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Gender Differences in Self-Rated Health among University Students in England, Wales and Northern Ireland: Do Confounding Variables Matter?

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Abstract

Introduction: We assessed gender differences in self-rated health (SRH) while considering physical health, health complaints, health service use, wider wellbeing, and health behaviours.

Methods: 3706 undergraduates at 7 Universities in the United Kingdom completed a self-administered questionnaire (2009–2008). Logistic regressions with excellent/very good SRH as dependent variable assessed the variables that explained the SRH sex difference.

Results: Females had more health complaints, illness periods, lower quality of life, more burdens, and took medication/s more often. The crude (unadjusted) odds ratio (OR) proposed that females were less likely to report excellent/very good SRH than males [OR 0.79, 95% CI 0.68-0.94]. Adjusting only for physical health and health service use, females' OR increased considerably, and the association between female sex and SRH was no longer significant. Also, when adjusting only for wider well-being or when adjusting only for health behaviour, the negative association between females and SRH was no longer significant. Adjusting for all the variables simultaneously (physical health, health service use, wider well-being, health behaviours) resulted in considerable increase of females' OR indicating now a positive association between female sex and SRH [OR 1.33, 95% CI 1.04-1.74].

Conclusion: Females' lower SRH found in the crude analyses was confounded by their higher stress level, lower quality of life, lower physical activity and by more illnesses or health complaints when compared with males. Gender-related SRH research should control for many potential confounders to prevent overestimation of the gender effect. Health promotion programs should consider these factors when tackling gender health disparities.

Keywords: self-rated health, university students, quality of life, gender, health service use, confounders

1. Introduction

Self-rated health (SRH) is a single-item five-level ordinal measure that is extensively employed in health research and practice as a marker of general health. Its common use is premised on being a valid single measure of overall health, linked to physical, mental and social features of wellbeing (Sugisawa & Sugisawa, 1995). SRH is related to historical, current, and future hospital records; and also correlated with subsequent mortality, morbidity, disability, and utilization of health services (Mossey & Shapiro, 1982; Nielsen, 2015). SRH incorporates physical, emotional and personal components of health that collectively make up individual "healthiness" ([Kull, 2002], p. 242). As such, SRH represents a broader indicator of health-related wellbeing.

The published literature of the gender differences in SRH exhibits conflicting results. First, some studies examined only females (Cheng et al., 2015) thus not allowing any gender comparisons. Other research that examined gender found with no significant gender differences in bivariate analysis (Piko, Barabas, & Boda, 1997), or when adjusting for other features (Garrity, Somes, & Marx, 1978); or conversely, reported significant gender differences in bivariate or stratified analyses. However, investigations of SRH among university student

populations in the USA have traditionally employed only crude analyses (ACHA, 2005; USC, 2005). Indeed, an unfortunate common shortcoming across these studies was that they did not investigate the influence of gender on SRH by employing multivariable models that would control for potential confounders (Piko, 2000; ACHA, 2005; Vaez & Laflamme, 2003; von Bothmer & Fridlund, 2003).

Such limitations are critically important, as a wide range of confounders might influence SRH. These confounders could be categorized into three groups: 1) physical health, health complaints and health service use variables; 2) broader well-being and general burdens features; and, 3) lifestyle characteristics and health behaviours variables. Due to the fact that significant differences between male and female university students have consistently been described, such potential confounders include alcohol and other drug use (El Ansari, Sebena, & Stock, 2013; El Ansari, Stock, & Mills, 2013; El Ansari, Vallentin-Holbech, & Stock, 2014), physical in/activity (El Ansari, Stock & UK Student Health Group 2011; Piko, 2000), burdens and stress (El Ansari, Oskrochi, & Haghgoo, 2014), as well as psychosomatic symptoms and health complaints, health awareness, health service use, and social support (El Ansari et al., 2011).

Very few studies have examined SRH gender differences in large samples of university student populations, whilst simultaneously taking into account a wide range of potential confounders. In order to bridge this knowledge gap, the current study assessed SRH while adjusting for many confounders that included: 1) physical health, health complaints and health service use features (6 variables); 2) wider well-being aspects (5 variables); and, 3) lifestyle characteristics and health behaviour factors (4 variables).

