Supplemental material

Title: New model with social climate of the public image of masculinity in physics and mathematics in Japan and England

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### Appendix 1. Statistical descriptions for the items in Survey 1.

| Japan | Physics | Math | Both |
|-------|---------|------|------|
|       | Mean    | SD   | %    | Mean | SD | % |
| Level of masculinity | 3.58 | 0.71 | 3.50 | 0.71 | |

#### Factor 1

|   | Occupation | Mathematical stereotype | Smartness of people (ref. "Smart") | Female role model (ref. "Have role model") |
|---|------------|-------------------------|----------------------------------|-----------------------------------------------|
| 1a | 3.54 | 0.72 | 3.26 | 0.67 | |
| 1b | 2.66 | 0.96 | Smart (60.2%) | Other (39.8%) |
| 1c | 3.54 | 0.72 | Other (61.0%) | Other (39.0%) |
| 1d | 2.66 | 0.96 | Have role model (8.4%) | Other (91.6%) |
|     |           |                            | Smart (61.0%) | Other (92.6%) |

#### Factor 2

|   | Childhood experience (ref. "Experienced") | Pressure of the choice of subjects (ref. "Pressured") |
|---|-------------------------------------------|------------------------------------------------------|
| 2a | Experienced (12.2%) | Experienced (18.2%) |
| 2b | Other (87.8%) | Other (81.8%) |
|     | Pressured (10.2%) | Other (89.8%) |

#### Factor 3

|   | Self-efficacy (ref. "Confident") |
|---|----------------------------------|
| 3  | Confident (12.7%), Other (87.3%) |

#### Factor 4

|   | Gender equality | View of university education | View of intellectual women | Attractiveness to opposite sex (ref. "Agree") |
|---|----------------|-------------------------------|----------------------------|-----------------------------------------------|
| 4a | 51.91 | 9.48 | 2.49 | 0.99 |
| 4b | 3.50 | 0.88 | 3.50 | 0.88 |
| 4c | Agree (5.2%) | Disagree (94.8%) |

| Number of observations | 1177 | 1177 |
| Appendix 2. Statistical descriptions for the items in Survey 2. |
|-------------------------------------------------------------|
| **UK**                                                     |
| **Physics** | **Math** | **Both** |
| Mean | SD | % | Mean | SD | % | Mean | SD | % |
| Level of masculinity | 3.21 | 0.63 | 3.17 | 0.60 |   |   |   |   |   |
| Factor 1 |   |   |   |   |   |   |
| (1a) Occupation | 3.49 | 0.73 | 3.18 | 0.64 | 1.95 | 1.11 |
| (1b) Mathematical stereotype |   |   |   |   |   |   |
| (1c) Smartness of people (ref. "Smart") | Smart (81.1%) |   | Smart (82.3%) |   |   | Other (18.9%) |   | Other (17.7%) |
| (1d) Female role model (ref. "Have role model") | Have role model (29.9%) |   | Have role model (34.3%) |   |   | Other (70.1%) |   | Other (65.7%) |
| Factor 2 |   |   |   |   |   |   |
| (2a) Childhood experience (ref. "Experienced") | Experienced (15.8%) |   | Experienced (29.4%) |   |   | Other (84.2%) |   | Other (70.6%) |
| (2b) Pressure of the choice of subjects (ref. "Pressured") |   |   |   |   |   |   |
| Factor 3 |   |   |   |   |   |   |
| Self-efficacy (ref."Confident") | Confident (28.3%) |   | Confident (37.4%) |   |   | Other (71.7%) |   | Other (62.6%) |
| Factor 4 |   |   |   |   |   |   |
| (4a) Gender equality | 56.64 | 9.78 |   |   |   |   |   |   |
| (4b) View of university education | 1.91 | 1.1 |   |   |   |   |   |   |
| (4c) View of intellectual women | 3.53 | 0.94 |   |   |   |   |   |   |
| (4d) Attractiveness to opposite sex (ref. "Agree") | Agree (19.8%) |   |   |   |   |   |   | Disagree (80.2%) |
| Number of observations | 1082 |   | 1082 |   |   |   |   |   |
Appendix 3. Survey items used for the analysis in this study

The questionnaire consisted of a long list that contained several studies. The order of presentation below is different from the questionnaire we used.

