

The Effects of Culture and Education on the Formation of Body Image and Exercising Behaviors: Focusing on Korean Female High School Students Who Attend an International School

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Abstract

The study investigates the effects of culture and education on the body image formation and exercising behaviors of Korean female high school students who attend an international school in South Korea. The study focuses on the concept of body image to examine how respondents perceive actual and desired self-images compared to Korean and U.S. female college students. The primary methodologies are chi-square test and difference in mean t-test. A self-administered survey was conducted, and the responses were compared to the survey results of the study of Lee and Moon (2018). The findings revealed that Chadwick International (CI) students have similar way of thinking with U.S. female college students except for how others perceive their appearance. As a result, CI students showed similar exercising behaviors with U.S. female college students. This study emphasizes that education, as a sub-concept of culture, has a prominent effect on the formation of the body image and resultant exercising behavior of female students. Therefore, we urge the introduction of school education programs that help improve student's physical and psychological well-being.

Keywords: Body Image, Culture, Education, Chi-Square Test, T-Test

1. Introduction

Various factors influence the formation of the body image of female students. Body image can be perceived and evaluated differently depending on culture (Jung and Lee, 2006). Considering that the ideal body shown through the media and the frequency of exposure is different in every region, the perfect beauty is diverse depending on the culture. It is said that comparing the standard with one's appearance is because the measure and degree of comparison differ depending on which culture one belongs to (Fallon, 1990). In particular, the degree of interest and involvement in women's behavior in

managing their appearance through body-related exercises, skincare, and makeup varies according to culture, such as individualism and collectivism (Markus and Kitayama, 1991).

Recently, women's interest in muscle building, which was thought to be the exclusive domain of men, is increasing, and such high interest is leading to action (Park and Chen, 2017). Jung and Lee (2006) investigated the existence of cultural differences between the dieting behaviors and body image perception of Korean and U.S. female college students. In a similar vein, Lee and Moon (2018) investigated the body image and dieting behaviors of Korean and U.S. female college students.

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According to Jung and Lee (2006), most women feel a difference between their current and ideal appearance. This difference, the degree of conformity, may vary depending on the individual's formed body image. The degree of conformity to the body image is the point of view of the theory of self-congruity. The theory of self-congruity states that the body image, defined as the totality of thoughts and feelings toward oneself, is different for every individual (Sirgy, 1982; Johar and Sirgy, 1991; Sirgy et al., 1991). The cause of this difference was explained as cultural factors according to individualism and collectivism (Markus and Kitayama, 1991).

Both Korean and U.S. female college students had the perception of wanting to lose their current weight. Still, the ratio of Korean female college students was significantly higher than that of U.S. female college students (Lee and Moon, 2018). On the other hand, the percentage of U.S. female college students was relatively higher than that of Korean female college students where they thought others perceived their weight as normal. This can be seen to imply that U.S. female college students have a positive view of their bodies compared to Korean female college students (Lee and Moon, 2018).

Our study was conducted by dividing weight training and cardiovascular activities regarding exercising behaviors following the methodology proposed by Lee and Moon (2018). Considering exercising behaviors as related to education, the study aims to broaden the understanding of high school girls by examining how exercising behaviors change depending on the influence of culture, education, and the degree of body image conformity. According to the culture to which an individual belongs (individualism or collectivism), it is said that women have various levels of exercising behaviors that meet the expectations and beauty standards of the culture to which they belong (Jung and Lee, 2006). In particular, it is said that women in most non-Western societies, belonging to a collectivist culture, tend to compare their appearance with those of others and are sensitive to other people's opinions on their appearance compared to women in Western societies of individualistic culture. In a similar vein, previous studies showed that women in non-Western cultures

consider dieting behaviors important and actively participate in diet-related activities (Lee et al., 2001; Lennon et al., 1999). This suggests that Korean female students are more aware and concerned about appearance-related information than American female students. In addition, this indicates that Korean female students tend to underestimate their physical attractiveness and are more critical of their bodies than U.S. female college students, which means that the gap between Korean female students' body image and their ideal body is more significant compared to U.S. female students.

Chadwick International (from now on referred to as CI) in 2021 has a suitable social experiment environment where many Korean students are provided with American education, which allows us to compare the effects of culture and education on their body image and exercising behaviors. Lee and Moon (2018) investigated the factors that formed the body image of Korean and U.S. female college students and the effect of the formed body image on their exercise behaviors. The results of their study are compared to the results of our study conducted through the same questionnaire. The survey resulted in 30 total responses (30 from Korean female high school students who attend an international school in South Korea).

Previous studies on body image formation have been conducted in various fields. First, factors that influence body image formation are family, friends or peers, teachers, society, media, et cetera (Ata et al., 2006; Ryu, 2019; Ra, 2020). According to Ata et al. (2006), low self-esteem and social support, weight-related teasing, and greater pressure to lose weight were associated with adolescents' negative body image and eating attitudes. According to Ra (2020), weight bias internalization increased considerably as the social pressure related to appearance increased. In contrast, it decreased when teachers and adolescents' relationship was close. Female children exposed to thinness-promoting messages (TPM) indicated a higher body image dissatisfaction than those not exposed to such messages. According to Ryu (2019), the discrepancies between BMI and subjective perception of body image showed significant differences according to parents' country of origin.

