

# Are lifestyle factors significantly associated with self-rated health among 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 assessment. The transition from adolescence to young adulthood is a critical period involving substantial changes in lifestyle and dietary habits. Therefore, it is important to understand SRH among young Japanese females. The present study aimed to investigate the relationships between SRH among female healthcare students and their lifestyle factors, such as living status (living with others or living alone), smoking habit, alcohol consumption, frequency of breakfast consumption (FBC), physical activity, insomnia, and physique recognition.

**Methods:** A cross-sectional survey was conducted among a total of 1101 female healthcare students in Japan. Body mass index was calculated from body height and weight using data from periodic health examinations. Lifestyle habits, physical activity, and SRH were self-reported using several previously validated scales. Participants were classified as having either good SRH (excellent, very good, or good) or impaired SRH (fair or poor). Multivariate logistic regression analysis was performed to investigate independent relationships between SRH and lifestyle factors after adjusting for grade level.

**Results:** We observed that 11.4% of the participants demonstrated impaired SRH. Participants with grade  $\geq 3$  showed a significantly higher percentage (13.9%) of impaired SRH compared with those with grades 1-2 ( $p < 0.05$ ). Logistic regression analysis revealed that grade level, smoking habit, FBC, University of California Los Angeles activity score, Athens Insomnia Scale, and physique recognition were associated with SRH.

**Conclusions:** Our results suggest that young Japanese females believe that skipping breakfast, smoking, lack of exercise, and insomnia are unhealthy, whereas a slender physique is healthy.

## Background

Self-rated health (SRH), a subjective perception of an individual's overall health, is a widely used measure in public health assessment. 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, individuals with better SRH exhibit higher survival rates compared with 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 previously been established in multiple studies [3, 4]. Study results indicate that SRH can be affected by several lifestyle, diet, and biochemical factors [5, 6].

SRH of the general population in Japan is officially assessed 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 findings from 2016 found that 86.7% of males and 84.4% of females reported excellent, very good, or good SRH [7].

SRH assessment among adolescents is an effective way to evaluate their self-concept of health [8, 9]. In adolescents, a high SRH score is strongly associated with general well-being and psychosomatic symptoms [10, 11]. In Japan, studies have examined whether the younger generation's knowledge affects their health behaviors or SRH. For example, one study examined whether an accurate knowledge about the healthiness of foods contributed to desirable eating behaviors among of female university students [12]. Another study examined smoking knowledge and practices among male university students. It has been confirmed that a correlation is present between the awareness of bad lifestyle habits and smoking behaviors, healthy eating habits, and personality traits (e.g., feeling inferior) [13].

The transition from adolescence to young adulthood is a critical period during which an individuals' pre-existing habits may be disrupted [14]. Leaving one's parent's home and handling the education system at this age are both associated with negative changes in diet [15], which can have significant and long-lasting effects on the future health of individuals and their families [16, 17].

According to an international survey of university students from 22 countries, 70% of Japanese females reported that they were attempting to lose weight [18]. Moreover, Japanese females reportedly exhibit a strong desire to have a thin physique [19]. The annual National Health and Nutrition Survey conducted by the Ministry of Health, Labour and Welfare suggests that young Japanese females tend to have a thin physique. The 2016 survey found that there was a significant increase in the number of females who were "thinner (low body weight)" with a body mass index (BMI) of <18.5 compared with the proportion 10 years earlier, with 20.7% of women in their 20s falling into this category. Being thin is associated with several health issues in young women, and malnutrition among young women and pregnant women may increase the risk of lifestyle diseases in their children [20-23]. Therefore, it is important to examine and understand the relationships between the lifestyle and SRH among young Japanese females.

The aim of the present study was to investigate the relationships between SRH among Japanese female students and their lifestyle factors, such as living status, smoking habit, alcohol consumption, frequency of breakfast consumption (FBC), physical activity, insomnia, and physique recognition.

## 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 the study and were informed that there was no penalty for choosing not to participate. The paper-based questionnaire was distributed only to students who had provided written consent. Students who received the questionnaire completed it during the physical examination of their periodic health examination.

