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 (Glick & Fiske, 1996, 1999); and (3) associations of the PMB with national gender equality (the GGGI; World Economic Forum, 2019) and human development (the HDI; United Nations Development Programme, 2019). 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

Precarious Manhood Beliefs in 62 Nations

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 feasible 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 correlates 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), Poland (Kosakowska-Berezecka et al., 2016), and Norway (Valved et al., 2020). 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 consequences 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 just *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. We hypothesized that the PMB scale will display acceptable metric isomorphism across the individual and country levels (*Hypothesis 1*).

Links to Prevalent Gender Ideologies

Theories of ambivalent gender ideologies – including ambivalent sexism and ambivalence toward men[1] (Glick & Fiske, 1996, 1999) – posit that gender relations are typically characterized by a combination of hostile (overtly insulting, angry) and benevolent (subjectively positive but patronizing) ideologies that work together to maintain the unequal gender hierarchy. Ambivalent sexism casts women as manipulative, insubordinate, and incompetent (hostile sexism [HS]), but also as morally pure, warm, and essential to men's happiness (benevolent sexism [BS]). Ambivalence toward men portrays men as arrogant, infantile, and sexually predatory (hostility toward men [HM]), while also competent, protective, and deserving of women's nurturance (benevolence toward men [BM]).

Presumably, these ideologies emerge from and reflect the gender 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

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[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.

reliance on one another for affection, mating, and coparenting (Miller & Fishkin, 1997) – gives rise to 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 beliefs about both women and men also tend to offset these negative views with more flattering, benevolent beliefs about each gender group, with medium-to-large pair-wise correlations between these ideologies (rs = .34 to .69; Glick et al., 2004).

The medium-to-large correlations between hostile and benevolent ideologies about women (HS and BS) and men (HM and BM) indicate that these are four distinct, but overlapping, sets of beliefs. Here, we examine whether precarious manhood beliefs constitute a fifth set of unique, but associated, gender beliefs. Whereas the ambivalent gender ideologies of HS, BS, HM, and BM describe the *contents* of gender stereotypes (i.e., what women and men are presumably like), precarious manhood beliefs describe the *structure* of the male gender role (i.e., how easy versus difficult it is to achieve "real" man status). Unlike ambivalent gender ideologies, precarious manhood beliefs do not specify men's actual or ideal qualities, nor do they outline the specific standards by which men are evaluated. Instead, these beliefs presumably reveal the extent to which male-male social relations are hierarchically organized and competitive: When men's status (relative to other men) is more variable and stratified, it is relatively difficult to earn a reputation as a "real," or dominant, man (Winegard et al., 2014). Precarious manhood beliefs reflect this difficulty via an emphasis on struggle, uncertainty, and social proof. Thus, we propose that the PMB measures a unique belief about manhood that is not

redundant with hostility and benevolence toward women or men. Specifically, scores on the

PMB and measures of HS, BS, HM, and BM should comprise a five-factor model (*Hypothesis*

2a) that shows metric isomorphism across individual and country levels (*Hypothesis 2b*).

At the same time, precarious manhood beliefs should correlate with ambivalent gender

ideologies. At their core, all of these beliefs presumably reveal something about men's social

dominance, over women and over other men. Ambivalent gender ideologies reflect men's

dominance over and dependence on women (Glick & Fiske, 1996, 1999), while precarious

manhood beliefs reflect the instability of male social hierarchies in which men struggle to

demonstrate dominance over other men (Winegard et al., 2014). As such, ambivalent gender

ideologies and precarious manhood beliefs should work together to explain and legitimize

existing social hierarchies in which dominant men hold disproportionate power. Consistent with

this notion, men sometimes compensate following manhood threats by more fervently embracing

hierarchy-enhancing gender ideologies. For instance, after a gender status threat, men increased

their endorsement of benevolent sexism and social dominance (Dahl et al., 2015), and withdrew

support for gender equitable actions and social movements supporting women (Kosakowska-

Berezecka et al., 2016).

Based on this logic, we hypothesized that the PMB scale should correlate at least

moderately positively with measures of HS, BS, HM, and BM, on both the individual and

country levels (*Hypothesis 3*)[2]. 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 HS ($r = .19$, $p = .003$) and BS ($r = .20$, $p = .001$). We

expected to replicate these patterns and extend them to include ambivalence toward men. Such

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

findings should demonstrate that beliefs about precarious manhood constitute a cross-culturally prevalent understanding of the male gender role that overlaps with, but is distinct from, 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 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

(ranked 14th in gender equality) (DiMuccio et al., 2017). Similarly, men from Poland (ranked

40th in gender equality) endorsed precarious manhood beliefs more strongly than men from

Norway (ranked 2nd in gender equality), and Polish men reacted with more public discomfort and

negative emotions to a masculinity threat than Norwegian men did (Valved et al., 2020).

