Psychometric Properties and Correlates of Precarious Manhood Beliefs in 62 Nations

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Abstract

Precarious manhood beliefs portray manhood, relative to womanhood, as a social status that is hard to earn, easy to lose, and proven via public action. Here, we present cross-cultural data on a brief measure of precarious manhood beliefs (the Precarious Manhood Beliefs scale [PMB]) that covaries meaningfully with other cross-culturally validated gender ideologies and with country-level indices of gender equality and human development. Using data from university samples in 62 countries across 13 world regions (N = 33,417), we demonstrate: (1) the psychometric isomorphism of the PMB (i.e., its comparability in meaning and statistical properties across the individual and country levels); (2) the PMB's distinctness from, and associations with, ambivalent sexism and ambivalence toward men; and (3) associations of the PMB with nation-level gender equality and human development. Findings are discussed in terms of their statistical and theoretical implications for understanding widely-held beliefs about the precariousness of the male gender role.

Keywords: psychometric isomorphism; precarious manhood beliefs; ambivalent sexism; ambivalence toward men

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> Among most of the peoples that anthropologists are familiar with, true manhood is a precious and elusive status beyond mere maleness, a hortatory image that men and boys aspire to and that their culture demands of them as a measure of belonging (Gilmore, 1990, p. 17).

In his anthropological study of several nonindustrial and agrarian societies around the world, Gilmore (1990) described a near-universal tendency for societies to demand, of their male members, a social proof of manhood status. The details of this proof vary across societies – ranging from demonstrations of sexual prowess to acquisition of material goods, participation in drunken brawls, and painful circumcision rituals – but the underlying theme is the same: Men must demonstrate, through some sort of public action, that they deserve the title of a "real man." Building on these ideas within social psychology, precarious manhood theory posits that manhood is widely conceptualized as a social status that is hard to earn, easy to lose, and must be proved repeatedly via action (Vandello et al., 2008). This theory further argues that the precariousness of their gender status leads men, relative to women, to experience higher levels of social anxiety and stronger motivation to compensate, sometimes via risky or aggressive posturing, when their gender status is challenged (Vandello & Bosson, 2013).

Gilmore's (1990) qualitative research provided some evidence of the universality of precarious manhood beliefs in societies such as the Trukese of Micronesia, the Mehinaku of Brazil, and the Samburu of Kenya. However, we lack systematic, quantitative, cross-cultural data on the prevalence of these beliefs. Given that prescriptive gender norms defining "real manhood" differ across cultures (Kimmel & Aronson, 2003), it is likely that beliefs about the precariousness of the male gender role differ cross-culturally as well. Thus, the current project measures precarious manhood beliefs in 62 countries representing six continents and

13 world regions. Specifically, we test the psychometric isomorphism of a brief (4-item) measure of Precarious Manhood Beliefs (the PMB), and ask whether it coheres meaningfully with other cross-culturally validated gender ideologies (Glick & Fiske, 1996, 1999). Finally, we ask if the PMB correlates with country-level indicators of gender inequality (the Global Gender Gap Index [GGGI]; World Economic Forum, 2019) and human development (the Human Development Index [HDI]; United Nations Development Programme, 2019). Together, the tests reported here shed light on the meaning, cross-cultural prevalence, and correlates of precarious manhood beliefs. This project is part of a larger investigation of gender beliefs preregistered in Open Science Framework (OSF; see https://osf.io/fqd4p/).

Precarious Manhood Beliefs

Precarious manhood refers to the notion that men's, relative to women's, gender status is considered elusive, tenuous, and proven through public action (Vandello et al., 2008; Vandello & Bosson, 2013). In some indigenous societies, boys achieve manhood status through rituals involving physical separation and isolation, and painful or dangerous tests of endurance (Gilmore, 1990; Herdt, 2017). Even in the absence of formalized manhood rituals, pressures to prove manhood are observed in North American and European countries including the U.S. (e.g., Vandello et al., 2008), Denmark (DiMuccio et al., 2017), and Poland (Kosakowska-Berezecka et al., 2016; Valved et al., in press). In contrast, the transition from girlhood to womanhood is more commonly viewed as an inevitable biological process, and women's status as "real" women is less frequently challenged (Gilmore, 1990; Vandello et al., 2008).

Moreover, preliminary data from U.S. samples suggests that precarious manhood beliefs may constitute a meaningful individual difference with implications for men's responses to gendered stimuli and feedback. Although researchers have not fully validated a measure of precarious manhood beliefs, some use or modify a 7-item scale from Vandello et

al. (2008) to assess variance in these beliefs. Findings from this research reveal that men higher in precarious manhood beliefs: are less inclined to confront a stranger who displays sexual prejudice (Kroeper et al., 2014); rate sexist and anti-gay jokes as funnier following a gender threat (O'Connor et al., 2017); and show larger cortisol reactivity (a stress response) following feedback that they lack masculinity (Himmelstein et al., 2019). However, these studies do not address the isomorphism, convergent validity, and cross-cultural usefulness of the PMB scale. Addressing the first two of these issues is important for validating the PMB's psychometric usefulness, while addressing the third issue can shed light on global variations in precarious manhood beliefs. This goal is important given that male gender role norms may not generalize across cultures (Best, 2001; Kimmel & Aronson, 2003).

Psychometric Isomorphism

Psychometric isomorphism (or *isomorphism*) refers to the similarity of a construct's meanings and statistical properties across different levels of data, such as the lower-level individual and higher-level country levels (Fontaine, 2008; Van de Vijver et al., 2008; Van de Vijver & Watkins, 2006). When a scale demonstrates isomorphism, this means that its characteristics at the higher level are comparable to its characteristics at the lower level (Tay et al., 2014). Demonstrating the isomorphism of the PMB scale is an important precursor to examining the cross-cultural prevalence of precarious manhood beliefs: Only by establishing the PMB's isomorphism can we assume that scores collected at the individual level indicate a property attributable to the country as a whole. Despite its importance, Byrne and Van de Vijver (2014) described psychometric isomorphism as "probably the most underrated topic in cross-cultural research methods" (p. 170).

Here, we test both the configural and metric isomorphism of the PMB. Configural isomorphism is evident when a scale has the same factor structure (i.e., same number of factors, same items per factor) across levels. Metric isomorphism is evident when a scale that

shows strong configural isomorphism also shows equivalent factor loadings across levels (Tay et al., 2014). We hypothesized that the PMB scale will display acceptable metric isomorphism across the individual and country levels (*Hypothesis 1*).

Links to Prevalent Gender Ideologies

Gender ideologies are broad sets of shared beliefs and attitudes about the expected roles, responsibilities, and traits of people, based on their gender (Davis & Greenstein, 2009). Across cultures, ambivalent sexism (Glick & Fiske, 1996) and ambivalence toward men (Glick & Fiske, 1999)[1] are universally recognized gender ideologies that contain both hostile (overtly insulting, angry) and benevolent (subjectively positive but patronizing) elements. Ambivalent sexism casts women as manipulative and insubordinate when they seek status or power (hostile sexism [HS]), but also as morally pure and warm when they meet men's intimacy needs (benevolent sexism [BS]). Ambivalence toward men portrays men as arrogant and predatory when they assert dominance (hostility toward men [HM]), while also competent and reliable when they fulfill a protector-provider role (benevolence toward men [BM]).

According to ambivalent sexism theory (Glick & Fiske, 1996, 1999), hostile and benevolent gender ideologies emerge from and reflect the structures of male dominance (i.e., patriarchy) and heterosexual interdependence (Vescio & Kosakowska-Berezecka, 2020). Patriarchy – the social system in which men as a group have more access to power and resources than women (Brown, 1991; Ortner & Whitehead, 1981; Sidanius & Pratto, 1999) – gives rise to hostile resentments and negative stereotypes (of women as insubordinate and men as power-hungry). Heterosexual interdependence – the gender groups' universal reliance on one another for affection, mating, and coparenting (Miller & Fishkin, 1997) – gives rise to

[1] We use these constructs' published labels – *sexism* toward women and *ambivalence* toward men – despite their asymmetry. This asymmetry conveys the researchers' assumption that *sexism* is directed toward those who lack structural power based on gender; thus, by this definition, men as a group do not experience sexism.

benevolent idealizations and positive stereotypes (of women as nurturers and men as protector-providers).

Joint endorsement of hostile and benevolent gender ideologies is theorized as essential for maintaining the gender hierarchy in which women and men hold unequal power while also depending on one another to meet important goals (Glick & Fiske, 1996, 2001). Indeed, cross-cultural studies indicate that HS and BS are almost universally positively correlated (Glick et al., 2000), as are HM and BM (Glick et al., 2004). Thus, cultures that endorse more hostile ideologies about both women and men also tend to offset these negative views with more flattering, benevolent ideologies about each gender group, with medium-to-large pair-wise correlations between these ideologies (*r*s = .34 to .69; Glick et al., 2004).

Here, we examine whether precarious manhood beliefs cohere meaningfully with the hostile and benevolent gender ideologies identified in ambivalent sexism theory (Glick & Fiske, 1996, 1999). Specifically, we test a multidimensional five-factor gender ideology model comprising hostile and benevolent stereotypes and attitudes about women and men (i.e., HS, BS, HM, and BM), as well as beliefs about the precariousness of manhood (i.e., PMB). We propose that precarious manhood beliefs supplement the ambivalent gender ideologies by capturing an associated, but distinct, set of ideas about the male gender role.

While hostile and benevolent gender ideologies reflect and legitimize men's group-level dominance over and dependence on women (Glick & Fiske, 1996, 1999), precarious manhood beliefs reflect the hierarchical and competitive nature of male-male intrasex social relations. Thus, at their root, all of these gender ideologies reveal something about the social dominance of men over women and of higher-status men over lower-status men. Although men as a group enjoy more status and power than women across cultures (Brown, 1991; Sidanius & Pratto, 1999), manhood status itself is elusive, competitive, and difficult to maintain (Vandello et al., 2008). Precarious manhood beliefs reflect the difficulty of earning

a reputation as a "real" or dominant man (Winegard et al., 2014) by emphasizing the struggle, uncertainty, and social proof requirements of the male gender role. If ambivalent gender ideologies and precarious manhood beliefs all arise from social hierarchies in which dominant men hold disproportionate power over women and lower-status men, then the PMB should cohere meaningfully with HS, BS, HM, and BM. Partially supporting this logic, unpublished data in a U.S. sample (N = 258; 48% women; Burnaford et al., 2008) revealed that people higher in precarious manhood beliefs also scored higher in hostile sexism (r = .19, p = .003) and benevolent sexism (r = .20, p = .001). Moreover, following a manhood threat, men responded by more fervently embracing benevolent sexism and social dominance (Dahl et al., 2015), and withdrawing support for gender equitable actions and social movements (Kosakowska-Berezecka et al., 2016).

Based on this logic, we tested whether scores on the PMB, HS, BS, HM, and BM comprise a five-factor model of status-relevant gender ideologies (*Hypothesis 2a*) that fits the data better than alternate one- and three-factor models. We also tested whether this five-factor gender ideology model shows metric isomorphism across individual and country levels (*Hypothesis 2b*). Finally, we tested whether the PMB correlates at least moderately positively with HS, BS, HM, and BM, on both the individual and country levels (*Hypothesis 3*)[1]. Such findings should demonstrate that beliefs about precarious manhood constitute a cross-culturally prevalent understanding of the male gender role that coheres meaningfully with other widespread gender ideologies.

