUJW correlated similarly to other variables.

Participants scored higher in BUJW ($M = 3.16$, $SD = 0.59$) than in BJW ($M = 2.73$, $SD = 0.59$), $difference = 0.43$, 95 % CI [0.33, 0.53], $t(539.98) = 8.55$, $p < .001$; $Cohen's d = 0.73$, 95 % CI [0.56, 0.91]). We found the same pattern when we compared personal and general beliefs in a just and unjust world. Likewise, General Beliefs in an Unjust World were higher ($M = 2.97$, $SD = 0.6$) than General Beliefs in a Just World ($M = 2.52$, $SD = 0.6$), $difference = 0.45$, 95 % CI [0.34, 0.55], $t(539.89) = 8.65$, $p < .001$; $Cohen's d = 0.74$, 95 % CI [0.57, 0.92]). Similarly, Personal Beliefs in an Unjust World was higher ($M = 3.36$, $SD = 0.67$) than Personal Beliefs in a Just World ($M = 2.94$, $SD = 0.69$), $difference = 0.42$, 95 % CI [0.31, 0.53], $t(539.88) = 7.28$, $p < .001$; $Cohen's d = 0.63$, 95 % CI [0.45, 0.80].

8.2. One latent factor of belief in a just world and well-being

We fitted two structural equation models with robust standard errors to test the association between BJW and BUJW with subjective well-

Table 3
Descriptive statistics and correlations of beliefs in a just and unjust world and well-being variables.

	Descriptives		Belief in a Just World			Beliefs in an Unjust World			Outcome variables				Sociodemographics		
	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. BJW	2.73	0.59													
2. P-BJW	2.94	0.68	0.93***												
3. G-BJW	2.52	0.6	0.91***	0.71***											
4. BUJW (r)	3.16	0.59													
5. P-BUJW (r)	3.36	0.67				0.94***									
6. G-BUJW (r)	2.97	0.6				0.92***	0.73***								
7. Sleeping issues	2.94	1.06	0.35***	0.38***	0.26***	0.30***	0.36***	0.19**							
8. Burnout	2.8	0.98	0.45***	0.47***	0.36***	0.25***	0.33***	0.14*	0.72***						
9. Stress	2.89	1	0.47***	0.46***	0.40***	0.33***	0.27***	0.17***	0.69***	0.79***					
10. Depressive symptoms	3.08	0.99	0.51***	0.52***	0.42***	0.35***	0.39***	0.25***	0.67***	0.77***	0.82***				
11. Self-reported health	2.83	0.94	0.33***	0.36***	0.23***	0.24***	0.32***	0.12*	0.52***	0.55***	0.52***	0.54***			
12. Financial well-being	2.16	0.75	0.26***	0.24***	0.24***	0.19**	0.18**	0.17**	0.27***	0.29***	0.25***	0.30***	0.26***		
13. Age	40.8	8.27	-0.08	-0.16**	0.02	-0.01	-0.08	0.06	-0.14***	0.01	-0.04	-0.04	-0.21***	0.04	
14. Religiosity	2.58	1.01	0.05	0	0.1	0.06	0.01	0.1	-0.05	-0.01	-0.06	-0.02	-0.02	0.03	0.15***
15. Sex (Female)	0.10†		0.02	0.02	0.01	0.20***	0.20***	0.18**	0.09*	0.07	0.04	0.08	0.13**	-0.15***	-0.01

Note: Pearson correlations between observed variables included in Study 2. *** $p < .001$, ** $p < .01$, * $p < .05$, † = Proportion; PBJW = Personal Belief in a Just World; GBJW = General Belief in a Just World; PBUJW = Personal Belief in an Unjust World; GBUJW = General Belief in an Unjust World; (r) = Items are reversed score to facilitate comparison with GBJW, which means that higher BUJW scores indicate lower belief in an Unjust World.

being. The measurement model for BJW showed appropriate fit indices, $\chi^2(280) = 474.56$, $p < .001$, $CFI = 0.94$, $TLI = 0.93$, $RMSEA = 0.05$, $RMSEA\ 90\% \text{ CI} = [0.05, 0.06]$, $SRMR = 0.05$. We also confirmed our hypothesis that BJW was positively associated with well-being ($\beta = 0.49$, $p < .001$) see Fig. 3, accounting for financial well-being, religiosity and age (see Table S3 in the supplementary material).