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 gender 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 are distinct from, but

overlap with, other prevalent gender ideologies.

Here, we examine these issues as part of a larger pre-registered study (see OSF

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 OSF

https://osf.io/u9xfg/). These initial exploratory tests were hypothesis-driven and were limited

entirely to those that we pre-registered (with one exception[3]). 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.

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 main 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).

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[3]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).

Method

Participants and Procedure

Data were collected between January 2018 and February 2020 as part of large cross-cultural project (see OSF https://osf.io/fqd4p/). All participants were undergraduate students who volunteered their time and (in most countries) received no compensation. 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. From the initial sample (N = 34,023), we removed records from 606 individuals (< 2%) who failed more than 1 of 3 attention checks 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.

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 ("Some boys do not become men no matter how old they get," "Other people often question whether a man is a 'real man'") 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 coefficients (McDonald, 1999), which use the results of the factor analysis and are preferable to alpha coefficients when items have different factor loadings (Trizano-Hermosilla & Alvarado, 2016). See Table 1 for omega 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). Internal consistency reliability (omega) coefficients for HS and BS were .77 and .61 across all participants.

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). Internal consistency reliability (omega) coefficients for HM and BM were .64 and .75 across all participants.

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

Reliability of the PMB across Countries

We estimated the internal consistency reliability of the PMB scale in each of the 62 countries using the coefficient omega (McDonald, 1999). While 0.70 is commonly used as a threshold (e.g., Lord & Novick, 1968), omega tends to underestimate internal consistency reliability in scales with fewer than 10 items (Graham, 2006). Thus, we adopted the more liberal criterion of 0.60. As shown in Table 1, the PMB demonstrated acceptable internal consistency reliability in all but 5 countries: Brazil, Japan, Portugal, Uruguay, and Vietnam.

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.

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 model 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 2, 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

1 shows mean PMB scores and standard deviations for each country, which ranged from -.78

(Finland) to .80 (Kosovo). Figure 1 shows the geographical distribution of PMB scores by

country. Note that, because we did not examine the measurement invariance of the PMB, we

cannot meaningfully compare individuals' mean PMB scores across countries. We can, however, view country-level PMB scores as meaningful attributes of countries and use them in multilevel correlational analyses.

Next, we proceeded to test 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 intraclass correlation coefficients (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 2, 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 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 2, 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 2, 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 in which we allowed one of the item's loadings

(λ_2) to vary across levels (Table 2, Model 4). 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 Ambivalent Gender Ideologies

We propose that the PMB is distinct from ambivalent sexism and ambivalence toward

men (Glick & Fiske, 1996, 1999). Thus, H2a states that 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, and H2b states that this five-factor model will demonstrate

acceptable metric isomorphism across individual and country levels. To test this, we first

ignored the multilevel structure of the data and used CFAs to fit a one-factor model (Table 3,

Model 5) in which all 16 items (from the PMB, HS, BS, HM, and BM) form one dimension;

a three-factor model (Table 3, 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 3, 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 3, 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 beliefs 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 3 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 3, 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 other gender beliefs 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 3, Model 12) and HDI (Table

3, Model 13) as correlates of the country-level latent PMB factor. These models showed

good fit to the data (see Table 3), even when controlling for other gender beliefs (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).

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 these analyses 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 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. Finally, precarious manhood beliefs

are uniquely associated with national gender equality and human development, even when

controlling for hostile and benevolent sexism and hostility and benevolence toward men.

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 1) 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.,

2020), this study represents the first systematic, global examination of these beliefs using a

standardized scale. The findings reveal, first, that beliefs about the precariousness of manhood

constitute a coherent gender ideology that differs meaningfully across cultures. Second, this

gender ideology is distinct from other cross-cultural gender ideologies including ambivalent

sexism and ambivalence toward men. Whereas ambivalent gender beliefs presumably arise from

and reflect the tensions (dominance-subordination and mutual interdependence) inherent in gender hierarchies (Glick & Fiske, 1996, 1999), precarious manhood beliefs convey the difficulties of men's competitive struggle for dominance (Gilmore, 1990; Vandello et al., 2008). Thus, consistent with precarious manhood theory (e.g., Vandello et al., 2008), these findings demonstrate that people around the globe recognize a common understanding of manhood as an achieved, rather than ascribed, status.

Third, these findings begin to illuminate how precarious manhood beliefs and hostile and benevolent gender ideologies work together to uphold patriarchal social structures. Individuals and countries that endorse more hostility and benevolence toward gender groups also view men's gender status as more difficult, tenuous, and rivalrous. We propose that the overlap in these gender ideologies reveals something about the hierarchical arrangement of men's social status within a given country. To the extent that 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).

Supporting this logic, countries with less equitable gender hierarchies score higher in precarious manhood beliefs. Thus, 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.