Links to Country-Level Gender Inequality and Human Development

Countries differ in the extent to which their male and female residents enjoy gender parity – i.e., equal access to resources, opportunities, and status – versus gender inequity. The Global Gender Gap Index (GGGI) quantifies women's nation-level disadvantages relative to

[1] Hypotheses are identical to those in the OSF preregistration, but renumbered to increase clarity.

men's in educational attainment, economic opportunity, political empowerment, and health on a scale of 0.00 to 1.00 (World Economic Forum, 2019). Countries with lower GGGIs tend to have more patriarchal social structures and traditional sex-based labor divisions, with larger proportions of men as economic providers, protectors, and political decision-makers, and larger proportions of women as homemakers, caretakers, and low-status workers (Glick et al., 2000; Wood & Eagly, 2012). Thus, men as a group are more dominant, and women as a group more subordinate, in countries with lower GGGIs.

At the country level, we expected to find higher PMB scores in less gender equal countries. There are at least two reasons for this. First, in less gender equal countries, male-male social relations tend to be more hierarchical and competitive, with greater variance in men's power and outcomes (Betzig, 1992; Smuts, 1995). Some scholars posit that dominant men's patriarchal control over women evolved hand-in-hand with their hierarchical control over subordinate males when human societies transitioned from kin-based to class-based social structures (Lerner, 1986). If men's intragroup competition for status, resources, and access to mates is especially fierce in less gender equal countries, then people in such countries should be more inclined to view manhood as a competitive social status. Consistent with this assumption, people in more (versus less) gender unequal nations view men as tougher and more power-hungry (Glick et al., 2004), and as better suited for high-status leadership roles (Brandt, 2011). Moreover, young men from the United States (ranked 53rd in gender equality; World Economic Forum, 2019) viewed their own manhood as more precarious than did young men from Denmark (14th in gender equality) (DiMuccio et al., 2017). Similarly, men from Poland (40th in gender equality) endorsed precarious manhood beliefs more strongly than men from Norway (2nd in gender equality), and Polish men reacted with less public comfort and more negative emotions to a masculinity threat than Norwegian men did (Valved et al., in press).

Second, by definition, countries lower in gender equality have more traditional gender roles and beliefs, with stronger prescriptions requiring men to protect and provide for women, family, and ingroup (Glick et al., 2000; Wood & Eagly, 2012). As Gilmore (1990) noted, these same male prescriptions underlie precarious manhood pressures: Precarious manhood norms prod men to action when the group's survival depends more heavily on men's willingness to do the difficult, dangerous, and competitive jobs of protecting (e.g., fighting) and providing (e.g., hunting, acquiring resources). Thus, people in countries that depend more heavily on men to assume protection and provision roles (i.e., less gender equal countries) should also be more inclined to view manhood as a risky endeavour with a high likelihood of failure. Moreover, country-level associations of gender equality with precarious manhood beliefs should emerge even when controlling for other associated gender ideologies (i.e., HS, BS, HM, and BM), demonstrating that the links between the PMB and GGGI cannot be explained entirely by relevant third variables (*Hypothesis 4a*).

We also examined links between the PMB scale and national human development. The Human Development Index (HDI) is a country-level indicator of human potential and well-being in terms of life expectancy, economic growth, and access to education (United Nations Development Programme, 2019). Countries with larger HDIs tend to grant their citizens more freedom to meet basic needs (e.g., for food, shelter, health) and more autonomy to choose desirable, self-improving pursuits such as education, work, and community participation. Because human development correlates negatively with sexism (Napier et al., 2010) and gender inequality (Ingelhart & Norris, 2003), we originally planned to covary the HDI in tests of Hypothesis 4a (i.e., the association of country-level PMB and gender equality). However, the HDI and GGGI were strongly correlated ($r = 0.60$) in the 62 countries included here, so we decided instead to examine country-level associations of PMB with the GGGI and the HDI separately. Thus, we expected countries lower in HDI to score

higher in PMB, even when controlling for measures of HS, BS, HM, and BM (*Hypothesis 4b*).

The Present Research

This cross-cultural, quantitative study examines the psychometric isomorphism of a measure of precarious manhood beliefs, and its associations with other prevalent gender ideologies. Although ethnographic work suggests that manhood may be universally conceived as precarious (Gilmore, 1990), endorsement of precarious manhood beliefs likely varies across cultures. Moreover, it is important to demonstrate that beliefs about precarious manhood operate similarly when measured at the individual and country levels, and that they cohere meaningfully with other prevalent gender ideologies.

Here, we examine these issues as part of a larger study (see https://osf.io/fqd4p/). The hypotheses listed here are pre-registered as confirmatory based on initial exploratory tests conducted on a subset (N = 45) of countries (see https://osf.io/u9xfg/). These initial exploratory tests were hypothesis-driven and were limited to those that we pre-registered (with one exception[2]). Based on the logic outlined earlier, hypotheses are as follows:

H1: The PMB scale will demonstrate acceptable metric isomorphism across individual and country levels.

H2a and H2b: A five-factor model (with PMB, HS, BS, HM, and BM as separate dimensions) should fit the data better than alternate one-factor and three-factor models (H2a), and this five-factor model should demonstrate acceptable metric isomorphism across the individual and country levels (H2b).

H3: The PMB will correlate at least moderately positively with HS, BS, HM, and BM at the individual and country levels.

[2] The only analysis we conducted that was not pre-registered examined the association of PMB with GGGI and HDI separately (due to the high GGGI-HDI correlation).

H4a and H4b: The PMB will correlate negatively with country-level GGGI (H4a), and with country-level HDI (H4b), when controlling for HS, BS, HM, and BM.

Note that the country samples differed in average age and gender distribution (% male; see Table 1), so we pre-registered hypotheses stating that our effects should emerge when controlling for age and gender distribution. However, these variables correlated very weakly with the PMB (age: r = -.10, p < .01; gender distribution: r = -.05, p < .01). Thus, to simplify notation in the text, and because controlling for these variables produced no substantial differences in the models' parameters, we present models without these variables (see the online supplement for results that include these covariates).

Method

Participants and Procedure

Data were collected between January 2018 and February 2020 as part of large cross-cultural project (see https://osf.io/fqd4p/). All participants were undergraduates who volunteered their time and (in most countries) received no compensation. Initially, a target sample of at least 200 participants (with roughly 50% male) was sought from each country, reflecting a balance between desired statistical power and feasibility. However, samples in seven nations (Georgia, Iran, Lebanon, Luxembourg, Portugal, Suriname, Uruguay) fell short of this goal, whereas samples in nations with multiple collection sites (e.g., Germany, Italy, Turkey) far exceeded the goal. From the initial sample (N = 34,023), we removed records from 606 individuals (< 2%) who failed more than 1 of 3 attention checks (Curran & Hauser, 2019) or provided incomplete data for the PMB scale. This yielded a total of N = 33,417 respondents (37% men) from 62 countries. Information on sample composition appears in Table 1.

IRB approval for each sample was obtained from researchers' respective institutions. Informed consent was obtained from all participants, and participants were assured that their

data would remain anonymous and confidential. Participants completed a set of scales (see Measures below) that measured more variables than those described here (see https://osf.io/fqd4p/ for all variables). The order of measures was randomized and data were collected via SurveyMonkey or Qualtrics platforms. In some cases, participants completed the survey with paper and pencil.

Measures

Bilingual scholars working in psychology used the back-translation procedure (see Van de Vijver & Leung, 1997) to create 29 different language versions of each scale. All items were translated from English to the target language, and then back-translated by an independent translator, unless the item was previously published in the target language. All scale translations are available at https://osf.io/fqd4p/.

Precarious Manhood Beliefs. The Precarious Manhood Beliefs scale consists of 4 items from Vandello et al. (2008). Based on an exploratory factor analysis of 7 items in a U.S. sample, we selected four items with loadings > .45 that conveyed beliefs that manhood is difficult to earn ("Other people often question whether a man is a 'real man,'" "Some boys do not become men no matter how old they get") and easy to lose ("It is fairly easy for a man to lose his status as a man," "Manhood is not assured – it can be lost"). Participants indicated their agreement on scales of 1 (*strongly disagree*) to 7 (*strongly agree*). To estimate internal reliability consistency for the PMB, we calculated omega (ω) coefficients (McDonald, 1999), which use the results of factor analyses and are preferable to alpha coefficients when items have different factor loadings (Trizano-Hermosilla & Alvarado, 2016). See Table 1 for ω values.

Ambivalent Sexism. We used six items from a short version of the Ambivalent Sexism Inventory (ASI, Glick & Whitehead, 2010; Rollero et al., 2014), which measures Hostile Sexism (HS) and Benevolent Sexism (BS). We selected items with factor loadings >

.50 as reported in Rollero et al. (2014). HS items were: “Women seek to gain power by getting control over men,” “Women exaggerate problems they have at work,” and “When women lose to men in a fair competition, they typically complain about being discriminated against.” BS items were: “Women should be cherished and protected by men,” “Men are incomplete without women,” and “Women, compared to men, tend to have superior moral sensibility.” Items were rated on scales of 0 (*strongly disagree*) to 5 (*strongly agree*). See Table 1 for ω coefficients.

Ambivalence toward Men. We used six items from a short version of the Ambivalence toward Men Inventory (AMI, Glick & Whitehead, 2010; Rollero et al., 2014), which measures Hostility toward Men (HM) and Benevolence toward Men (BM). We selected items with factor loadings > .50 as reported in Rollero et al. (2014). HM items were: “Men will always fight to have greater control in society than women,” “Men act like babies when they are sick,” and “Most men sexually harass women, even if only in subtle ways, once they are in a position of power over them.” BM items were: “Men are more willing to put themselves in danger to protect others,” “Every woman needs a male partner who will cherish her,” and “A woman will never be truly fulfilled in life if she doesn’t have a committed, long-term relationship with a man.” Items were rated on a scale of 0 (*strongly disagree*) to 5 (*strongly agree*). See Table 1 for ω coefficients.

Global Gender Gap Index (GGGI). The GGGI captures the magnitude of gender-based disparities within a country (World Economic Forum, 2019) by benchmarking women’s disadvantage, relative to men’s, in economic, education, health, and political arenas. The overall GGGI reflects a country’s progress towards gender parity on a scale of 0 (disparity) to 1 (parity). We used GGGI data compiled for 2020 (see Table 1).

Human Development Index (HDI). The HDI is a composite measure of a country’s development, based on life expectancy at birth, access to knowledge (measured by years of

schooling), and standard of living (measured by Gross National Income (GNI) per capita adjusted for the price level of the country) (United Nations Development Programme, 2019). We used HDI data from 2019 (see Table 1).

Results

Preliminary Analyses

Reliability of the PMB, ASI, and AMI across countries. We estimated the internal consistency reliability of the gender scales in each country using the coefficient ω (McDonald, 1999). Because ω tends to underestimate internal consistency reliability in scales with fewer than 10 items (Graham, 2006), we adopted the liberal criterion of 0.60 as a threshold. As shown in Table 1, the PMB demonstrated acceptable internal consistency reliability in all but 5 countries: Brazil, Japan, Portugal, Uruguay, and Vietnam (ωs from .46 to .57). Examination of the wordings of the PMB scale in these countries did not reveal any problems with the items' translations. We thus retained these 5 countries in the analyses reported here, but present all analyses with these 5 countries excluded in the online supplement. Note that all results, conclusions, and interpretations remain identical whether or not we include these 5 countries.