Body height and weight data were obtained from the periodic health examination. BMI was calculated as weight in kg/height in m<sup>2</sup>. Global SRH measures typically include the question “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 impaired health (fair or poor) [24-26].

The seven independent variables for this study were grade level (1-2 or  $\geq 3$ ), living status (living with others or living alone), smoking habit (none, past smoker, or current smoker), alcohol consumption (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) [27], Athens Insomnia Scale (AIS) (no insomnia or insomnia) [28-30], and FBC ( $< 6$  days/week or  $\geq 6$  days/week). We classified the participants into three groups based on physique recognition (“Want to be underweight,” “Want to be overweight,” or “Want to be normal weight”), as measured by the relationship between their current BMI and their desire to lose or gain weight. Physical activity was assessed using the UCLA activity score [27], which has used previously [31].

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 [28-30]. 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  $\geq 4$  on the selected items shows suspected insomnia, and a total score of  $\geq 6$  indicates insomnia.

Based on their current BMI, which was obtained via physical examination, we asked the participants “Do you want to gain or lose weight in the future?”. We classified their responses into three categories: “I want to lose weight,” “I want to stay the same weight,” and “I want to gain weight” (Table 1). Furthermore, based on Table 1, we defined physique recognition into the following three groups: “Want to be underweight,” “Want to be overweight,” and “Want to be standard weight.” If their current BMI was  $< 18.5$  but they desired to lose weight or stay the same weight, participants were defined as wanting to be underweight. Those with a current BMI  $< 18.5$  who desired to gain weight were defined as wanting to achieve standard weight. Those with a current BMI of  $\geq 25.0$  who desired to gain weight or stay the same weight were defined as wanting to be overweight, and if they desired to lose weight, they were defined as wanting to achieve standard weight. If their current BMI was 18.5–24.9, participants who desired to lose weight were classified as the wanting to be underweight group, those who desired to gain weight were classified as the wanting to be overweight group, and those who desired to stay the same weight were classified as the wanting to remain at the standard weight group (Fig. 1).

[Insert Table 1 here]

Participants were classified as having either good SRH (excellent, very good, or good) or impaired SRH (fair or poor). Differences in grade level, living status, smoking habit, alcohol consumption, UCLA activity score, AIS score, FBC, and physique recognition were compared using the Chi-square test, as appropriate.

A cross-tab table was created including items such as living status, smoking habit, alcohol consumption, UCLA activity score, AIS score, FBC, and physique recognition to display the distribution of participant characteristics based on whether they had good or impaired SRH.

Multiple logistic regression analysis was used to investigate independent relationships between SRH and living status, smoking habit, alcohol consumption, UCLA activity score, AIS score, FBC, and physique recognition, after adjusting for grade level. Adjusted odds ratios and 95% confidence intervals were calculated. All statistical analyses were conducted using JMP 9.0.2 (SAS Institute Inc., Cary, NC, USA).

## Results

Overall, 1305 female students participated in the periodic health examination, of which 1101 completed the questionnaire, thereby resulting in a response rate of 84.4%. Mean participant age was 19.7 years [standard deviation (SD) = 2.7; range = 18–46 years], and 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 their current BMI data, which were classified as physique recognition. Several students with a BMI of <18.5 or 18.5–24.9 desired to lose weight. The grade levels, lifestyle habits, dietary habits, physical activity levels, physique recognition, and SRH of the participants are shown in Table 2. The distribution of participant characteristics based on whether they had good or impaired SRH is shown in Table 3. For physique recognition, participants who desired to lose weight tended to believe that they were healthy. Table 4 shows the results of the logistic regression analysis of factors associated with impaired SRH in all participants. Although FBC for <6 days/week, smoking history (past smoker), UCLA activity score of <5 points, and AIS score indicative of insomnia were positively correlated with impaired SRH, a negative correlation was observed with the wanting to be underweight group.

