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Impact of Gaps in the Educational Levels between Married Partners on Health and a Sustainable Lifestyle: Evidence from 32 Countries

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Abstract: Using original cross-sectional internet survey data from 32 countries covering six continents, we investigated the impact of education gaps between married partners on their health status and sustainable lifestyles using the instrumental variable method. A self-rated health status index, mental health index, and an objective health status index were utilized to assess the health statuses of individuals, and six unique indices were used to investigate the sustainable lifestyles. According to the main findings, work-family conflicts may be severe for both wives and husbands with high education levels, and the hypothesis regarding the positive effect of income was not supported. Two major conclusions were derived. First, in general, as opposed to couples with equal education levels, the probability of reporting a worse health status was higher, and the activities related to sustainable development such as improving environmental sustainability were less for couples with education gaps. Second, a comparison of the effects of education gaps on the health status of couples in various groups reveals that highly educated groups, women, and people in Asian or middle-income countries had a higher negative effect on their health status.

Keywords: intrahousehold education gap; marriage; health status; instrumental variable; level of education; self-rated health; sustainable lifestyle

1. Introduction

The United Nations published the sustainable development goals (SDGs), which include responsible consumption and production (goal 12), good health and well-being (goal 3), quality education (goal 4), gender equality (goal 5), and reduced inequalities (goal 10), as well as the 2030 agenda for sustainable development in 2015 [1]. From the SDG perspective, this study investigates the impact of the gaps in education levels between married couples on health and a sustainable lifestyle [2]. Moreover, it employs an international comparison on the issue based on original international survey data collected from 32 countries across six continents.

The main contributions of this study can be considered as follows. First, regarding the issue of the correlations between education and health, since exploring the determinants of individual health is an important issue for policymakers seeking to improve the health status of the national population, many researchers have conducted empirical studies on this issue. Regarding self-rated health (SRH) and mental health, it has been found that socioeconomic factors such as income and health behaviors (e.g., avoiding alcohol consumption and smoking) are associated with health outcomes. An individual's level of education is the most controversial index in human development. It is a

primary factor in the labor market, and it may also be an important factor in determining the health status of individuals. As such, many studies have investigated the relationship between education and health outcomes. Previous studies have shown that education has a positive effect on health [3,4]. Regarding mental health, recent studies have indicated that there is a lower probability of developing a mental health disorder if the education level of an individual is high [5–9]. Moreover, Fletcher [9] argued that there is a negative relationship between education and mental health for women. Although many previous studies have investigated the relationship between education and health, some issues have yet to be discussed. For example, based on the collective model proposed by Chiappori [10], intrahousehold bargaining power may affect intrahousehold economic resource allocation, which may, in turn, affect household members' health outcomes [11–19]. Additionally, the education gap between wives and husbands has been utilized as an index of intrahousehold bargaining power [20,21].

Based on the abovementioned previous research, it is assumed that an education gap between wives and husbands may influence the health outcomes of intrahousehold members. From an economic perspective, there are four reasons why an intrahousehold education gap (IHEG) could affect health. First, an individual with a high level of education may be more likely to find a better job and have a higher income than an individual with a low level of education. Therefore, he or she may be able to accumulate more wealth than other household members and invest more money to improve his or her health status [11–18]. As a result, a couple's education gap might positively influence their health status (the positive effect of income hypothesis). Second, based on gender role consciousness, even highly educated wives who earn more income tend to undertake more housework than their husbands [21–23]. The work-family conflict may worsen the health status of wives (the negative effect of the gender role consciousness hypothesis). Third, highly educated individuals may have higher professional abilities and skills [24–27]. Because skill gaps exist between wives and husbands, a highly educated individual may not get help from the less-educated partner in overcoming difficulties in life and work, which may worsen their mental health (the negative effect of skill gap hypothesis). Fourth, the stress of work hours can have negative effects on health. In reality, a highly educated individual may have longer working hours than less-educated partner. Long working hours may negatively affect the health status of individuals (the negative effect of long working hours hypothesis) [28–31]. Because of the positive and negative effects mentioned above, and because gender-roles consciousness regarding family responsibility differs by country, an empirical study based on cross-country data should be undertaken to investigate the relationship between couples' education gaps and their health in order to determine the impact of education on health. However, although Groot and Van Den Brink [20] and Ma and Piao [21] reported that an education gap between wives and husbands affects the happiness of the individuals concerned, empirical studies on this issue involving international comparisons are scarce. This study bridges the gap in the literature.

Second, since human activities started to significantly modify the global environment, investigation on sustainable production and consumption has been expanding, prompted by the willingness to reduce the impact of the throwaway culture. There are several examples of recent studies carried out to bring the human behavior close to a sustainable lifestyle and try to build a systematical resource management and an efficient recycling system, reducing the electric waste and improving the electric management [2,32–42]. Regarding the issue of a sustainable lifestyle, which is related to the SDGs, it is assumed that the intrahousehold education gap may influence a sustainable lifestyle by reshaping patterns of individuals' behaviors. According to Akenji and Chen [2], the sustainable lifestyle is defined as "a cluster of habits and patterns of behavior embedded in a society and facilitated by institutions, norms, and infrastructures that frame individual choice, in order to minimize the use of natural resources and generation of wastes, while supporting fairness and prosperity for all". Therefore, to achieve the SDGs, the patterns of reducing consumption of natural resources and generation of wastes have attracted the attention of scholars (e.g., [2,32–37]). Shove [32] provided a theoretical framework that combines end users who are comfortable with their service and sustainable technology consumption, which might play a role in reshaping patterns of resource consumption. Peattie and

Collins [37] highlight the important role of sustainable consumption in releasing environmental resource consumption pressure. They argue that this is expected to sustain the environment. Moreover, Zakaria et al. [34] argued that consumers' consumption choices are associated with a sustainable lifestyle. However, a sustainable lifestyle affects sustainable consumption practice. Therefore, it is necessary to conduct an empirical study to investigate the correlations between the gaps in education levels between married couples, their health, and sustainable lifestyles through consumption choices. Tilman and Clark [42] highlight the crucial relationship between environmental sustainability and public health through food lifecycle analysis.

This study provides empirical evidence about the relationship between IHEGs and the health status of individuals (SRH, mental health, and objective health status) using cross-country household survey data covering 32 countries on six continents (Asia, Europe, North America, South America, Africa, and Australia). To the best of our knowledge, this is the first study on the issue, which may provide new evidence regarding the link between education and health as well as a sustainable lifestyle.

This paper is structured as follows. Section 2 describes the analytic methods, including an introduction to the data and models. Section 3 discusses the analysis results, and Section 4 introduces the quantitative analysis results. The last section summarizes the main conclusions.

