

# Relationships between ideal figure, lifestyle habits, physical activity and self-rated health in Japanese female healthcare students

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## Research article

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# Abstract

## Background

Self-rated health (SRH), a subjective perception of an individual's overall health, is widely used in public health. The transition from adolescence to young adulthood is a critical period, with significant changes in lifestyle and dietary habits. It is therefore important to understand the self-rated health of young Japanese women. The aim of this study to provide basic data on the epidemiological features of SRH in female students of healthcare subjects, including their recognition of appropriate physique, lifestyle habits, and levels of physical activity.

## Methods

A cross-sectional survey was conducted in a total of 1101 female students of healthcare subjects in Japan. Body mass index was calculated from body height and weight using data from periodic health examinations, and lifestyle habits, physical activity, and self-rated health were self-reported using several previously-validated scales. Multivariate logistic regression analysis was used to investigate the relationship between self-rated health and scores for lifestyle habits and physical activity, adjusting for grade and smoking.

## Results

The odds ratio of poor/fair self-rated health was 1.87 (95% confidence interval (CI) 1.13–3.24) for lower vs higher levels of activity, 5.38 (3.59–8.10) for those with vs. without insomnia, and 0.44 (0.28–0.69) for the group who wanted to be thin, rather than those whose ideal weight was standard.

## Conclusions

Young women tend to want to be thin, so it is important to provide health education that will help them to understand appropriate weight on a medical basis, and prevent health problems caused by the inappropriate idealization of thinness.

## Background

Self-rated health (SRH), a subjective perception of an individual's overall health, is a measure widely used in public health discipline. Typically, SRH is examined using a single question, i.e., asking respondents to rate their overall health on a scale from excellent to poor [1]. According to Kaplan, persons with better SRH have higher survival rates than do those with poorer SRH, regardless of the presence or absence of disease [2]. Additionally, SRH affects life expectancy, an index that is highly predictive of mortality risk [2]. Furthermore, the validity of SRH measures to predict mortality risk has already been established in

multiple studies [3]. Study results indicate that SRH is affected by several lifestyle, diet, and biochemical factors [4, 5].

The SRH of Japan's general population is assessed officially every 3 years via the Comprehensive Survey of Living Conditions (CSLC), a nationwide cross-sectional survey of a representative sample of the country's general population. The CSLC from 2016 found that 86.7% of men and 84.4% of women had excellent, very good, or good SRH [6].

SRH assessment among adolescents is an effective way to evaluate their self-concepts of health [7, 8]. A high SRH in adolescents has been found to be strongly associated with general well-being and psychosomatic symptoms [9, 10]. In Japan, studies have examined whether the younger generation's knowledge affects their health behaviors or SRH. For example, one study examined whether female university students' accurate knowledge about the healthiness of foods contributed to desirable eating behaviors [11]. Another study examined male university students' smoking knowledge and practices [12]. It has been confirmed that there is a correlation between awareness of bad lifestyle habits and smoking behaviors, healthy eating habits, and personality traits (e.g., feeling inferior).

The transition from adolescence to young adulthood is a critical period during which an individuals' pre-existing habits may be disrupted [13]. Leaving home and the education system at this age are associated with negative diet changes [14], which can have significant and long-lasting effects on the future health of individuals and their families [15, 16].

The annual National Health and Nutrition Survey conducted by the Ministry of Health, Labour and Welfare suggests that young women in Japan tend to be thin. The 2016 survey found that the number of women who were "thinner (low body weight)" with a body mass index (BMI) of less than 18.5 has significantly increased compared to 10 years before, with 20.7% of women in their 20s falling into this category. Being thin is associated with several health problems in young women, and malnutrition among young women and pregnant women may also increase the risk of lifestyle diseases in their children [17–20]. Therefore, it is important to examine and understand the SRH of young Japanese women.

This study sought to provide basic data on the epidemiological features of SRH in female students, including their recognition of and knowledge about healthcare subjects such as appropriate physique, lifestyle habits, and physical activity levels.

## Methods

A cross-sectional study was conducted among 1305 female students who participated in a periodic health examination between April and May 2018 at a Japanese medical university. The students were from nine departments: radiological technology, clinical nutrition, physiotherapy, medical welfare, acupuncture, clinical engineering, medical information science, pharmaceutical sciences, and nursing. All participants provided written informed consent before participating in this study and understood that there was no penalty for choosing not to participate. The paper-based questionnaire was distributed only

to students who had given written consent. Students who received the questionnaire completed it during their physical examination.