The HS and BM scales also demonstrated acceptable internal consistency reliability in most countries (see Table 1). Exceptions for the HS scale included Indonesia, Nepal, Nigeria, and Portugal (ωs from .50 to .59), and exceptions for the BM scale included Brazil, Finland, Ghana, Indonesia, Morocco, Nigeria, and Suriname (ωs from .46 to .59). More problematic were the coefficients for the BS and HM scales: In 32 and 24 countries, respectively, these scales demonstrated ωs from .44 to .59 (the BS) and from .38 to .59 (the HM; see Table 1). Note that we used ultra-short (3 items) versions of these scales, which may partially explain their relatively low internal reliability consistencies in some countries. Nonetheless, we urge caution when interpreting results with the BS and HM in particular.

Between-country and within-country variance. To estimate the between- and within-country variance of the gender scales, we computed intraclass correlation coefficients (ICCs) for each scale. ICCs represent the proportion of total (between + within) variance attributable to between-country differences, with the remainder (1.0 – ICC) attributable to within-country differences. While all five of the gender scales demonstrated substantially lower between-country than within-country variance (ICCs < .50), the PMB had the lowest between-country variance: ICC_{PMB} = .11; ICC_{HM} = .17; ICC_{HS} = .18; ICC_{BS} = .23; and ICC_{BM} = .32. Thus, 89% of the variance in PMB scores is attributable to differences among individuals within – and not between – countries.

Gender differences in the PMB. Table 2 shows the mean PMB scores, as well as the PMB factor scores (derived from the confirmatory factor analysis presented in the next section) for each country, split by participant gender. As shown in Table 2, exploratory tests of gender differences in PMB endorsement did not reach statistical significance in most (n = 37) nations. However, in 15 countries, men endorsed the PMB more strongly than women (ds from 0.15 to 0.47), and in nine countries, women endorsed the PMB more strongly than men (ds from 0.20 to 0.69). Interestingly, women tended to endorse the PMB more strongly than men in countries lower in gender equality and human development (GGGI: r = .28, p < .05; HDI: r = .43, p < .01). We consider this pattern further in the Discussion.

Primary Analyses

Factor structure and isomorphism of the PMB. Before testing hypotheses, we conducted a confirmatory factor analysis (CFA) on the total sample, ignoring the multilevel structure of the data, to test the factor structure of the PMB. To assess model fit using maximum likelihood estimation we examined the Bayesian information criterion (BIC), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) or standardized root mean square residual (SRMR) for models with low degrees of freedom

(i.e., a one-factor PMB model). We applied the commonly used cut-off criteria of these indices to assess model fit (i.e., CFI > .90 and RMSEA/SRMR < .08 indicating acceptable fit; Kline, 2016; lower BIC values indicating better fit). We used the lavaan package (Rosseel, 2012) in the R environment (R Core Team, 2020) for all analyses.

Given the contents of precarious manhood beliefs, the brevity of the PMB scale (4 items), and results of prior factor analyses (Kroeper et al., 2014), we expected a one-factor PMB model to fit the data well. As shown in Table 3, the one-factor model (Model 1) demonstrated a good fit. We created PMB factor scores for each participant based on the CFA output; factor scores can theoretically range from -2.1 to 2.1 (M = 0, SD = 1.00). Table 2 shows mean PMB raw and factor scores and standard deviations for each country. PMB factor scores ranged from -.78 (Finland) to .80 (Kosovo). Figure 1 shows the geographical distribution of PMB scores by country.[3]

Next, we tested H1, which states that the PMB will demonstrate acceptable metric isomorphism across individual and country levels. To test this, we followed the steps outlined by Tay et al. (2014; see also Fischer, 2012; Fontaine & Fischer, 2011). First, we established the need for multilevel analyses by estimating the ICCs for each PMB item. ICCs represent the variance of items attributable to between-group differences, and ICCs above .05 indicate enough variance that a multilevel approach is suitable (Dyer et al., 2005). The ICC values for PMB items ranged from .05 (for "It is fairly easy for a man to lose his status as a man") to .12 (for "Some boys do not become men, no matter how old they get").

Second, we established the configural isomorphism of a one-factor PMB model (Table 3, Model 2) across the individual and country levels. To do this, we specified an isomorphic model (with the same number of factors across levels) and assessed its fit. Due to the very low complexity of the single-factor PMB model, we did not compare this model to

[3] Note that directly comparing means across countries requires tests of measurement invariance, which we do not assess here. See the Discussion for further details.

alternate models (although we specified alternate models in the next steps of our analysis). To assess relative model fit we used the BIC (with lower values indicating better fit), and to determine absolute model fit we used CFI, RMSEA, and SRMR (both within-group [$SRMR_W$] and between-group [$SRMR_B$]). As shown in Table 3, Model 2 had very good fit measures, indicating that the PMB has the same factor structure across levels.

Finally, to test the PMB's metric isomorphism (i.e., equivalence of factor loadings across levels), we constrained the loadings to be equal across levels in a one-factor model (Model 3) and compared its fit to that of Model 2, in which the loadings were not constrained equal. As shown in Table 3, the BIC, CFI, RMSEA, and $SRMR_W$ fit statistics for Model 3 were as good as those for Model 2, but the $SRMR_B$ indicated worse fit for Model 3 than Model 2. We thus tested an alternate model (Table 3, Model 4) in which we allowed one of the item's loadings (λ_2; "Some boys do not become men no matter how old they get") to vary across levels. This model fit the data as well as Model 2. Note that we retained the item with loadings that varied across levels, to ensure acceptable reliability in as many countries as possible. Thus, H1 was supported, with the 4-item PMB demonstrating partial strong (rather than strong) metric isomorphism.

Factor structure and isomorphism of the five-factor gender ideology model. H2a states that the PMB, HS, BS, HM, and BM should comprise a five-factor gender ideology model, and H2b states that this five-factor model will demonstrate acceptable metric isomorphism across individual and country levels. To test H2a, we compared the fit of the five-factor gender ideology model to alternate one-factor and three-factor models. We first ignored the multilevel structure of the data and used CFAs to fit a one-factor model (Table 4, Model 5) in which all 16 items (from the PMB, HS, BS, HM, and BM) form one dimension; a three-factor model (Table 4, Model 6) in which the PMB items, the ambivalent sexism (HS and BS) items, and the ambivalence toward men (HM and BM) items form separate

dimensions; and a five-factor model (Table 4, Model 7) in which the PMB, HS, BS, HM, and BM each forms a separate dimension. Consistent with H2a, the five-factor model (Model 7) fit substantially better than the one-factor model (Model 5) and the three-factor model (Model 6). As shown in Table 4, the BIC value was lower for Model 7 than for Models 5 and 6, and the absolute fit statistics were acceptable for Model 7, whereas they indicated poor fit for Models 5 and 6. Thus, H2a was supported.

Next, we examined whether Model 7 demonstrated good metric isomorphism across levels. First, the ICC values for the HS, BS, HM, and BM items all ranged from .05 to .30, indicating that multilevel analyses are appropriate. We thus established the configural isomorphism of the five-factor gender ideology model by specifying models with five dimensions at the individual level and different numbers of dimensions at the country level (Model 8 = one-factor, Model 9 = three-factor, Model 10 = five-factor). Table 4 shows the results from fitting the configural isomorphic model (Model 10) and the two non-configural isomorphic models (Model 8 and 9). Model 10 fit the data better (on the $SRMR_B$ criterion) than Model 8, but it fit similarly to the three-factor Model 9. Given similar fit between Models 9 and 10, we considered the configural isomorphic model (Model 10) superior to Model 9 based on theoretical grounds.

Finally, to test the metric isomorphism of the five-factor model, we constrained the factor loadings to be equal in Model 11. As shown in Table 4, Model 11 fit the data as well as the strong configural isomorphic model (Model 10), in that both models had similar absolute fit statistics (i.e., CFI, RMSEA, $SRMR_W$, $SRMR_B$). Thus, H2b was supported.

Correlations of PMB with ambivalent gender ideologies. H3 states that the PMB will correlate at least moderately positively with HS, BS, HM, and BM at the individual and country levels. As shown in Figure 2, associations of the PMB with the four ambivalent gender ideology scales were all positive at both levels of analysis. Moreover, whereas one

association was small in size (coefficient = .28), the remaining fell into the range of medium or large effects (coefficients = .33 to .71). H3 was thus largely supported.

Correlations of PMB with country-level gender inequality and human development. H4a and H4b state that the PMB will correlate negatively with the GGGI and the HDI. To test these hypotheses, we included the GGGI (Table 4, Model 12) and HDI (Table 4, Model 13) as correlates of the country-level latent PMB factor. These models showed good fit to the data (see Table 4), even when controlling for the ambivalent gender ideology scales (HS, BS, HM, and BM). Figure 2 shows the CFA results for the model with the GGGI as a correlate of the PMB (results look similar in the model with the HDI). As depicted in Figures 3 and 4, and supporting H4a and H4b, countries higher in GGGI and HDI are lower in PMB (-0.52 and -0.47 respectively). Moreover, in the online supplement we report the results of exploratory cluster analyses of countries, demonstrating geographical clustering of PMB scores by gender equality and human development.

We also tested a model (Table 4, Model 14) with both the GGGI and HDI as covariates, despite their strong association. This model showed poor absolute fit on the $SRMR_B$ criterion. Moreover, when both country-level predictors were in the model, the relationship between PMB and GGGI weakened but remained significant (-0.37), while the relationship between PMB and HDI became non-significant (-0.25).

Finally, following Kuppens and Pollet's (2015) critique that researchers should control for national wealth per capita in studies examining correlates of country-level gender equality, we re-ran Models 12 and 13 controlling for GNI per capita (World Bank, 2020). Correlations of the PMB with GGGI and HDI were somewhat weaker, but still significant, when controlling for this variable: -0.30 and -.26.

Discussion

Anthropological and qualitative data suggest that societies around the world – despite differing in values, languages, social structures, and norms – share a common conceptualization of manhood as more precarious than womanhood (DiMuccio et al., 2017; Gilmore, 1990). Here, we used quantitative methods to examine the cross-cultural prevalence of precarious manhood beliefs in 62 nations covering 13 world regions and representing over 33,400 respondents. Specifically, we tested the isomorphism and gender-relevant correlates of the Precarious Manhood Beliefs (PMB) scale, a brief self-report scale measuring the notion that manhood is hard to earn and easy to lose.

Our findings can be summarized both statistically and theoretically. Statistically, the PMB demonstrates strong configural isomorphism and partial strong metric isomorphism across individual and country levels. This means that the scale has similar factor structures, factor loading patterns, and factor loading strengths at both levels of analysis (Tay et al., 2014). Thus, beliefs about precarious manhood, as measured via the PMB scale, mean the same thing at the individual level and the country level. Further, a theoretically derived, five-factor gender ideology model – comprising separate dimensions for precarious manhood beliefs (PMB), and hostile and benevolent gender ideologies about women (HS, BS) and men (HM, BM) – demonstrated psychometric isomorphism across the individual and country levels. Thus, both the PMB and ultra-brief versions of the Ambivalent Sexism Inventory (Glick & Fiske, 1996) and the Ambivalence toward Men Scale (Glick & Fiske, 1999), can be used and interpreted similarly whether the units of analysis are individuals or countries. Moreover, precarious manhood beliefs are associated with national gender equality and human development, even when controlling for hostile and benevolent sexism and hostility and benevolence toward men. When both gender equality and human development are

included in the same model, precarious manhood beliefs are still associated with national gender equality.