[Insert Table 2 here]

[Insert Table 3 here]

[Insert Table 4 here]

## Discussion

The present study examined the relationships between SRH among Japanese female healthcare students and their lifestyle habits. The results indicated that FBC, smoking habit, UCLA activity score, AIS score, and physique recognition were significantly associated with impaired SRH. Overall, this cross-sectional observational study of lifestyle habits among Japanese female healthcare students revealed that skipping breakfast, past smoking, lower physical activity, and insomnia were significantly positively associated with impaired SRH. Further, the desire to be underweight was significantly negatively associated with impaired SRH.

Some dietary patterns, such as skipping breakfast, have been shown to be unhealthy lifestyle factors and food habits that reduce nutrient intake [32]. On the other hand, several individuals believe that the habit of eating breakfast is important [33], and our results also demonstrate that skipping breakfast is unhealthy. Therefore, it is important to encourage individuals who skip breakfast to change their lifestyle to form reliable breakfast-eating habits.

Although the number of students who reported current or past smoking was small and the relationship with SRH remains unknown, the results of this study found the interesting result that females with a smoking history considered themselves to be unhealthy.

Insomnia has been identified as the most common sleep disorder [34]. Various risk factors for insomnia, including female sex and obesity—both of which increase the risk of chronic insomnia, have been identified in the general population [35]. In the present study sample of female university students, we observed 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 the levels of insomnia and stress [36]. Another study in Japan validated the simplified Japanese version of the AIS (AIS-SJ) in relation to psychological issues [37]. Therefore, the students in our study may have had impaired SRH because of stress or psychological issues.

SRH was positively associated with physical activity in the present study. This result is consistent with other findings regarding the relationship between physical activity and SRH in young adults [38, 39]. Several possible hypotheses could explain the relationship between physical activity and health, including hypotheses from physiological [40] and psychological viewpoints [41]. However, because females tend to judge their SRH as good or bad based on various factors (e.g., pain and mental/physical symptoms [42]), these findings likely reflect several combinations of factors. Regardless of the precise reason, an independent association is present between a lower physical activity level and impaired SRH, which necessitates public health programs to encourage regular physical activity.

Most of the study participants were either normal weight or underweight, with very few being overweight. Regardless of this, most students desired to have a thinner physique. Interestingly, the group who desired to be underweight still considered itself to be healthy. Baba et al. reported that the desire to be thinner was positively correlated with a sense of gain or loss about one's body, being praised, and sex role acceptance but negatively correlated with self-esteem and stress [43]. These psychological factors might affect the desire to be thin because individuals may feel a sense of merit in losing weight. These studies, including the present study, suggest that several young females misinterpret appropriate body weight and have developed an erroneous body image and SRH viewpoint. One study conducted among young Japanese females [44] reported that groups of underweight females—both those with and without a desire to be thinner—required nutritional education to help them maintain an appropriate body weight. Therefore, we suggest that any educational intervention designed to help young females understand and correctly rate their own health and understand their appropriate body weight 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 was thus not population based. These participants may have followed healthier lifestyles and been more health-conscious than the general population of the same age. Therefore, caution should be exercised when generalizing these results to the general population, even among those in the same age group. Although the study's convenience sampling may have contributed to selection bias, the students showed high levels of incorrect physique recognition, suggesting that the results are likely to be valid. Second, in recent years, there have been studies that investigated body image among university students, such as the Health Behaviour in School-Aged Children (HBSC) study [18, 45, 46]. However, in these studies, although self-reported BMI was used to determine one's body image, self-reported height and weight bias was cited as a limitation. In the present study, we asked participants if they would like to gain weight from the BMI actually obtained by physical examination and further classified each student's ideal body physique by BMI and their self-report. Consequently, it was clarified that students who had misperceived their body image misunderstood that they were healthy. However, this survey method is a new approach that incorporates the survey methods of Noh et al [47] with reference to the HBSC survey method; therefore, further empirical testing is required. Third, in the present survey, participants were asked to complete a questionnaire about their desired body physique; this might lead to a social desirability bias, which projects a favorable image of themselves to avoid receiving a negative evaluation. Finally, because this was a cross-sectional study, causal relationships could not be determined. In the future, investigating whether skipping breakfast, smoking habit, physical activity, sleeping, and physique recognition are the results or causes of SRH is warranted.