Finally, countries lower in human development – defined as human potential and well-being – also score higher in precarious manhood beliefs. Thus, precarious manhood beliefs covary with the difficulties and struggles inherent to daily survival within a given country. In countries in which people face more hardships and encounter fewer desirable pursuits, it may be adaptive to valorize boys and men who risk their lives to protect and provide for others. 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. In this sense, real manhood is "an inducement for high performance in the social struggle for scarce resources" (p. 223). Of course, the link between precarious manhood beliefs and human development is correlational, and causation thus cannot be determined.

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. Hence, when possible, we recruited participants from multiple sites within a given country, although we lack sufficient numbers of multi-site countries in our

dataset to conduct meaningful within-country analyses. The issue of generalizability of our findings 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 the term "culture" refers to a more complex and nuanced construct than the term "nation," and that nations differ in how much internal heterogeneity they contain in terms of beliefs, norms, and social roles. To address this, researchers should examine precarious manhood beliefs in more diverse samples, from even 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.

Next, despite the overall 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 we deemed necessary to solicit widespread volunteer commitments given that this scale was embedded within a 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. Moreover, the loading for one item ("Some boys do not become men, no matter how old they get") did not display metric isomorphism across levels, indicating that this item loads onto the latent PMB variable differently at the individual and country levels. However, this limitation is mitigated in the present study by considering the broader range of gender beliefs.

Another limitation of the PMB is that all of the 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, perhaps by measuring and controlling for this bias or using other statistical approaches to correct for it (Welkenhuysen-Gybels et al., 2003).

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 is limited in its focus on domains in which women are disadvantaged relative to men. Thus, the GGGI 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. Using the BIGI, Stoet and Geary found that women have better outcomes in 68% of the 134 countries they examined, while men have better outcomes in 32% of countries. 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.

Note that national scores on the PMB are not randomly distributed across the globe, but rather show notable geographical clustering. In exploratory cluster analyses of countries (see the online supplement), we found four clusters each for the associations of the PMB with both gender equality and human development. Regarding the associations of precarious manhood beliefs and gender equality, three clusters show a linear negative relationship between the two 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. 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. While we made no predictions about how specific nations or regions would cluster, future research would benefit from examining the cultural norms and values that may give rise to these global variations in beliefs about manhood.

More generally, 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. Alternatively, nation-level PMB may be an important moderator of the links between gender equality movements and men's zero-sum thinking, as such links may be especially pronounced in countries in which men already view their gender status as tenuous.

Along similar lines, 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 be thus fruitful in future research to analyze the links between nation-level PMB scores and national data on both male-to-male male-to-female violence.

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 gender measures. Thus, national PMB scores may offer a valuable research tool for examining a wide and diverse range of cultures. Whereas some of the countries examined here (e.g., Kosovo, Albania, Iran) embrace the notion that manhood is precarious, others (e.g., Finland, Germany, Spain) reject this notion. Nonetheless, 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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Tables

Table 1. Sample Composition, Descriptive Statistics for the PMB, and Country-Level Indicators (HDI and GGGI) for Each Country.

Country	N	% men	Age		PMB (CFA scores)			HDI	GGGI
			M	*SD*	*M*	*SD*	*Omega*		
Albania	239	37	22.99	4.90	0.72	1.09	0.77	791	0.769
Argentina	424	47	32.23	12.28	-0.32	1.04	0.63	830	0.746
Armenia	282	45	20.01	1.91	0.05	1.07	0.72	760	0.684
Australia	664	34	29.85	11.19	0.04	1.01	0.74	938	0.731
Belgium	1,951	46	21.59	5.97	-0.30	0.93	0.66	919	0.750
Bosnia	219	42	22.99	5.85	-0.12	1.28	0.89	769	0.712
Brazil	1,150	30	24.04	7.70	-0.03	1.01	0.53	761	0.691
Canada	913	31	19.85	2.90	0.03	0.89	0.69	922	0.772
Chile	237	34	21.76	5.10	-0.06	1.09	0.63	847	0.723
China	600	34	19.48	1.96	0.17	0.78	0.69	758	0.676
Colombia	615	36	21.49	4.95	-0.16	1.02	0.63	761	0.758
Croatia	363	20	23.19	5.80	0.47	0.89	0.68	837	0.720
Czechia	423	68	27.99	8.41	-0.04	1.00	0.75	891	0.706
Denmark	255	39	25.41	4.75	-0.30	0.87	0.66	930	0.782
England	744	38	22.24	7.28	-0.10	0.98	0.75	920	0.767
Finland	314	11	26.46	7.07	-0.78	0.86	0.64	925	0.832
France	422	18	22.26	6.74	-0.41	0.97	0.61	891	0.781
Georgia	197	47	21.74	3.48	0.39	1.17	0.81	786	0.708
Germany	1,864	37	28.21	9.80	-0.49	0.94	0.69	939	0.787
Ghana	329	37	20.20	2.58	0.53	1.12	0.71	596	0.673
Greece	282	27	26.39	9.10	-0.20	0.92	0.71	872	0.701
Hungary	768	17	22.34	4.27	0.41	0.95	0.74	845	0.677
India	388	37	22.16	5.01	-0.01	0.97	0.69	647	0.668
Indonesia	255	42	21.11	4.09	0.18	0.81	0.63	707	0.700
Iran	174	40	29.07	8.18	0.66	0.90	0.65	797	0.584
Ireland	571	46	19.84	3.70	0.10	0.94	0.70	942	0.798