Demonstrating the psychometric isomorphism of the PMB scale has several implications and advantages. As mentioned, aggregated individual scores can be interpreted to reflect a psychological attribute of the country at large. This allows researchers to correlate country-level PMB scores with other country-level variables. National PMB scores can also be used as a country property in multilevel analyses, to assess their associations with both lower-level (e.g., individual) and higher-level (e.g., world region) variables. Such scores may be useful in research on the behavior, attitudes, and roles of men within given cultures, as well as in research on broader cross-cultural social phenomena. Thus, we view the publication of nation-level PMB scores for 62 countries (see Table 2) as a major contribution of this work.

Theoretically, these findings extend the precarious manhood framework in novel ways. Although precarious manhood beliefs and their correlates have been measured both qualitatively and quantitatively in several different cultures (e.g., Himmelstein et al., 2019; Valved et al., in press), this study represents the first systematic, global examination of these beliefs using a standardized scale. The findings reveal, first, that notions of precarious of manhood are universally understood, but endorsed to differing degrees across cultures. Thus, consistent with precarious manhood theory (Vandello et al., 2008), people around the globe recognize a common understanding of manhood as an achieved, rather than ascribed, social status (e.g., Linton, 1936).

Second, precarious manhood beliefs cohere with ambivalent gender ideologies to form a multidimensional, universal gender ideology model. Specifically, this model captures distinct but correlated dimensions of hostility and benevolence toward women and men, and beliefs about the tenuousness of men’s gender status. We propose that, at root, all of these

dimensions reveal structures in which dominant men hold status over women and lower-status men. Whereas ambivalent gender ideologies presumably arise from and reflect the intergroup tensions (dominance-subordination and mutual interdependence) inherent in gender hierarchies (Glick & Fiske, 1996, 1999), precarious manhood beliefs reflect the difficulties of men's competitive intrasex struggles for dominance (Gilmore, 1990; Vandello et al., 2008). That is, when men hold more intergroup dominance over women – necessitating the hostile and benevolent ideologies that justify and sustain such dominance – they also experience more stratified within-group status and more competitive dominance struggles. These latter male-male dynamics presumably give rise to cultural precarious manhood beliefs, which assist in gender role socialization by preparing boys to face challenges, take risks, and fill protector-provider roles (Gilmore, 1990).

Third, these findings illuminate the unique associations of precarious manhood beliefs with country-level patriarchal social structures. Specifically, the more that men outrank women in political power, resource control, and health outcomes in a country, the more inhabitants of that country view manhood itself as a social status that must be earned and can easily be lost. Of course, these data are correlational and we cannot know whether unequal gender hierarchies cause increases in precarious manhood beliefs; increases in precarious manhood beliefs cause gender hierarchies; or some third variable causes both of these. One historical account suggests that as humans transitioned from kin-based to class-based social structures, political and social power became concentrated among small groups of high-status, dominant men (Lerner, 1986). Presumably, when humans moved from subsistence economies to economies based on wealth-acquisition and property ownership, dominant men exploitatively controlled both women for their reproduction, and subordinate men for their labor (Betzig, 1993). If so, then perhaps the increasing human tendency toward class-based

social structures is a distal third variable from which both precarious manhood beliefs and ambivalent gender ideologies arose.

Next, countries lower in human development – defined as human potential and well-being – also score higher in precarious manhood beliefs. Thus, in countries in which people face more hardships and encounter fewer desirable pursuits, it may be adaptive to socialize boys and men to embrace the risks and struggles of protector-provider roles. As noted, Gilmore (1990) suggests that precarious manhood beliefs motivate men to reject puerility and participate in society as resourceful, powerful, and dominant adults. To the extent that such participation requires more unpleasant sacrifice and toil, societies must exert stronger social pressures on men to do their part. Of course, the link between precarious manhood beliefs and human development is also correlational, and causation thus cannot be determined.

Interestingly, we found that in countries lower in gender equality and human development, women tend to endorse precarious manhood beliefs more strongly than men. Perhaps in more patriarchal and less developed countries, women – as the lower-status gender group – are especially attuned to men's need for social validation. This possibility makes sense given that men sometimes respond to manhood threats by dominating and sexualizing women (Dahl et al., 2015) or behaving aggressively (Bosson et al., 2009). If these manhood-restoring strategies are especially common in harsher, more patriarchal cultural contexts, then women's heightened sensitivity to precarious manhood dynamics may reflect a protective adaptation. Another possibility is that men in harsher and more patriarchal cultures may be less willing than women to explicitly characterize the male gender role as precarious, as such admission may be perceived as a sign of weakness or vulnerability. Note, however, that these effects were not predicted and thus require replication before firm conclusions can be drawn.

Limitations and Future Research

Although we achieved impressive cross-cultural coverage in our sample, our participants were all university students. While using university students helps standardize the samples in terms of age and socioeconomic status, we cannot generalize our findings to all or most residents of each nation that provided data. This brings up another, related issue: Throughout this paper, we use the term "culture" rather than "nation" when describing assumed inter-country differences. We recognize that "culture" is often a more complex and nuanced construct than "nation," and that nations differ in how much internal cultural heterogeneity they contain. To address this, researchers should examine precarious manhood beliefs in more diverse samples, from more representative data collection sites, and perhaps using qualitative methods that allow for in-depth analyses of hard-to-reach groups. Within a single country, we might expect to find differences in precarious manhood beliefs as a function of local economic conditions and access to education, for example.

On a related note, we observed more within-country than between-country variance on the PMB, and more within-country variance on the PMB than on other gender scales (the HS, BS, HM, and BM). Thus, a substantial proportion of the variance in precarious manhood beliefs is attributable to differences among individuals within countries. A full understanding of the variance in PMB scale responses will therefore require studying individual difference predictors of these beliefs such as conformity to male role norms (Mahalik et al., 2003) or preferences for traditional sex-based labor divisions (Davis & Greenstein, 2009). Such investigations represent important avenues for future research.

Next, despite the finding that the PMB has adequate psychometric properties, scale reliabilities for the PMB were low in five countries (Brazil, Japan, Portugal, Uruguay, and Vietnam). This likely reflects the very brief (4-item) nature of the PMB, which was necessary to solicit widespread volunteer commitments to complete the larger survey. While our general conclusions do not change when excluding data from these five countries (see online

supplement), we urge researchers to use caution when interpreting country-level scores from these countries. Similar problems of low internal consistency reliabilities emerged with the ambivalent gender scales, and especially the BS and HM scales. Although we selected items for these short (3-item) scales based on their strong factor loadings in prior research, these items do not cohere strongly across all of the countries we sampled. We thus urge caution when interpreting the results of analyses on benevolent sexism and hostility toward men. Recall also that one PMB item did not display metric isomorphism across levels, indicating that this item loads onto the latent PMB variable differently at the individual and country levels. Additional psychometric investigations should determine whether modifications to this item are needed.

Another qualification of our study is that we assessed only the metric isomorphism, and not the measurement invariance, of the PMB. Our findings indicate that the PMB items are, for the most part, configurally similar, and that relations of the PMB with other variables are comparable, across both the individual and country levels. However, mean differences in PMB scores across nations cannot be interpreted without first establishing the PMB's scalar equivalence, i.e., full score equivalence (He & van de Vijver, 2012; van de Vijver & Leung, 1997; see also Brandt et al., in press). Without this step, conclusions are at best ambiguous and at worst erroneous (Chen, 2008; Steenkamp & Baumgartner 1998). Even when scalar equivalence is established, however, the construct may not be cross-culturally comparable in breadth, as it may not capture culture-specific aspects of PMB. This issue is similar to the argument that Big Five inventories capture common aspects of personality, but may underrepresent or miss non-Western aspects of personality (see Cheung et al., 2011; Cheung et al., 2001). It will be critical in future studies to address both the scalar equivalence of the PMB and the breadth of the underlying construct, to avoid potentially problematic misinterpretations (see Hambleton et al., 2005; van Osch et al., 2020).

Next, the PMB assesses the first two tenets of precarious manhood theory (i.e., manhood is "hard to earn" and "easy to lose"), but not the third tenet (i.e., manhood requires repeated "social proof"). This decision reflected a compromise among competing needs for scale brevity, high-loading items, and wordings that would translate across 29 languages. Ultimately, we sacrificed measurement of the "social proof" component in favor of measuring the elusive and tenuous nature of the male gender role. Note, however, that social proof may be less essential to measure with self-reports given that it can manifest in observable actions – such as male risk-taking, vehicular accidents, smoking, aggression, and participation in competitive sports and dangerous occupations – that should correlate with the PMB.

Note also that all of the PMB items are worded in the same direction, with no reverse-scored items. The PMB is thus vulnerable to acquiescence bias, or the tendency to respond to conceptually different items with consistent agreement or disagreement. This poses a challenge in cross-cultural research in particular, because countries vary in levels of acquiescence bias (Rammstedt et al., 2017). Future research should thus examine the extent to which country-level PMB scores are affected by acquiescence bias.

Our reliance on a single index of national gender equality, the GGGI, is another limitation of this study. While the GGGI is used widely, it focus exclusively on domains in which women are disadvantaged and ignores domains in which men are disadvantaged (e.g., higher rates of incarceration and homelessness; overrepresentation in risky and dangerous occupations). In response to the GGGI, Stoet and Geary (2019) published the Basic Index of Gender Inequality (BIGI), which assesses women's relative to men's childhood educational opportunities, healthy life expectancy, and overall life satisfaction. In future studies, it will be interesting to examine correlations of the PMB with the BIGI. One possibility is that countries with larger deviations from parity in either direction – whether favoring men or

women – will also have higher PMB scores. This may occur because structures that disadvantage women (i.e., reduced access to political power and resources), and those that disadvantage men (i.e., incarceration biases and socialization into dangerous occupations) both arise from hierarchical social systems and sex-based labor divisions.

Next, as reported in the online supplement, national scores on the PMB are not randomly distributed across the globe, but instead show geographical clustering. Specifically, we found four clusters each for the associations of the PMB with gender equality and human development. Given that these cluster analyses were exploratory, future research would benefit from examining the cultural norms and values that may give rise to these global variations in beliefs about manhood. Similarly, it will be important in future research to track PMB scores over time, to examine how they change longitudinally with global changes in economic, social, and political conditions. For instance, increases in women's political and social power, especially in countries with higher gender equality, may trigger compensatory zero-sum thinking whereby men view women's gains as directly tied to men's losses (Kosakowska-Berezecka et al., 2020; Ruthig et al., 2017). In turn, increases in men's zero-sum thinking might predict increases in their views of manhood as a precarious social status requiring active defense. Hence, it might be interesting to analyze how cross-cultural variations in the visibility of gender equality movements predict changes in men's precarious manhood beliefs.

Finally, to the extent that countries conceptualize the male gender role as a precarious social identity, men within those countries likely experience more frequent challenges to their gender status. In laboratory studies, such gender threats have increased men's aggressive posturing and acts of dominance over women as they seek to re-establish their masculine credentials (Bosson et al., 2009; Dahl et al., 2015; Vescio & Kosakowska-Berezecka, 2020). It might thus be fruitful in future research to analyze links between nation-level PMB scores

and national data on male-to-male and male-to-female violence, as well as violence against gender non-conforming people including transgender, nonbinary, and sexual minority individuals.

Summary and Conclusions

We found that a short measure of precarious manhood beliefs (the PMB) is psychometrically valid at both the individual and country levels. It can thus be administered cross-culturally and retain its meaning. Moreover, the PMB correlates uniquely with country-level gender equality and human development, above and beyond other widely used measures of gender ideology. Thus, national PMB scores may offer a valuable research tool for examining a wide and diverse range of cultures. Whereas the countries examined here vary in their endorsement of precarious manhood beliefs, residents of all countries appear to recognize the concept and meaning of precarious manhood. Given this, we hope that national scores on the PMB are a valuable source of data for future researchers.