## Conclusion

We conducted a cross-sectional study to investigate the relationships between SRH and lifestyle among female healthcare students at a Japanese medical university. Skipping breakfast, past smoking, UCLA activity score, AIS score, and physique recognition were all significantly associated with impaired SRH. Specifically, it was suggested that young females believe that skipping breakfast, smoking habit, lack of exercise, and insomnia are unhealthy and that having a slender physique is healthy.

## Abbreviations

AIS: Athens Insomnia Scale; BMI: body mass index; CSLC: the Comprehensive Survey of Living Conditions; FBC: frequency of breakfast consumption; HBSC: Health Behaviour in School-Aged Children; SRH: self-rated health; UCLA: University of California Los Angeles.

## 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.

### **Availability of data and materials**

The datasets used and/or analyses during the current study are available from the corresponding author on reasonable request.

### **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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## Tables

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	<i>p</i> -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 are expressed as n (%). \*Chi-square test was used. BMI: body mass index.

Table 2. Sociodemographic characteristics and lifestyle habits, dietary habits, and level of physical activity

Variable	Total (n = 1101)	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
FBC	5.7 ± 1.9 <sup>†</sup>	
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	889	80.7
Want to be normal weight	207	18.8
Want to be overweight	5	0.5
SRH		
Excellent	307	28.0
Very good	246	22.4

Good	422	38.4
Fair	115	10.5
Poor	11	1.0

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

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

	Good SRH (n = 975)		Poor/fair SRH (n = 126)	
	n	%	n	%
<b>Grade</b>				
1-2	558	90.4	59	9.6
≥3	417	86.1	67	13.9
<b>Living status</b>				
Living with others	726	89.4	86	10.6
Living alone	249	86.1	40	13.9
<b>FBC</b>				
≥6 days/week	310	84.5	57	15.5
<6 days/week	665	90.6	69	9.4
<b>Smoking</b>				
None	964	89.0	119	11.0
Past smoker	7	58.3	5	41.7
Current smoker	4	60.0	2	40.0
<b>Alcohol drinking</b>				
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
<b>UCLA activity score</b>				
≥5 points	265	93.0	20	7.0
<5 points	710	87.0	106	13.0
<b>AIS scores</b>				
Non-insomnia group	813	93.2	59	6.8
Insomnia group	162	70.7	67	29.3
<b>Physique recognition</b>				
Want to be underweight	805	90.6	84	9.4

Want to be normal weight	167	80.7	40	19.3
Want to be overweight	3	60.0	2	40.0

FBC: frequency of breakfast consumption; UCLA: University of California Los Angeles; AIS: Athens Insomnia Scale; SRH: self-rated health.

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

Variable	OR	95% CI		<i>p</i> -value <sup>§</sup>
		Lower	Upper	
<b>Grade</b>				
1-2	Ref			
≥3	1.52	1.04	2.20	0.028
<b>Living status</b>				
Living with others	Ref			
Living alone	1.30	0.87	1.95	0.206
<b>FBC</b>				
≥6 days/week	Ref			
<6 days/week	1.70	1.17	2.48	0.007
<b>Smoking</b>				
None	Ref			
Past smoker	5.07	1.57	16.37	0.007
Current smoker	3.54	0.64	19.70	0.149
<b>Alcohol drinking</b>				
None	Ref			
A few times/month	0.83	0.47	1.47	0.519
A few times/week	1.02	0.52	2.03	0.944
Daily	2.20	0.43	11.27	0.344
<b>UCLA activity score</b>				
≥5 points	Ref			
<5 points	1.90	1.15	3.13	0.012
<b>AIS</b>				
Non-insomnia group	Ref			
Insomnia group	5.71	3.87	8.44	<0.0001
<b>Physique recognition</b>				
Want to be normal weight	Ref			
Want to be overweight	2.67	0.43	16.45	0.293