2. Methodology

First, the health function was estimated in order to investigate the relationship between IHEGs and health. The instrumental variable method was used to address the endogeneity problem and investigate the causal relationship between couples' education gaps and health. The ordinary least squares (OLS) model is presented in Equation (1).

$$H_{iC} = \alpha + \theta IHEG_{iC} + X'_{iC}\beta + D'_{C}\delta + \varepsilon_{iC} \quad (1)$$

Here, *iC* refers to an individual *i* in country *C*; *H* is an individual's health status (SRH, the mental health index, and objective health); *IHEG* denotes an intrahousehold education gap, which is the couple's education gap; *D* represents the country dummy variables; α is a constant; θ, β, and δ are the estimated coefficients; and ε is an error term. When θ is a negative value and is statistically significant, it indicates that a high IHEG may worsen an individual's health.

An endogeneity problem is possible in the OLS model, i.e., when an individual with poor health prefers to marry a highly educated partner for financial benefits, and the main independent variables of interest, *IHEG*, is correlated with the error term. Thus, to address this endogeneity problem, the instrumental variable (IV) method was utilized in this study [43,44]. The first-stage and second-stage estimation equations are expressed as Equations (2) and (3), respectively.

$$IHEG_{iC} = b_0 + Z'_{iC}b_1 + X'_{iC}b_2 + D'_{C}b_3 + u_{iC} \quad (2)$$

$$H_{iC} = \alpha + \theta\widehat{IHEG}_{iC} + X'_{iC}\beta + D'_{C}\delta + \varepsilon_{iC} \quad (3)$$

In Equations (2) and (3), b_0 is a constant; b_1, b_2, and b_3 represent the estimated coefficients; u is an error term; Z is the set of instrumental variables (e.g., parent's highest education level); and $\widehat{IHEG}$ is an imputed value based on the results of the first-stage regression shown by Equation (2). The weak instrument test and the Sargan test were used to test for the endogenous problem and to judge the statistical validity of the instruments [45].

Second, to investigate the probability channels in order to explain the impact of IHEGs on health, multiple regression models were used, as shown in Equation (4):

$$Y_{iC} = \alpha + \theta IHEG_{iC} + X'_{iC}\beta + D'_{C}\delta + \varepsilon_{iC} \quad (4)$$

In Equation (2), *Y* represents income satisfaction, weekly working days, overcoming difficulties, satisfaction with health or medical care, and attending environmental activities as a volunteer.

3. Data

Hence, to investigate the impact of IHEGs on individual health, an internet survey via a website was conducted by a third-party company in Japan in 2015 and 2017. The third party company has provided lots of reliable website survey services in recent decades, and the company also has an extensive panel that allows the conducted sample to match the population distribution by regional area, age, and gender constitution. The original survey was conducted from 2015 to 2017, and data regarding demographics, household income, education level, SRH, mental health, and objective health were collected by matching country-level population age and gender. While web-based surveys randomly select respondents, compared to interview-based surveys, web-based surveys tend to select well-educated respondents because non-internet users are excluded. To address this problem, we carefully analyzed the respondents with high and low education levels separately. The detailed description regarding this original survey is included in [46].

The original cross-country survey data were comprised of 32 developing and developed countries on six continents: Asia, Europe, North America, South America, Africa, and Australia. Thirty-two countries were assessed using a web-based survey, and five countries were assessed using an interview-based survey that was web-based. The information on these specific country-level observations is available upon reasonable request. The countries surveyed in each continent are as follows:

1. Asia (Japan, Thailand, Malaysia, Indonesia, Singapore, Vietnam, the Philippines, India, and China);
2. Europe (Russia, Germany, the United Kingdom, France, Spain, Italy, Sweden, the Netherlands, Greece, Turkey, Hungary, Poland, Czechoslovakia, and Romania);
3. North America (Mexico, Canada, and the United States);
4. South America (Venezuela, Chile, Brazil, and Colombia);
5. Australia (Australia);
6. Africa (South Africa).

The dependent variables were three indices. (1) An individual's SRH was a scale variable from one to five. We coded the health status numbers as "5 = very good, 4 = good, 3 = neither, 2 = poor, and 1 = very poor". (2) The mental health index was a mental health score, which was calculated based on the 12 survey items related to mental health. All answer options for the 12 survey items were from 1 to 4, which indicated mental health status from the worst status to the best. The 12 survey items included concentrating ability, sleeping quality, feelings of stress, behavioral control, depression, feelings of confidence, and positive effects. The 12-item general health questionnaire in the survey was a general short version of the World Health Organization's 60-item questionnaire. (3) Objective health was a dummy variable that was equal to 1 if an individual did not experience an illness or surgery in the past half-year (healthy = 1, unhealthy = 0). Objective unhealthy includes physical illness and mental illness.

The main independent variable was IHEG. Two indices were utilized in this study: (1) IHEG value (IHEG1) and (2) IHEG dummy variable (IHEG2). IHEG1 was a continuous variable which denotes the difference between the educational attainment level of an individual minus their partner's education level. IHEG2 was a IHEG dummy variable (equal or unequal). The scale value of educational attainment level was as follows: never attended school = 1; dropping out of primary school = 2; primary school = 3; junior high school = 4; senior high school = 5; vocational school = 6; college = 7; university = 8; graduate school (master's degree) = 9; and graduate school (doctor degree) = 10. Education gap was a scale variable that ranged from −9 to 9 that was calculated by the scale number of the respondent's education minus that of his/her partner's education. For example, a value of −9 indicates that an uneducated individual married a partner who had a doctorate degree, and a value of 9 is the opposite. The education gap based on years of schooling was also conducted to improve the robustness of the results (the results using years of schooling are available upon request). As mentioned above, since there are both negative and positive effects on the relationship between the education gap and health, the results of the effect of the education gap on health are not clear. When the negative effect

was greater than the positive effect, the coefficient of the education gap variable (IHEG1 or IHEG2) was negative, and the value was statistically significant and vice versa. These results are reported in the following section.

Thus, to address the endogenous problem, instrumental variables were utilized, which are as follows. (1) Parents' highest educational attainment, which is a scale variable from 1 to 10 (a parent's highest education level was evaluated as follows: never attended school = 1; dropping out of primary school = 2; primary school = 3; junior high school = 4; senior high school = 5; vocational school = 6; college = 7; university = 8; graduate school (master) = 9; and graduate school (doctorate) = 10.) (2) The dummy variable of a parent's advanced educational attainment (also known as tertiary education (International Standard Classification of Education (ISCED) levels 5 to 8—tertiary education included both commonly accepted academic education and advanced vocational or professional education) defined by UNESCO or higher education referred to as World Bank, mentioned by the World Bank) [47,48].

