



WINPEC Working Paper Series No.E2123

March 2022

Gender differences in tolerance for women's opinions and the role of social norms

Ryo Takahashi

Waseda INstitute of Political EConomy
Waseda University
Tokyo, Japan

Gender differences in tolerance for women's opinions and the role of social norms

Ryo Takahashi ^{a*}

^a Waseda University, Graduate School of Economics, 1-6-1 Nishi-Waseda, Tokyo Japan

Abstract

This study empirically examines gender differences in tolerance for opinions and identifies how social norms for gender equality mitigate gender differences in tolerance for women's opinions by conducting online randomized experiments in Japan. In this experiment, we asked the participants to evaluate the agreement score for ten anonymous statements and implemented two types of random interventions: disclosing the gender of the statement poster and providing information on social norms for gender equality. The results of both cross-sectional and panel data analyses showed that people significantly reduced the agreement score for women's opinions compared to men's and non-gender-disclosure opinions. Meanwhile, the negative impact of female gender disclosure was neutralized when participants were provided with information on gender norms. These results suggest that people are likely to be less tolerant of women's opinions in general, while such gender differences are mitigated through social norms.

Keywords: Social norms, gender bias, online randomized experiment, Japan

JEL codes: C91, J16, D91, C99

* Corresponding author: E-mail addresses: ryo@waseda.jp (Ryo Takahashi),

1 Introduction

Women often experience gender differences in various situations, such as the hiring process (Coffman et al., 2021), wage levels (Biasi and Sarsons, 2020; Card et al., 2016; Flabbi, 2010; Mulligan and Rubinstein, 2008), promotion (Babcock et al., 2017; Régner et al., 2019), educational attainment (Brenøe and Zölitz, 2020; Carlana, 2019), and bargaining outcomes (Ayres and Siegelman, 1995; Dittrich et al., 2014; Ge et al., 2016; Hernandez-Arenaz and Iriberry, 2018). A large body of literature has shown that gender differences also exist in evaluating women's abilities and statements; women are underestimated in their abilities, even when they have the same abilities as men (Ayalew et al., 2021; Boring, 2017; Huang et al., 2020). These studies suggest that women's opinions and ideas may be devalued by gender, not by their content. However, it remains unclear whether, in general, people change their tolerance for women's opinions.

This study had two main objectives. First, we empirically investigated tolerance attitudes toward women's opinions by conducting online randomized experiments with 1,600 individuals in Japan. In this experiment, we presented ten anonymous statements to the participants and asked them to evaluate the agreement score for each statement. At that time, we disclosed the gender of the statement poster to randomly selected participants. Since the disclosure of gender and the type of gender were determined randomly, in the absence of gender differences, the agreement score was expected to be similar regardless of the poster's gender.

As the second objective, this study examined how social norms for gender equality (hereafter, "gender norms") mitigate gender differences in tolerance for women's opinions. Social norms are a set of prescriptive and proscriptive rules that affect human behavior through the power of people's willingness to punish (or reward) others who breach norms (Adriani and Sonderegger, 2018; Benabou and Tirole, 2011; Buckholtz, 2015; Elster, 1989; Fehr and Gächter,

2000; Krupka and Weber, 2013). Previous studies have indicated that information provision that reinforces social norms stimulates prosocial behavior (DellaVigna et al., 2012; Gächter et al., 2017; Goldstein et al., 2008) and mitigates antisocial behavior (Bicchieri et al., 2020; Dimant and Gesche, 2021; Dulleck et al., 2016; Fisman and Miguel, 2007; Hallsworth et al., 2017). In this study, by providing information on gender norms, we tested whether gender norm information mitigated gender differences in the agreement score for women's opinions.

More precisely, we gave randomly selected participants the information that the majority of society in Japan generally demands alleviation of gender differences. One of the advantages of conducting the experiment in Japan is that we can expect to create a gap in awareness of gender norms through information provision. In general, Japan is a male-dominated country with a low awareness of gender equality (Lee, 2019; Ogasawara and Komura, 2021). In fact, Japan ranks 120th out of 156 countries in the Global Gender Gap Report 2021, which is the lowest among developed countries (World Economic Forum, 2021). At the same time, there is a strong demand to mitigate gender differences in Japan. For example, in a public opinion survey in 2019, more than 90% of the respondents required the government to implement policies to promote gender equality (Cabinet Office, 2019). In addition, as in other countries, many studies conducted in Japan have reported behavioral changes through social norms (Arimura et al., 2016; Horioka, 2019; Horioka et al., 2018; Takahashi and Tanaka, 2021; West, 1997; Yamamura, 2011). For example, Okuyama (2021) found that a radio program to strengthen gender equity norms increased women's political participation during the Allied Occupation of Japan. Hence, the provision of gender norm information was expected to increase awareness of gender norms, allowing us to estimate the impact of social norms on tolerance for women's opinions.

2 Literature Review and Hypotheses

2.1 An overview of previous studies

Gender differences in economic outcomes, especially those in favor of men, have been extensively examined in the literature (Blau and Kahn, 2000; Card et al., 2016; Croson and Gneezy, 2009; Hernandez-Arenaz and Iriberry, 2018; Husain et al., 2021; Mengel, 2021). In addition, women's abilities are underestimated because of their gender. For example, Azmat and Ferrer (2017) reported that female lawyers earn less than half as much as male lawyers from new clients, even after controlling for individual characteristics. Furthermore, Hoisl and Mariani (2017) focused on technological inventions and found that female inventors earned approximately 14% less than male inventors.

Similar gender differences have been observed in academia (Bosquet et al., 2019; Ersoy and Pate, 2021; Hechtman et al., 2018; Huang et al., 2020). For example, Knobloch-Westerwick et al. (2013) found that the scientific quality of female scientists was underestimated, especially in male-dominated fields. Ginther and Kahn (2021) reported that female economists were 15% less likely to be promoted to associate professor, even after controlling for academic achievements, such as cumulative publications, citations, and grants. In addition, a number of studies have indicated that female teachers are rated lower in class evaluations than male teachers (Boring, 2017; Buser et al., 2019; Mengel et al., 2019).

To reduce gender differences, several approaches have been proposed, such as increased opportunities for interaction between men and women (Dahl et al., 2021) and a childhood environment that promotes awareness of gender equality (Dhar et al., 2018; Getik and Meier, 2021). Another approach is the enforcement of social norms for gender equality.

In general, the relationship between social norms and gender differences is discussed mainly from two perspectives. The first perspective primarily investigates how social norms

cause gender differences. Although many studies have indicated that norm enforcement helps to sustain cooperation in a society (Fehr and Gächter, 2000; Gülerk et al., 2006), social norms also have a negative aspect that could potentially damage welfare by stimulating antisocial behavior (Elster, 1989; Smerdon et al., 2019). Hence, gender differences are likely to increase when social norms unfavorable to women (e.g., how they should act, look, think, and feel) are shared in society. In fact, particularly in developing countries, many studies have pointed out that social norms are one of the causes of gender differences (Alesina et al., 2013; Bertrand et al., 2015; Field et al., 2010; Gneezy et al., 2009; Jayachandran, 2015, 2021).¹

The second perspective focuses on how social norms mitigate gender differences, which is the main focus of this study (Boring and Philippe, 2021; Okuyama, 2021). For example, Tang and Zhang (2021) indicated that gender-equal norms from multinational firms increased the appointment of female managers and total factor productivity in China. In addition, Bursztyn et al. (2020) found that correcting misperceptions of social norms stimulated female labor participation in Saudi Arabia. However, to the best of my knowledge, none of the studies have investigated whether gender norms efficiently reduce gender differences in tolerance for women's opinions.

