Methods

Ethics statement. This study was approved by the Research Ethics Committee, National Taiwan Normal University (No.: 201808HS001). Signed consent forms were collected from both the husbands and wives before they began filling out the paper-based survey.

Sampling. The study employed a stratified proportional sampling method in all 12 districts of Taipei City. With the aim of interviewing approximately 150 married heterosexual couples, we included couples from each district in proportion to the number of households in the entire city. The sample sizes for the districts are as follows: Songshan (n = 12), Xinyi (n = 13), Da’an (n = 18), Zhongshan (n = 14), Zhongzheng (n = 9), Datong (n = 7), Wanhua (n = 11), Wenshan (n = 15), Nangang (n = 7), Neihu (n = 15), Shilin (n = 15), and Beitou (n = 14). The potential eligible couples were approached on streets by trained interviewers and asked whether they were married and both aged ≥20 years. The eligible couples were then asked whether they were both willing to participate in a survey on climate change mitigation and sustainability behaviours. The couples who agreed to participate in the survey were asked to present their identification cards to the interviewers to verify that they were legally married. The participants received a small gift card as a token of appreciation for participation. To ensure a representative sample, the respondents were purposefully selected based on the age of the husband. Half of the couples had a husband aged <50 years, and among the other half husbands were aged ≥50 years. The survey was performed by the Global View Survey Research Center, a Taiwanese research company, from 12 March to 6 April 2019.

Sample characteristics. Sample characteristics of all 152 married heterosexual couples who participated in this study are summarised as follows: Regarding
demographic characteristics, the mean household size was four (standard deviation [SD] = .83), and 52% of the couples had children aged <18 years. The mean ages of the wives and husbands were 48 (SD = 8.8) and 50 (SD = 9) years, respectively. On average, the couples had been married for 21 (SD = 9.2) years. The median household income for the entire year of 2018 was between NT$1,000,000 (about US$32,200) and NT$1,500,000 (about US$48,300). At least a college degree was held by 50% and 41% of the husbands and wives, respectively.

**Questionnaire development.** The questionnaire comprised identical questions for both husbands and wives. The couples were asked to fill out their own questionnaires individually and not discuss it with their partner when answering the questions. The couples were posed statements that they could answer on a 5-point Likert-scale. Motivation for behavioural change to mitigate climate change (Brody et al 2012) was measured using the following statement: ‘I plan to take steps to reduce my contribution to global warming and climate change’ (husband mean = 3.95, SD = .52; wife mean = 3.97, SD = .64). Climate change risk perceptions were measured using four statements (revised from that of Brody et al 2012): (1) ‘Climate change or global warming results in more typhoons striking the place I live’, (2) ‘Climate change or global warming enables typhoons to cause more loss to the place I live’, (3) ‘Global warming and climate change will have a noticeably negative impact on my health’, and (4) ‘Global warming and climate change will have a noticeably negative impact on my economic and financial situation’. Because these statements yielded an acceptable internal consistency (husband Cronbach’s alpha = .73; wife Cronbach’s alpha = .675), summative indices were created for the husbands (mean = 16.21, SD = 2.05) and wives (mean = 16.4, SD = 1.94). Self-efficacy was measured using the following question (Brody et al 2012): ‘My energy-saving behaviours are very helpful for the mitigation of global warming and climate change’ (husband mean = 3.86, SD = .65; wife mean = 3.89, SD = .65). Finally, gender role attitudes were measured using the following statement (Davis and Greenstein 2009): ‘A man’s job is to earn money, and a women’s job is to look after the home and family’ (husband mean = 3.14, SD = .99; wife mean = 3.11, SD = .99). The higher the score, the more traditional is the gender role attitude. The aforementioned statements were translated into Chinese by the first author and double-checked by professionals of the Global View Survey Research Center.

**Data analysis.** The survey data was managed using the statistical software SPSS (version 23) (IBM Corp. 2015). Descriptive analysis for variables used here was also generated in SPSS. We performed an actor–partner interdependence model (APIM)
analysis by using APIM_MM (Kenny 2015), which is part of the Web program for dyadic data analysis called DyadR, developed by David A. Kenny. APIM_MM performs APIM by multilevel modelling. APIM_MM uses ‘generalised least squares analysis with correlated errors and restricted maximum likelihood estimation’ (Kenny 2015), and the ‘tests of coefficients are Z tests and the tests of correlations are based on t-tests of correlation coefficients’ (Kenny 2015). The effect sizes described here used partial correlations. For the estimation of the climate change risk perception–motivation, self-efficacy–motivation, and gender role attitudes–motivation relationships, the outcome variable was the husbands’ and wives’ motivation, whereas the predictor variable was their climate change risk perception, self-efficacy, gender role attitudes, respectively.

The APIM measures interdependences within interpersonal relationships (Cook and Kenny 2005). Standard statistical tests, such as one-way ANOVA or multiple and linear regression, assume that observations in the dependent variable are independent and uncorrelated. On the other hand, when the assumption of independence is violated (e.g., the influence of couples or siblings on each other), the test statistic and statistical significance are inaccurate and biased (Cook and Kenny 2005, Kenny et al 2006). The APIM tackles the problem of nonindependence by measuring the association between the scores of the dyad members. There are two major components in APIM: actor effects and partner effects. The actor effect measures how much a person’s Y variable is predicted by his or her own X variable, while partner effects measures how much a person’s Y variable is predicted by his or her partner’s X variable (Cook and Kenny 2005). The correlations between the error terms (residuals) of the dependent variables take into account the correlations of the two dependent variables not explained by the predictors, and the compositional effect that cannot be explained by the partner and actor effects included in the APIM (Fitzpatrick et al 2016). A more comprehensive discussion on APIM can be found in a study of Kenny et al (2006).

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