It is possible that a parent's educational attainment level does not directly influence an adult child's health level but affects the child's educational attainment. The overidentification test was used to test the validity of these instruments. First, the range in evaluated educational attainment was 1 to 10, from the lowest level (uneducated) to the highest level (individuals having doctorate degrees). The mandatory number of years of education differs by country and area, and this type of data was largely missing in the survey; therefore, measurement error may have occurred. Thus, the range score of evaluated education from 1 to 10 was a better variable than the years of schooling variable. Second, nine dummy variables of a parent's highest educational attainment level were utilized as instrumental variables: (1) dropping out of primary school dummy, (2) primary school, (3) junior high school, (4) senior high school, (5) vocational school, (6) college, (7) university, (8) graduate school (master), and (9) graduate school (doctorate). We will discuss the validity and violation of the instrument variables in the following section.

The other explanatory dummy variables were as follows: female dummy variable; work status dummy variables (e.g., individual unemployed, full-time employee, part-time employee, company owner, government employee, professional worker such as physician and professor, self-employed, student, and housewife or househusband); education level dummy variables (e.g., senior high school or lower, vocational school, college or university, and graduate school); housing status dummy variables (e.g., rent and house owner); age dummies (e.g., less than 30 years old, 31–39, 40–49, 50–59, and 60 years or older); number of children dummy variables (e.g., no child, one child, two children, and three or more children); five household income dummy variables (e.g., first quintile to the fifth quintile); and country dummy variables were used to control country-level heterogeneity. The original data comprised 32 countries, including developing and developed countries on six continents (Asia, Europe, North America, South America, Africa, and Australia).

The following variables were utilized as dependent variables to investigate the potential channel of the impact of education gaps on health and a sustainable lifestyle. The dummy variables were income satisfaction, weekly working days, overcoming difficulties (based on the question "Have you recently felt that you could not overcome your difficulties?"), the overcome difficulties variable is constructed as "4 = not at all, 3 = no more than usual, 2 = rather more than usual, and 1 = much more than usual"), and satisfaction with health or medical care. Regarding a sustainable lifestyle, six dummy variables are constructed as sustainable lifestyle indices based on Akenji and Chen [2]. Attend environmental activities as volunteers (yes = 1, no = 0), donate to environmental activities (income) (yes =1, no = 0), donate to environmental activities (goods) (yes = 1, no = 0), purchase energy-saving household products (yes = 1, no = 0), energy-saving activities (yes = 1, no = 0), sorting or reducing rubbish (yes = 1, no = 0).

In the robustness check, the variables (1) satisfaction with health/medical care, (2) do not smoke dummy variable, (3) alcohol consumption dummy variable (drink alcohol every day; 4–5 times per week; 2–3 times per week; once per week; less than above; and do not drink alcohol) were selected.

The statistical descriptions of the variables utilized in this study are summarized in Table 1.

Table 1. Descriptive statistics.

Variables	Mean	S.D.	Obs.
Self-rated health (1–5)	3.88	0.84	53,365
Mental health (1–4)	3.06	0.50	53,365
Objective health (0.1)	0.83	0.38	53,365
Intra-household education difference ((−9)–9) (IHEG1 =individual's education−partner's education)	0.28	1.55	53,365
Having education gap (IHEG2) (0.1)	0.51	0.50	53,365
Intra-country household income			
Income first quintile	0.27	0.44	53,365
Income second quintile	0.24	0.42	53,365
Income third quintile	0.14	0.35	53,365
Income fourth quintile	0.19	0.39	53,365
Income fifth quintile	0.17	0.38	53,365
Educational attainment			
Senior high school or lower	0.22	0.41	53,365
Vocational school	0.09	0.29	53,365
College or university	0.56	0.50	53,365
Masters or more	0.13	0.33	53,365
Aged less than 30 years	0.14	0.35	53,365
Aged 31–39 years	0.22	0.42	53,365
Aged 40–49 years	0.25	0.43	53,365
Aged 50–59 years	0.23	0.42	53,365
Aged 60 years or more	0.16	0.37	53,365
Occupational status (ref. Unemployed)			
Full-time employee	0.52	0.50	53,365
Part-time employee	0.07	0.26	53,365
Company owner	0.03	0.16	53,365
Government employee	0.04	0.19	53,365
Professional	0.04	0.20	53,365
Self-employed	0.07	0.26	53,365
Student	0.01	0.11	53,365
Housewife/Househusband	0.09	0.29	53,365
Other	0.07	0.25	53,365
Female dummy	0.47	0.50	53,365
No child	0.17	0.37	53,365
One child	0.40	0.49	53,365
Two children	0.30	0.46	53,365
Three or more children	0.13	0.34	53,365
Rent	0.21	0.41	53,365
Owner	0.77	0.42	53,365
Other	0.02	0.15	53,365
Instrument set 1			
Parents' highest education attainment (1–10)	5.62	2.18	53,365
Parents have advanced education (0.1)	0.47	0.50	53,365
Instrument set 2			
never attended school	0.04	0.19	53,365
dropped out of primary school	0.04	0.20	53,365
primary school	0.09	0.28	53,365
junior high school	0.13	0.33	53,365
senior high school	0.24	0.42	53,365
vocational school	0.11	0.31	53,365
college	0.08	0.27	53,365
university	0.20	0.40	53,365
graduate school (master)	0.05	0.23	53,365
graduate school (doctorate)	0.02	0.15	53,365
Income satisfaction	3.22	0.89	51,384
Weekly working days	5.05	1.03	38,600
Difficulties overcome	2.98	0.81	53,365

Table 1. *Cont.*

Variables	Mean	S.D.	Obs.
Satisfaction of health/medical care	3.41	1.22	53,365
Volunteer attendance at environmental activities	0.26	0.44	18,223
Donation to environmental activities (income)	0.19	0.39	53,365
Donation to environmental activities (goods)	0.17	0.38	53,365
Purchase energy saving household products	0.52	0.50	53,365
Energy saving activities	0.64	0.48	53,365
Sorting/reducing rubbish	0.63	0.48	53,365
Do not smoke	0.68	0.47	18,223
Frequency of drinking alcohol			
Drink alcohol every day	0.22	0.42	18,223
4–5 times per week	0.18	0.38	18,223
2–3 times per week	0.26	0.44	18,223
Once per week	0.06	0.24	18,223
Less than above	0.19	0.39	18,223
Do not drink alcohol	0.09	0.28	18,223

Note: Calculated based on the original international survey from 2015 to 2017. IHEG1: Difference between individual's own educational attainment level and the partner's level. IHEG2: having an education gap dummy variable (1 = having a gap, 0 = no gap).