Italy	2,419	33	22.84	5.33	0.07	0.95	0.66	883	0.707
Japan	397	39	21.36	2.95	0.49	0.72	0.49	915	0.652
Kazakhstan	344	43	20.22	3.82	0.52	0.98	0.71	817	0.710
Kosovo	433	37	20.25	3.86	0.80	1.05	0.73	791	0.769
Lebanon	134	27	20.00	1.78	0.42	0.98	0.73	730	0.599
Lithuania	355	28	23.87	6.76	0.19	1.12	0.77	869	0.745
Luxembourg	181	34	24.61	5.43	-0.06	1.11	0.79	909	0.725
Malta	254	34	26.90	10.18	0.23	1.01	0.71	885	0.693
Mexico	343	45	23.69	8.93	-0.18	0.99	0.62	767	0.754
Morocco	294	45	29.05	9.68	0.05	1.04	0.78	676	0.605
Nepal	219	37	22.33	5.86	0.21	0.96	0.68	579	0.680
Netherlands	893	32	20.60	3.25	-0.36	0.89	0.72	934	0.736
New Zealand	216	29	19.01	2.33	0.05	0.85	0.70	921	0.799
Nigeria	461	41	21.12	3.14	0.65	1.06	0.60	534	0.635
Northern Ireland	303	38	22.15	5.59	-0.06	1.01	0.74	920	0.767
Norway	210	42	23.13	4.11	-0.42	0.95	0.73	954	0.842
Pakistan	573	43	22.04	3.73	0.18	0.88	0.65	560	0.564
Philippines	468	47	19.78	2.01	0.26	0.94	0.68	712	0.781
Poland	843	38	22.95	4.68	0.34	1.00	0.71	872	0.736
Portugal	173	18	22.14	4.91	-0.39	0.86	0.55	850	0.744
Romania	253	41	22.83	4.64	0.36	1.03	0.72	816	0.724
Russia	698	31	21.84	6.83	0.41	1.03	0.73	824	0.706
Serbia	720	22	22.24	5.34	0.27	1.12	0.76	799	0.736
Slovakia	622	44	21.95	4.64	0.29	0.98	0.73	857	0.718
South Africa	415	14	20.60	2.48	0.40	0.97	0.67	705	0.780
Spain	1,235	34	25.68	8.72	-0.52	0.95	0.62	893	0.795
Suriname	182	45	22.92	5.73	0.32	1.02	0.74	724	0.707
Sweden	671	48	26.20	7.30	-0.46	0.98	0.64	937	0.820
Switzerland	581	35	23.53	5.36	-0.44	0.94	0.66	946	0.779
Turkey	1,495	31	22.27	3.96	-0.34	1.11	0.71	807	0.635
UAE	510	34	20.00	1.47	0.38	1.00	0.74	866	0.655
Ukraine	285	34	19.15	1.43	0.55	0.94	0.72	750	0.721

			PMB			HDI	GGGI		
Uruguay	187	39	22.57	6.46	-0.32	0.84	0.46	808	0.737
USA	786	30	20.38	4.44	0.15	1.01	0.74	920	0.724
Vietnam	408	25	22.34	5.77	0.17	0.85	0.57	693	0.700
Wales	213	35	30.61	10.42	0.07	1.05	0.73	920	0.767
Total sample	**33,417**	**37**	**23.06**	**6.80**	**0.00**	**1.00**	**0.71**	**-**	**-**

Note. PMB = Precarious Manhood Beliefs Scale; HDI = Human Development Index; GGGI

= Global Gender Gap Index.