Similarly, the measurement model for BUJW showed appropriate fit indices, $\chi^2(280) = 474.17$, $CFI = 0.94$, $TLI = 0.93$, $RMSEA = 0.05$, $RMSEA\ 90\% \text{ CI} = [0.05, 0.06]$, $SRMR = 0.05$. We also confirmed that BUJW was positively correlated to well-being ($\beta = 0.34$, $p < .001$), after accounting for covariates. The difference between the effect sizes of BJW and BUJW predicting well-being was not statistically significant ($\text{difference} = 0.15$, $z = 1.63$, $p = .10$).

8.3. Two latent factors for belief in a personal and general just/unjust world and well-being

The two-factor model for beliefs in a PBJW and GBJW obtained appropriate fit indices, $\chi^2(276) = 460.52$, $p < .001$, $CFI = 0.95$, $TLI = 0.94$, $RMSEA = 0.05$, $RMSEA\ 90\% \text{ CI} = [0.04, 0.06]$, $SRMR = 0.05$. We found that the factor capturing PBJW was positively associated with well-being ($\beta = 0.49$, $p = .03$). On the contrary, the factor related to GBJW was unassociated with well-being ($\beta \leq 0.01$, $p = .99$) (see Fig. 4).

Regarding the BUJW, the two-factor model representing PBUJW and GBUJW also obtained appropriate fit indices, $\chi^2(276) = 480.35$, $p < .001$, $CFI = 0.94$, $TLI = 0.93$, $RMSEA = 0.06$, $RMSEA\ 90\% \text{ CI} = [0.05, 0.06]$, $SRMR = 0.05$. We found that PBUJW positively predicted well-being ($\beta = 0.83$, $p < .001$). On the other hand, GBUJW was not statistically significantly correlated with well-being ($\beta = -0.49$, $p = .07$). As in Study 1, we found that the effect of PBJW and PBUJW on well-being was not significantly different from zero ($\text{difference} = 0.34$, $z = 1.02$, $p = .31$).

9. Discussion

In Study 2, we confirmed the results we obtained in Study 1 by using a larger sample size and an alternative measure of well-being. We found that the one latent factor for BJW and BUJW was positively associated with well-being. This finding is consistent with Study 1 and results from

Hafer et al. (2020), suggesting that an underlying construct of BJW and BUJW is consistently related to people's well-being. We also confirmed that the factor associated with personal beliefs, instead of general beliefs, is the one consistently linked to well-being.

Although not statistically significant, the association between well-being and PBUJW was almost twice as large as that including PBJW. This finding may indicate either that there are no true differences or that we failed to reach statistical significance due to large standard errors associated with the relatively small sample size. As such, this finding may stimulate future research about potential asymmetries between PBJW and PBUJW in influencing well-being.

10. General discussion

The current studies aim to advance knowledge on the relationship between perceptions of injustice and well-being. This was done using, for the first time, the same items to measure BJW and BUJW, adjusting exclusively the terms used in the writing to indicate just or unjust. In two studies, we examined whether well-being is associated differently with just and unjust world beliefs, and we further extended the study of these distinct effects to differentiate between personal and general beliefs in a just and an unjust world.

We began by testing a one-second-order factor model that captures a latent variable for BJW—combining GBJW and PBJW—to replicate the results from Hafer et al. (2020) regarding the positive association between BJW and well-being. In both studies, we confirmed the theoretical model proposed by Hafer et al. (2020), which suggests that one latent factor of BJW is positively associated with a latent variable of well-being. Furthermore, for the first time, we examined and confirmed that a one-second-order factor of BUJW—combining GBUJW and PBUJW—is significantly related to well-being.

We consider these results important because, as far as we know, it is the first replication of Hafer et al. (2020) findings and the first extension of this analysis to include BUJW. Our results suggest a similar pattern of responses for BJW and BUJW. Therefore, we reason that the different patterns obtained by Dalbert et al. (2001) and Lench and Chang (2007) may have been due to the different content of the items used to measure BJW and BUJW.