4. Results

4.1. Impact of a Couple's Education Gap on Health: OLS and Instrumental Variable Two-Stage Least-Squares (IV-2SLS) Estimations

The first stage was based on the OLS model. It estimated various influence factors that included the effect of a parent's highest education level on the IHEG. The results are shown in Table 2. The dependent variables in Model 1 and Model 2 were labeled as "IHEG1," and in Model 3 and Model 4, they were labeled as "IHEG2." The main independent variables were a parent's highest level of education, which was described as instrumental variables in the two-stage least squares (2SLS) model. Stock et al. [45] suggested that if the *F*-statistic values were greater than 10 for one of the endogenous variables based on the 2SLS estimation, then the selected instrument variable was not weak. From Model 1 to Model 4, the *F*-statistic values for the joint significance on the coefficients of the instruments were 704.550, 159.136, 230.902, and 60.043, respectively, which were all larger than 10. Therefore, it is clear that the selected instruments in this study are not weak.

The estimation results are summarized as follows. (1) A parent's highest level of education was negatively correlated with both IHEG1 and IHEG2 in Model 1 and Model 3 (−0.092 in Model 1, −0.025 in Model 3), and the results were significant at the 1% level. (When using the number of years of schooling of parents as the educational attainment index of parents, the results were similar. However, the mandatory minimum number of years of schooling differs by country and area. Moreover, the number of years of schooling for individuals who dropped out was unable to be counted, which resulted in measurement errors. Therefore, we determined that the evaluated education from 1 to 10 was more appropriate than transforming the results into years of schooling.) The coefficient of parents with an advanced education was −0.106 in Model 1, and it was statistically significant at the 1% level. The results indicate that the IHEG was smaller for individuals with highly educated parents.

Table 3 presents the estimation results by using various health indices (SRH, the mental health index, and objective health) and various methods of analysis (the OLS and IV-2SLS methods). The dependent variable for Model 1, Model 2, and Model 6 was SRH. The dependent variable for Model 3, Model 4, and Model 7 was the mental health index, and the dependent variable for Model 5 and Model 8 was objective health. The results of the OLS model are shown in Models 1 and 3. The results of the IV-2SLS method are shown in Models 2 and 8. The results of the overidentification tests in Model 2 and from Model 4 to Model 7 were statistically insignificant at the 5% level. These findings indicate that the instruments are statistically exogenous in these models and that the instrument variable methods

should be utilized to address the endogeneity problem. This means that there was bias in the results based on the OLS model. Therefore, we report mainly the results based on the IV-2SLS method in the following section. We also compare the results to those based on the OLS model. The main results are as follows.

First, to compare the results obtained by the OLS and IV models, although the coefficients in both the OLS (Model 1) and IV-2SLS (Model 3) were statistically significant at the 1% level, the coefficient of IHEG1 was −0.020 for the OLS model and −0.046 for the IV-2SLS model. Similar results were observed in Models 3 and 4; the coefficient of IHEG1 was −0.003 for the OLS model (Model 3) and −0.029 for the IV-2SLS model (Model 4). The magnitudes of the coefficients in the IV-2SLS model were greater than those in the OLS model, which suggests that the impact of IHEG1 on health might be underestimated by the OLS model. Consistent results were obtained by additionally controlling health insurance satisfaction, alcohol consumption, and smoking.

Second, regarding the impact of IHEGs on health, there were two outcomes. (1) The coefficients of IHEG1 were negative values (−0.046 in Model 2; −0.029 in Model 4; and −0.015 in Model 5; Table 3), and they were statistically significant at the 1% and 5% levels. These findings suggest that health status (SRH, mental health, and objective health) was worse for individuals with a higher level of education than for their partner. Because a negative effect of IHEG1 on health was found for both husbands and wives, we investigate the above effects by gender in the following section. (2) The coefficients of IHEG2 (couples with education gaps) were negative values (−0.205 in Model 6; −0.137 in Model 7; and −0.062 in Model 8—when using the educational attainment dummy variables, it was also found that the IHEG negatively affected objective health status, and the result was statistically significant at the 5% level—and they were statistically significant at the 1% and 10% levels. These findings indicate that, compared with the health statuses of couples with equal levels of education, health status (SRH, mental health, or objective health) was worse for couples with intra-education gaps.

4.2. Estimations by Various Groups

To consider the heterogeneity in various groups, we also made estimations based on education, gender, age, income, and country. As a kind of human capital, a high level of education is associated with more working skills and higher incomes. A couple with a large education gap may also have great skill and knowledge gaps, resulting in communication difficulties. Moreover, the probability of obtaining help from his or her partner may be lower for an individual with a higher level of education because he or she is more likely to do work that requires specific skills and knowledge. To consider the heterogeneity due to individual education level, we made estimations using two groups: (1) a high education level group that completed vocational school or higher (also referred to as tertiary education (ISCED levels 5 to 8) by The United Nations Educational, Scientific and Cultural Organization (UNESCO) (tertiary education included both commonly accepted academic education and advanced vocational or professional education) or higher education by the World Bank) [47,48]; (2) a low education level group that completed senior high school or lower (also known as primary or secondary education (ISCED levels 0 to 4)) by UNESCO). The estimations were also employed by gender (women and men), age (younger than 40 years and older than 40 years), continents (Asia, Europe, and North America, and South America and Australia), and by income (high-income countries and middle-income countries) groups. The results for the high- and low-education groups are summarized separately in Table 4 column (a) and column (b) The value of the IHEG (IHEG1) was used as the education gap index (IHEG) in the estimations. The dependent variables were SRH, mental health, and objective health. The independent variables were similar with those in Table 3, but only the results of the IHEG are summarized in Table 4. The main results are as follows.

Table 2. First-stage estimates of the effects of parental education attainment and intrahousehold couples' educational gap—OLS.

	Model 1		**Model 2**		**Model 3**		**Model 4**	
	IHEG1 Coeff.	**S.E.**	**IHEG1 Coeff.**	**S.E.**	**IHEG2 Coeff.**	**S.E.**	**IHEG2 Coeff.**	**S.E.**
Parents' highest educational attainment	−0.092 ***	(0.005)			−0.025 ***	(0.002)		
Parents have advanced education attainment	−0.106 ***	(0.022)			0.007	(0.008)		
Parents' highest education attainment (ref. never attended school)								
dropped out of primary school			−0.174 ***	(0.042)			0.065 ***	(0.015)
primary school			−0.196 ***	(0.036)			0.007	(0.013)
junior high school			−0.260 ***	(0.035)			−0.006	(0.012)
senior high school			−0.367 ***	(0.033)			−0.057 ***	(0.012)
vocational school			−0.557 ***	(0.036)			−0.048 ***	(0.013)
college			−0.667 ***	(0.037)			−0.097 ***	(0.013)
university			−0.738 ***	(0.034)			−0.130 ***	(0.012)
graduate school (master)			−0.939 ***	(0.041)			−0.121 ***	(0.015)
graduate school (doctorate)			−0.974 ***	(0.052)			−0.121 ***	(0.019)
Other controls.	Yes		Yes		Yes		Yes	
Country dummy	Yes		Yes		Yes		Yes	
Number of observations	53,365		53,365		53,365		53,365	
Number of countries	32		32		32		32	
F-statistic for instruments	704.550		159.136		230.902		60.043	
R-squared	0.229		0.229		0.044		0.045	

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. IHEG1: Individual's education−partner's education; IHEG2: having an education gap dummy variable (1 = having a gap, 0 = no gap). Other controls are income, education, age, occupation, female dummy, number of children, house status. Sources: Calculated based on original international survey from 2015 to 2017.