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Table 1

Sample Composition, Omega Coefficients for Scales, and Country-Level Indicators (HDI and GGGI) for Each Country

			Age		Omega (ω) coefficient						
Country	*N*	% men	*M*	*SD*	PMB	HS	BS	HM	BM	HDI	GGGI
Albania	239	37	22.99	4.90	0.77	0.74	0.49	0.66	0.80	791	0.769
Argentina	424	47	32.23	12.28	0.63	0.77	0.57	0.55	0.77	830	0.746
Armenia	282	45	20.01	1.91	0.72	0.60	0.64	0.43	0.73	760	0.684
Australia	664	34	29.85	11.19	0.74	0.80	0.50	0.72	0.71	938	0.731
Belgium	1,951	46	21.59	5.97	0.66	0.73	0.61	0.62	0.75	919	0.750
Bosnia	219	42	22.99	5.85	0.89	0.72	0.64	0.55	0.76	769	0.712
Brazil	1,150	30	24.04	7.70	0.53	0.72	0.57	0.62	0.55	761	0.691
Canada	913	31	19.85	2.90	0.69	0.72	0.58	0.64	0.67	922	0.772
Chile	237	34	21.76	5.10	0.63	0.74	0.63	0.59	0.65	847	0.723
China	600	34	19.48	1.96	0.69	0.68	0.50	0.56	0.75	758	0.676
Colombia	615	36	21.49	4.95	0.63	0.75	0.62	0.60	0.71	761	0.758
Croatia	363	20	23.19	5.80	0.68	0.79	0.58	0.63	0.73	837	0.720
Czechia	423	68	27.99	8.41	0.75	0.74	0.65	0.50	0.75	891	0.706
Denmark	255	39	25.41	4.75	0.66	0.77	0.53	0.61	0.70	930	0.782
England	744	38	22.24	7.28	0.75	0.78	0.64	0.65	0.71	920	0.767
Finland	314	11	26.46	7.07	0.64	0.79	0.61	0.67	0.59	925	0.832
France	422	18	22.26	6.74	0.61	0.74	0.65	0.69	0.71	891	0.781
Georgia	197	47	21.74	3.48	0.81	0.61	0.60	0.62	0.70	786	0.708
Germany	1,864	37	28.21	9.80	0.69	0.78	0.61	0.65	0.75	939	0.787
Ghana	329	37	20.20	2.58	0.71	0.69	0.44	0.38	0.46	596	0.673
Greece	282	27	26.39	9.10	0.71	0.71	0.59	0.58	0.74	872	0.701
Hungary	768	17	22.34	4.27	0.74	0.72	0.65	0.66	0.75	845	0.677
India	388	37	22.16	5.01	0.69	0.67	0.60	0.46	0.72	647	0.668
Indonesia	255	42	21.11	4.09	0.63	0.59	0.77	0.43	0.47	707	0.700
Iran	174	40	29.07	8.18	0.65	0.72	0.52	0.53	0.62	797	0.584
Ireland	571	46	19.84	3.70	0.70	0.78	0.55	0.64	0.69	942	0.798
Italy	2,419	33	22.84	5.33	0.66	0.75	0.69	0.57	0.67	883	0.707
Japan	397	39	21.36	2.95	0.49	0.66	0.62	0.58	0.61	915	0.652
Kazakhstan	344	43	20.22	3.82	0.71	0.65	0.58	0.58	0.73	817	0.710
Kosovo	433	37	20.25	3.86	0.73	0.75	0.61	0.57	0.77	791	0.769
Lebanon	134	27	20.00	1.78	0.73	0.68	0.56	0.57	0.64	730	0.599

Lithuania	355	28	23.87	6.76	0.77	0.77	0.55	0.67	0.66	869	0.745
Luxembourg	181	34	24.61	5.43	0.79	0.76	0.66	0.70	0.80	909	0.725
Malta	254	34	26.90	10.18	0.71	0.74	0.64	0.66	0.70	885	0.693
Mexico	343	45	23.69	8.93	0.62	0.74	0.62	0.64	0.74	767	0.754
Morocco	294	45	29.05	9.68	0.78	0.77	0.59	0.65	0.50	676	0.605
Nepal	219	37	22.33	5.86	0.68	0.58	0.51	0.52	0.67	579	0.680
Netherlands	893	32	20.60	3.25	0.72	0.69	0.53	0.62	0.72	934	0.736
New Zealand	216	29	19.01	2.33	0.70	0.81	0.54	0.67	0.66	921	0.799
Nigeria	461	41	21.12	3.14	0.60	0.50	0.53	0.43	0.48	534	0.635
Northern Ireland	303	38	22.15	5.59	0.74	0.83	0.61	0.66	0.75	920	0.767
Norway	210	42	23.13	4.11	0.73	0.74	0.56	0.67	0.67	954	0.842
Pakistan	573	43	22.04	3.73	0.65	0.68	0.57	0.51	0.64	560	0.564
Philippines	468	47	19.78	2.01	0.68	0.77	0.56	0.65	0.73	712	0.781
Poland	843	38	22.95	4.68	0.71	0.72	0.64	0.61	0.75	872	0.736
Portugal	173	18	22.14	4.91	0.55	0.58	0.55	0.59	0.68	850	0.744
Romania	253	41	22.83	4.64	0.72	0.75	0.63	0.60	0.73	816	0.724
Russia	698	31	21.84	6.83	0.73	0.79	0.66	0.67	0.77	824	0.706
Serbia	720	22	22.24	5.34	0.76	0.73	0.57	0.63	0.74	799	0.736
Slovakia	622	44	21.95	4.64	0.73	0.71	0.58	0.64	0.75	857	0.718
South Africa	415	14	20.60	2.48	0.67	0.66	0.60	0.67	0.62	705	0.780
Spain	1,235	34	25.68	8.72	0.62	0.78	0.57	0.67	0.69	893	0.795
Suriname	182	45	22.92	5.73	0.74	0.69	0.62	0.60	0.57	724	0.707
Sweden	671	48	26.20	7.30	0.64	0.81	0.55	0.66	0.76	937	0.820
Switzerland	581	35	23.53	5.36	0.66	0.74	0.58	0.59	0.77	946	0.779
Turkey	1,495	31	22.27	3.96	0.71	0.74	0.62	0.62	0.68	807	0.635
UAE	510	34	20.00	1.47	0.74	0.69	0.54	0.60	0.70	866	0.655
Ukraine	285	34	19.15	1.43	0.72	0.71	0.67	0.54	0.65	750	0.721
Uruguay	187	39	22.57	6.46	0.46	0.73	0.59	0.65	0.71	808	0.737
USA	786	30	20.38	4.44	0.74	0.75	0.64	0.66	0.68	920	0.724
Vietnam	408	25	22.34	5.77	0.57	0.63	0.49	0.46	0.65	693	0.700
Wales	213	35	30.61	10.42	0.73	0.83	0.67	0.59	0.78	920	0.767
Total sample	33,417	37	23.06	6.80	0.71	0.77	0.62	0.65	0.75	-	-

Note. PMB = Precarious Manhood Beliefs; HS = Hostile Sexism; BS = Benevolent Sexism; HM = Hostility toward Men; BM = Benevolence toward Men; HDI = Human Development Index; GGGI = Global Gender Gap Index.

Table 2

Descriptive Statistics and Gender Differences for the PMB for Each Country

	PMB (raw score)						PMB (CFA score)							
	All		Men		Women		All		Men		Women			
Country	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*t*	Cohen's *d*
Albania	5.07	1.50	4.48	1.55	5.44	1.34	0.72	1.09	0.29	1.13	1.00	0.97	-4.86**	0.69
Argentina	3.73	1.44	3.70	1.36	3.75	1.51	-0.32	1.04	-0.34	0.98	-0.31	1.08	-0.25	0.02
Armenia	4.18	1.50	3.95	1.48	4.48	1.39	0.05	1.07	-0.10	1.05	0.24	1.01	-2.45*	0.34
Australia	4.19	1.38	4.37	1.41	4.11	1.36	0.04	1.01	0.19	1.04	-0.03	0.99	2.66**	0.22
Belgium	3.70	1.26	3.79	1.31	3.64	1.20	-0.30	0.93	-0.21	0.96	-0.36	0.88	3.42**	0.16
Bosnia	3.87	1.83	3.44	1.80	4.38	1.84	-0.12	1.28	-0.41	1.26	0.23	1.29	-3.44**	0.50
Brazil	4.18	1.38	4.20	1.38	4.18	1.37	-0.03	1.01	-0.01	1.02	-0.04	1.00	0.38	0.03
Canada	4.19	1.21	4.34	1.33	4.13	1.15	0.03	0.89	0.17	0.98	-0.02	0.84	2.85**	0.22
Chile	4.06	1.52	3.90	1.50	4.30	1.46	-0.06	1.09	-0.18	1.06	0.12	1.06	-2.01*	0.28
China	4.21	1.12	4.30	1.15	4.16	1.10	0.17	0.78	0.23	0.80	0.13	0.77	1.37	0.12
Colombia	3.92	1.42	4.10	1.35	3.77	1.47	-0.16	1.02	-0.03	0.98	-0.26	1.05	2.71**	0.23
Croatia	4.77	1.21	4.94	1.25	4.71	1.22	0.47	0.89	0.63	0.89	0.41	0.90	1.81	0.24
Czechia	4.02	1.36	4.01	1.38	3.96	1.28	-0.04	1.00	-0.04	1.00	-0.09	0.95	0.47	0.05
Denmark	3.69	1.20	3.92	1.07	3.53	1.26	-0.30	0.87	-0.11	0.77	-0.44	0.91	3.02**	0.38
England	3.99	1.36	4.18	1.41	3.86	1.33	-0.10	0.98	0.04	1.03	-0.19	0.95	3.04**	0.24
Finland	3.05	1.21	3.46	1.46	3.00	1.15	-0.78	0.86	-0.42	1.06	-0.82	0.81	2.12*	0.47
France	3.57	1.32	3.67	1.39	3.53	1.31	-0.41	0.97	-0.28	1.02	-0.45	0.96	1.35	0.18
Georgia	4.63	1.59	4.25	1.51	5.06	1.58	0.39	1.17	0.14	1.12	0.68	1.17	-3.16**	0.47
Germany	3.41	1.31	3.43	1.36	3.38	1.28	-0.49	0.94	-0.45	0.99	-0.52	0.92	1.47	0.07
Ghana	4.86	1.54	4.68	1.52	4.94	1.53	0.53	1.12	0.39	1.10	0.59	1.12	-1.51	0.17
Greece	3.84	1.28	3.93	1.32	3.80	1.27	-0.20	0.92	-0.13	0.94	-0.24	0.91	0.90	0.12
Hungary	4.67	1.30	4.43	1.35	4.71	1.29	0.41	0.95	0.26	0.98	0.43	0.95	-1.85	0.18
India	4.12	1.35	4.10	1.42	4.11	1.34	-0.01	0.97	-0.02	1.02	-0.04	0.96	0.15	0.02
Indonesia	4.25	1.14	4.11	1.17	4.30	1.13	0.18	0.81	0.08	0.84	0.22	0.80	-1.24	0.17
Iran	4.90	1.21	4.74	1.33	4.95	1.13	0.66	0.90	0.56	1.00	0.69	0.84	-0.92	0.15
Ireland	4.29	1.29	4.35	1.32	4.23	1.25	0.10	0.94	0.15	0.96	0.04	0.91	1.48	0.13
Italy	4.24	1.31	4.33	1.28	4.19	1.32	0.07	0.95	0.16	0.92	0.02	0.95	3.63**	0.16
Japan	4.68	0.98	4.55	1.04	4.79	0.95	0.49	0.72	0.38	0.77	0.57	0.70	-2.39*	0.26
Kazakhstan	4.80	1.36	4.56	1.34	5.01	1.32	0.52	0.98	0.36	0.98	0.67	0.94	-2.87**	0.32
Kosovo	5.21	1.43	5.29	1.38	5.12	1.46	0.80	1.05	0.87	1.02	0.73	1.06	1.32	0.13
Lebanon	4.69	1.35	4.99	1.21	4.52	1.36	0.42	0.98	0.58	0.89	0.31	0.99	1.52	0.29
Lithuania	4.33	1.54	4.38	1.50	4.27	1.56	0.19	1.12	0.25	1.07	0.13	1.14	0.88	0.10
Luxembourg	4.06	1.54	4.32	1.68	3.94	1.46	-0.06	1.11	0.14	1.21	-0.16	1.06	1.64	0.27