2.2 Hypotheses

Following the above discussion, we developed hypotheses regarding tolerance for women's opinions and the expected impact of gender norms. As discussed, women are undervalued because of their gender, even when they have abilities similar to men (Ayalew et al., 2021; Boring, 2017; Bosquet et al., 2019; Ersoy and Pate, 2021; Hechtman et al., 2018;

¹ Although it is important to investigate whether social norms generate gender differences in tolerance for opinions, it is beyond the scope of this study.

Huang et al., 2020; Mengel et al., 2019). These studies imply that women's opinions and ideas may be less acceptable due to their gender, even if the quality of the content is high. This argument leads to the first hypothesis:

Hypothesis 1. Tolerance for women's opinions is lower compared to the same opinions of men.

In addition, the literature indicates that social norms for gender equality mitigate gender differences (Okuyama, 2021; Tang and Zhang, 2021). If gender differences exist in tolerance for opinions, such differences might be mitigated through provision of information on gender norms. Accordingly, we propose the following hypothesis:

Hypothesis 2. Provision of information on gender norms mitigates gender differences in tolerance for women's opinions.

3 Experimental Design and Data Collection

To test the above hypotheses, we conducted two online randomized experiments in Japan. The first experiment was conducted on August 3 and 4, 2021, targeting 1,600 individuals through the online survey platform “iResearch.”² We conducted a second survey a month later (between September 3 and 7) to construct panel data. Although we invited 1,000 participants from the first survey, 774 participated in the second survey (attrition rate was 22.6%). For each survey, participants received a participation allowance of 35 yen (approximately US\$0.35), which is the standard price fixed by the survey company. The participants took an average of

² The individuals registered in the online survey platform “iResearch” were recruited for the survey. After finalizing the instructions and experiment design, the survey company “Neo Marketing” constructed the electronic questionnaire.

six minutes to complete the two tasks: (1) a demographic questionnaire survey and (2) evaluation of an anonymous statement.³

3.1 Evaluation of anonymous statements

The main objective of this study was to identify whether people changed their attitudes toward statements depending on the gender of the statement poster. For this purpose, we asked the participants to evaluate their preferences for anonymous statements at the end of the survey.⁴

More precisely, first, the participants were told that ten statements would be presented on the screen one at a time, and all statements were made by anonymous persons. Table 1 shows the ten statements used in the first and second surveys. To avoid ordering effects, the order of the statements presented to the participants was randomized. Then, the participants were asked to rate how much they agreed or disagreed with each statement based on a 7-point scale (hereafter, “agreement score”), ranging from “Strongly disagree” to “Strongly agree.” For the analysis, we set a response of neither agree nor disagree as zero, while "Strongly disagree" and "Strongly agree" answers were scored -3 and 3, respectively.⁵

³ The translated version of the questions and instructions used in this study are presented in Appendix A.

⁴ At the end of the survey, we presented the debriefing information to participants (see Appendix A).

⁵ The scale values were not presented to the participants.

Table 1

Ten statements presented during the first and second surveys

1	“Climate change is becoming more serious every day. Even at the expense of economic growth, efforts to tackle climate change should be pursued rapidly.
2	“Thermal power generation, which emits large amounts of carbon dioxide, should be abolished as soon as possible, and a system for supplying electricity from renewable energy sources should be established.”
3	“To reduce air pollution from automobiles, the government should promote a policy of shifting all domestic vehicles to electric vehicles by 2030.”
4	“We should aim for a denitrogenous society, where the same amount of greenhouse gas emissions are absorbed and the net result is zero.”
5	“Japan should formulate a law that requires at least 40% of the board members of listed companies to be women, as has been introduced in Scandinavian countries, to promote women's participation in society.”
6	“A mother's presence is essential for the education of her children. It is a desirable form of family for a woman to enter the home.”
7	“It is natural for a married couple to share the same last name, but they should discuss and decide which one to use.”
8	“There are many victims of sexual harassment. To reduce sexual harassment, it should be strictly punished.”
9	“It is necessary to have a defense force in case we are attacked by other countries.”
10	“The new coronavirus continues to rage around the world. We should wear masks when we go out, especially in crowded places such as trains.”

Note: The same statements were used consistently in the first and second surveys.

3.2 Random interventions

To empirically test the hypotheses, we implemented two types of interventions (Fig. 1). In the first intervention, we provided information related to gender norms in Japan to randomly selected participants before the evaluation of statement agreement (gender norm information treatment). Dimant and Gesche (2021) indicated that information on what others do or approve reinforced existing social norms. Accordingly, in this study, we provided the following instructions of the gender norm information:

The following is a summary of the results of a public opinion survey conducted by the Cabinet Office in 2019.

According to the survey, more than 70% of the respondents feel that men are more privileged in society and that gender inequality persists.

Furthermore, more than 90% of respondents require the government to implement policies to promote gender equality.

By providing gender norm information, we expected to increase the awareness of gender norms. It is important to note that the instructions did not indicate the potential risk that gender bias may affect tolerance for women's opinions. Instead, the gender norm information implied that it is socially desirable to mitigate gender-unequal behavior.

The second intervention was disclosure of the statement poster's gender (gender disclosure treatment). We indicated the gender of the posters (anonymous women or anonymous men) when we presented each statement, while we showed "anonymous person" to participants without the gender disclosure treatment. The gender disclosed to the participants was randomly selected; 50.25% of statements in the gender disclosure treatment were presented as women's opinions.

Fig. 1 shows an overview of the experimental design of this study. In the first survey, 1,600 participants were randomly assigned to one of the four groups. A total of 600 out of 1,600 participants received one or two treatments (groups 1 to 3 in Fig. 1), while the remaining 1,000 did not receive any intervention (hereafter, the “control group”). Since the participants in the control group were not exposed to our interventions, we only invited them for the second survey to examine how the treatments affected the changes in the agreement score. A total of 774 people participated in the second survey (attrition rate was 22.6%) and were again randomly sorted into four groups. In the second survey, we asked participants to rate the agreement score for exactly the same ten statements as in the first survey.

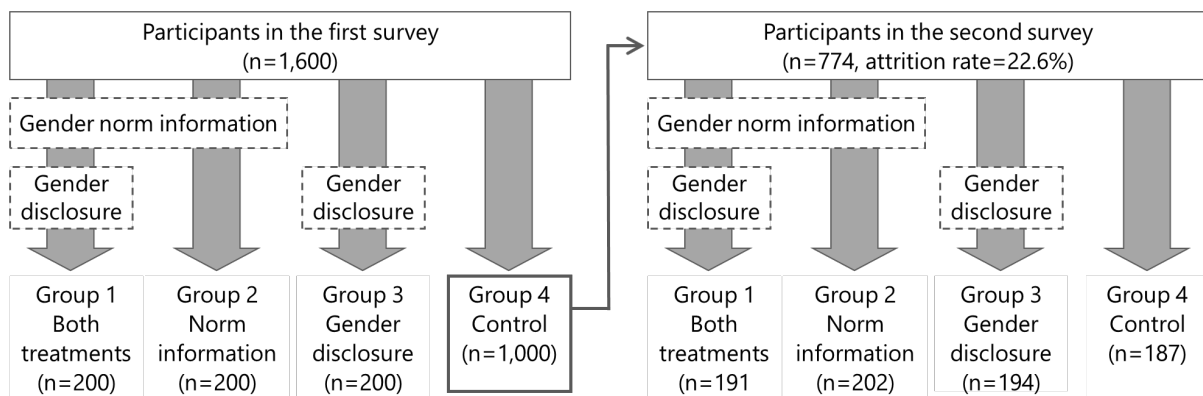


Fig. 1. Experimental design overview. Notes: The two interventions (i.e., the provision of norm information and the disclosure of poster’s gender) are illustrated in dash box. Numbers in parentheses indicate the number of observations.