Furthermore, we argue that justice perceptions may be influenced by

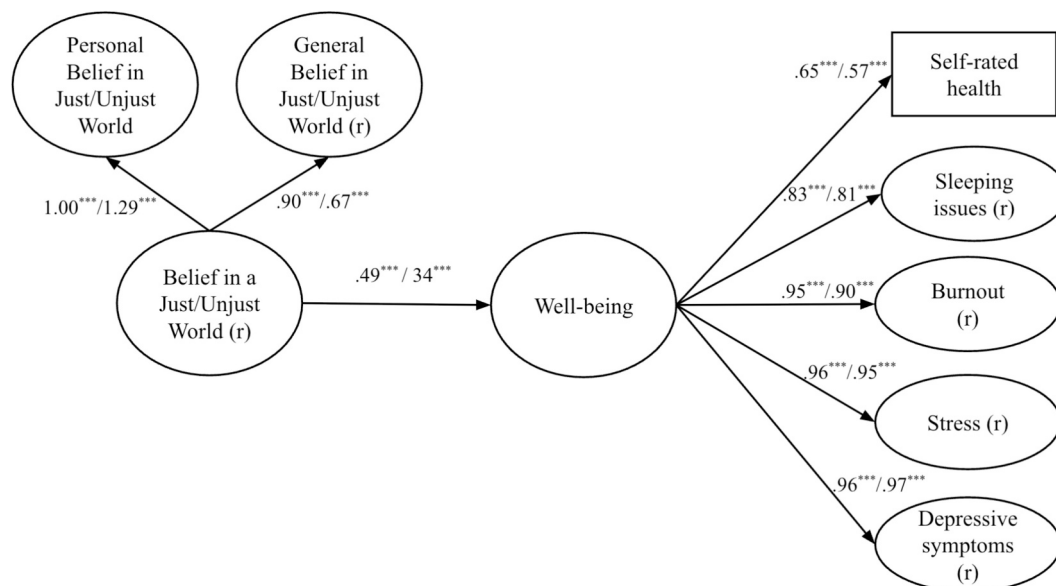


Fig. 3. Path diagram depicting standardized regression coefficients for a structural equation model of Beliefs in a Just/Unjust world related to well-being. Note: *** $p < .001$, ** $p < .01$, * $p < .05$, $^{\dagger}p < .10$; coefficients are displayed indicating justice above injustice frames; (r) = indicates that the variable is reverse scored, such that higher values reflect lower levels of the construct; Solid black lines indicate statistically significant coefficients; gray dotted lines indicate non-significant coefficients; coefficients are displayed indicating justice above injustice frames.

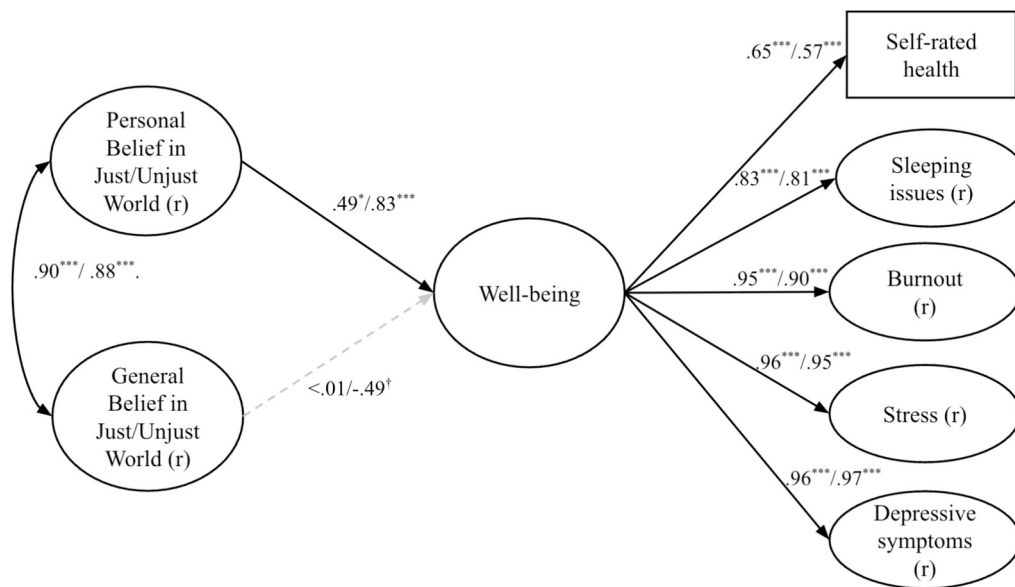


Fig. 4. Path diagram depicting standardized regression coefficients for structural equation model testing Beliefs in a Just and Unjust World related to well-being. Note: *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$; (r) = indicates that the variable is reverse scored, such that higher values reflect lower levels of the construct; solid black lines indicate statistically significant coefficients; gray dotted lines indicate non-significant coefficients; coefficients are displayed indicating justice above injustice frames.