Malta	4.47	1.37	4.74	1.35	4.29	1.34	0.23	1.01	0.48	0.98	0.08	1.00	3.08**	0.41
Mexico	3.92	1.37	3.95	1.33	3.87	1.39	-0.18	0.99	-0.15	0.97	-0.22	1.00	0.73	0.08
Morocco	4.15	1.45	3.65	1.43	4.61	1.31	0.05	1.04	-0.29	1.03	0.36	0.96	-5.51**	0.66
Nepal	4.35	1.34	4.44	1.41	4.31	1.32	0.21	0.96	0.28	1.01	0.17	0.94	0.74	0.11
Netherlands	3.58	1.24	3.79	1.31	3.48	1.19	-0.36	0.89	-0.17	0.95	-0.45	0.85	4.16**	0.31
New Zealand	4.19	1.18	4.08	1.33	4.23	1.11	0.05	0.85	0.00	0.95	0.06	0.81	-0.43	0.07
Nigeria	5.06	1.43	4.99	1.39	5.13	1.46	0.65	1.06	0.58	1.04	0.71	1.08	-1.27	0.12
Northern Ireland	4.06	1.39	4.24	1.40	3.93	1.38	-0.06	1.01	0.09	1.02	-0.17	1.00	2.16*	0.26
Norway	3.48	1.32	3.61	1.44	3.39	1.17	-0.42	0.95	-0.32	1.03	-0.49	0.86	1.19	0.17
Pakistan	4.36	1.23	4.35	1.16	4.37	1.29	0.18	0.88	0.18	0.84	0.18	0.91	0.09	0.01
Philippines	4.53	1.26	4.41	1.30	4.65	1.24	0.26	0.94	0.18	0.97	0.35	0.92	-1.86	0.18
Poland	4.63	1.34	4.75	1.31	4.54	1.36	0.34	1.00	0.45	0.96	0.26	1.01	2.55**	0.19
Portugal	3.59	1.18	3.77	1.34	3.56	1.15	-0.39	0.86	-0.25	0.97	-0.41	0.83	0.90	0.20
Romania	4.56	1.42	4.42	1.48	4.64	1.38	0.36	1.03	0.26	1.08	0.42	1.00	-1.16	0.15
Russia	4.62	1.43	4.72	1.48	4.63	1.36	0.41	1.03	0.50	1.06	0.40	0.99	1.19	0.10
Serbia	4.61	1.48	4.33	1.40	4.70	1.50	0.27	1.12	0.10	1.04	0.32	1.13	-2.28*	0.20
Slovakia	4.50	1.37	4.59	1.37	4.46	1.31	0.29	0.98	0.38	0.99	0.25	0.95	1.56	0.13
South Africa	4.73	1.31	4.87	1.33	5.08	1.50	0.40	0.97	0.51	1.01	0.65	1.08	-0.86	0.14
Spain	3.42	1.33	3.43	1.24	3.42	1.37	-0.52	0.95	-0.50	0.90	-0.53	0.98	0.55	0.03
Suriname	4.57	1.41	4.60	1.52	4.57	1.33	0.32	1.02	0.37	1.09	0.30	0.98	0.41	0.06
Sweden	3.47	1.36	3.56	1.42	3.35	1.28	-0.46	0.98	-0.36	1.03	-0.58	0.91	3.01**	0.24
Switzerland	3.49	1.29	3.62	1.43	3.44	1.21	-0.44	0.94	-0.32	1.04	-0.50	0.87	2.05*	0.19
Turkey	3.61	1.53	3.77	1.53	3.54	1.52	-0.34	1.11	-0.23	1.10	-0.40	1.10	2.70**	0.15
UAE	4.67	1.38	4.63	1.38	4.69	1.38	0.38	1.00	0.37	0.99	0.38	1.01	-0.10	0.01
Ukraine	4.84	1.30	4.72	1.32	4.91	1.29	0.55	0.94	0.47	0.94	0.61	0.93	-1.15	0.14
Uruguay	3.73	1.14	3.61	1.15	3.79	1.14	-0.32	0.84	-0.38	0.83	-0.28	0.85	-0.80	0.12
USA	4.37	1.40	4.46	1.41	4.34	1.38	0.15	1.01	0.26	1.02	0.11	1.00	1.76	0.14
Vietnam	4.30	1.19	4.45	1.17	4.27	1.18	0.17	0.85	0.24	0.84	0.14	0.84	1.03	0.12
Wales	4.29	1.45	4.57	1.31	4.15	1.53	0.07	1.05	0.27	0.93	-0.03	1.11	-0.08	0.29
Total sample	4.12	1.43	4.14	1.43	4.09	1.42	0.00	1.03	0.03	1.03	-0.03	1.03	5.22**	0.06

Note. PMB = Precarious Manhood Beliefs Scale; t = t-test results from gender comparisons on the CFA scores. *$p < 0.05$; **$p < 0.01$.

Table 3

Comparison of Multilevel Factor Analysis Models for the PMB Scale

Model type	Model	Fit statistics				
		BIC	CFI	RMSEA	$SRMR_W$	$SRMR_B$
Ignoring multilevel structure	One-factor (Model 1)	535878	0.97	0.093	0.030	–
Strong configural isomorphism	One-factor (Model 2)	529097	0.96	0.074	0.030	0.022
Strong metric isomorphism	One-factor, all loadings constrained to be equal (Model 3)	529101	0.96	0.057	0.031	0.106
Partial strong metric isomorphism	One-factor, all loadings constrained to be equal, except Item #2 (Model 4)	529088	0.96	0.061	0.030	0.050

Note. N = 33,417. PMB = Precarious Manhood Beliefs; BIC = Sample-size adjusted Bayesian Information Criterion; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; $SRMR_W$ = Standardized Root Mean Square Residual within covariance matrix; $SRMR_B$ = Standardized Root Mean Square Residual between covariance matrix.

Table 4

Comparison of Multilevel Factor Analysis Models including Precarious Manhood Beliefs, Hostile Sexism, Benevolent Sexism, Hostility toward Men, and Benevolence toward Men

Model type	Model	Fit statistics				
		BIC	CFI	RMSEA	$SRMR_W$	$SRMR_B$
Ignoring multilevel	One-factor (Model 5)	1913334	0.69	0.116	0.092	–
structure	Three-factor (Model 6)	1896916	0.80	0.094	0.076	–
	Five-factor (Model 7)	1879171	0.93	0.059	0.047	–
Strong configural	One-factor at L2 (Model 8)	1844422	0.91	0.039	0.047	0.097
isomorphism	Three-factor at L2 (Model 9)	1844354	0.92	0.039	0.047	0.075
	Five-factor at both levels (Model 10)	1844358	0.92	0.040	0.047	0.071
Strong metric isomorphism	Five-factor (Model 11)	1844332	0.92	0.039	0.047	0.077
With country-level	Five-factor ~ GGGI (Model 12)	1844186	0.92	0.039	0.047	0.071
covariates	Five-factor ~ HDI (Model 13)	1845117	0.92	0.038	0.047	0.071
	Five-factor ~ GGGI and HDI (Model 14)	1844901	0.92	0.038	0.047	0.100

Note. N = 33,417. BIC = Sample-size adjusted Bayesian Information Criterion; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; $SRMR_W$ = Standardized Root Mean Square Residual within covariance matrix; $SRMR_B$ = Standardized Root Mean Square Residual between covariance matrix.

Figure 1

World Map Showing Country-Level Mean PMB Factor Scores

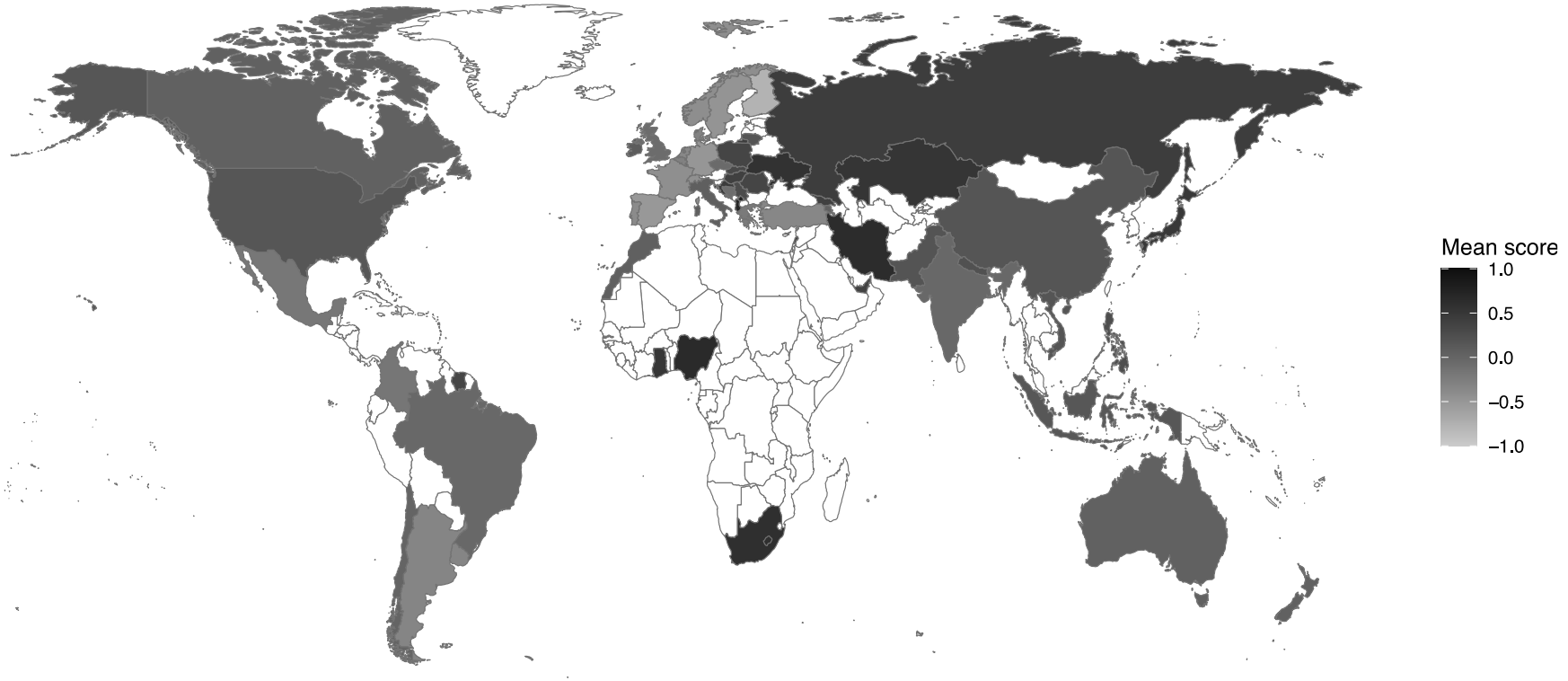


Figure 2

Two-Level CFA Results of the Five-Factor Gender Ideology Model with Country-Level Gender Equality (GGGI)