Therefore, employing university student populations from England, Wales and Northern Ireland, the objectives of the current study were to:

- Examine SRH by sex along with a range of physical health, health complaints and health service use variables; wider well-being variables; and, lifestyle characteristics and health behaviour variables; and,
- Assess, while adjusting for sex and using a series of multivariable models, the individual and collective influences of the variables that contribute to explaining the SRH sex difference.

2. Materials and Methods

2.1 Sample and Data Collection Procedures

Health & Wellbeing Questionnaire

The study was a general student health and well-being survey similar to studies of student health implemented in several countries (El Ansari & Stock, In Press; El Ansari et al., 2011; El Ansari, Sebena, & Stock, 2013). It included socio-demographic information (e.g., gender, age), self-reported health data, and questions on health awareness, health service use, social support, burdens and university study related questions.

Self-rated health and health awareness (2 items): these inquired about general health (adopted from American College Health Association 2005). Students reported their current general SRH by the question: "How would you describe your general health?" (five-point response scale, 1= 'excellent', 5= 'poor', later recoded to 3 categories). A related item (adapted from Stock et al., 2003) asked about students' general awareness of their health: "To what extent do you keep an eye on your health?" (four-point response scale, 1= 'not at all', 4= 'very much', later recoded to 2 categories).

Health service use and other illnesses (3 items): participants were asked: "Have you seen a medical practitioner (excluding a dentist) in the past 6 months?"; "During the past 12 months, have you been so ill that you had to stay in bed?", as well as "Do you take any regularly take any medication?" all with dichotomous 'yes'/'no' responses (Stock et al., 2003). Participants who answered 'yes' to the first item were then asked about the number of times they had seen a medical practitioner (later recoded to 3 categories: '1-2 times', '3-4 times' or '5 or more times').

Symptoms and health complaints score (22 items): students rated 22 symptoms measuring a range of health complaints as adopted from previous studies (Stock et al., 2003; Stock et al., 2008; El Ansari, Oskrochi, & Haghgoo, 2014; El Ansari, Oskrochi, Labeeb, & Stock 2014; Hurrelmann & Kolip, 1994; Simonsson et al., 2008). Sample items included stomach trouble/heartburn, back pain, rapid heart beat/circulatory problem/dizziness, headaches, sleep disorder/insomnia, concentration difficulties, neck and shoulder pain, and depressive mood. Respondents rated the question: "How often have you had these complaints during the past 12 months?" (four-point response scale, 1= 'never', 4= 'very often'). Cronbach's alpha of the scale was 0.88. For the purpose of the analysis undertaken in this paper, all items were summed up to a score (range 22 to 88) that was then divided (median split) into two categories: high (> median) and low level (< median) of symptoms and

complaints.

Quality of one's life (1 item): "If you consider the quality of your life: How did things go for you in the last four weeks?". The item was based on the COOP/WONCA charts (Bruusgard, Nessioy, Rutle, Furuseth, & Natvig 1993) (5 response categories, ranging from 'very badly' to 'very well'). This variable was further recoded into two categories.

Social support and satisfaction with social support (2 items): measured by modifying the Sarason's Social Support Questionnaire (Sarason, Levine, Basham, & Sarason, 1983), using two questions: "How many people do you know – including your family and friends – support you whenever you feel down?". The numerical response was recoded into 'low' (1 person), 'medium' (2- 3 persons) or 'high' (> 3 persons) social support. Satisfaction with social support was measured by: "Are you on the whole satisfied with the support you get in such situations?" (5 point Likert scale, 1= 'very satisfied', 5= 'very dissatisfied', later recoded into 2 categories).

Perceived burden (1 item): Students were asked to respond to the question: "To what extent do you feel burdened overall?", with the 6 response categories ranging from 'not at all' to 'very strongly', and subsequently recoded into 2 categories. The same question was asked for the following burdens: Studies in general; Exams, assignments, presentations; Workload in addition to studying; Lack of time for studies; Bad job prospects; and Financial problems.