The participants’ demographic characteristics and the balance between the groups are reported in Appendix B. Scheffe’s multiple comparison test confirmed that there were no statistical differences in the average demographic characteristics between the four groups. Table 2 reports the average agreement scores of the groups for the first and second surveys. The total averages of agreement score were 0.85 and 0.86 in the first and second surveys, respectively. In both surveys, the average agreement score was relatively smaller for the groups with the gender disclosure treatment (i.e., both treatments and gender disclosure groups). Fig.

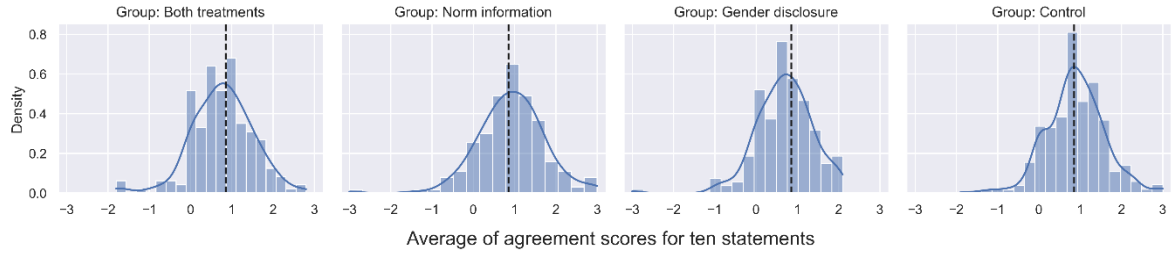
2 reports the distribution of average agreement scores for ten statements at the individual level by the groups: images A and B represent the distribution of the first and surveys, respectively. The figure indicates that all groups had a bell-shaped distribution around the mean.

Table 2

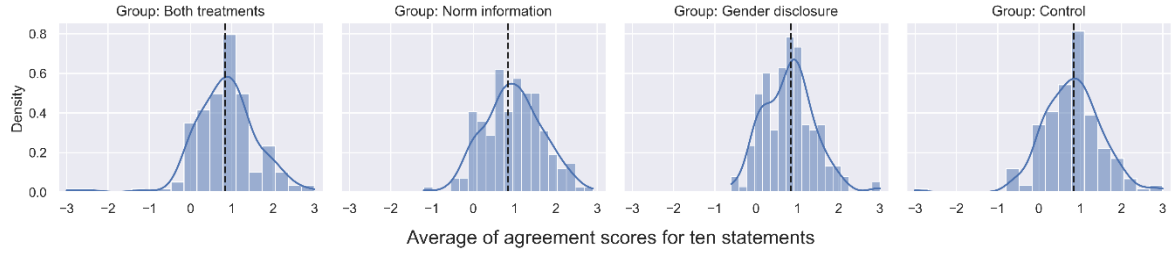
Average agreement scores at the individual level by the groups

	Both treatments	Norm information	Gender disclosure	Control
<i>Panel A. The first survey</i>				
Agreement scores	0.77 (1.50)	0.92 (1.48)	0.69 (1.54)	0.89 (1.47)
Proportion of female disclosure (%)	50.05		50.45	
Agreement scores for female poster	0.77 (1.47)		0.67 (1.55)	
<i>Panel B. The second survey</i>				
Agreement scores	0.86 (1.43)	0.97 (1.43)	0.80 (1.41)	0.81 (1.44)
Proportion of female disclosure (%)	49.05		50.91	
Agreement scores for female poster	0.81 (1.46)		0.79 (1.39)	

Note. Standard deviations are in parentheses. The gender of the poster is disclosed only for the participants in the both treatments group and gender disclosure group.



(A)



(B)

Fig. 2. Distribution of average agreement score for ten statements at the individual level by the groups: (A) Data from the first survey (B) Data from the second survey. The values on the horizontal axis are the average agreement scores for ten statements. The vertical dashed line indicates the overall average for each survey.

Fig. 3 shows the changes in the agreement score at the statement level between the first and second surveys. Zero on the horizontal axis in the figure means that the agreement score for the statement did not change between the first and second experiments, while positive and negative values indicate an increase or decrease in the score in the second survey, respectively. 49% of the statements did not change between the two experiments. In contrast, 24% and 27% of the statements increased and decreased the scores in the second survey.

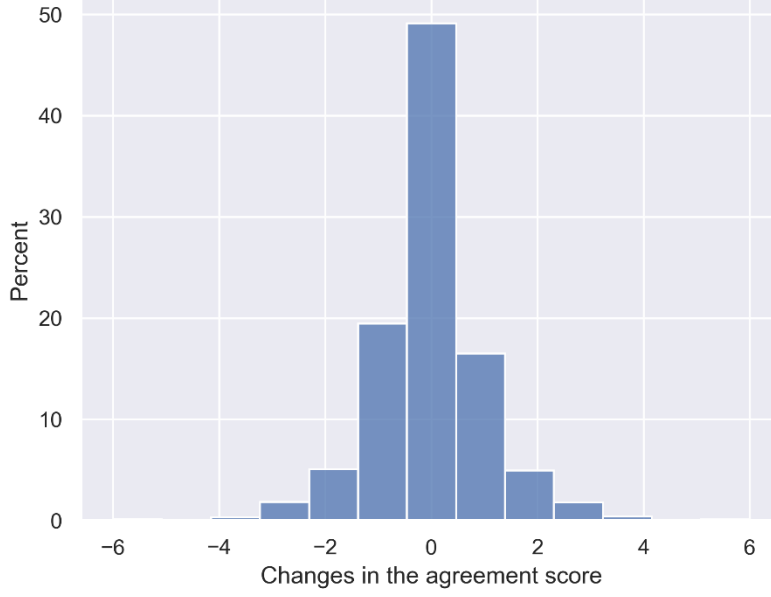


Fig. 3. Distribution of the changes in the agreement score at the statement level between the first and second surveys.

4 Methodology

4.1 Benchmark estimations

To identify how the agreement level was affected by the gender of the poster, this study employed both cross-sectional and panel data analyses. First, we started with a prefecture-level fixed effects regression model using observations from the first survey (cross-sectional analysis), as follows:

$$\begin{aligned}
 Agreement_{ij} = & \alpha + \beta_1 Gender_{Female_{ij}} + \beta_2 Gender_{Not_{ij}} + \beta_3 NormInfo_i + \\
 & \beta_4 (Gender_{female_{ij}} \times NormInfo_i) + \beta_5 (Gender_{Not_{ij}} \times NormInfo_i) + \gamma State_j + \delta X_i + \\
 & \rho_i + \varepsilon_{ij},
 \end{aligned} \tag{1}$$

where $Agreement_{ij}$ is the agreement scale ranging from -3 to 3 for statement j for individual i . $Gender_{Female_{ij}}$ and $Gender_{Not_{ij}}$ are the dummy variables representing the gender disclosure treatment of individual i for statement j (hereafter, “female gender disclosure dummy” and “no-gender disclosure dummy,” respectively). More precisely, $Gender_{Female_{ij}}$ takes a value of 1 if the gender of the poster of statement j is disclosed as female, while $Gender_{Not_{ij}}$ takes a value of 1 if the gender of statement j is not disclosed to individual i . $NormInfo_i$ is a dummy variable that takes a value of 1 if individual i receives the gender norm information. In Equation 1, we include two interaction terms between each gender disclosure dummy and the norm information dummy, shown as $Gender_{female_{ij}} \times NormInfo_i$ and $Gender_{Not_{ij}} \times NormInfo_i$. $State_j$ denotes a set of dummy variables for each statement. X_i indicates a set of observable demographic characteristics of individual i (see Table B1 in Appendix B). ρ_i is the prefecture-specific fixed effect for individual i , which reduces the unobserved time-invariant differences between prefectures. Standard errors are clustered at the treatment level to account for autocorrelations in the error term ε_{ij} .

