

Gender bias in cultural tightness across the 50 US states, its correlates, and links to gender inequality in leadership and innovation

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Abstract

Cultural tightness theory, which holds that “tight” cultures have rigid norms and sanctions, provides unique insights into cultural variations. However, current theorizing has not analyzed gender differences in cultural tightness. Addressing this gap, this research shows that women are more constrained than men by norms within the same society. By recruiting 15,425 respondents, we mapped state-level gender bias in cultural tightness across the United States. Variability in gender bias in cultural tightness was associated with state-level sociopolitical factors (religion and political ideology) and gender-related threats. Gender bias in cultural tightness was positively associated with state-level gender inequality in (business and political) leadership and innovation, two major challenges faced by women professionals. Overall, this research advances cultural tightness theory and offers a cultural norms account on persistent gender inequalities in society.

Keywords: cultural tightness–looseness, gender inequality, gender bias, leadership, innovation, United States

Significance Statement

Cultural tightness theory, which holds that “tight” cultures have rigid norms and sanctions, provides unique insights into cultural variations. However, current theorizing has not analyzed gender differences in cultural tightness. We propose that gender bias in cul

mension and offer a cultural norms account on persistent gender inequalities.

Cultural psychologists have used cultural “tightness” and “looseness” to describe different cultures: tight cultures have “strong norms and a low tolerance of deviant behavior,” whereas loose cultures have “weak norms and a high tolerance of deviant behavior” (1). This stream of research provides unique insights toward understanding cultural variations across societies (2–5). However, current theorizing has not analyzed gender differences in cultural tightness. In the current research, we propose that societal-level gender bias in cultural tightness likely exists and that it varies across different societies and regions. Furthermore, we theorize that societal-level gender bias in cultural tightness is associated with societal-level gender inequality in leadership and innovation. We focus on gender inequality in leadership

and innovation, as a variety of research and broader statistics have shown that women professionals are starkly underrepresented in elite leadership (including business and political leadership) and fields that involve innovation (6–12). Moreover, gender inequality in leadership and innovation is integrally relevant to cultural tightness theory because both effective leadership and innovation involve revising extant norms and challenging the status quo (13, 14).

There are two theoretical premises for this gender bias at the societal level. First, in most societies, women often face and need to comply with stronger social norms (especially gender stereotypical norms) compared with men (15). For example, societies regard women who choose their career over having children

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as "selfish"; in contrast, men are unlikely to face such a judgment (16, 17). Similarly, societies see women's engagement in premari

restricted domestic roles and are the 'weak' sex (36)" and serve to justify men's power, control, and dominance.

Additionally, women (compared with men) may face more physical threats, ranging from robbery, domestic violence, sexual harassment, to human trafficking (41, 42). While men and boys also face these threats, the majority of individuals identified as victims in violence cases and identified as trafficked for both labor and commercial sex are women and girls. The Global Report on Trafficking in Persons in 2020 found that 84% victims of human trafficking among three countries in North America (i.e. Canada, Mexico, and the United States) were women and girls

[Supplementary Text](#) on how each variable was measured and
Table S1

95% CI [1.78, 3.38]), and Northeast region ($n = 9$, Mean = 2.46, SD = 0.42, 95% CI [2.14, 2.78]). Results of Tukey's honestly significant difference (HSD) post hoc tests further demonstrated that while the South region score had marginally significant differences with the Northwest region score ($t_{\text{mean}} = 0.98$, SE = 0.39, $P = 0.069$) and the West region score ($t_{\text{mean}} = 0.86$, SE = 0.35, $P = 0.078$), there was no significant difference between any two of these four regions (see Table S2 for all descriptive statistics).

However, when investigating the differences of gender bias in

Table 2. Links between religion (Pew) and gender bias in cultural tightness.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Percentage of adults who are highly religious ^a	5.51*** (1.08)	4.46*** (1.22)										
Importance of religion			5.45*** (1.09)	4.41** (1.27)								
Frequency of prayer					6.07*** (1.25)	4.82*** (1.37)						

percentage of adults who are nonreligious ($b = -5.47$, $SE = 1.24$, $P < 0.001$) was negatively related to gender bias in cultural tightness. The percentage of adults who are moderately religious ($b = 0.60$, $SE = 4.56$, $P = 0.895$) was not significantly related to gender bias in cultural tightness.

Sociopolitical factors: political ideology

Gender bias in cultural tightness is also reflected in political institutions, ideologies, and practices. Specifically, states with political conservatives tend to endorse more patriarchal values, which are related to gender bias in cultural tightness (34). Thus, we suggest that states where conservatives make up a larger share of the population are more likely to have larger gender bias in cultural tightness. To analyze this, we collected data from the Pew Research Center (2014) showing state-level data on the percentage of people who hold conservative beliefs. Results in Table 5 indicated that the percentage of conservatives was positively associated with gender bias in cultural tightness ($b = 11.65$, $SE = 1.81$, $P < 0.001$).