1. Demographic profiles
   - [Age] How old are you?
   - [Gender] What is your gender?
     - Male/ Female /Prefer not to say/ Prefer to self-describe
     - * “Prefer not to say” and “Prefer to self-describe” was used only in Survey 2.
   - [Educational attainment] What is the highest level of education you have obtained?
     - Secondary school/ Vocational school/ Sixth form/ Undergraduate degree/ Master's degree/ Doctoral degree/ Other

2. Level of masculinity in physics and mathematics
   - Do you think that the following fields (Physics/ Mathematics) sound more suitable for women or men? Please select one appropriate answer for each.
     - More suitable for men/ Somewhat more suitable for men/ Neither/ Somewhat more suitable for women/ More suitable for women

3. Items in Factor 1 (“masculine culture of the fields”)
   - [(1a) Occupation] Do you think that the occupations available after studying the following fields (Physics/ Mathematics) sound more suitable for women or men? Please select one appropriate answer for each.
     - More suitable for men/ Somewhat more suitable for men/ Neither /Somewhat more suitable for women/ More suitable for women
   - [(1b) Mathematical stereotype] Do you agree with the following sentences? Women are not as good at mathematics as men.
     - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   - [(1c) Smartness of people] Do you think that people who go on to the following university faculties or departments (Physics/ Mathematics) are generally smart? Please select one appropriate answer for each.
     - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   - [(1d) Female role model] Can you think of at least one specific woman who studied in the following fields (Physics/ Mathematics) and is active in work or public life? Please select one appropriate answer for each.
     - Cannot imagine at all/ Cannot easily imagine/ Cannot say either way/ Can somewhat imagine/ Can easily imagine
4. Items in Factor 2 ("insufficient early experience")
   
   • [(2a) Childhood experience] To what extent did you have the opportunity to experience
games in the following fields (Physics/ Mathematics) before secondary school (playing out-
side or at home, in the classroom or at museums or libraries)? Please select one appropriate
answer for each.
   
   ➢ Never/ Rarely/ Sometimes/ Frequently/ Very frequently
   
   • [(2b) Pressure of the choice of subjects] Did you feel any pressure when you made your
choice of subjects at sixth form?
   
   ➢ I felt pressure to take humanities-related courses/ I felt pressure to take science-related
courses/ I did not feel any pressure/ I was not free to choose my courses/ Other

5. Items in Factor 3 ("gender gaps in self-efficacy")
   
   • How confident were you about each subject (Physics/ Mathematics) you took at sixth form?
Please select one appropriate answer for each.
   
   ➢ Not confident at all/ Slightly confident/ Somewhat confident/ Fairly confident/ Completely confident/ Didn't choose

6. Items in Factor 4 ("social climate surrounding gender role")
   
   • [(4a) Gender equality] Do you agree with the following sentences? Please select one appro-
priate answer for each.
   
   ➢ Women in high social positions have difficulty getting married
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ Important issues should be decided by husbands
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ Working wives cause marital disharmony
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ Women at home and men at work
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ Working women put a strain on the family
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ No necessity to change surname after marriage
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ Domestic chores should be shared between spouses
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
   
   ➢ Bringing up children is the most important job for women
     ❖ Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- It is important to raise a boy to be masculine and a girl to be feminine
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- Daughters should be raised to become housewives and sons to have jobs
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- Women should work part-time because they have to raise children
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- For a woman, the roles of wife and mother are important, but working outside is equally important.
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- Women should work even after having a child
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- Women do not have to work if there is no economic need
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree
- Women should not get a job with responsibility and competition
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree

[(4b) View of university education] Do you agree with the following sentences? A university education is more important for men than women.
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree

[(4c) View of intellectual women] Do you agree with the following sentences? Women should be intellectual.
  - Strongly disagree/ Disagree/ Neither agree nor disagree/ Agree/ Strongly agree

[(4d) Attractiveness to others] When choosing a particular faculty or department, have you ever been told or heard that your choice will make you less attractive to the opposite sex (or similar such comments)?
  - Agree/ Disagree