Table 3. The effects of intrahousehold couples' educational gap on health—OLS and IV-2SLS estimation results.

	Self-Rated Health		Mental Health		Objective Health	Self-Rated Health	Mental Health	Objective Health
	Model 1 OLS Coeff.	**Model 2 IV-2SLS Coeff.**	**Model 3 OLS Coeff.**	**Model 4 IV-2SLS Coeff.**	**Model 5 IV-2SLS Coeff.**	**Model 6 IV-2SLS Coeff.**	**Model 7 IV-2SLS Coeff.**	**Model 8 IV-2SLS Coeff.**
IHEG1 (value)	−0.020 ***	−0.046 ***	−0.003 **	−0.029 ***	−0.015 **			
	(0.002)	(0.016)	(0.001)	(0.009)	(0.007)			
IHEG2(Having an education gap)						−0.205 ***	−0.137 ***	−0.062 *
						(0.076)	(0.045)	(0.036)
Household Income (ref. Income first quintile)								
Income second quintile	0.099 ***	0.093 ***	0.067 ***	0.061 ***	−0.003	0.103 ***	0.067 ***	0.000
	(0.010)	(0.011)	(0.006)	(0.006)	(0.005)	(0.010)	(0.006)	(0.005)
Income third quintile	0.095 ***	0.085 ***	0.078 ***	0.068 ***	−0.005	0.094 ***	0.074 ***	−0.002
	(0.012)	(0.013)	(0.007)	(0.008)	(0.006)	(0.012)	(0.007)	(0.006)
Income fourth quintile	0.139 ***	0.125 ***	0.099 ***	0.085 ***	−0.000	0.135 ***	0.090 ***	0.003
	(0.011)	(0.014)	(0.007)	(0.008)	(0.006)	(0.012)	(0.007)	(0.006)
Income fifth quintile	0.206 ***	0.187 ***	0.123 ***	0.104 ***	0.008	0.201 ***	0.112 ***	0.012 *
	(0.012)	(0.016)	(0.007)	(0.010)	(0.008)	(0.014)	(0.008)	(0.006)
Educational attainment (ref. Senior high school or lower)								
Vocational school	−0.024 *	−0.005	−0.006	0.013	−0.019 **	−0.020	0.004	−0.024 ***
	(0.014)	(0.018)	(0.008)	(0.011)	(0.008)	(0.016)	(0.009)	(0.007)
College or university	0.066 ***	0.106 ***	0.026 ***	0.066 ***	0.014	0.037 ***	0.022 ***	−0.008 *
	(0.010)	(0.026)	(0.006)	(0.015)	(0.012)	(0.010)	(0.006)	(0.004)
Graduate school	0.142 ***	0.199 ***	0.025 ***	0.082 ***	0.026	0.129 ***	0.038 ***	0.004
	(0.014)	(0.036)	(0.008)	(0.022)	(0.017)	(0.017)	(0.010)	(0.008)
Other controls.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	53,365	53,365	53,365	53,365	53,365	53,365	53,365	53,365
Number of countries	32	32	32	32	32	32	32	32
Overidentification test (Sargan test)		chi2(1) = 1.701		chi2(1) = 0.217	chi2(1) = 3.549	chi2(1) = 3.109	chi2(1) = 0.952	
		(p = 0.19)		(p = 0.64)	(p = 0.06)	(p = 0.08)	p = 0.33)	
R-squared	0.106	0.104	0.102	0.097	0.022	0.094	0.095	0.020

Notes: (1) Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (2) Instrument variables: Parents' educational attainment and parents have advanced education from Model 1 to Model 7. Model 8 instrument variable: parents' educational attainment. (3) IHEG1 (value) = individual's education−partner's education; IHEG2: having an education gap dummy variable (1 = having a gap, 0 = no gap). (4) Other controls include age, occupation, female dummy, number of children, house status. Source: Calculated based on the original international survey from 2015 to 2017.

First, in general, the coefficients of the IHEG were negative values (−0.084 in (a) for SRH; −0.042 in (a) for mental health; and −0.024 in (a) for objective health), and they were all statistically significant at the 1% level. This finding indicates that for the group with a high education level that completed vocational school or higher, an education gap between a respondent and his or her partner may lower the respondent's SRH, mental health, and objective health status. Individuals with education levels that are higher than those of other family members may have more household financial responsibilities, which may result in long working hours and more feelings of stress. As a result, their mental health and physical health status may be poor.

Second, the effects of the IHEG on health differed in the different groups. (1) For the high-education group (a), the coefficients of the IHEG were negative for women (−0.106 in Model 1(a); −0.034 in Model 3(a) for mental health; and −0.057 in Model 5(a)), and they were all statistically significant at the 1% level. These results suggest that when a wife has a higher level of education than her husband, her SRH, mental health, and objective health may be worse. The coefficients for men were −0.063, −0.043, and −0.001 and were statistically significant at the 1% level for SRH and mental health. An education gap between wives and husbands also negatively affects the husband's health. Comparing the groups of husbands and wives, the negative effect of having a higher education than one's partner was greater for women regarding SRH and objective health. Accordingly, on average, wives have more housework. Therefore, work-family conflicts might be severe for a wife when she has an education level that is greater than that of her partner. However, for the low-education group, most coefficients were not statistically significant for either wives or husbands. Compared with the high-education group, the negative effect of an IHEG seemed to be smaller for the low-education group. This finding indicates that work-family conflicts may be severe for both wives and husbands with high education levels.

(2) For the high-education group, although a negative effect of the IHEG on health was found in both the younger group and the older group, the effect was greater for the younger group based on SRH and mental health than for their counterparts. However, the effect was greater for the older group based on objective health. For the low-education group, most coefficients were not statistically significant for either the younger or older groups.

(3) Comparing the results in various areas of the world, for the high-education group, the coefficients of the IHEG were negative for Asian countries (−0.108 in Model 1(a); −0.057 in Model 3(a); and −0.045 in Model 5(a)), and they were all statistically significant at the 1% level. This finding suggests that, for the high-education group, an IHEG may worsen the SRH, mental health, and objective health of individuals in Asian countries. The coefficients for Europe and North America were −0.082, −0.033, and 0.003, and they were statistically significant at the 1% and 5% levels in Model 1 and Model 2. Comparing Asian countries with European and North American countries, the negative effect of an IHEG on health was greater for individuals in Asian countries. However, for the low-education group, most coefficients were not statistically significant for the Asian, European, and North American countries.