In addition, we collected and computed the proportion of Republicans in the U.S. Senate and House of Representatives from the Biographical Directory of the United States Congress (2019–2021, i.e. the 116th Congress). Results in Table 5 indicated that the percentage of Republicans in the U.S. Senate ($b = 1.28$, $SE = 0.26$, $P < 0.001$) and in the House of Representatives ($b = 1.74$, $SE = 0.33$, $P < 0.001$) was all positively related to gender bias in cultural tightness. In sum, these results suggested that states with more people embracing conservative political ideology appear to have larger gender bias in cultural tightness.

Gender-related threats

Gender-related social threats including both benevolent sexism and hostile sexism are rooted in a belief that “women inhabit restricted domestic roles and are the ‘weak’ sex” (36). They serve to justify men’s power, control, and dominance. Thus, women in states where either form of sexism is commonplace are likely to experience greater emphasis on traditional gender roles and hence greater constraints on them. As such, we suggest that sexism is positively related to gender bias in cultural tightness.

A variable related to sexism is societies’ tolerance toward sexual diversity. Societies that have more open attitudes toward lesbians, gays, bisexuals, and transgender (LGBT) individuals are also likely to have more liberal attitudes toward women (63, 64). In addition, societies where people have fewer negative views about those who do not assume traditional gender roles tend to have a less patriarchal culture (63) and thus fewer constraints on women. Accordingly, women in such societies may experience fewer social threats. Thus, we suggest that states that are in favor of protecting LGBT individuals from discrimination would likely have smaller gender bias in cultural tightness.

To test these propositions, we collected data on state-level sexism from (i) the World Value Survey (2017) (i.e. state sexism belief i) and (ii) the DDB Needham Life Style Survey (1975–1998) (i.e. state sexism belief ii). Specifically, state sexism belief i comprised five items that reflected patriarchal gender roles and gender stereotypes from the World Value Survey (e.g. “On the whole, men make better political leaders than women do”), whereas state sexism belief ii comprised other five items that reflected patriarchal gender roles and gender stereotype from the DDB Needham Life Style Survey (e.g. “Women’s place is in the home”). We also examined statistics from the American Values Atlas (2019) regarding the percentage of people who favor laws protecting the LGBT

community from discrimination, as well as data from the Pew Research Center (2014) on the percentage of people viewing homo

against women, $b = -0.06$, $SE = 0.05$, $P = 0.223$; for relative domestic violence, $b = 0.23$, $SE = 0.36$, $P = 0.530$; and for relative human trafficking, $b = -0.23$, $SE = 0.18$, $P = 0.198$). Our interpretation of this finding is that unlike gender-related social threats such as sexism

Table 7. Links between gender bias in cultural tightness and gender inequality in business leadership.

Variables	Gender inequality in boards of publicly traded companies ^a	Gender inequality in CEOs of publicly traded companies	Gender inequality in management occupations: total	Gender inequality in management occupations: top executives	Gender inequality in business leadership (aggregated) ^b
Mgs:					

and methods. Subsequently, using disambiguated patent inventor names and name-gender linked data from the Global Name Recognition system, a name-search technology produced by IBM (IBM-GNR), and the WIPO worldwide gender-name dictionary (WGND), the patent office was able to identify the gender of roughly 93% of inventors (70). Our analyses were based on patents wherein the gender of the inventors was previously identified using the above method.

Table 9 showed that gender bias in cultural tightness was positively related to gender inequality in success for patents ($b = 0.01$, $SE = 0.004$, $P = 0.004$). Specifically, gender bias in cultural tightness was positively related to gender inequality in utility patent success ($b = 0.01$, $SE = 0.003$, $P < 0.001$) but not significantly related to gender inequality in design patent success ($b = -0.01$, $SE = 0.01$, $P = 0.714$) or plant patent success ($b = 0.07$, $SE = 0.12$, $P = 0.550$). One potential explanation is that challenging status quo plays a much more salient role in developing utility patents compared with design and plant patents, as utility patents are granted for new discoveries and inventions of technology and products, which require high levels of inventiveness (71). In contrast, design patents are for new designs of existing products and plant patents are for creation and reproduction of a new plant variety, involving more incremental innovation (2, 72, 73).

Since most utility patents are based in STEM fields (8), we also examined the relationship between gender bias in cultural tightness and gender inequality in STEM occupations, which was computed by using the equation mentioned above with the data from the U.S. Census Bureau's ACS (2005–2019). As shown in Table 9, they were indeed positively related ($b = 0.01$, $SE = 0.005$, $P = 0.003$). That is, states that place more constraints on women than men also have fewer women in STEM occupations.