Table 2. Comparison of Multilevel Factor Analysis Models for Precarious Manhood Beliefs (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; 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 3. 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	SRMRw	SRMRB
Ignoring multilevel structure	One-factor (Model 5)	1913334	0.69	0.116	0.092	–
	Three-factor (Model 6)	1896916	0.80	0.094	0.076	–
	Five-factor (Model 7)	1879171	0.93	0.059	0.047	–
Strong configural isomorphism	One-factor at L2 (Model 8)	1844422	0.91	0.039	0.047	0.097
	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 covariates at county level	Five-factor ~ GGGI (Model 12)	1844186	0.92	0.039	0.047	0.071
	Five-factor ~ HDI (Model 13)	1845117	0.92	0.038	0.047	0.071

Figures

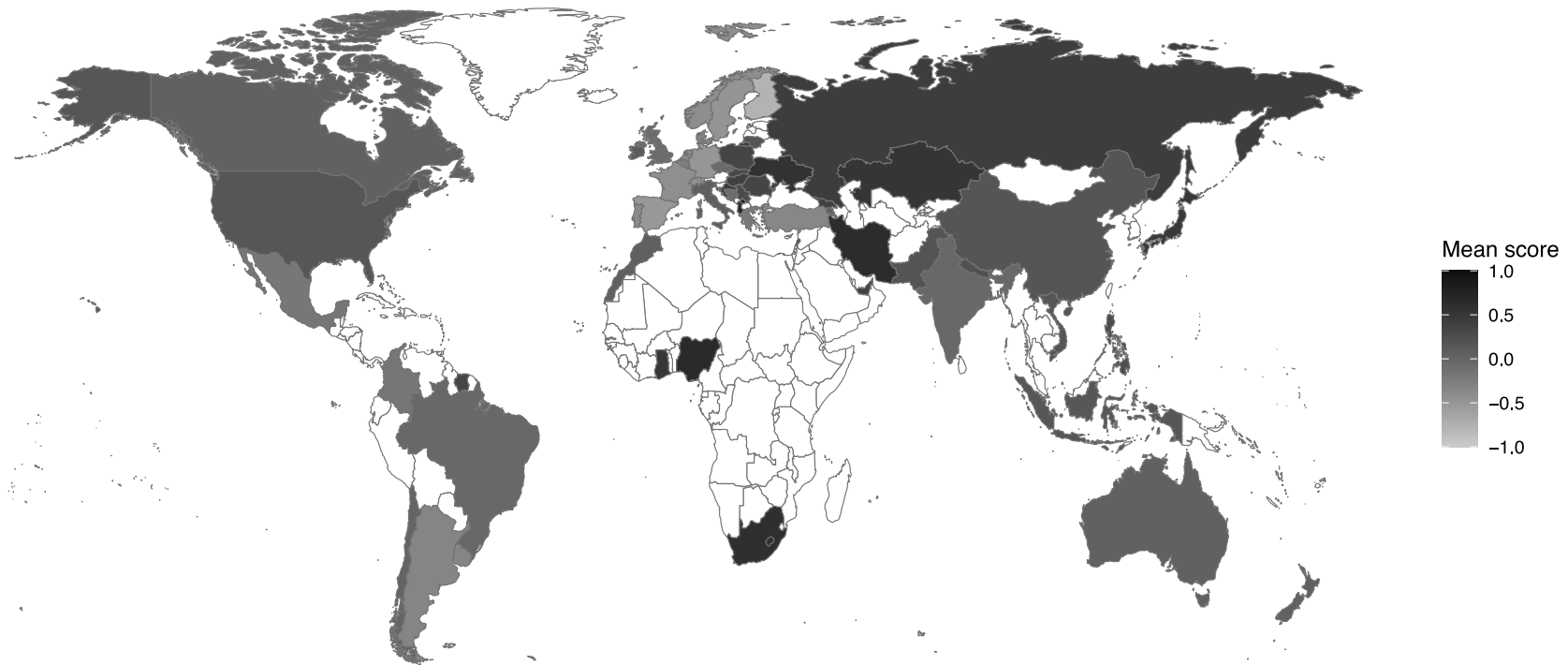Figure 1. World Map Showing Country-Level Mean PMB Factor Scores