Body height and weight data was obtained from the periodic health examination. BMI was calculated as weight in kg/height in m<sup>2</sup>. Global SRH measures generally include a question asking “How would you rate your overall health?” with five response categories ranging from excellent to poor (i.e., excellent, very good, good, fair, and poor). These five categories are dichotomized into either good health (excellent, very good, or good) or poor/fair health (fair or poor) [21–23].

The seven independent variables for this study were grade (1–2 or  $\geq 3$ ), living status (living with others or living alone), smoking (none, past smoker, or current smoker), alcohol drinking (none, a few times per month, a few times per week, or daily), University of California Los Angeles (UCLA) activity score (< 5 points or  $\geq 5$  points) [24], Athens Insomnia Scale (AIS; non-insomnia or insomnia) [25, 26, 27], and frequency of breakfast consumption (< 6 days/week or  $\geq 6$  days/week).

Using Noh et al.’s method [28], we classified the participants into three groups by desired weight (underweight, overweight, or normal weight), as measured by the relationship between their current BMI and their desire to lose or gain weight. Physical activity was assessed using UCLA activity score [24], which we have used in previous research [29].

AIS is a self-assessment insomnia scale created by the World Health Organization for the World Project on Sleep and Health. This instrument’s reliability and validity have already been verified in other studies [25, 26, 27]. AIS items measure waking during the night, early morning awakening, total sleep duration, sleep quality, and daytime sleepiness. Each of the scale’s eight questions is answered from 0 (no problem) to 3 (a very serious problem). A total score of 4 or more on the selected items shows a suspicion of insomnia, and a total score 6 or more indicates insomnia.

We asked participants “Do you want to gain or lose weight in the future?” and defined their perceptions of their ideal weight into the three groups: underweight, overweight, and standard weight. If current BMI was < 18.5, but they wished to lose weight or stay the same, participants were defined as wanting to be underweight. Those with a current BMI < 18.5 who wanted to gain weight were defined as wanting to be on standard weight. Those with a current BMI of  $\geq 25.0$  who wanted to gain weight or stay the same weight were defined as wanting to be overweight, and if they wished to lose weight, they were defined as wanting to be on standard weight. If current BMI was 18.5–24.9, those who wanted to lose weight were in the wanting to be underweight group, those who thought they needed to gain weight were in the wanting to be overweight group, and those who wished to stay the same weight were in the wanting to be a standard weight group (Fig. 1).

Participants were classified as having either good SRH (excellent, very good, or good) or poor/fair SRH (fair or poor). Independent variables were compared between groups. Differences in categorical variables between those with good and poor/fair SRH were evaluated using the chi-square test.

Multivariate logistic regression analysis was used to examine the relationship between dietary habits, lifestyle, physical activity, recognition of physique, and SRH, after adjusting for grade and smoking. The independent variables included UCLA activity score, AIS scores, frequency of breakfast consumption, and recognition of physique. Adjusted odds ratios and 95% confidence intervals were calculated. All statistical analyses used JMP 9.0.2 (SAS Institute Inc., Cary, NC, USA).

## Results

In total, 1305 women students participated in the periodic health examinations, of which 1101 completed the questionnaire, accumulating a response rate of 84.4%. The mean participant age was 19.7 years (standard deviation [SD] = 2.7; range = 18–46 years), and the mean BMI was 20.9 (SD = 3.0; range = 14.3–38.4).

Table 1 shows the responses to the question “Do you want to gain or lose weight in the future?” based on current BMI data which were classified as recognition of physique. Many students with a BMI < 18.5 or 18.5–24.9 wanted to lose weight. Participants’ grades, lifestyle habits, dietary habits, physical activity levels, recognition of physique, and SRH are shown in Table 2. The largest group under recognition of physique was those who wished to be underweight.

Table 1  
Do you want gain or lose weight in the future from your current level?

BMI (kg/m <sup>2</sup> )	All	I want to lose weight	I want to stay the same weight	I want to gain weight	p Value*
< 18.5	207 (18.8)	79 (38.2)	97 (46.9)	31 (14.9)	
18.5–24.9	805 (73.1)	713 (88.6)	88 (10.9)	4 (0.5)	
≥ 25.0	89 (8.1)	88 (98.9)	1 (1.1)	0 (0.0)	< 0.0001

Data expressed as n (%). \*Chi-square test was used. BMI: body mass index.