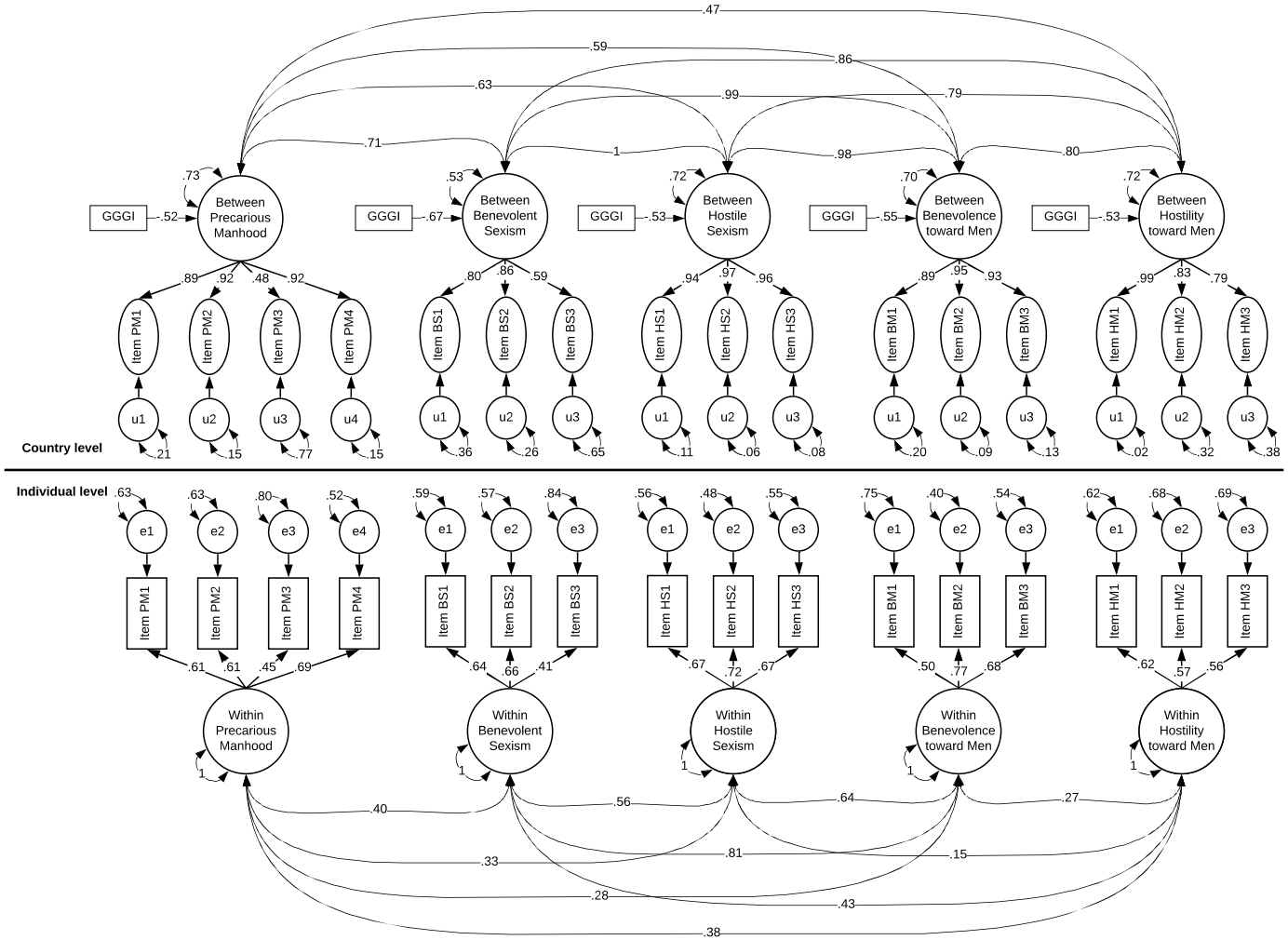


Figure 3

Scatterplot Showing the Association of Country-Level Precarious Manhood Beliefs and Gender Equality (the GGGI)

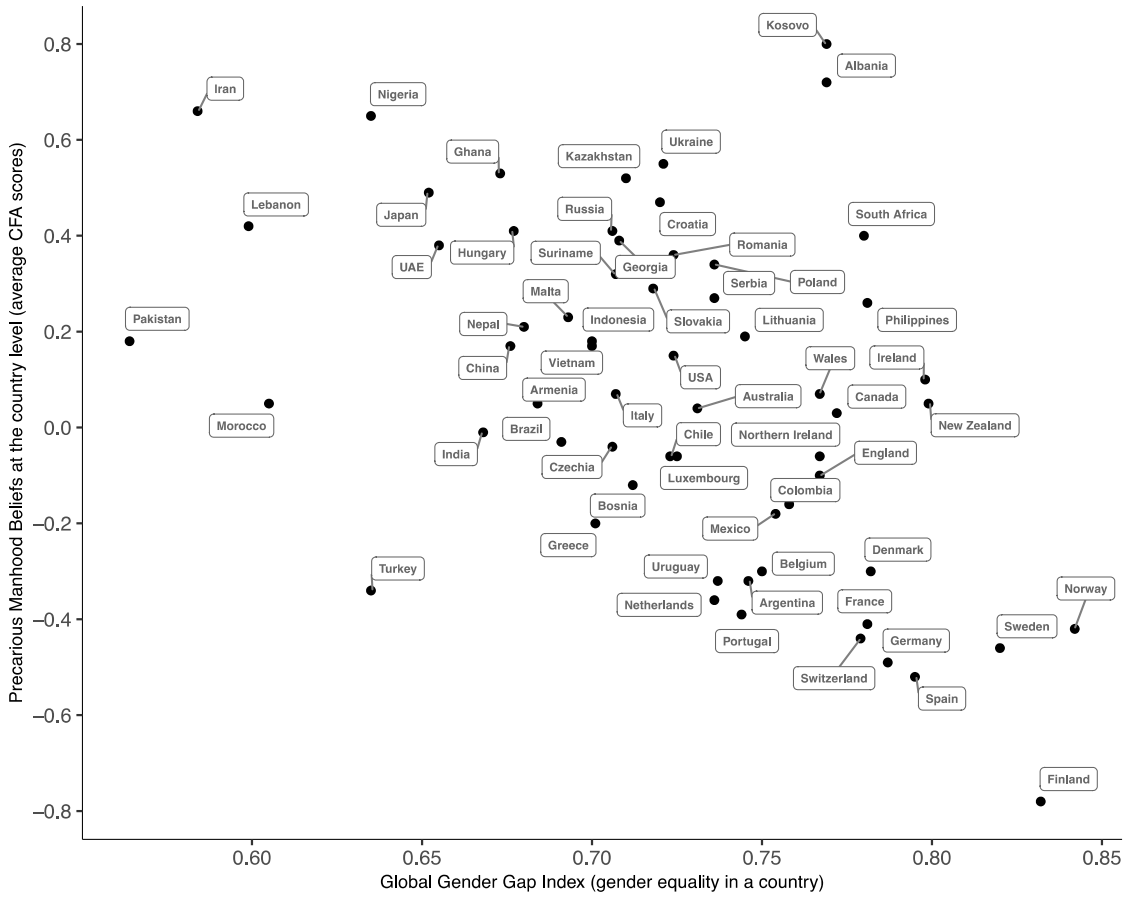
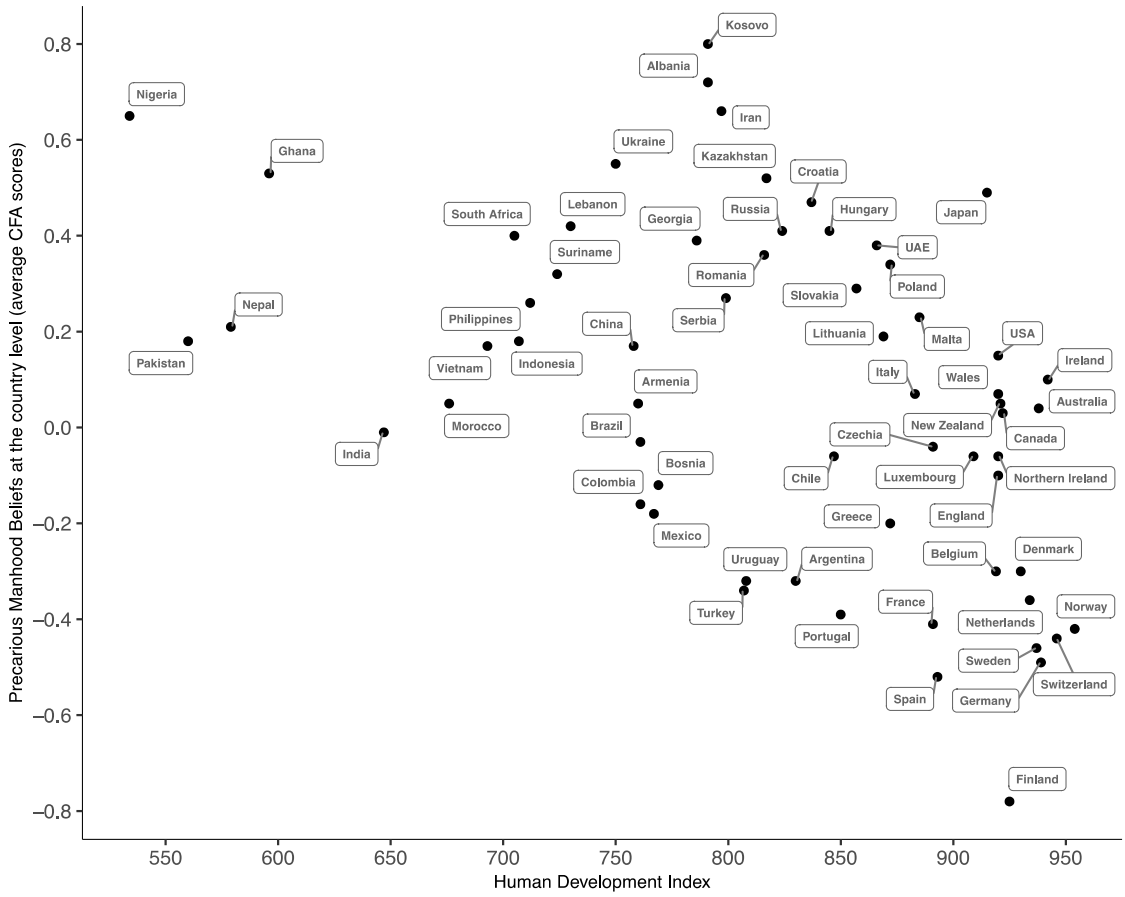


Figure 4

Scatterplot Showing the Association of Country-Level Precarious Manhood Beliefs and Human Development (the HDI)



Title: Online Supplement to Psychometric Properties and Correlates of Precarious Manhood Beliefs in 62 Nations

Description: Supplemental material for Psychometric Properties and Correlates of Precarious Manhood Beliefs in 62 Nations by Jennifer K. Bosson et al. (full list of authors appears in the manuscript) in *Journal of Cross-Cultural Psychology*.