Next, by using the data from the second survey, we conducted a panel data model estimation:

$$Agreement_{ijt} = \alpha + \beta_1 Gender_{Female_{ijt}} + \beta_2 Gender_{Not_{ijt}} + \beta_3 NormInfo_{it} + \beta_4 (Gender_{female_{ijt}} \times NormInfo_{it}) + \beta_5 (Gender_{Not_{ijt}} \times NormInfo_{it}) + \varepsilon_{ij}, \quad (2)$$

where t is the time of the survey round. The independent variables in Equation 2 are almost the same as in Equation 1, except that Equation 2 excludes time-invariant variables.

We tested Hypothesis 1 by examining whether the agreement score is decreased when the gender of the poster was disclosed as female. In Equations 1 and 2, we set the gender

disclosure of male posters as the baseline category. Therefore, β_1 in Equations 1 and 2 indicates the difference in the agreement scores between female and male disclosures. In this experiment, the exact same statements were presented to all participants in both surveys, and the only difference between the participants in the gender treatment group and control group was whether the participants were aware of the gender of the statement poster. Hence, if gender bias reduces tolerance for women's opinions, the parameter of β_1 is expected to have a negative coefficient.

Meanwhile, as shown in Hypothesis 2, gender norm information may mitigate the influence of gender bias and improve tolerance for women's opinions. The general impact of norm information is captured in β_3 , while this study focuses on its impact on the agreement score for women's statements, which is shown by the interaction term between the female gender disclosure dummy and the norm information provision dummy (i.e., $Gender_{female} \times NormInfo$ in equations). More precisely, we expected β_4 to be positive.

Moreover, we further estimated the nonlinear effects of the treatments. As shown in Fig. 3, the change in the agreement score between the first and second surveys can be classified into three categories: no change in the agreement score (49%), increase (24%), and decrease (27%). This study employed a multinomial logistic model to estimate the nonlinear effects of the treatments on each category:

$$\text{Prob}(Change_{ij} = k) = \frac{\exp(\theta'_k Z_i)}{1 + \sum_{k=0}^2 \exp(\theta'_k Z_i)}, \quad (3)$$

where $Change_{ij}$ represents the change category of statement j for individual i : no change ($k = 0$), increase ($k = 1$), or decrease ($k = 2$). I assume θ'_0 for normalization. Z_{ij} is a set of variables, including the treatment dummies, the interaction terms between the treatment dummies, the

statement dummies, observable characteristics (X in Equation 1), and prefecture-specific fixed effects. Marginal effects are used to estimate the probability of change in the agreement score.

4.2 Robustness checks

Even if we find that the provision of gender norm information significantly increases the agreement score for women's opinions in the benchmark results, the agreement score can differ between the treatments owing to motivations other than the enforcement of social norms. Particularly, we are concerned about the behavior of participants who already had a high concern for gender issues. If the pre-existent concern for gender issues is the dominant reason for increasing the agreement score, participants who are highly concerned about gender issues may have higher agreement scores for women's opinions when they receive gender norm information.

To empirically test this possibility, we conducted robustness checks by utilizing one demographic variable, such as the high gender concern dummy, which is already included in X in Equation 1. The high gender concern dummy takes a value of 1 if the participant strongly agrees that gender inequality needs to be addressed. We included the interaction term between the female gender disclosure dummy, the norm information dummy, and the high gender concern dummy in Equation 1.

5 Results

5.1 Results of the benchmark estimations

The estimation results are presented in Table 3, with Columns 1 and 2 showing the

results of the cross-sectional and panel data analyses, respectively. First, the results of the cross-sectional analysis indicated that the female gender disclosure dummy negatively affected the agreement score. The coefficient indicates that participants decreased the agreement score for women's opinions by 0.063 compared with men's opinions, even though we presented the exact same statements. Since the average agreement score was 0.85 in the first survey, the coefficient accounts for approximately 7% reduction in the agreement score by female disclosure.

Meanwhile, even after controlling for the general effect of gender norm information treatment, we observed a significantly positive effect of the interaction term between the female gender disclosure dummy and the norm information dummy. The coefficient indicates that gender norm information neutralizes the negative effect of female gender disclosure. These results suggest that norm information mitigates gender differences in tolerance for women's opinions.

Similar findings were found in the panel data analysis shown in Column 2. The coefficient of female gender disclosure indicates that participants reduced the agreement score by 0.127 (accounting for approximately 15% reduction) when they were aware that the poster was female. Although participants reduced the agreement score for women's opinions, this negative effect was mitigated when gender norm information was provided. The result of the interaction term indicated that the agreement score for female statements was increased through the gender norm information by 0.171 (approximately 20% of the overall average).

Table 3

Effect of the gender norm information and gender disclosure on agreement score

	Cross-section (1)	Panel (2)
Female gender disclosure	-0.063*** (0.006)	-0.127** (0.053)
Female gender disclosure×norm information	0.04*** (0.009)	0.171** (0.073)
No-gender disclosure	0.168*** (0.016)	-0.009 (0.038)
No-gender disclosure×norm information	-0.033 (0.021)	0.048 (0.058)
Norm information	0.074*** (0.02)	-0.06 (0.052)
Constant	0.933*** (0.167)	0.895*** (0.036)
Demographic characteristics	YES	-
Statement dummies	YES	-
Prefecture fixed effect	YES	-
Observations	16,000	15,480
R-squared	0.201	0.002
Mean of the dependent variable	0.853	0.874

Note: The female gender disclosure variable represents the gender disclosure dummy for women. Female gender disclosure×norm information is the interaction term between female gender disclosure and the gender norm information dummy. The no-gender disclosure variable is the dummy for not disclosing the gender of the statement poster. The norm information variable denotes whether an individual receives the gender norm information treatment. Standard errors are clustered at the group level in parentheses; *** and ** indicate statistical significance at the 1% and 5% levels, respectively.

Fig. 4 shows the estimated marginal effects compared to the male gender disclosure from the multinomial logistic model. The probabilities of each change category for the female gender disclosure dummy are presented in Image A. The results show that when the gender of the statement poster is disclosed as female, the probability of decreasing the agreement score

is stimulated by 5%, while the probability of increasing the score is dropped by 4% ($p<0.01$). In contrast, the opposite result is observed for the interaction term with the norm information dummy shown in Image B. The probability of decreasing the agreement score for women's opinions was significantly declined by 8% when the participants received the gender norm information. Moreover, I found that the information provision on gender norm increased the probability of “increase” and “no change” options by 4% and 5%, respectively ($p<0.01$).

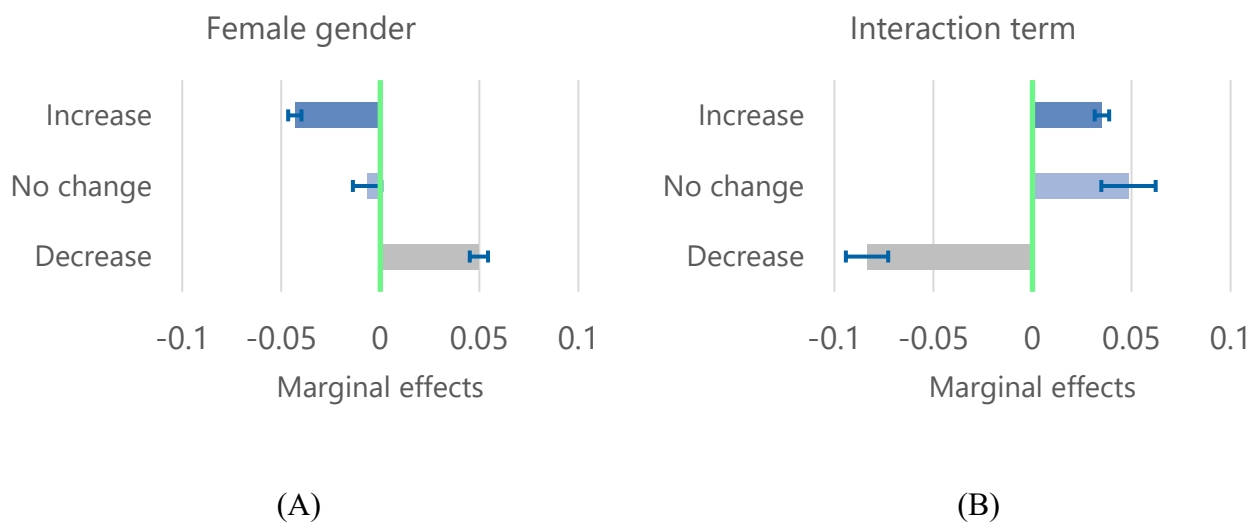


Fig. 4. The probability of change in the agreement score: (A) Female gender disclosure (B) Female gender disclosure \times norm information. Marginal effects on the probability of each category and 95% confidence intervals of a multinomial logistic model are reported.