Table 2

Sociodemographic characteristics and lifestyle habits, dietary habits, and levels of physical activity

Variables	Number	Percent
Age (years)	19.7 ± 2.3 <sup>†</sup>	
Grade		
1–2	617	56.0
≥ 3	484	44.0
BMI (kg/m <sup>2</sup> )	20.9 ± 3.0 <sup>†</sup>	
Living status		
Living with others	812	73.7
Living alone	289	26.3
Smoking		
None	1083	98.4
Past smoker	12	1.1
Current smoker	6	0.5
Alcohol drinking		
None	820	74.5
A few times/month	182	16.5
A few times/week	91	8.3
Daily	8	0.7
UCLA activity score	4.4 ± 2.0 <sup>†</sup>	
AIS scores	3.8 ± 3.2 <sup>†</sup>	
Frequency of breakfast consumption	5.7 ± 1.9 <sup>†</sup>	
Physique recognition		
Want to be underweight	887	87.7
Want to be normal weight	208	18.9
Want to be overweight	6	0.5

<sup>†</sup>Values are mean ± standard deviation. BMI: body mass index; UCLA: University of California Los Angeles; AIS: Athens Insomnia Scale; SRH: self-rated health.

<b>Variables</b>	<b>Number</b>	<b>Percent</b>
SRH		
Excellent	307	28.0
Very good	246	22.4
Good	422	38.4
Fair	115	10.5
Poor	11	1.0
<sup>†</sup> Values are mean ± standard deviation. BMI: body mass index; UCLA: University of California Los Angeles; AIS: Athens Insomnia Scale; SRH: self-rated health.		

Table 3 shows the bivariate analysis of the independent variables with SRH. Grade and smoking were associated with SRH. However, because living status and alcohol drinking had no association with SRH, these two variables were not included in the logistic regression analysis. Table 4 shows the results of the logistic regression analysis of factors associated with poor/fair SRH in all participants. While UCLA activity score ( $\geq 5$  points) and AIS (insomnia group) were positively correlated with poor/fair SRH, there was a negative correlation with the wanting to be underweight group.

Table 3  
 Characteristics of the groups with good and poor/fair SRH

<b>Variable</b>	<b>Good SRH</b>	<b>Poor/fair SRH</b>	<b>p Value<sup>‡</sup></b>
Grade			
1-2	558 (90.4)	59 (9.6)	
≥ 3	417 (86.1)	67 (13.9)	0.027
Living status			
Living with others	726 (89.4)	86 (10.6)	
Living alone	249 (86.1)	40 (13.9)	0.136
Smoking			
None	964 (89.0)	119 (11.0)	
Past smoker	7 (58.3)	5 (41.7)	
Current smoker	4 (60.0)	2 (40.0)	0.001
Alcohol drinking			
None	731 (89.1)	89 (10.9)	
A few times/month	160 (87.9)	22 (12.1)	
A few times/week	78 (85.7)	13 (14.3)	
Daily	6 (71.4)	2 (28.6)	0.470
Data expressed as n (%). <sup>‡</sup> Chi-square test was used.			

Table 4  
Logistic regression analysis of factors associated with poor/fair SRH

Variable	Good SRH (n = 975)	Poor/fair SRH (n = 126)	OR	95% CI	P values <sup>§</sup>
Grade					
1–2	558	59	Ref		
≥ 3	417	67	1.29	0.86–1.94	0.216
Smoking					
None	964	119	Ref		
Past smoker	7	5	2.50	0.63–9.74	0.189
Current smoker	4	2	3.61	0.44–24.00	0.207
UCLA activity score					
≥ 5 points	710	106	Ref		
< 5 points	265	20	1.87	1.13–3.24	0.014
AIS scores					
Non-insomnia group	162	67	Ref		
Insomnia group	813	59	5.38	3.59–8.10	< 0.0001
Frequency of breakfast consumption					
≥ 6 days / week	309	57	Reference		
< 6 days / week	666	69	1.32	0.87–2.00	0.194
Recognition of physique					
Want to be normal weight	171	40	Reference		
Want to be overweight	3	2	3.14	0.38–20.93	0.261

Adjusted for grade and smoking. <sup>§</sup>Logistic regression analysis was used. UCLA: University of California Los Angeles; AIS: Athens Insomnia Scale, SRH: self-rated health.