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

## Figures

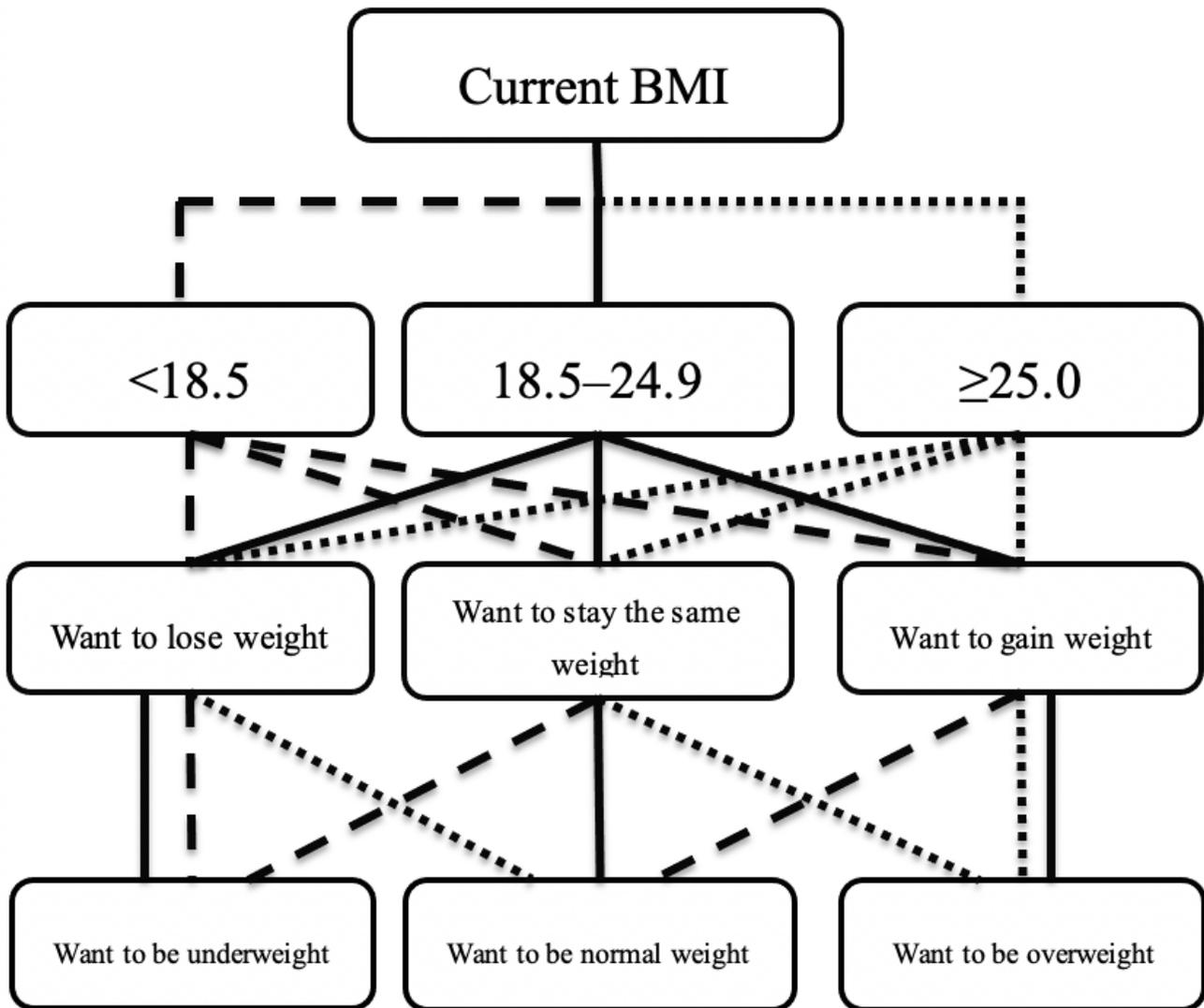


Figure 1

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

physique from BMI <18.5. BMI: Body mass index