5.2 Robustness checks

The results of the robustness checks are presented in Table 4.⁶ Although the coefficient of the interaction term with the high gender concern dummy was positive (0.083), we could not find any significant differences. In contrast, the interaction term between female gender disclosure and gender norm information was continuously significant and positive.

⁶ Although we did not report the results in Table 4, we included the interaction term between the no-gender disclosure dummy, the norm information dummy, and the high gender concern dummy in the estimation model.

Table 4

Results of robustness checks

	Robustness (1)
Female gender disclosure	-0.063*** (0.006)
Female gender disclosure×norm information	0.023* (0.012)
Female gender disclosure×norm information×High gender concern	0.083 (0.054)
Norm information	0.074*** (0.02)
High gender concern	0.254*** (0.056)
Other variables	YES
Statement dummies	YES
Prefecture fixed effect	YES
Observations	16,000
R-squared	0.201

Note: The estimation results for the four variables are reported in this table. High gender concern is a dummy variable representing a high level of interest in gender issues before the experiment. The variable “Female gender disclosure×norm information×High gender concern” is the interaction term between the three variables: the female gender disclosure dummy, the gender norm information dummy, and the high gender concern dummy. Standard errors are clustered at the group level in parentheses; *** and * indicate statistical significance at the 1% and 10% levels, respectively.

Overall, the results of both cross-sectional and panel data analyses, as well as robustness checks, showed that tolerance for women’s opinions was reduced by disclosing gender, which was consistent with our expectation. These findings are consistent with previous studies showing that women's abilities are underestimated (Ayalew et al., 2021; Boring, 2017; Bosquet et al., 2019; Ersoy and Pate, 2021; Hechtman et al., 2018; Huang et al., 2020; Mengel et al.,

2019). Meanwhile, the provision of gender norm information significantly increased the agreement score for women's opinions. Hence, based on these findings, we conclude that both Hypotheses 1 and 2 were supported.

6 Conclusion

By conducting a randomized online experiments with 1,600 individuals in Japan, this study reported empirical evidence on gender differences in tolerance for women's opinions. In our experiment, although the exact same statements were presented to all participants, the results of both cross-sectional and panel data analyses indicated that people reduced the agreement score when the gender of the statement poster was disclosed as female. These results suggest that people are likely to be less tolerant of women's opinions. However, the negative impact of female gender disclosure was neutralized when participants were provided with information on social norms for gender equality, suggesting that gender differences in women's opinions can be mitigated through social norms.

These findings have policy implications for mitigating gender differences. First, it is important to recognize that there is a risk of underestimating women's opinions, even unconsciously. I believe that the participants did not intendedly reduce the agreement score for women's opinions in order to oppress them. In fact, approximately 60% of participants reported that they have a strong or relatively strong concern on gender inequality issue. However, this study found a statistical difference in the score between female and male disclosure, suggesting that people may unintendedly decline women's opinions based on gender, not by its quality. This point is practically important because in a society where women's opinions are disregarded, their views will not be reflected in policy, which may reproduce a male-dominated society (Chattopadhyay and Duflo, 2004).

Second, it is essential to increase the awareness of gender equality norms in a society. Efforts to disseminate information on gender equality have been undertaken for a long time (Beach and Hanlon, 2019; Lau et al., 2021; Okuyama, 2021). In addition, recent studies have indicated that correcting misperceptions of social norms on women's roles through information provision can be effective in reducing gender differences (Bursztyn et al., 2020). Likewise, our study suggests that people may refrain from making gender differences when they perceive social norms demanding gender equality, even in a male-dominated country like Japan.

Finally, we discuss the limitations of this study. The primary limitation is that the individual motivation to decrease the agreement score for women's opinions is not clear. One potential motivation is that the participants may have decreased the agreement score due to the underestimation of women's opinions. Another potential reason for the lower scores on women's opinions is the different social norms unfavorable to women. Since Japan is a male-dominated country, there is a possibility that hidden unfavorable social norms may exist and influence the decision of participants without gender norm information. Furthermore, because it is not clear how individuals perceived the gender norm information treatment, the actual mechanisms of improving the agreement score through information provision were not clearly identified. Future research should focus on gathering more empirical evidence to understand the mechanisms of how people change their behavior toward women when they perceive social norms of gender equality.

Acknowledgments

The author would like to thank K. Ishibashi for her help with data collection.

Funding

This paper was supported by JSPS KAKENHI Grant-in-Aid for Scientific Research (B) Number 19H01492.

Declarations of interest:

The authors declare that they have no competing financial interests or personal relationships that could have influenced the work reported in this paper.

Author contribution

The author confirms sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results, and manuscript preparation.

References

- Adriani, F., Sonderegger, S., 2018. The signaling value of punishing norm-breakers and rewarding norm-followers. *Games* 9, 102.
- Alesina, A., Giuliano, P., Nunn, N., 2013. On the origins of gender roles: Women and the plough. *Quarterly Journal of Economics* 128, 469-530.
- Arimura, T.H., Katayama, H., Sakudo, M., 2016. Do social norms matter to energy-saving behavior? endogenous social and correlated effects. *Journal of the Association of Environmental and Resource Economists* 3, 525-553.
- Ayalew, S., Manian, S., Sheth, K., 2021. Discrimination from below: Experimental evidence from Ethiopia. *Journal of Development Economics* 151, 102653.
- Ayres, I., Siegelman, P., 1995. Race and gender discrimination in bargaining for a new car. *American Economic Review*, 304-321.
- Azmat, G., Ferrer, R., 2017. Gender gaps in performance: Evidence from young lawyers. *Journal of Political Economy* 125, 1306-1355.
- Babcock, L., Recalde, M.P., Vesterlund, L., Weingart, L., 2017. Gender differences in accepting and receiving requests for tasks with low promotability. *American Economic Review* 107, 714-747.
- Beach, B., Hanlon, W.W., 2019. Censorship, family planning, and the historical fertility transition. National Bureau of Economic Research, <https://www.nber.org/papers/w25752>.
- Benabou, R., Tirole, J., 2011. Laws and norms. National Bureau of Economic Research, <https://www.nber.org/papers/w17579>.
- Bertrand, M., Kamenica, E., Pan, J., 2015. Gender identity and relative income within households. *Quarterly Journal of Economics* 130, 571-614.
- Biasi, B., Sarsons, H., 2020. Flexible wages, bargaining, and the gender gap. National Bureau of Economic Research, <https://www.nber.org/papers/w27894>.
- Bicchieri, C., Dimant, E., Sonderegger, S., 2020. It's Not A Lie if You Believe the Norm Does Not Apply: Conditional Norm-Following with Strategic Beliefs. <http://dx.doi.org/10.2139/ssrn.3326146>.
- Blau, F.D., Kahn, L.M., 2000. Gender differences in pay. *Journal of Economic Perspectives* 14, 75-99.
- Boring, A., 2017. Gender biases in student evaluations of teaching. *Journal of Public Economics* 145, 27-41.
- Boring, A., Philippe, A., 2021. Reducing discrimination in the field: Evidence from an awareness raising intervention targeting gender biases in student evaluations of teaching. *Journal of Public Economics* 193, 104323.
- Bosquet, C., Combes, P.P., García-Peñalosa, C., 2019. Gender and promotions: evidence from