2.2 Statistical Analysis

IBM SPSS version 22 was used for statistical analysis (P set at <0.05). We calculated frequencies and proportions. Chi-square statistic tested the differences in frequencies between males and females. Multivariate logistic regression calculated Odds Ratios (OR) and 95% confidence intervals (CI) in analysing the variables associated with 'excellent/very good' SRH as the dependent variable. Different logistic regression models examined the sets of variables (physical health and health service use; wider well-being and burdens; and lifestyle features and health behaviours) that explained the SRH sex difference observed in the initial crude model. For this task, we built five models and entered sets of variables that were hypothesized to explain the SRH sex difference into the models. The variables entered into the models were those that exhibited a significant gender difference in the initial Chi-square tests. However, in order to avoid multi-collinearity, we only included the variable 'burdened overall' into the multivariate models, despite the fact that other types of burdens also exhibited significant results in the initial Chi-square tests.

In all models 'excellent/very good' SRH was the dependent variable. In Model 1, only sex was entered into the model as the independent variable, thus calculating the crude OR for sex. In the next step, in Model 2, physical health and health service use variables were additionally entered into the model to test whether the gender differences across these variables contributed to the SRH sex difference. Similarly, in Model 3 a group of wider well-being variables were entered into the model to test whether gender differences across these variables explained the SRH sex difference; while in Model 4 a set of health behaviour variables were entered. In the final model (Full Model), we entered all relevant variables into the model in order to examine the influence of all the relevant factors on the association between sex and SRH. Potential interactions were not examined.

3. Results

3.1 Socio-Demographic Characteristics of the Sample

The majority (77.9%) of the sample was females. Students were enrolled at universities in England, Wales and Northern Ireland: University of Gloucestershire (n=908/25.1%), University of Chester (n=871/25.1%), University of Ulster (n=463/13.4%), Bath Spa University (n=460/13.3%), University of Swansea (n=398/11.5%), Oxford Brookes University (n=195/5.6%), and Plymouth University (n=169/4.9%). About 43.5% of the students were 20 years of age, and 23.0% were ≥ 30 years, and only 16.4% were married. Nearly 42.2% of the sample were first year undergraduates, 50.3% in the second year or third year, and 7.5% were in the fourth year or in graduate or professional studies.

3.2 SRH and Variables under Study by Gender

As depicted in Table 1, female students rated their health significantly lower, although they had higher health awareness (watched/kept an 'eye' on their health) when compared with males. During the last 6 months prior to the survey, generally more females consulted a medical practitioner at least once, but the number of visits to a doctor did not differ by sex. Women were also more likely to report that in the past 12 months, they had been so ill that they had to stay in bed, and were more often taking medication/s regularly. The proportion of students with symptoms/health complaints score above median was significantly higher among women than men, also reflected in the lower proportion of women who felt that their quality of life was good. There were no gender

differences in the number of persons to depend on for social support when feeling down nor with the satisfaction with the social support that students received in such situations. Participants' most frequent burdens were examinations, assignments and presentations, followed by financial issues, workloads, in addition to their study at university, lack of time for studying, studies in general, and bad working conditions. Males were consistently less likely to report such burdens.