Similarly, to the extent that education attainment is necessary for innovation and doctoral degrees involve original knowledge creation (especially for utility innovation) (74–76), we examined the relationship between gender bias in cultural tightness and gender inequality in higher education attainment. As shown in Table 10, gender bias in cultural tightness was positively related to gender inequality in attaining a doctorate degree ($b = 0.01$, $SE = 0.002$, $P < 0.001$) but not significantly related to gender inequality in attaining a bachelor's degree ($b = -0.0002$, $SE = 0.01$, $P = 0.871$), a master's degree ($b = 0.01$, $SE = 0.03$, $P = 0.625$), or a professional degree ($b = 0.04$, $SE = 0.02$, $P = 0.107$). In sum, our results showed that states with tighter cultural constraints on women (compared with men) have fewer number of women patent holders, fewer women in STEM occupations, and fewer women with doctorate degrees.

Additional analyses on gender inequality in entrepreneurship

We also examined the relationships between gender bias in cultural tightness and gender inequality in entrepreneurship as additional evidence on the robustness of the relationships between gender bias in cultural tightness and gender inequality in innovation, given that entrepreneurship often involves disruptive innovation that breaks existing industry rules (77, 78). That is, entrepreneurs are individuals who reform or revolutionize current patterns of production by creating new products, services, and processes (79), and only by breaking rules rather than accepting conventional wisdom can entrepreneurs embrace emerging business opportunities (80–83). Accordingly, we collected data on the ownership of startup firms from the Annual Survey of Entrepreneurs (ASE; 2014–2016) and computed gender inequality among the owners of those firms. As a firm-level survey with a

focus on young firms and the experiences of firm owners (i.e. entrepreneurs), the ASE collected information annually on up to 4 owners from a sample of about 290,000 firms with paid employees over the entire private nonagricultural US economy (84). Table S6 showed that gender bias in cultural tightness was positively related to gender inequality in entrepreneurship (i.e. number of startup firms owned by women versus men) ($b = 0.03$, $SE = 0.01$, $P < 0.001$). To the extent that entrepreneurship is a main path to firm ownership (85) as people leave wage-based employment to start their own businesses (86), we also examined the relationship between gender bias in cultural tightness and gender inequality in firm ownership of all types of firms (Survey of Business Owners [SBO; 2002–2012] from the U.S. Census Bureau) and found that they were also positively related ($b = 0.02$, $SE = 0.01$, $P = 0.009$). Taken together, our findings suggest that fewer women become

weaker associations with gender inequality in leadership and innovation. We interpret these findings as evidence that gender bias in cultural tightness and the three gender equality scores as residing in different nomological nets.² Importantly, we also find evidence that gender bias in cultural tightness was still related to gender inequality in leadership and innovation above and beyond the effects of the three gender equality scores and the effect sizes were generally stronger than those of the three gender equality scores.

Discussion

This research reveals that in general, women are more constrained by cultural norms than men in the United States and that there is significant variation in gender bias in cultural tightness across the 50 states. Such variability appears to be associated with sociopolitical factors (religion and political ideology) and gender-related threats. Importantly, we found that gender bias in cultural tightness is associated with gender inequality (favoring men) in business and political leadership and innovation at the state level.

This research makes several theoretical contributions to the literatures on cultural tightness and gender inequality. First, it contributes to the cultural tightness theory by offering new insights into whether a given society's cultural norms apply equally to men and women. Prior research has documented that there is wide variability in tightness across nations, states, and provinces (1, 2, 4). However, this earlier research did not investigate whether the extent of cultural tightness is the same for both men and women in a given nation or region. We argue that gender bias in cultural tightness exists across societies. We test this thesis with data from the US 50 states and found that even within the same state, there may be different degrees of normative constraints and tolerance of aberrant behaviors for women versus