Figure 2. Two-Level CFA Results of the Five-Factor Gender Beliefs Model with Country-Level Gender Equality (GGGI).
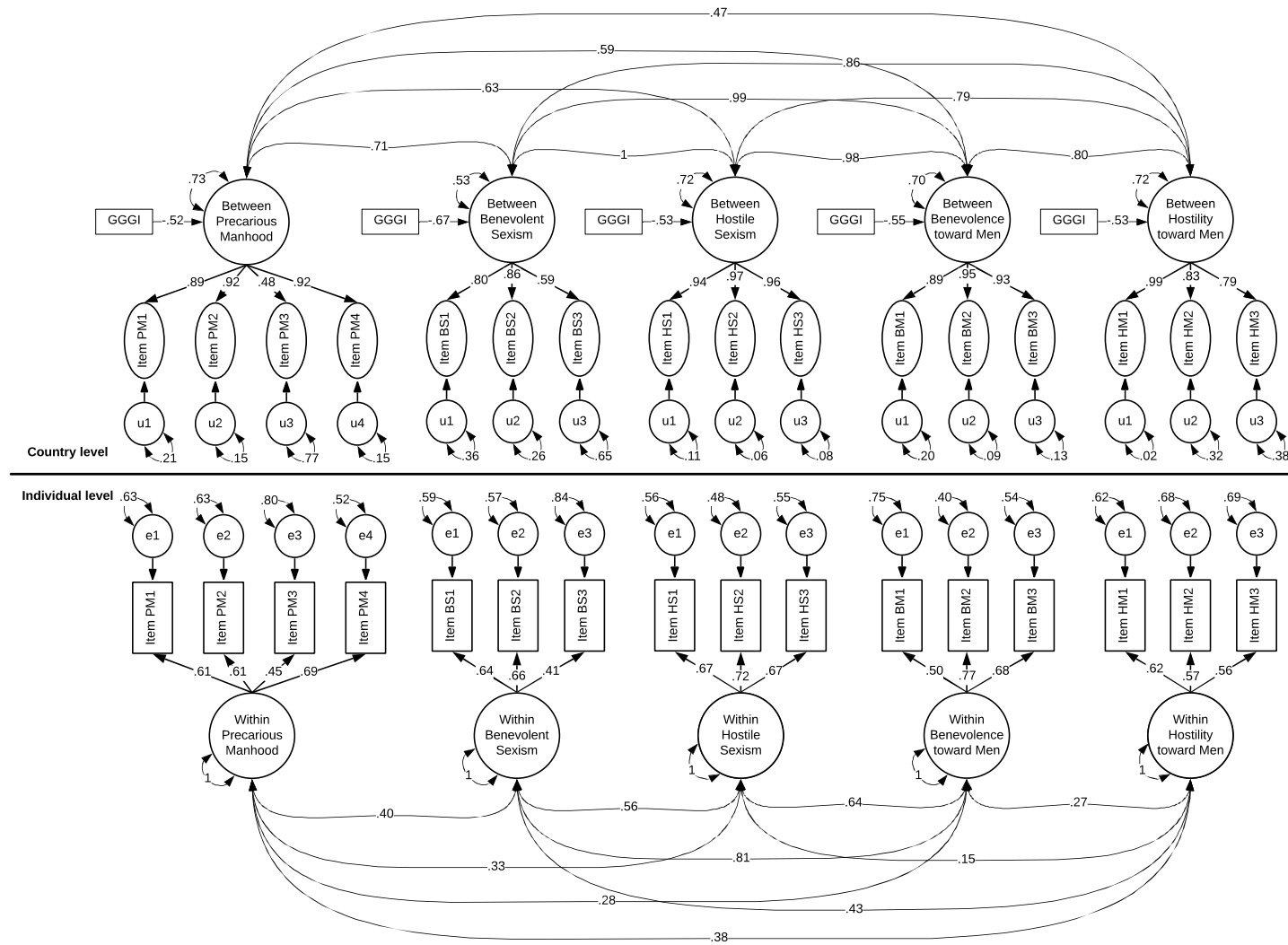
Figure 3. Scatterplot Showing the Association of Country-Level Precarious Manhood Beliefs (PMB) and Gender Equality (GGGI).