(4) Considering the results of lower and upper middle-income countries and high-income countries internationally, the negative effect of an IHEG on health was greater for lower and upper middle-income countries than for high-income countries regarding mental health and objective health for the lower and upper middle-income countries. This finding may be because high-income countries can provide universal public health insurance and advanced medical or health care service.

Third, for the low-education group, there may be a positive relationship between an IHEG and health. For example, the coefficients of the IHEG were positive values (0.053 in Model 2(b) for the total; 0.020 in Model 6(b)), and they were statistically significant at the 1% and 10% level. This finding suggests that, for the low-education group, reducing the education gap may improve the health status of an individual, particularly regarding the mental health condition of women (0.076 and statistically significant at the 1% level in Model 4 (b) for women).

Table 4. Summaries of the IV-2SLS results by subsamples.

	Self-Rated Health		Mental Health		Objective Health	
Model	**Model 1 (a) High Education Coeff. (S.E.)**	**Model 2 (b) Low Education Coeff. (S.E.)**	**Model 3 (a) High Education Coeff. (S.E.)**	**Model 4 (b) Low Education Coeff. (S.E.)**	**Model 5 (a) High Education Coeff. (S.E.)**	**Model 6 (b) Low Education Coeff. (S.E.)**
Total	−0.084 ***	0.039	−0.042 ***	0.053 ***	−0.024 ***	0.020 *
	(0.016)	(0.027)	(0.009)	(0.016)	(0.008)	(0.012)
Selected subsamples: By gender groups						
women	−0.106 ***	0.040	−0.034 **	0.076 ***	−0.057 ***	0.022
	(0.028)	(0.043)	(0.017)	(0.026)	(0.014)	(0.019)
men	−0.063 ***	0.039	−0.043 ***	0.024	−0.001	0.017
	(0.020)	(0.036)	(0.012)	(0.021)	(0.009)	(0.016)
By age groups						
age ≤ 40	−0.051 **	0.056	−0.052 ***	0.025	−0.027 **	0.034 **
	(0.024)	(0.037)	(0.017)	(0.025)	(0.012)	(0.016)
age > 40	−0.096 ***	0.002	−0.035 ***	0.056 **	−0.019 **	0.006
	(0.021)	(0.040)	(0.011)	(0.022)	(0.010)	(0.018)
By continent groups						
Asia	−0.108 ***	−0.061	−0.057 ***	0.056 **	−0.045 ***	−0.022
	(0.022)	(0.042)	(0.013)	(0.024)	(0.011)	(0.018)
Europe and North America	−0.082 ***	0.043	−0.033 **	0.040 *	0.003	0.042 **
	(0.027)	(0.038)	(0.016)	(0.023)	(0.012)	(0.017)
South America and Australia	0.024	0.086	0.023	0.027	−0.009	0.034
	(0.031)	(0.056)	(0.022)	(0.035)	(0.016)	(0.025)
By inter-country income level groups						
lower and upper middle-income countries	−0.070 ***	0.083 **	−0.043 ***	0.103 ***	−0.045 ***	−0.022
	(0.020)	(0.039)	(0.013)	(0.025)	(0.011)	(0.019)
high-income countries	−0.086 ***	0.001	−0.033 **	0.022	0.007	0.048 ***
	(0.025)	(0.038)	(0.014)	(0.021)	(0.010)	(0.016)

Notes: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The control variables are the same with those in Table 4 except for the respondent's educational attainment. 9 kinds of educational attainment dummy variables are utilized. IHEG1 (value): Individual's education–partner's education. Self-rated health scale is from 5 (very healthy) to 1 (very poor); Mental health index score is from 4 (very healthy) to 1 (very poor). High education: vocational school or higher; Low education: senior high school or lower. Sources: Calculated based on original international survey from 2015 to 2017.

4.3. The Impact of IHEGs, Sustainable Lifestyle, and Health

Next, we investigated the potential mechanism of the negative effect of IHEGs on health and sustainability lifestyle. We estimated the effects of IHEG1 (value) on (1) income satisfaction, (2) weekly working days, (3) overcoming difficulties (the impact of IHEGs on feelings of stress was also estimated, and the results were consistent with those for overcoming difficulties in the analyses. These results are available upon request), (4) satisfaction with health or medical care, (5) attending environmental activities as a volunteer, (we also explored the effect of IHEGs on the frequency of drinking alcohol and smoking behavior. The results indicated that the impact of a couple's education gap on healthy behavior was not statistically significant. An intrahousehold education gap may not worsen health behaviors) (6) donation to environmental activities (income), (7) donation to environmental activities (goods), (8) purchase energy-saving household products, (9) energy-saving activities, and (10) sorting or reducing rubbish.

As the mechanism may differ by education level, we made estimations for both the (a) high-education group (vocational school or higher)—this designation is known as tertiary education (ISCED levels 5 to 8) by UNESCO or higher education by the World Bank—and (b) the low-education group (senior high school education or lower). This designation is also known as primary/secondary education (ISCED 0 to 4) by UNESCO. The results are summarized in Table 5.

For the high-education group, all coefficients of the IHEG in the five models were statistically significant at the 5% or 1% level. Based on the results, four channels regarding the effect of IHEGs on health were determined. First, an individual with a high level of education is more likely to find a better job and have a higher income in the labor market than an individual with a low level of education. Therefore, he or she can accumulate more wealth and invest more to improve his or her health status and those of other household members (positive effect of income hypothesis). A high IHEG may decrease an individual's income satisfaction (−0.036) and health or medical care satisfaction (−0.016). These results do not support the positive effect of the income hypothesis. Therefore, the negative effects may be greater than the positive effects.

Second, regarding household responsibilities, a highly educated individual may have longer working hours than their less-educated partner. It was found that long working hours may negatively affect the health status of individuals (negative effect of longer working hours hypothesis). The coefficient of the IHEG was 0.017 for weekly working days, and −0.008 for attending environmental activities as a volunteer. These findings indicate that a highly educated individual with a higher IHEG may have to work longer and that the probability of participation in social activities is lower, which may worsen their health status (For the impacts of long working hours on mental health, please see [28–31]; for the impacts of volunteer activity on health, please see ref. [49–51]). These results support the negative effect of the longer working hours hypothesis. Third, the coefficient of the IHEG for overcoming difficulties was −0.008, which shows that the higher the IHEG, the lower the probability of overcoming difficulties. A couple's education gap may decrease the amount of help provided by a partner for individuals with high education levels. As a result, he or she has to address these problems alone, which may increase loneliness and stress when the individual faces difficulties in life and work. The results support the negative effect of the skill gap hypothesis.

Table 5. The potential mechanism by two different educational attainment groups.