- 9 Greider CW, et al. 2019. Increasing gender diversity in the STEM research workforce. *Science* 366:692–695.
- 10 Lyness KS, Grotto AR. 2018. Women and leadership in the United States: are we closing the gender gap? *Annu Rev Organ.* 5:227–265.
- 11 Milli J, et al. 2016. Equity in innovation: women inventors and patents [accessed 2022 April 2]. <https://iwpr.org/wp-content/uploads/2020/12/C448-Equity-in-Innovation.pdf>
- 12 World Economic Forum. 2021. Global Gender Gap Report [accessed 2022 February 15]. <https://www.weforum.org/reports/global-gender-gap-report-2021>
- 13 Acs Z, David A. 1988. Innovation in large and small firms: an empirical analysis. *Am Econ Rev.* 78:678–690.
- 14 Bass BM, Riggio RE. 2006. *Transformational leadership*. 2nd ed. New York: Psychology Press.
- 15 Ellemers N. 2018. Gender stereotypes. *Annu Rev Psychol.* 69: 275–298.
- 16 Ladge JJ, Little LM. 2019. When expectations become reality: work-family image management and identity adaptation. *Acad Manage Rev.* 44:126–149.
- 17 Kaufman G. 2000. Do gender role attitudes matter? Family formation and dissolution among traditional and egalitarian men and women. *J Fam Issues.* 21:128–144.
- 18 Sagebin Bordini G, Sperb TM. 2013. Sexual double standard: a review of the literature between 2001 and 2010. *Sex Cult.* 17: 686–704.
- 19 Zaikman Y, Marks MJ. 2014. Ambivalent sexism and the sexual double standard. *Sex Roles* 71:333–344.
- 20 Bosson JK, Wilkerson M, Kosakowska-Berezecka N, Jurek P, Olech M. 2022. Harder won and easier lost? Testing the double standard in gender rules in 62 countries. *Sex Roles* 87:1–19. <https://doi.org/10.1007/s11199-022-01297-y>
- 21 Vandello JA, Bosson JK, Cohen D, Burnaford RM, Weaver JR. 2008. Precarious manhood. *J Pers Soc Psychol.* 95:1325–1339.
- 22 Heilman ME. 2012. Gender stereotypes and workplace bias. *Res Organ Behav.* 32:113–135.
- 23 Egan M, Matvos G, Seru A. 2022.

- challenges, and practical recommendations. *Ind Organ Psychol*. 8: 171–179.
- 55 Paolacci G, Chandler J. 2014. Inside the Turk: understanding Mechanical Turk as a participant pool. *Curr Dir Psychol Sci*. 23: 184–188.
- 56 Durante F, et al. 2017. Ambivalent stereotypes link to peace, conflict, and inequality across 38 nations. *Proc Natl Acad Sci U S A*. 114:669–674.
- 57 Lu JG, Jin PA, English AS. 2021. Collectivism predicts mask use during COVID-19. *Proc Natl Acad Sci U S A*. 118(23):e2021793118. [10.1073/pnas.2021793118](https://doi.org/10.1073/pnas.2021793118)
- 58 Ruppanner L, Maume DJ. 2016. The state of domestic affairs: housework, gender and state-level institutional logics. *Soc Sci Res*. 60:15–28.
- 59 Cunningham M. 2005. Gender in cohabitation and marriage: the influence of gender ideology on housework allocation over the life course. *J Fam Issues*. 26:1037–1061.
- 60 Risman BJ, Davis G. 2013. From sex roles to gender structure. *Curr Sociol*. 61:733–755.
- 61 Vandello J, Cohen D. 1999. Patterns of individualism and collectivism across the United States. *J Pers Soc Psychol*. 77:279–292.
- 62 Jayachandran S. 2015. The roots of gender inequality in developing countries. *Annu Rev Econ*. 7:63–88.
- 63 Kite ME, Whitley B. 1996. Sex differences in attitudes toward homosexual persons, behaviors, and civil rights: a meta-analysis. *Pers Soc Psychol Bull*. 22:336–353.
- 64 LaMar L, Kite ME. 1998. Sex differences in attitudes toward gay men and lesbians: a multidimensional perspective. *J Sex Res*. 35:189–196.
- 65 Campuzano MV. 2019. Force and inertia: a systematic review of women’s leadership in male-dominated organizational cultures in the United States. *Hum Resour Dev Rev*. 18:437–469.
- 66 Catalyst: Women in male-dominated industries and occupations; 2020 [accessed 2021 February 28]. <https://www.catalyst.org/research/women-in-male-dominated-industries-and-occupations/#easy-footnote-bottom-1-3710>
- 67 Ko I, Kotrba L, Roebuck A. 2015. Leaders as males? The role of industry gender composition. *Sex Roles* 72:294–307.
- 68 Ferreira F, Gyourko J. 2014. Does gender matter for political leadership? The case of US mayors. *J Public Econ*. 112:24–39.
- 69 Yukl G. 1989. Managerial leadership: a review of theory and research. *J Manage*. 15:251–289.
- 70 U.S. Patent and Trademark Office, Office of the Chief Economist, Progress and Potential: A profile of women inventors on U.S. patents; 2020. <https://www.uspto.gov/sites/default/files/documents/OCE-DH-Progress-Potential-2020.pdf>
- 71 Huang KG, Murray FE. 2009. Does patent strategy shape the long-run supply of public knowledge? Evidence from human genetics. *Acad Manage J*. 52:1193–1221.
- 72 Hall BH, Ziedonis RH. 2001. The