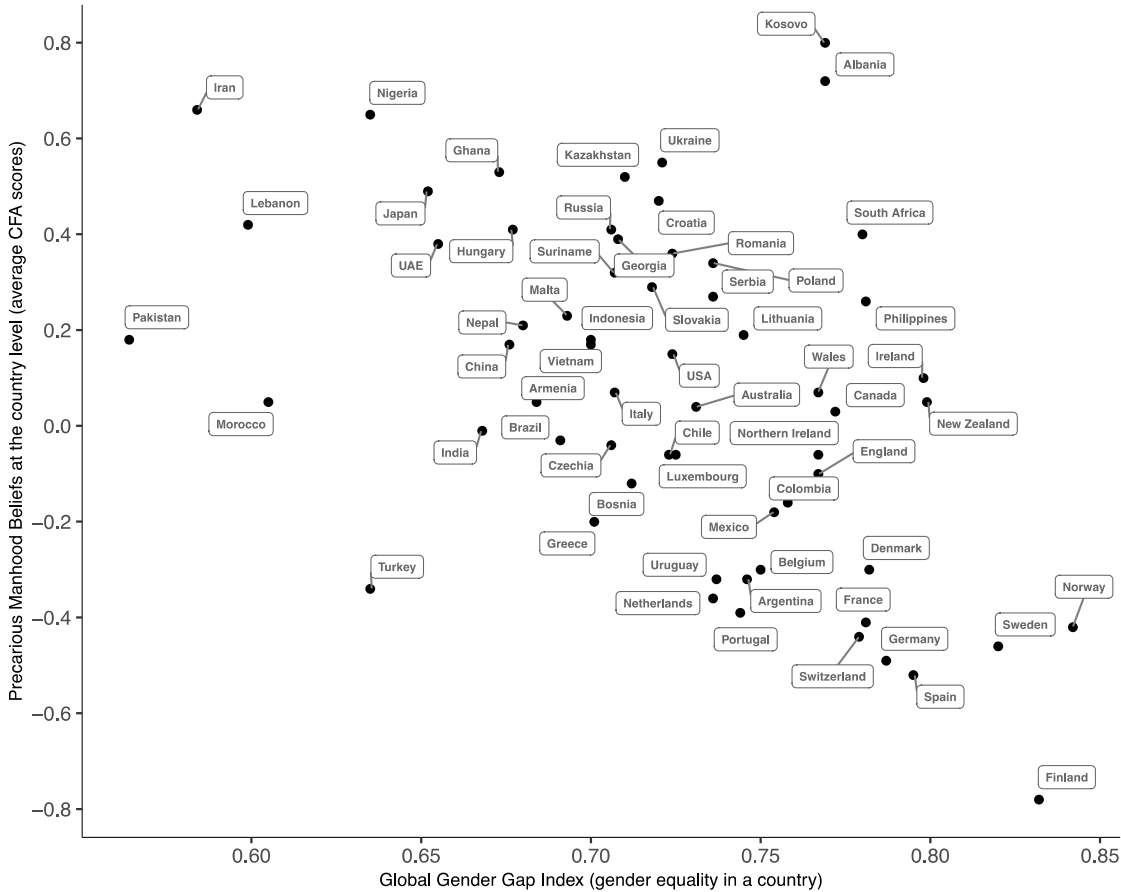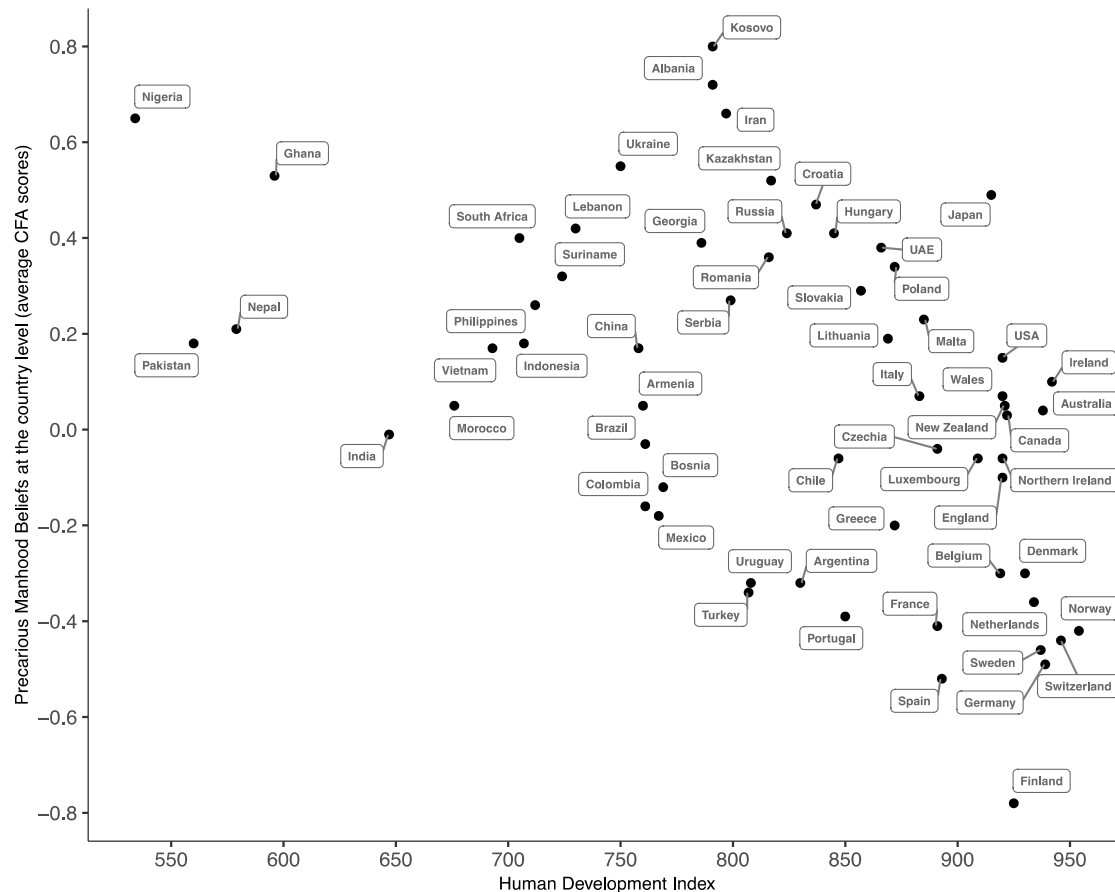
Figure 4. Scatterplot Showing the Association of Country-Level Precarious Manhood Beliefs (PMB) and Human Development (HDI).