- academic economists in France. *Scandinavian Journal of Economics* 121, 1020-1053.
- Brenøe, A.A., Zölitz, U., 2020. Exposure to more female peers widens the gender gap in stem participation. *Journal of Labor Economics* 38, 1009-1054.
- Buckholtz, J.W., 2015. Social norms, self-control, and the value of antisocial behavior. *Current Opinion in Behavioral Sciences* 3, 122-129.
- Bursztyn, L., González, A.L., Yanagizawa-Drott, D., 2020. Misperceived social norms: Women working outside the home in Saudi Arabia. *American Economic Review* 110, 2997-3029.
- Buser, W., Hayter, J., Marshall, E.C., 2019. Gender bias and temporal effects in standard evaluations of teaching, *AEA Papers and Proceedings*, pp. 261-265.
- Cabinet Office, 2019. Public opinion poll on gender-equal society (in Japanese). <https://survey.gov-online.go.jp/r01/r01-danjo/gairyaku.pdf>.
- Card, D., Cardoso, A.R., Kline, P., 2016. Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women. *Quarterly Journal of Economics* 131, 633-686.
- Carlana, M., 2019. Implicit stereotypes: Evidence from teachers' gender bias. *Quarterly Journal of Economics* 134, 1163-1224.
- Chattopadhyay, R., Duflo, E., 2004. Women as policy makers: Evidence from a randomized policy experiment in India. *Econometrica* 72, 1409-1443.
- Coffman, K.B., Exley, C.L., Niederle, M., 2021. The role of beliefs in driving gender discrimination. *Management Science*.
- Croson, R., Gneezy, U., 2009. Gender differences in preferences. *Journal of Economic Literature* 47, 448-474.
- Dahl, G.B., Kotsadam, A., Rooth, D.-O., 2021. Does integration change gender attitudes? The effect of randomly assigning women to traditionally male teams. *Quarterly Journal of Economics* 136, 987-1030.
- DellaVigna, S., List, J.A., Malmendier, U., 2012. Testing for altruism and social pressure in charitable giving. *Quarterly Journal of Economics* 127, 1-56.
- Dhar, D., Jain, T., Jayachandran, S., 2018. Reshaping adolescents' gender attitudes: Evidence from a school-based experiment in India. National Bureau of Economic Research, <https://www.nber.org/papers/w25331>.
- Dimant, E., Gesche, T., 2021. Nudging enforcers: How norm perceptions and motives for lying shape sanctions. SSRN 3953021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3953021.
- Dittrich, M., Knabe, A., Leipold, K., 2014. Gender differences in experimental wage negotiations. *Economic Inquiry* 52, 862-873.
- Dulleck, U., Fooker, J., Newton, C., Ristl, A., Schaffner, M., Torgler, B., 2016. Tax compliance and psychic costs: Behavioral experimental evidence using a physiological marker.

- Journal of Public Economics 134, 9-18.
- Elster, J., 1989. Social norms and economic theory. *Journal of Economic Perspectives* 3, 99-117.
- Ersoy, F., Pate, J., 2021. Invisible Hurdles: Gender and Institutional Bias in the Publication Process in Economics. <http://dx.doi.org/10.2139/ssrn.3870368>.
- Fehr, E., Gächter, S., 2000. Cooperation and punishment in public goods experiments. *American Economic Review* 90, 980-994.
- Field, E., Jayachandran, S., Pande, R., 2010. Do traditional institutions constrain female entrepreneurship? A field experiment on business training in India. *American Economic Review* 100, 125-129.
- Fisman, R., Miguel, E., 2007. Corruption, norms, and legal enforcement: Evidence from diplomatic parking tickets. *Journal of Political Economy* 115, 1020-1048.
- Flabbi, L., 2010. Gender discrimination estimation in a search model with matching and bargaining. *International Economic Review* 51, 745-783.
- Gürerk, Ö., Irlenbusch, B., Rockenbach, B., 2006. The competitive advantage of sanctioning institutions. *Science* 312, 108-111.
- Gächter, S., Gerhards, L., Nosenzo, D., 2017. The importance of peers for compliance with norms of fair sharing. *European Economic Review* 97, 72-86.
- Ge, Y., Knittel, C.R., MacKenzie, D., Zoepf, S., 2016. Racial and gender discrimination in transportation network companies. National Bureau of Economic Research, <https://www.nber.org/papers/w22776>.
- Getik, D., Meier, A.N., 2021. Early socialization and the gender wage gap.
- Ginther, D.K., Kahn, S., 2021. Women in Academic Economics: Have We Made Progress? *AEA Papers and Proceedings* 111, 138-142.
- Gneezy, U., Leonard, K.L., List, J.A., 2009. Gender differences in competition: Evidence from a matrilineal and a patriarchal society. *Econometrica* 77, 1637-1664.
- Goldstein, N.J., Cialdini, R.B., Griskevicius, V., 2008. A room with a viewpoint: Using social norms to motivate environmental conservation in hotels. *Journal of Consumer Research* 35, 472-482.
- Hallsworth, M., List, J.A., Metcalfe, R.D., Vlaev, I., 2017. The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics* 148, 14-31.
- Hechtman, L.A., Moore, N.P., Schulkey, C.E., Miklos, A.C., Calcagno, A.M., Aragon, R., Greenberg, J.H., 2018. NIH funding longevity by gender. *Proceedings of the National Academy of Sciences* 115, 7943-7948.
- Hernandez-Arenaz, I., Iriberri, N., 2018. Women ask for less (only from men): Evidence from bargaining in the field. *Journal of Economic Behavior & Organization* 152, 192-214.
- Hoisl, K., Mariani, M., 2017. It's a man's job: Income and the gender gap in industrial research.

- Management Science 63, 766-790.
- Horioka, C.Y., 2019. Are the Japanese unique? Evidence from saving and bequest behavior. *Singapore Economic Review* 64, 5-22.
- Horioka, C.Y., Gahramanov, E., Hayat, A., Tang, X., 2018. Why do children take care of their elderly parents? Are the Japanese any different? *International Economic Review* 59, 113-136.
- Huang, J., Gates, A.J., Sinatra, R., Barabási, A.-L., 2020. Historical comparison of gender inequality in scientific careers across countries and disciplines. *Proceedings of the National Academy of Sciences* 117, 4609-4616.
- Husain, A.N., Matsa, D.A., Miller, A.R., 2021. Do male workers prefer male leaders? An analysis of principals' effects on teacher retention. *Journal of Human Resources*, 1118-9838R1112.
- Jayachandran, S., 2015. The roots of gender inequality in developing countries. *Annual Review of Economics* 7, 63-88.
- Jayachandran, S., 2021. Social norms as a barrier to women's employment in developing countries. *IMF Economic Review* 69, 576-595.
- Knobloch-Westerwick, S., Glynn, C.J., Huge, M., 2013. The Matilda effect in science communication: an experiment on gender bias in publication quality perceptions and collaboration interest. *Science Communication* 35, 603-625.
- Krupka, E.L., Weber, R.A., 2013. Identifying social norms using coordination games: Why does dictator game sharing vary? *Journal of the European Economic Association* 11, 495-524.
- Lau, J.D., Kleiber, D., Lawless, S., Cohen, P.J., 2021. Gender equality in climate policy and practice hindered by assumptions. *Nature climate change* 11, 186-192.
- Lee, J.F., 2019. In the pursuit of a gender-equal society: Do Japanese EFL textbooks play a role? *Journal of Gender Studies* 28, 204-217.
- Mengel, F., 2021. Gender bias in opinion aggregation. *International Economic Review*.
- Mengel, F., Sauermann, J., Zölitz, U., 2019. Gender bias in teaching evaluations. *Journal of the European Economic Association* 17, 535-566.
- Mulligan, C.B., Rubinstein, Y., 2008. Selection, investment, and women's relative wages over time. *Quarterly Journal of Economics* 123, 1061-1110.
- Ogasawara, K., Komura, M., 2021. Consequences of war: Japan's demographic transition and the marriage market. *Journal of Population Economics*, 1-33.
- Okuyama, Y., 2021. Empowering Women Through Radio: Evidence from Occupied Japan.
- Régner, I., Thinus-Blanc, C., Netter, A., Schmader, T., Huguet, P., 2019. Committees with implicit biases promote fewer women when they do not believe gender bias exists. *Nature Human Behaviour* 3, 1171-1179.
- Smerdon, D., Offerman, T., Gneezy, U., 2019. 'Everybody's doing it': on the persistence of