Variable	Good SRH (n = 975)	Poor/fair SRH (n = 126)	OR	95% CI	P value <sup>§</sup>
Want to be underweight	801	84	0.44	0.28– 0.69	0.001
Adjusted for grade and smoking. <sup>§</sup> Logistic regression analysis was used. UCLA: University of California Los Angeles; AIS: Athens Insomnia Scale, SRH: self-rated health.					

## Discussion

This study has examined the relationships between the SRH of women students at a Japanese medical university and their demographic characteristics, lifestyle habits, dietary habits, and physical activity levels. Results indicated that UCLA activity score, AIS, and recognition of physique were significantly associated with poor/fair SRH. Overall, this cross-sectional observational study of lifestyle habits, dietary habits, and physical activity in women students revealed that lower physical activity and insomnia were significantly positively associated with poor/fair SRH. However, wanting to be underweight was significantly negatively associated with poor/fair SRH.

Insomnia has been identified as the most common sleep disorder [30]. Various insomnia risk factors have been identified in the general population, including being female and being obese, both of which increase the risk for chronic insomnia [31]. In this sample of female university students, we found low levels of obesity but high levels of insomnia. A cross-sectional study of students from seven universities in Poland found a strong positive correlation between insomnia levels and stress levels [32]. Another study in Japan validated the simplified Japanese version of the AIS (AIS-SJ) in relation to psychological problems [33]. Therefore, the students in our study may have had poor/fair SRH because of stress or psychological problems.

SRH was positively associated with physical activity, as shown in this study. This result is consistent with other findings about the relationship between physical activity and SRH in young adults [34, 35]. Several possible hypotheses could explain the relationship between physical activity and health, including physiological [36] and psychological hypotheses [37]. However, because females tend to judge their SRH as good or bad based on various factors (e.g., pain and mental/physical symptoms [38]), these findings likely reflect several combinations of factors. Whatever the precise reason, there is an independent association between a lower physical activity level and poor SRH, which is why public health programs encourage regular physical activity.

Most of the study participants were either normal weight or underweight, with very few overweight. Regardless, the majority of students wanted to be thinner. Interestingly, the group who wanted to be underweight still considered itself to be healthy. Baba et al. reported that wanting to be thinner was positively correlated with a sense of gain or loss about one's body, being praised, and sex role acceptance,

but it is negatively correlated with self-esteem and feelings of stress [39]. These psychological factors might affect the desire to be thin, as individuals may feel a sense of merit in losing weight. These studies, including the current study, suggest that many young women misinterpret appropriate body weight and have developed an erroneous body image and view of SRH. One study among Japanese young women [40] reported that groups of underweight women—both those with and without a desire to be thinner—required nutritional education to help them maintain an appropriate body weight. Because the young women in our study had a strong desire to be thin, providing health education designed to help them achieve recognition of an appropriate, science-based body weight will be an important strategy to prevent health problems caused by the inappropriate recognition of physique. We suggest, therefore, that any education designed to help young women understand and correctly rate their own health should include a psychological approach along with nutritional and health education.

This study had some limitations. First, it was conducted in a medical university and, therefore, was not population based. These participants may have had healthier lifestyles and been more health-conscious than the general population of the same age. Caution should therefore be exercised when generalizing these results to the general population, even among those in the same age group. Moreover, while the study's convenience sampling may have contributed to selection bias, the students still showed high levels of incorrect recognition of physique, suggesting that the results are likely to be valid. Next, this study employed the recognition of physique measure used by Noh et al. [28], but the validity of this approach has not been examined. Finally, because this study was cross-sectional, causal relationships could not be determined. In the future, we need to examine whether physical activity, sleeping, and recognition of physique are the results or causes of SRH.

## **Conclusion**

We conducted a cross-sectional study to investigate the relationship between SRH and BMI, lifestyle habits, and recognition of physique among women students at a medical university. We found that UCLA activity score, AIS, and recognition of physique were all significantly associated with poor/fair SRH. We suggest that health education that includes information about physical activity and sleeping is important for improving SRH among women students at this university. Additionally, to prevent health problems caused by the inappropriate recognition of physique, it is important to provide health education to enable young women to develop an appropriate recognition of the ideal physique that is grounded in science.