Contents:

I. Analyses with Age and Gender Distribution as Covariates

Table A1

Comparison of Multilevel Factor Analysis Models for the PMB (Including Age and Gender Distribution as Covariates)

Model type	Model	Fit statistics				
		BIC	CFI	RMSEA	$SRMR_W$	$SRMR_B$
Ignoring multilevel structure	One-factor (Model 1)	490528	0.94	0.073	0.033	–
Strong configural isomorphism	One-factor (Model 2)	731443	0.93	0.066	0.036	0.029
Strong metric isomorphism	One-factor, all loadings constrained to be equal (Model 3)	731449	0.93	0.059	0.036	0.116
Partial strong metric isomorphism	One-factor, all loadings constrained to be equal, except Item #2 (Model 4)	731433	0.93	0.061	0.036	0.063

Note. N = 30,648. BIC = Sample-size adjusted Bayesian Information Criterion; CFI = Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; $SRMR_W$ =

Standardized Root Mean Square Residual within covariance matrix; $SRMR_B$ = Standardized Root Mean Square Residual between covariance matrix.

Table A2

Comparison of Multilevel Factor Analysis Models including Precarious Manhood Beliefs (PMB), Hostile Sexism (HS), Benevolent Sexism (BS), Hostility toward Men (HM), and Benevolence toward Men (BM) (Including Age and Gender Distribution as Covariates)

Model type	Model	Fit statistics				
		BIC	CFI	RMSEA	$SRMR_W$	$SRMR_B$
Ignoring multilevel structure	One-factor (Model 5)	1758491	0.66	0.109	0.091	–
	Three-factor (Model 6)	1742376	0.78	0.091	0.076	–
	Five-factor (Model 7)	1722974	0.92	0.058	0.046	–
Strong configural	One-factor at L2 (Model 8)	1929766	0.90	0.041	0.046	0.094
isomorphism	Three-factor at L2 (Model 9)	1929704	0.90	0.041	0.046	0.075
	Five-factor at both levels (Model 10)	1929711	0.90	0.042	0.046	0.073
Strong metric isomorphism	Five-factor (Model 11)	1929699	0.90	0.041	0.046	0.079
With covariates at county	Five-factor ~ GGGI (Model 12)	1929539	0.90	0.040	0.046	0.072
level	Five-factor ~ HDI (Model 13)	1930470	0.90	0.040	0.046	0.072

Note. N = 30,648. BIC = Sample-size adjusted Bayesian Information Criterion; CFI = Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; $SRMR_W$ = Standardized Root Mean Square Residual within covariance matrix; $SRMR_B$ = Standardized Root Mean Square Residual between covariance matrix.

II. Analyses with Five Countries Excluded

Table A3

Comparison of Multilevel Factor Analysis Models for the PMB (Using Data from 57 Countries)

Model type	Model	Fit statistics				
		BIC	CFI	RMSEA	$SRMR_W$	$SRMR_B$
Ignoring multilevel structure	One-factor (Model 1)	496681	0.97	0.095	0.030	–
Strong configural isomorphism	One-factor (Model 2)	490522	0.97	0.075	0.030	0.027
Strong metric isomorphism	One-factor, all loadings constrained to be equal (Model 3)	490524	0.96	0.058	0.030	0.105
Partial strong metric isomorphism	One-factor, all loadings constrained to be equal, except Item #2 (Model 4)	490511	0.97	0.062	0.030	0.028

Note. N = 31,102. BIC = Sample-size adjusted Bayesian Information Criterion; CFI = Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; $SRMR_W$ = Standardized Root Mean Square Residual within covariance matrix; $SRMR_B$ = Standardized Root Mean Square Residual between covariance matrix.

Table A4

Comparison of Multilevel Factor Analysis Models including Precarious Manhood Beliefs (PMB), Hostile Sexism (HS), Benevolent Sexism (BS), Hostility toward Men (HM), and Benevolence toward Men (BM) (Using Data from 57 Countries)

Model type	Model	Fit statistics				
		BIC	CFI	RMSEA	$SRMR_W$	$SRMR_B$
Ignoring multilevel structure	One-factor (Model 5)	1774494	0.69	0.117	0.092	–
	Three-factor (Model 6)	1758502	0.81	0.094	0.075	–
	Five-factor (Model 7)	1741764	0.93	0.059	0.046	–
Strong configural isomorphism	One-factor at L2 (Model 8)	1710665	0.92	0.039	0.047	0.092
	Three-factor at L2 (Model 9)	1710606	0.92	0.039	0.047	0.071
	Five-factor at both levels (Model 10)	1710618	0.92	0.040	0.047	0.067
Strong metric isomorphism	Five-factor (Model 11)	1710586	0.92	0.039	0.047	0.080
With covariates at county level	Five-factor ~ GGGI (Model 12)	1710462	0.92	0.038	0.047	0.079
	Five-factor ~ HDI (Model 13)	1711314	0.92	0.038	0.047	0.079

Five-factor ~ GGGI and HDI (Model 14)	1711125	0.92	0.038	0.047	0.100

Note. N = 31,102. BIC = Sample-size adjusted Bayesian Information Criterion; CFI = Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; $SRMR_W$ = Standardized Root Mean Square Residual within covariance matrix; $SRMR_B$ = Standardized Root Mean Square Residual between covariance matrix.

III. Cluster Analyses of Country-Level Variables

For both pairs of variables (PMB by GGGI and PMB by HDI) we performed exploratory k-means clustering of countries. We applied the classical approach, based on scaled values of our variables and using Euclidean distance. In both cases we investigated how many clusters were recommended: elbow, silhouette, and gap statistics methods were used. Next we assessed goodness of fit for the numbers of clusters indicated (for PMB by GGGI we considered k = 4 and 8; for PMB by HDI we considered k = 2, 4, and 7). We selected final models with the smallest numbers of clusters and with at least decent values for Sums of Squares between divided by Sums of Squares total. In both cases k = 4. For PMB by GGGI (SS between) / (SS total) = 73.6%; for PMB by HDI (SS between) / (SS total) = 76.3%.

As shown in Table A5, national scores on the PMB are not randomly distributed across the globe, but rather show geographical clustering. Specifically, we found four clusters each for the associations of the PMB with gender equality and human development. For the PMB and gender equality associations, three clusters show a linear negative relationship between these variables. These clusters include countries with low GGGI and high PMB (e.g., Iran, Nigeria, Lebanon, Japan); countries with average levels of both variables (e.g., China, Vietnam, Brazil, Chile); and countries with high GGGI and low PMB (e.g., Spain, Germany, Sweden, Norway). However, the fourth cluster contains nations with high PMB scores and moderate GGGI,

including Eastern European countries (e.g., Kosovo, Albania, Kazakhstan, Russia) and South Africa, Suriname, and the Philippines (see Figure A1). Very similar results emerged from cluster analyses on the association of the PMB with human development. However, in this case, the fourth cluster includes Eastern European countries along with highly economically developed countries such as the UAE and Japan (see Figure A2).

Table A5

Centers of Clusters

Cluster	PMB versus HDI		PMB versus GGGI	
	HDI	PMB	GGGI	PMB
1	691	0.172	0.777	-0.274
2	906	0.044	0.627	0.419
3	824	0.471	0.735	0.419
4	896	-0.403	0.697	0.024

Figure A1

Scatterplot Showing Four Clusters for Country-Level Precarious Manhood Beliefs (the PMB) and Gender Equality (the GGGI)

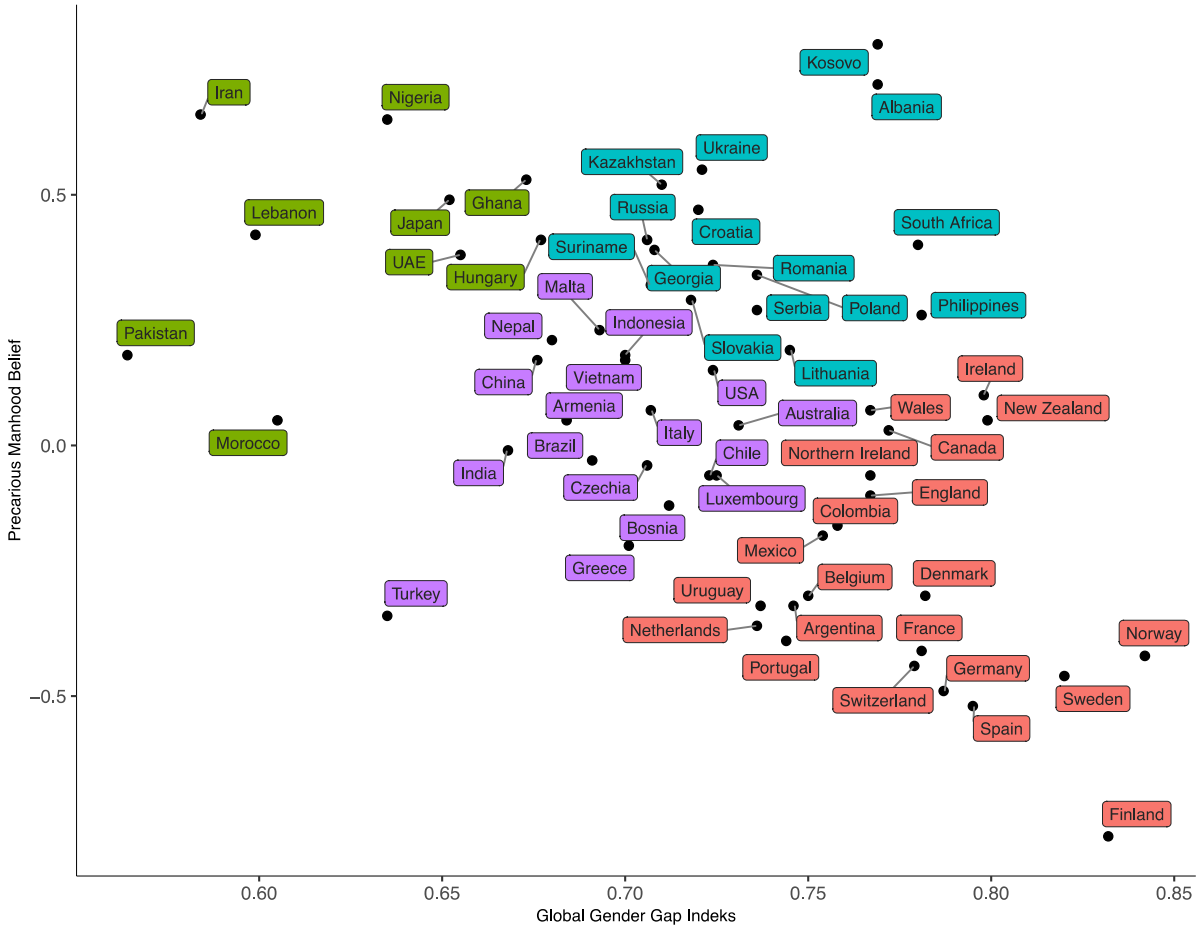


Figure A2

Scatterplot Showing Four Cluster for Country-Level Precarious Manhood Beliefs (PMB) and Human Development (HDI)