- bad social norms. *Experimental Economics*, 1-29.
- Takahashi, R., Tanaka, K., 2021. Social punishment for breaching restrictions during the COVID-19 pandemic. *Economic Inquiry* 59, 1467-1482.
- Tang, H., Zhang, Y., 2021. Do multinationals transfer culture? Evidence on female employment in China. *Journal of International Economics* 133, 103518.
- West, M.D., 1997. Legal Rules and Social Norms in Japan's Secret World of Sumo. *Journal of Legal Studies* 26, 165-201.
- World Economic Forum, 2021. Global Gender Gap Report 2021. Geneva, Switzerland, https://www3.weforum.org/docs/WEF_GGGR_2021.pdf.
- Yamamura, E., 2011. Effects of social norms and fractionalization on voting behaviour in Japan. *Applied Economics* 43, 1385-1398.

Appendix A: Survey Scripts

Below, we provide the questions and instructions used in the online survey (the average survey time was approximately six minutes). All participants (1,600 and 1,000 participants in the first and second surveys, respectively) took the exact same questionnaire survey presented in Section A.1.

After the questionnaire survey, the participants were randomly allocated to one of four groups: group with norm information and gender disclosure, group with norm information, group with gender disclosure, and group without additional information. For the participants in the first two groups (i.e., group with norm information and gender disclosure and group with norm information), we showed the instructions in Section A.2. Then, the participant evaluated the agreement score for the ten opinions presented in Section A.3. At that time, we only indicated the gender of the statement poster for each opinion to the participants in the group with norm information and gender disclosure and the group with gender disclosure. The gender of the poster was chosen randomly. To avoid ordering effects, the order of opinions presented to the participants was randomized. An example of a screen displayed during opinion evaluation is shown in Figure A1.

A.1. Questions in the questionnaire survey (translated from the Japanese original)

1. Please choose your sex.
 - (1) Male
 - (2) Female
2. Please indicate your age.
3. Please choose a prefecture that you live in.
4. How many people are there in the household including yourself?
5. Please tell us about your experience of marriage.
 - (1) Never married
 - (2) Married
 - (3) Bereaved
 - (4) Divorced
 - (5) Factual marriage
6. Do you have children?

7. Please indicate the gender of your first child.
8. Choose your nationality.
 - (1) Japanese
 - (2) Chinese
 - (3) Korean
 - (4) Other
9. Please select your last educational background.
 - (1) Junior high school degree or less
 - (2) High school degree
 - (3) Undergraduate school degree
 - (4) Junior college, business college degree
 - (5) Graduate school degree
10. Which political party do you currently support?
 - (1) No political party to support
 - (2) Party A
 - (3) Party B
 - (4) Party C
 - (5) Party D
 - (6) Party E
 - (7) Other
11. Please select your employment status.
 - (1) Company director/manager
 - (2) Company employee
 - (3) Public servant
 - (4) Contract worker, temporary worker
 - (5) Part-time worker
 - (6) Self-employed / Freelancer
 - (7) Houseworker
 - (8) Student
 - (9) Unemployed (including retired)
 - (10) Other
12. Please indicate the number of years you have worked.
13. What is the postcode of your residence?
14. Please indicate your annual household income.
 - (1) Less than 2 million yen
 - (2) More than 2 million yen, less than 4 million yen
 - (3) More than 4 million yen, less than 6 million yen
 - (4) More than 6 million yen, less than 8 million yen
 - (5) More than 8 million yen, less than 10 million yen
 - (6) More than 10 million yen, less than 12 million yen
 - (7) More than 12 million yen, less than 14 million yen
 - (8) 1400 million yen or more
15. On a scale of one to five, how important do you think it is to address the following issues?
 - Climate change
 - Gender inequality
 - (1) Not important
 - (2) Relatively not important
 - (3) Can't say either
 - (4) Relatively important
 - (5) Important

A.2. Instructions of norm information presented to randomly selected participants (translated from the Japanese original)

The following is a summary of the results of a public opinion survey conducted by the Cabinet Office in 2019.

According to the survey, more than 70% of the respondents feel that men are more privileged in society and that gender inequality persists.

Furthermore, more than 90% of respondents require the government to implement policies to promote gender equality.

A.3. Questions evaluating the agreement score for individual opinion (translated from the Japanese original)

Ten different opinions expressed anonymously will be displayed on the screen. To what extent do you agree or disagree with each opinion? Please select the option closest to your opinion.

- Opinion 1. "Climate change is becoming more serious every day. Even at the expense of economic growth, efforts to tackle climate change should be pursued rapidly."
- Opinion 2. "Thermal power generation, which emits large amounts of carbon dioxide, should be abolished as soon as possible, and a system for supplying electricity from renewable energy sources should be established."
- Opinion 3. "To reduce air pollution from automobiles, the government should promote a policy of shifting all domestic vehicles to electric vehicles by 2030."
- Opinion 4. "We should aim for a denitrogenous society, where the same amount of greenhouse gas emissions are absorbed and the net result is zero."
- Opinion 5. "Japan should formulate a law that requires at least 40% of the board members of listed companies to be women, as has been introduced in Scandinavian countries, to promote women's participation in society."
- Opinion 6. "A mother's presence is essential for the education of her children. It is a desirable form of family for a woman to enter the home."
- Opinion 7. "It is natural for a married couple to share the same last name, but they should discuss and decide which one to use."
- Opinion 8. "There are many victims of sexual harassment. To reduce sexual harassment, it should be strictly punished."
- Opinion 9. "It is necessary to have a defense force in case we are attacked by other countries."
- Opinion 10. "The new coronavirus continues to rage around the world. We should wear masks when we go out, especially in crowded places such as trains."

[Choices for Opinions 1-10]

- (1) Strongly agree
- (2) Agree
- (3) Somewhat agree
- (4) Neither agree nor disagree
- (5) Somewhat disagree
- (6) Disagree
- (7) Strongly disagree

[Debriefing instructions In the first survey, the instructions were not presented to the participants in the control group because they may affect their decisions in the second survey. In contrast, we presented this information to all participants in the second survey.]

In this survey, you were asked to indicate whether you agree or disagree to ten opinions. Although we explained "opinions were expressed anonymously," all the opinions were created by the investigator for the purpose of assessing the level of approval or disapproval of each social problem or issue.

Therefore, all the opinions presented are hypothetical, not realistically expressed.

A.4: The example of screen displayed during the survey

Anonymous women "Climate change is becoming more serious every day. Even at the expense of economic growth, efforts to tackle climate change should be pursued rapidly."

[Req]

Q20 To what extent do you agree or disagree with above opinion?
Please select the option closest to your opinion.

- ☐ Strongly agree
- ☐ Agree
- ☐ Somewhat agree
- ☐ Neither agree nor disagree
- ☐ Somewhat disagree
- ☐ Disagree
- ☐ Strongly disagree

Next

Fig A1. Example of the screen used for evaluation of individual opinions

Note: The language in the figure has been translated into English from Japanese. This figure is an example of a female gender disclosure.