## **Abbreviations**

SRH: self-rated health, CSLC: the Comprehensive Survey of Living Conditions, BMI: body mass index; UCLA: University of California Los Angeles; AIS: Athens Insomnia Scale.

## **Declarations**

# Ethics approval and consent to participate

All participants provided written informed consent prior to participating in the study, which was approved by the Institutional Review Board of Suzuka University of Medical Science (approval no. 356). This study was conducted in accordance with the principles of the Declaration of Helsinki.

## Consent for publication

Not applicable.

## Competing interests

The authors declare that they have no competing interests.

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# Authors' contributions

MO, YW, TN, SU and TO designed the study. MO, YW and TN conducted the experimental work. MO, SU and TO analyzed the data, prepared the figure, and drafted the manuscript. All authors participated in data interpretation and revised the manuscript. The final version of manuscript was approved by all authors.

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## Figures

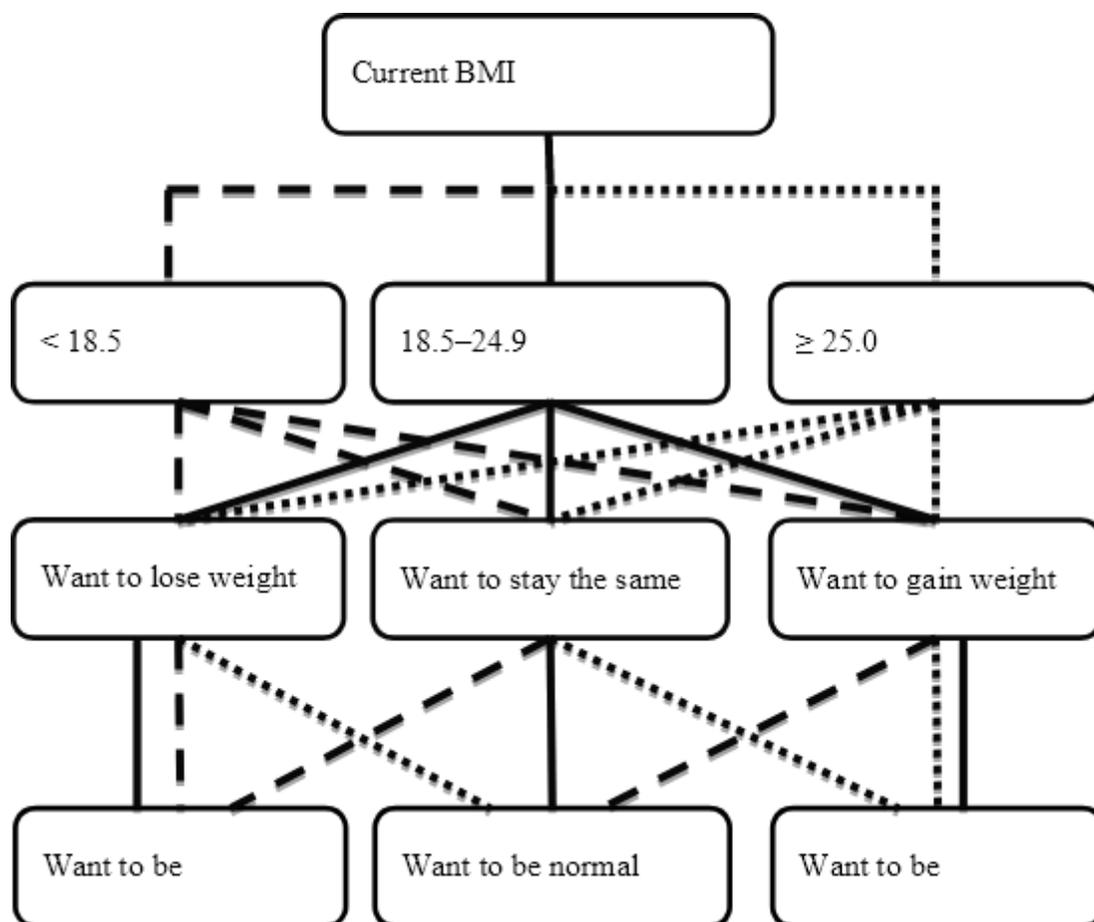


Figure 1

Classification of recognition of physique. The solid line represents ideal figure from BMI 18.5–24.9, the small dotted line indicates ideal figure from BMI  $\geq 25.0$  and the big dotted line indicates ideal figure from BMI  $< 18.5$