Table 1. Self rated health and other groups of variables by gender

Variable	All Students (n=3464)	Gender[a]		*P* Value
		Male (n=765)	Female (n=2699)	
Physical Health and Health Service Use				
Self-rated health				0.001 [b]
Excellent/Very good	47.6	52.2	46.4	
Good	41.6	35.8	43.2	
Fair/Poor	10.8	12.0	10.4	
Health awareness (To some extent/Very much)	79.6	74.3	81.0	<0.001
Seen medical practitioner in past 6 months[a] (Yes)	60.9	47.6	64.7	<0.001
Among those (N=2073)				0.085 [b]
1-2 times	71.5	76.6	70.3	
3-4 times	19.1	14.9	20.3	
≥ 5 times	9.4	8.5	9.6	
Past 12 months, been so ill that had to stay in bed (Yes)	37.9	34.0	39.1	0.006
Do you regularly take any medication? (Yes)	28.5	12.0	32.0	<0.001
Symptoms and complaints score (> median)	51.2	35.3	55.8	<0.001
Well-being and Burdens				
Quality of one's life (Quite well/Very well)	64.6	68.4	34.6	<0.001
Social support whenever you feel down				0.508 [b]
Low (None/1 person)	8.5	11.1	7.7	
Medium (2-3 persons)	26.4	23.7	27.2	
High (> 3 persons)	65.1	65.2	65.1	
Satisfaction with support you get in such situations?				
Very satisfied /Satisfied	70.6	71.7	70.2	0.229
Burdens (Very strongly/Strongly burdened)				
Burdened overall	13.4	8.8	14.7	<0.001
Studies in general	22.2	16.6	23.8	<0.001
Exams, assignments, presentations	40.7	29.4	43.9	<0.001
Workload in addition to studying	29.0	19.6	31.7	<0.001
Lack of time for studies	24.7	16.5	27.0	<0.001
Bad job prospects	17.1	11.6	18.7	<0.001
Financial problems	30.2	71.1	69.5	0.209
Lifestyle Features & and Health Behaviours				
Daily smoking	15.7	14.7	15.9	0.281
Binge drinking in the last 2 weeks	67.2	76.4	64.6	<0.001
Ever used illicit drugs	30.1	46.8	25.4	<0.001
Achieve any type of recommended physical activity (MVPA)	36.5	49.7	32.6	<0.001

All cells are percentages; [a] Does not include seeing a dentist; [b] p-values refer to Chi-square test over all answering categories.

3.3 Gender Differences in SRH while Adjusting for Other variables

The results of the logistic regression models with excellent/very good SRH as the dependent variable vs. 'medium/poor' self-rated SRH are depicted in Table 2. When female sex was entered into the model (Model 1) as the only variable, females had 21% lower odds in reporting excellent/very good SRH compared to males. When the model was adjusted for the physical health and health service use variables (Model 2), females' odds for excellent/very good SRH increased and the sex difference was no longer significant. Similarly, in Model 3, no sex difference in SRH was observed when we adjusted only for the wider wellbeing variables (quality of life, and overall burden experienced). Likewise, adjusting the analysis only for the health behaviour variables (binge drinking, ever use of drugs, and achieving the recommended physical activity levels) resulted in disappearance of any significant sex difference in excellent/very good SRH. However, when all the physical health variables, the wider well-being variables and the health behaviour variables were entered into the model (Full Model), the sex difference in excellent/very good SRH between females and males was rendered again statistically significant, but in the opposite direction. In the full model, females had 33% higher odds of reporting excellent/very good SRH compared to males.

Table 2. Variables associated with sex differences in excellent/very good self-rated health

	Model 1		**Model 2**		**Model 3**		**Model 4**		**Full Model**	
	Crude OR		**Adjusted OR**							
Variable	OR*	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
	Sex									
Female sex	**0.79**	**0.68-0.94**	1.20	0.97-1.49	0.85	0.72-1.07	0.86	0.71-1.03	**1.33**	**1.04-1.74**
	Physical Health and Health Service Use									
Health awareness (To some extent/Very much)			**1.52**	**1.22-1.89**					**1.45**	**1.13-1.86**
Seen medical practitioner in past 6 months* (Yes)			0.89	0.74-1.07					0.95	0.77-1.17
Past 12 months, been so ill that had to stay in bed (Yes)			**0.63**	**0.53-0.76**					**0.65**	**0.54-0.80**
Do you regularly take any medication? (Yes)			**0.69**	**0.57-0.86**					**0.70**	**0.55-0.88**
Health complaints (Score > median)			**0.44**	**0.37-0.52**					**0.53**	**0.43-0.65**
	Wider Well-being and Burdens									
Quality of one's life (Quite well/Very well)					**2.02**	**1.73-2.34**			**1.78**	**1.42-2.19**
Burdened overall (Strongly/Very strongly)					**0.59**	**0.47-0.74**			0.84	0.61-1.17
	Lifestyle Features and Health Behaviours									
Binge drinking in the last 2 weeks							0.89	0.75-1.05	0.95	0.77-1.17
Ever used illicit drugs							**0.68**	**0.58-0.81**	1.16	0.94-1.44
Any type of recommended physical activity (MVPA)							**1.69**	**1.44-1.99**	**1.57**	**1.28-1.93**
Omnibus Chi-square test	0.006		<0.001		<0.001		<0.001		<0.001	
Nagelkerke R square	0.003		0.10		0.04		0.03		0.13	

Note: OR* = crude odds ratio; AOR = odds ratio adjusted for all other variables in the model; CI=95% confidence interval; bolded cells indicate statistical significance; each model contained only the variables listed in the table.