Model	Intrahousehold Education Gap	
	Coeff.	(S.E.)
Model 1 Income satisfaction		
(a) High education	−0.036 ***	(0.003)
(b) Low education	−0.005	(0.005)
Model 2 Satisfaction with health/medical care		
(a) High education	−0.016 **	(0.007)
(b) Low education	0.003	(0.010)
Model 3 Weekly working days		
(a) High education	0.017 ***	(0.004)
(b) Low education	0.012	(0.009)
Model 4 Volunteer attendance at environmental activities		
(a) High education	−0.008 ***	(0.002)
(b) Low education	−0.002	(0.002)
Model 5 Difficulties overcome		
(a) High education	−0.008 **	(0.003)
(b) Low education	0.004	(0.005)
Model 6 Donation to environmental activities (income)		
(a) High education	−0.008 ***	(0.001)
(b) Low education	0.001	(0.002)
Model 7 Donation to environmental activities (goods)		
(a) High education	−0.004 ***	(0.001)
(b) Low education	0.000	(0.002)
Model 8 Energy saving household products		
(a) High education	0.001	(0.002)
(b) Low education	−0.008 ***	(0.003)
Model 9 Energy saving actions		
(a) High education	0.001	(0.002)
(b) Low education	−0.006 **	(0.003)
Model 10 Sorting and reducing rubbish		
(a) High education	0.001	(0.002)
(b) Low education	−0.009 ***	(0.003)

Notes: (1) Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. (2) The control variables are similar with those in Table 4, except for the respondent's educational attainment. (3) The OLS regression is utilized in Model 1 to Model 10. (4) High education: vocational school or higher; Low education: senior high school or lower. (5) The independent variable is intrahousehold education (value) Source: Calculated based on the original international survey from 2015 to 2017.

Third, regarding a sustainable lifestyle, the results suggest that the intrahousehold education gap may decrease the sustainable lifestyle activities of improving environmental sustainability. For example, the coefficient for the intrahousehold education gap regarding volunteer attendance at environmental activities is −0.008 for the high-education group. Statistically, it is significant at 1%. It suggests that individuals who completed vocational school education or higher (high education) and experience an education gap in marriage are less likely to volunteer for environmental activities. On the contrary, for the low-education group, the coefficient is positive and statistically insignificant; it indicates that for individuals who completed high school or lower and experience a low-education gap in marriage are more likely to volunteer for environmental activities. Similar trends are found in income donation or goods donation to environmental activities (models 6 and 7). The results show that the negative influence of the education gap in marriage on the environmental activities may influence environmental sustainability. Regarding household-consumption-related environmental activities, there is a similar negative relationship with a sustainable lifestyle. For example, the coefficient of the education gap for energy-saving household products is a negative value for the low-education group, and it is statistically significant at the 1% level. It suggests that individuals who completed high school or lower and experience an education gap have a lower probability of purchasing energy-saving household products. However, no significant influence is found in the high-education group. Moreover,

the results are almost similar for energy-saving actions and sorting or reducing rubbish (models 9 and 10). These results suggest that the intrahousehold education gap may worsen the sustainability lifestyle (i.e., reducing the activities of improving environmental sustainability).

Besides the workload and income effects on the linkages between health and education gaps, our results show the negative role played by the intrahousehold education gap on reshaping the household's choice to harmonize environment through energy consumption, recycling, separate collection and reduction of rubbish, volunteer attendance, and charity. As highlighted by Tilman and Clark [42], the crucial relationship between sustainability lifestyle and public health is through environmental sustainability and food lifecycle. These results demonstrate the importance of the linkages between health and education gaps and a sustainable lifestyle and suggest that education equality in marriage plays a crucial role in enhancing consumption and production sustainability.

4.4. Robustness Check to Consider Intergeneration Influences in the Relation between Education and Health

The exclusion restriction in this study was that the impact of a parent's educational attainment level on an adult child's health must be indirect (such as a child's education level or a couple's educational difference) and not via direct channels [52–59]. As such, the two sets of selected instrumental variables using a parent's educational attainment for the endogenous variables of a couple's education difference should satisfy this exclusion restriction condition. It has been argued that increasing the educational attainment level of parents improves the educational level of children [53,58]. When individuals attain a high education level (e.g., complete a doctorate degree in graduate school), well-educated individuals are more likely to have higher education levels than their partners. Therefore, it is acceptable that parents that are more educated may potentially affect their adult child's choice of an educated partner versus a less-educated partner, but a parent's education level is not directly associated with an adult child's health. As far as we know, evidence of a direct correlation of health status and parent educational attainment has rarely been shown.

The indirect effects of parental education on health may also result from reshaping an adult child's unhealthy behavior (such as smoking). Individuals with relatively better education levels are thought to exhibit healthier behaviors; for example, these individuals are more likely to have a ealthy weight, consume a healthy diet, exhibit healthier behaviors, have a reduced likelihood of disaster, and have an enlarged social network [52–59]. When parents are well educated, they have extensive knowledge on the harmful effects of smoking and consuming alcohol in large amounts and have a more efficient way of selecting health insurance. These kinds of knowledge might influence the health behaviors or choices of their adult children, and as a consequence, their adult children may be healthy (indirect channel). To consider this possible indirect channel, we conducted a further robustness check by controlling additional control variables (Panel 2). The variables were (1) satisfaction with health/medical care, (2) nonsmoker, (3) alcohol consumption (drink alcohol every day; 4–5 times per week; 2–3 times per week; once per week; less than above; and do not drink alcohol). The regression results with the abovementioned additional controls for (1), (2), and (3) are summarized in Table 6 Panel 2 (Model 4(a)–Model 6(b)), where the individuals who completed vocational school or higher (this designation is known as tertiary education (ISCED levels 5 to 8) by UNESCO or higher education by the World Bank) are denoted in (a), and those who completed senior high school or had a lower education level are denoted in (b) [47,48]. The corresponding regression results omitting the above controls ((1), (2), and (3)) are displayed in Panel 1 (Model 1(a)–Model 3(b)) using the same sample.

The coefficient of IHEG was −0.077 and statistically significant (Model 1(a)), whereas the coefficient was −0.060 when controlling for the additional variables (the variables were (1) satisfaction with health/medical care, (2) do not smoke dummy variable, (3) alcohol consumption dummy variable (drink alcohol every day; 4–5 times per week; 2–3 times per week; once per week; less than above; and do not drink alcohol)), and the result was statistically significant (Model 4(a)). Similar results were also found in the other models, in which the coefficients had a similar magnitude, were statistically significant, and had the same sign (Model 1(b) with Model 4(b); Model 2(a) with Model 5(a); Model 2(b)

with Model 5(b); Model 3(a) with Model 6(a); and Model 3(b) with Model 6(b)). The difference between the coefficients of IHEG in Panel 1 and those in Panel 2 was small. This finding suggests that the indirect channel of the impact of parent education on adult children's health did not conflict with our main conclusions.