the egocentric bias (van Prooijen, 2008, for a review) and the positive-asymmetry bias (Baumeister et al., 2001), and that these two biases may jointly impact the relationship between justice perceptions and well-being. Therefore, we further examined the difference between BJW and BUJW, accounting for a personal and general perspective. Our results provide support for the relevance of distinguishing between personal and general dimensions when studying perceptions of justice and injustice. In Studies 1 and 2, we found that well-being was positively correlated with PBJW and PBUW, but not with GBJW and GBUEW.

Importantly, in Study 1, we found that the effect size of PBUJW was higher than the effect of PBJW, although it was non-statistically significant under $p < .05$. This lack of statistical significance may be due to a lack of statistical power—128 participants in each analysis—and therefore we tried to replicate this analysis using a larger sample and alternative indicators of well-being to validate these findings. In Study 2, we found the same pattern of results, such that the effect size of the association between PBUJW and well-being was almost two times larger than the one involving PBJW, although this difference was again non-statistically significant.

In sum, when further examining the difference between each of the personal and general BJW compared with the BUJW, we found support for the relevance of PBUJW and PBJW as the strongest factors associated with well-being. Our findings are innovative and run counter Dalbert et al.'s (2001) findings and conclusions that, in contrast to BJW, BUJW would not have the same adaptive functions and, therefore, would not promote the same underlying processes that explain the relationship between BJW and well-being. Furthermore, this can be theoretically conceived as reflecting the egocentric bias that makes injustice happening to the self more important than injustice happening in general. Moreover, the fact that, in Study 2, although not significant, the association between well-being and PBUJW was almost twice as large as that including PBJW, may encourage future research to test the hypothesis that the egocentric bias — whereby injustice happening to the self is more impactful than injustice happening in general — may interact with positive-negative asymmetry — whereby injustice is more impactful than justice — in influencing people's well-being.

Future research should examine and compare which are the underlying processes that mediate the relationship between the PBUJW and PBJW and well-being. Research should also address the possibility that

in the case of PBUJW, these underlying processes may take place simultaneously, as it has been recently found for PBJW (Correia, Carvalho, Romão et al., 2024).

Although not hypothesized, we found a negative relationship between GBUJW and well-being in Study 2. This result was also observed by Hafer et al. (2020), who also found that GBJW and psychological well-being were negatively correlated. These authors argued that this may be a statistical artifact that could be explained by a strong association between PBJW and GBJW that distorts the relationship with subjective well-being. This argument was also proposed by Sutton & Douglas (2005), who claim that GBJW and PBJW can mask or suppress each other's effects (MacKinnon et al., 2000). Indeed, Correia & Dalbert (2007, Study 2) found that GBJW was positively associated with peer justice, but such an effect became negative once they controlled for PBJW, suggesting a potential suppressing effect. The same situation happened to Sutton and Winnard (2007), who found that the association between GBJW and delinquent behavior changed the sign after accounting for PBJW. Therefore, it is likely that the negative association between GBJW and GBUJW with well-being is due to a high correlation between general and personal beliefs.

We also found that associations between GBJW and GBUJW with well-being changed substantially after accounting for PBJW and PBUJW, becoming non-significant or even negative. A similar result was observed by Hafer et al. (2020), who also found that GBJW and psychological well-being were negatively correlated. These authors argued that this may be a statistical artifact that could be explained by a strong association between PBJW and GBJW that distorts the relationship with subjective well-being. Other researchers have found similar results where GBJW changes its effect after accounting for PBJW (Correia & Dalbert, 2007, Study 2; Sutton & Douglas, 2005; Sutton & Winnard, 2007). Therefore, it is likely that the negative association between GBJW and GBUJW with well-being is due to a high correlation between general and personal beliefs, suggesting a type of suppression effect.