3.4 Associations between SRH and Different Variables

Table 2 also shows the adjusted odds ratios for the variables associated with excellent/very good SRH as dependent variable (full model depicts all the relevant variables entered into the model). Three variables were positively associated with excellent/very good SRH: reporting 'quite well/very well' quality of life; higher health awareness (watched their health to 'some extent/very much' compared with those who had lower health awareness); and achieving any type of recommended physical activity guidelines. In addition, women were also more likely to report excellent/very good good SRH (as described above) when adjusted for other relevant factors. Conversely, three variables were negatively associated with excellent/very good SRH: higher levels of health complaints; being so ill that to the extent of staying in bed; and, regularly taking medications. All the remaining variables (having seen a doctor in the past 12 months, being overall strongly/very strongly burdened, binge drinking in the last 2 weeks, and having ever used drugs) were not associated with excellent/very good SRH.

4. Discussion

Controversy remains over the impact of gender on SRH (Crimmins, Kim, & Solé-Auró, 2011; Foraker et al., 2011; McCullough & Laurenceau, 2004). The current study assessed, using a series of multivariable models, the individual and collective influences of different groups of variables that contribute to explaining the SRH sex difference.

Our initial analysis (crude OR, not adjusted for any variables, Model 1) indicated that females had significantly 21% lower odds in reporting 'excellent/very good' SRH compared to males. However, when we controlled individually for the various groups of potential cofounding variables, females' OR increased (Model 2, adjusted for physical health and health service use variables) then decreased (Model 3, adjusted for wider well-being variables; and Model 4, adjusted for lifestyle and health behaviours variables) although the increase and decreases did not reach statistical significance.

Our pattern of observed fluctuation in females' OR of reporting excellent/very good SRH (i.e. our different models) generally agreed with the variation pattern reported by others (Crimmins, Kim, & Solé-Auró, 2011) in terms of the changes in OR of SRH with each subsequent addition of/adjustment for groups/sets of variables. Crimmins and coworkers (2011) found that when only age-adjusted, a higher percentage of females than males in five countries reported having poor/fair SRH; but when diseases were added to the equation, females' odds of rating their health poorly were still higher in Greece and Sweden, but became insignificant in Belgium, Italy and Spain. In France, with adjusting for the presence of diseases, males rated their health worse; and when indicators of functioning were added to the equation, females' odds of rating their health poorly were higher only in Greece, but males rated their health worse in five countries (Crimmins, Kim, & Solé-Auró, 2011). Likewise, our findings across this UK sample were also in agreement with other SRH research in Egypt (El Ansari & Stock, 2016) among university students, where the unadjusted OR suggested that females were less likely than males to rate their SRH as excellent/very good (OR 0.56, 95% CI 0.47-0.68). Adjusting only for relevant physical health and health service use variables, females' OR for excellent/very good SRH increased, but nevertheless still remained significantly lower than that of males; and with further adjustment for physical health, health service use, and also for wider well-being variables, the gender difference in SRH was rendered no longer statistically significant (El Ansari & Stock, 2016).

Such patterns and fluctuations in females' SRH compared to males as reported by others (Crimmins, Kim, & Solé-Auró, 2011; El Ansari & Stock, 2016), and as we similarly observed across our sample, highlighted the importance of adjusting for a range of potential confounding variables when examining gender difference in SRH. The implications for research and practice is that if investigations of gender differences in SRH are to be rigorous and hence the results useful, then it is important to collect the necessary data on confounders; and undertake such adjustments during the analyses. Prevention and intervention programs that fail to consider such implications, or premise their policies and strategies on 'unadjusted findings', might inadvertently lead to erroneous approaches or unintentionally propagate existing differences or accentuate prevailing disparities in SRH. Hence SRH based on initial (crude) analyses should be treated with caution, as it could be deceptive and will probably change when adjustment is undertaken.