Appendix B: Detailed description of survey participants

Appendix B provides a detailed description of survey participants. We recruited 1,600 individuals throughout Japan for the first survey (Fig B1). Table B1 shows the average demographic characteristics of the participants at the group level. The proportion of female participants was 50% for each treatment because of initial screening by gender. By conducting Scheffe's multiple comparison test, we confirmed that there were no statistical differences in the average of each variable between the four groups.

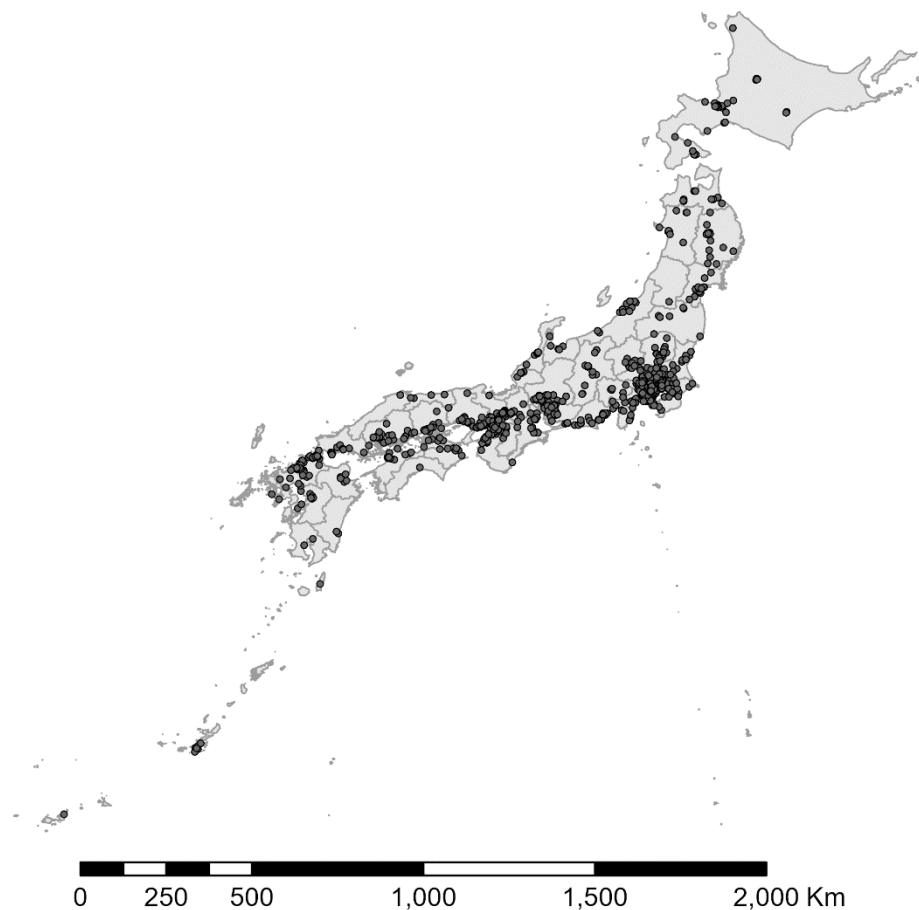


Fig B1. Location of the city where survey participants lived

The average demographic characteristics of our participants were similar to the national average in Japan. For example, the average age and the number of household members in our observations were 44.8 years and 2.7 persons, respectively, which are close to the national averages of 47.7 years and 2.4 persons obtained from the 2020 census data. In addition, approximately 15% of the participants received an annual income of over 10 million yen (equivalent to US\$100 thousand). The distribution of annual income shown in Fig B2 confirms that the proportion of each income class was similar to the census data.

In the questionnaire survey, we asked questions about supporting political parties, and 66% of participants responded that they did not support any particular political party. Although 16% of participants supported one political party A, we are not able to disclose the name of the political party due to a contract with the research company. Lastly, we obtained data related to the initial level of concern for gender equality issues. An average of 16% reported that they strongly agree that gender inequality needs to be addressed before the experiment.

Table B1

Average demographic characteristics (the first survey)

	Both treatments (1)	Norm information (2)	Gender disclosure (3)	Control (4)	Total (5)
Number of participants	200	200	200	1000	1600
Female proportion (%)	50	50	50	50	50
Age	44.97 (13.55)	44.65 (13.64)	44.73 (14.12)	44.84 (13.81)	44.82 (13.78)
Number of household members	2.68 (1.25)	2.59 (1.26)	2.67 (1.26)	2.69 (1.23)	2.67 (1.24)
University-graduate	0.47 (0.50)	0.52 (0.50)	0.51 (0.50)	0.49 (0.50)	0.50 (0.50)
Annual income over 10 million yen	0.15 (0.36)	0.11 (0.31)	0.17 (0.38)	0.15 (0.36)	0.15 (0.36)
No political party supported	0.65 (0.48)	0.69 (0.46)	0.63 (0.48)	0.66 (0.47)	0.66 (0.47)
Supporters of Party A	0.15 (0.36)	0.17 (0.37)	0.20 (0.4)	0.14 (0.35)	0.16 (0.36)
High gender concern dummy	0.21 (0.41)	0.18 (0.39)	0.19 (0.39)	0.23 (0.42)	0.21 (0.41)

Note: Standard deviations are in parentheses. There were no statistical differences between the four groups.

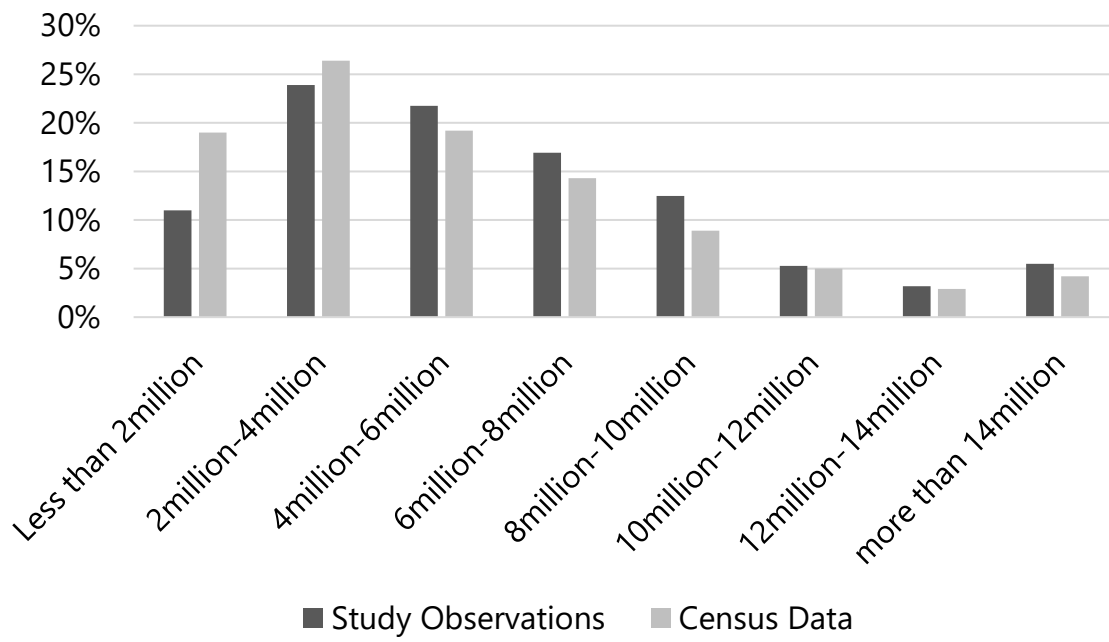


Fig B2. Distribution of annual income among the participants of the first survey

Data source: Ministry of Health, Labour and Welfare of Japan