Supplement

Title: Online Supplement to Precarious Manhood Beliefs in 62 Nations

Description: Supplemental material for Precarious Manhood Beliefs in 62 Nations by Jennifer K. Bosson et al. (full list of authors appears in the manuscript) in *Journal Name.*

Contents:

I. Analyses with Age and Gender Distribution as Covariates

II. Analyses with Five Countries Excluded

III. Cluster Analyses of Country-Level Variables

I. Analyses with Age and Gender Distribution as Covariates

Table A1. Comparison of Multilevel Factor Analysis Models for Precarious Manhood Beliefs (PMB) Scale (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	–

		BIC	CFI	RMSEA	SRMR$_W$	SRMR$_B$
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 Precarious Manhood Beliefs (PMB) Scale (Using Data from 57 Countries).

		Fit statistics				
Model type	**Model**	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

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 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 by the above methods (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

Sum of Squares between divided by Sum 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%.

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
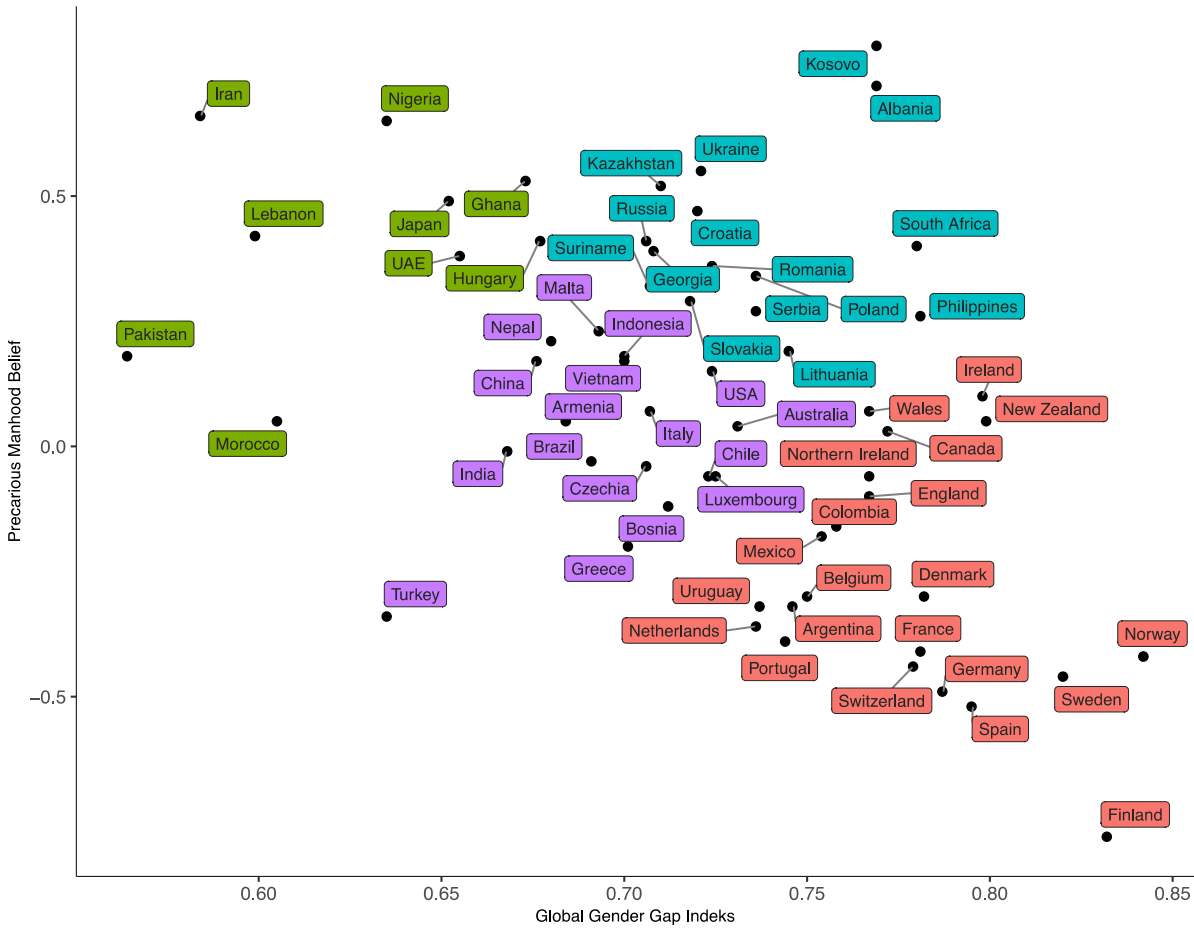
(PMB) and Gender Equality (GGGI).

Figure A2. Scatterplot Showing Four Cluster for Country-Level Precarious Manhood Beliefs (PMB) and Human Development (HDI).