It is not straightforward to precisely speculate the reasons behind the gender SRH differences. Some have proposed that gender differentials in health might be due to a combination of biological, social and behavioural differences, as well as the interaction of these factors (Waldron, 2000). For example, among university students in Hungary, acute illness episodes and the frequency of psychosomatic symptoms contributed significantly to the self-perception of health (Piko, 2000). We are in agreement with others, as in our sample, whilst males engaged

significantly more in risky behaviours than females (e.g. binge drinking in the last 2 weeks; or ever use of illicit drugs), conversely significantly less females achieved any type of recommended physical activity guidelines. Such combination of factors and their interactions further highlights the importance of collecting relevant confounding data and adjusting for it in analyses of SRH gender differences. Our full model (controlling simultaneously for all variables) indicated that three variables were positively associated with females' excellent/very good SRH (good quality of life; higher health awareness; and achieving any type of recommended physical activity guidelines); and conversely, three variables were negatively associated with excellent/very good SRH (higher levels of health complaints; being so ill that to the extent of staying in bed; and, regularly taking medications). When comparing these variables vis-a-vis each other, we observed that higher quality of life and a lower level of health complaints exhibited the strongest associations with SRH compared with the other health related or health behaviour variables. This suggested that the subjective perception of one's health may be largely triggered by the perception of health complaints as well as by the overall perception of well-being and quality of life. Since females have been shown to perceive more health complaints and also to rate their quality of life lower than males, this is likely to explain their usually lower ratings of SRH to a large extent, if the analysis is not adjusted for these factors. However a question still remains unanswered: whether the higher perception of complaints is due to more symptoms or due to the higher likelihood of females to express pain and discomfort? The same could also hold true for quality of life that tends to be lower among female students, either due to discrimination or gender roles that cause negative emotional states among females, or simply due to a higher willingness of women to report poor quality of life.

This study has limitations. Self-reported information could suffer from potential misclassification, sociability or social desirability; and as a cross-sectional survey, temporality or causality cannot be assessed. The sample comprised students at seven universities in the three countries of the UK, enrolled in different academic disciplines, diverse scientific traditions and faculties, however, for better representativeness and generalizability, future studies would need to include more universities to ensure a better geographical spread across the UK. Such undertaking might facilitate comparisons between different faculties or disciplines of study. We did not include other lifestyle variables that could potentially influence SRH, e.g., body mass index, nutritional habits, or perceived stress, so we are unable to exclude any additional residual confounding. However, this bias might not have greatly affected our findings because others in Japan have reported little relation between healthy life habits and good SRH (Hirakawa, Kimata, & Uemura, 2014). Students reported both 'seeing a medical practitioner' and 'being ill to stay in bed' retrospectively for the last 12 months, whilst SRH was reported as present status, again emphasizing that the temporal relation of these variables could not be determined.

5. Conclusion

The lower SRH we observed for females in the crude analyses can be broadly explained by the fact that females report more health complaints and illness periods; report overall poorer quality of life; and are generally less physically active. Adjustment for these factors leads to higher odds for excellent/good SRH for females. Such adjusted odds ratio is more likely than the crude odds ratio to reflect the real health status of females compared to males and is in line with the higher life expectancy for women.

5.1 Implications for Practice and/or Policy

Further research is required in order to validate the findings of the current study and determine whether our data can be generalized on a wider level. However for rigorous examinations of the gender differences in SRH, it is critical to: 1) gather the perquisite data on confounders; and, 2) undertake adjustments during the analyses. Prevention and intervention efforts that do not consider such implications, or build their policies and strategies on 'unadjusted findings', could unintentionally lead to inaccurate approaches or un-deliberately increase the prevailing differences or accentuate the disparities in SRH. SRH premised on initial (crude) analyses need to be treated cautiously, as it could be misleading and could possibly change when controlling for confounding factors is undertaken.

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Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

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