Of note, the association between PBJW and PBUJW with well-being were consistent across studies and after accounting for covariates, suggesting that just world beliefs linked to the self (vs. general) are less likely to be affected by covariates (see SM, Table S8 for zero-order correlations among latent variables; and Table S9 for partial correlations for each dimension after accounting for covariates).

10.1. Strengths and limitations

The strengths of the current studies are mainly related to the way they overcame caveats of previous studies that examined the relation between just world and unjust world beliefs. Firstly, by using the same items to measure BJW and BUJW, we controlled for potential sources of variance due to the content of the item, and we assured that differences between items were only due to the interpretation of just or unjust frames. Secondly, by distinguishing between personal and general beliefs in just and unjust world, we extended the study of the difference between justice and injustice to the specific components of the personal and general that may exert a stronger influence on well-being. We found similar results in two samples with different types of participants and alternative outcome variables of well-being controlling for socio-demographic variables. This is probably an indication that the association between personal and general beliefs in a just and unjust world and well-being is robust and independent from person characteristics.

Our studies have some limitations. Firstly, both studies are cross-sectional which poses some caution to infer a causal relationship between variables in the model. Secondly, research data were collected through participants' self-report, which might be subjective and lead to self-reported bias. Thirdly, the samples of both studies were convenience samples from the same country, which limits the generalizability of the results found to other samples from other countries. We conducted an invariance analysis to test whether our findings were conditional on sample characteristics. We found that both the pattern of associations (configural invariance) and the factor loadings (weak invariance) were consistent across samples (See SM, Table S7). This suggests that BJW and BUJW exhibit similar psychometric properties regardless of group-specific characteristics. Moreover, the fact that we observed comparable psychometric properties and associations in two samples differing in both composition and well-being outcomes further supports the robustness of the relationship between personal and general beliefs in a just and unjust world and well-being. Still, further research should examine whether these findings can vary in different cultures and contexts to increase generalizability.

Fourthly, our participants were from a Western country with an individualistic culture, which also limits the generalizability of the results found to non-Western countries that might have collectivistic cultures, where the general BJW is a better predictor of well-being than the personal BJW. In collectivistic cultures, also general BUJW might be a better predictor of well-being than the personal BUJW.

Fifthly, participants were randomly assigned to respond to either BJW or BUJW, both personal and general. This allows us to evaluate the psychometric properties of BJW and BUJW using the same items, adjusting exclusively for the use of just and unjust terms in the writing. Therefore, the same participants did not answer both just and unjust measures. Although this prevented us from doing a within-participants comparison, it provided us with the guarantee that the high content overlap between BJW and BUJW did not provoke response contamination, due to semantic overlap and priming effects, potentially distorting the very asymmetries we seek to identify. For that reason, we decided to randomize the administration of BJW and BUJW.

11. Conclusion

The present studies set out to examine whether Belief in a Just World (BJW) and Belief in an Unjust World (BUJW) related similarly or differently with well-being. Although this question has been deemed theoretically significant (see Dalbert et al., 2001, for a review), inconsistent empirical findings in earlier research led to a decline in scholarly attention. Our work seeks to revisit this issue using a novel methodological approach (identical items were employed to measure both BJW and BUJW, differing only in the framing of justice versus injustice), and situated within the context of recent theoretical advances in BJW theory.

Across both studies, we found that a latent BJW factor was positively

associated with a latent well-being variable. Notably, and for the first time, we also observed a significant relationship between a latent BUJW factor and well-being. Further analysis revealed that personal beliefs in a just and unjust worlds (PBUJW and PBJW)—were more strongly linked to well-being than their general counterparts (GBUJW and GBJW).

These findings make a meaningful contribution to the literature. Whereas previous studies tended to support the notion of BJW and BUJW have different relationships with well-being, our results suggest a shared psychological foundation: lower beliefs in justice and higher beliefs in injustice appear to function similarly in relation to well-being.

Taken together, the current studies pave the way for further developments of instruments adapting just and unjust world beliefs, considering the importance of both just/unjust and personal/general frames. Furthermore, it is our hope that the present paper increases the interest in including the study of injustice in the field of Social Psychology of Justice.

CRediT authorship contribution statement

Isabel Correia: Writing – review & editing, Writing – original draft, Project administration, Investigation, Funding acquisition, Data curation, Conceptualization. **Efraín García-Sánchez:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.paid.2025.113532>.

Data availability

Data will be made available on request.

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