In addition, other factors affected health status. For example, (1) increasing levels of satisfaction with health/medical care also improved an individual's health status; (2) compared with the smoking group, the nonsmokers report better subjective health and mental health, whereas there was no great difference between these two groups regarding objective health; and (3) drinking alcohol more frequently positively affected SRH and objective health, whereas alcohol consumption negatively affected mental health.

5. Conclusions

How does an IHEG affect a married individual's well-being (e.g., SRH, mental health, and objective health) and lifestyle for sustainable development (e.g., activities to improve environmental sustainability)? This study first investigated the relationship between the gap of education levels between married couples, health status, and a sustainable lifestyle using an original international survey data collected from 32 countries on six continents. A self-rated health status index, a mental health index, and an objective health status index were utilized to assess the health statuses of individuals. Objective health was a dummy variable that was equal to 1 if an individual did not experience an illness or surgery in the past half-year. Objective unhealthy includes physical illness and mental illness. Moreover, six unique indices are used to investigate sustainable lifestyles. The instrument variable method was utilized to investigate the causal relationship between the two issues above.

The main conclusions are as follows. First, in general, compared to couples with equal education levels, couples with education gaps reported worse levels of SRH, mental health, and objective health when an individual's level of education, household income, occupation, and other factors were held constant. Second, the negative effect of IHEGs on health differed in various groups. For example, the negative effect of IHEGs on health was greater for the high-education group than for the low-education group. Moreover, for the high-education group, the negative effect of IHEGs on health was greater for women, individuals in Asian countries, and couples in middle-income countries than for their counterparts (men, individuals in Europe/North America and South America/Australia, and high-income countries). However, for the low-education group, a reduction in the education gap seemed to improve the husband's health status. In this situation, however, women's mental health deteriorated. Third, for the channels of the impact of IHEGs on health, the positive effect of income hypothesis was not supported, whereas the results supported both the negative effect of the longer working hours hypothesis and the negative effect of a couple's skill gap hypothesis. Finally, the education gap between married couples may reduce the activities of individuals in improving environmental sustainability, such as decreasing the probability of volunteering, reducing the donation of income or goods, purchasing energy-saving products, energy-saving activities, and sorting or reducing rubbish. For a highly educated individual, the education gap between married couples reduces the likelihood of charitable activities (e.g., donation). However, low-educated individuals reduce the probability of activities regarding household consumption and a sustainable lifestyle (e.g., energy-saving activities).

Table 6. Robustness check: to consider the intergenerational influence in the relation between education and health.

Panel 1	**Self-Rated Health**	**Self-Rated Health**	**Mental Health**	**Mental Health**	**Objective Health**	**Objective Health**
	Model 1(a) High Education	**Model 1(b) Low Education**	**Model 2(a) High Education**	**Model 2(b) Low Education**	**Model 3(a) High Education**	**Model 3(b) Low Education**
IHEG1: value	−0.077 ***	0.040	−0.033 **	0.040 *	0.007	0.045 **
	(0.027)	(0.039)	(0.016)	(0.024)	(0.012)	(0.018)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Panel 2	**Self-Rated Health**	**Self-Rated Health**	**Mental Health**	**Mental Health**	**Objective Health**	**Objective Health**
	Model 4(a) High Education	**Model 4(b) Low Education**	**Model 5(a) High Education**	**Model 5(b) Low Education**	**Model 6(a) High Education**	**Model 6(b) Low Education**
IHEG1: value	−0.060 **	0.029	−0.030 *	0.037 *	0.009	0.045 **
	(0.026)	(0.038)	(0.016)	(0.022)	(0.012)	(0.018)
Satisfaction with health/medical care	0.134 ***	0.139 ***	0.081 ***	0.081 ***	0.016 ***	0.011 **
	(0.006)	(0.009)	(0.004)	(0.005)	(0.003)	(0.004)
Do not smoke	0.062 ***	0.104 ***	0.060 ***	0.076 ***	0.009	0.016
	(0.016)	(0.023)	(0.010)	(0.014)	(0.008)	(0.011)
Frequency of drinking alcohol (ref. drink alcohol every day)						
4–5 times per week	−0.016	0.052	0.008	−0.041	0.010	−0.009
	(0.038)	(0.056)	(0.023)	(0.034)	(0.018)	(0.026)
2–3 times per week	−0.030	−0.058	0.084 ***	0.034	−0.003	−0.034 *
	(0.030)	(0.044)	(0.018)	(0.026)	(0.014)	(0.020)
Once per week	−0.031	−0.087 *	0.095 ***	0.081 ***	−0.005	−0.065 ***
	(0.031)	(0.045)	(0.018)	(0.027)	(0.014)	(0.021)
Less than above	−0.115 ***	−0.123 ***	0.074 ***	0.049 *	−0.024 *	−0.055 ***
	(0.030)	(0.042)	(0.018)	(0.025)	(0.014)	(0.019)
Do not drink alcohol	−0.139 ***	−0.123 ***	0.075 ***	0.081 ***	−0.030 **	−0.080 ***
	(0.031)	(0.042)	(0.018)	(0.026)	(0.014)	(0.020)
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Observation	12,211	6012	12,211	6012	12,211	6012
R-squared	0.162	0.159	0.101	0.086	0.039	0.010

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Based on the results of this study, the policy implication for improving public health (national welfare) is as follows. First, it has been shown that reducing the IHEG may also improve an individual's health status. Because a gender gap in the levels of education exists, particularly in developing countries, the gender gap in school enrollment and levels of education was high. Therefore, increasing the female school enrollment rate may contribute to reducing the IHEG, which can improve health statuses and increase the national human capital needed to increase economic growth. Second, the results showed that family-work conflicts still exist, particularly for the highly educated groups, women, individuals in Asian countries, and middle-income countries. Health improvement policies may be more important for these groups. Third, long working hours and poor support or help between couples with a higher IHEG were the main channels for the negative effects of IHEG on health. Therefore, regarding traditional gender-role consciousness, providing more support for family care by the government, implementing family-friendly systems, such as flexible work hours in the workplace, and improving communication between couples can lead to health status improvements. Finally, from the perspective of the SDGs, the United Nations recommended the sustainability development goals, which clearly linked 17 goals to sustaining human well-being. This study is related to responsible consumption and production (goal 12), good health and well-being (goal 3), quality education (goal 4), gender equality (goal 5), and reducing inequalities. The empirical study results suggest that reducing the intrahousehold education gap may positively contribute to establishing a sustainable development society by improving both individual well-being and a sustainable lifestyle.

Author Contributions: S.M. designed and conducted the website survey; X.P. and X.M. designed the research including conceptualization and methodology. X.P. analyzed the data and wrote the original paper. X.M., X.P. and C.Z. revised the paper; writing—review and editing, S.M., X.M. and C.Z.; supervision, X.M. and S.M.; funding acquisition, X.M. and S.M. All authors have read and agreed to the published version of the manuscript.

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