Several studies discuss the moderating effect of differences according to the subject's gender, age, or occupation (college major) on body image formation (Harrison, 2000; Maeng and Han, 2017; Yoon and Jung, 2018). These are studies about female college students, high school students, elementary school students, male students, dance majoring college students, etc. According to Harrison (2000), watching TV increased eating disorders in 3rd-grade children and their stereotypes about obese bodies. According to Maeng and Han (2017), gender, age, economic status, academic performance, and subjective health status have significant influences on the distortion of adolescent body image. According to Yoon and Jung (2018), the ideal body image of high school girls majoring in Korean dance is generally conceptualized as an abstract and ideal body, a body one could not have: the efforts of high school girls to achieve the ideal body image were derived from rigorous physical training, basic and extreme dieting, plastic surgery, medical procedures, medication, and basic body shape management such as acupuncture massage and physical therapy.

Other than that, several studies concern the effect of body image on certain behaviors such as depression and exercising behaviors (Maeng and Han, 2017). These include psychological well-being (dissatisfaction, depression, self-esteem), stress and suicidal thoughts, exercise, and health care. According to Maeng and Han (2017), body image distortion in adolescents significantly affects depression.

Finally, there are comparative studies similar to this study. These include gender comparison, international comparison, cultural comparison, etc. According to Grogan (2017), women generally have higher levels of body dissatisfaction than men. Women often want to lose weight, whereas men are equally likely to want to be heavier or lighter and want to be more muscular at all ages. However, sexuality, age, and psychological factors such as self-esteem and the internalization of body ideals impact these differences.

Our hybrid method is a methodology that uses the findings of previous studies as data. This method is used when multiple studies address a related question. For example, the hybrid method was used

in Carlsen et al. (1992), research on male fertility declining over the previous 50 years, since conducting research over the previous 50 years was impossible. Carlsen et al. (1992) uses data from multiple studies conducted throughout those years.

According to Herrera Ortiz et al. (2021), systematic literature reviews/meta-analyses of clinical trials are considered the best evidence in clinical research; thus, if performed appropriately, they can save resources by avoiding the development of unnecessary clinical trials.

Our study adopted the hybrid methodology, which combines past and current findings. Furthermore, the effects of the approximate four-year gap between Lee and Moon (2018) and our study and the differences between college and high school students on the quality of our study are negligible.

Our study compares the different nature of culture and education in the United States and South Korea. It aims to determine whether culture or education has a more significant impact on female high school students' body image formation and exercise behaviors. Our study assesses the similarity between Korean female high school students who attend an international school and US female college students and Korean college students who attend a Korean university regarding how they perceive their bodies. Also, our study aims to determine whether the relationship between body image formation and exercise behaviors is the same for all three groups of female students. The indicators of our statistical test procedures are the significance levels of chi-square test statistics of the responses to each question on the questionnaire from Lee and Moon (2018) regarding the formation of the body image and t-test statistics of those regarding exercising behaviors of Korean female high school students who attend an international school.

The contribution of our study is multifold. First, we separate culture and education, a sub-concept of culture, confirming their relative influence through statistical test procedures and showing that adolescents can form desirable exercising habits through school education. Our study takes a step toward school education programs that help students develop healthy body image and support students' physical and psychological well-being. Another

methodological uniqueness also deserves a note. We combine our data with those from previous literature. Our innovative hybrid method is helpful for researchers under research budget constraints.

The remainder of this paper is organized as follows. We introduce the data and variable calculations in section 2. In section 3, we discuss our findings. Concluding remarks appear in the final section.

2. Empirical Analyses

2.1 Hypothesis

This research can be divided into two large parts: perception of body image and choices of time spent on exercises. This research has four research hypotheses as follows.

Hypothesis 1-1

The perception of body image of CI female students will be closer to that of Korean female college students.

Since CI female students are Koreans living in South Korea, the influence of Korean media and Korean culture on their perception of their ideal body image and their self-image is inevitably significant. According to the results of studies examining the relationship between mass media and body image, it is known that in most cases, body image-related media messages affect women's body image satisfaction and self-satisfaction (Myers and Biocca, 1992; Stice and Shaw, 1994; Harrison and Cantor, 1997; Turner et al., 1997).

Hypothesis 1-2

The perception of body image of CI female students will be closer to that of U.S. female college

students.

The influence of education and teachers cannot be ignored. Jones et al. (2004) showed that internalization mediated the relationship between appearance conversations and body dissatisfaction for both boys and girls. In addition, internalization, appearance criticism, and BMI directly contributed to body dissatisfaction for both boys and girls. Therefore, the perception of body image of CI female students may be similar to that of U.S. female college students.

Hypothesis 2-1

The exercising time of CI female students will be similar to that of Korean female college students.

CI Korean students interact with their Korean family members every day. Therefore, Korean culture inevitably influences their lifestyle choices. Suppose culture inclusive of family environments has a prominent influence on the body image formation of CI female students. In that case, their exercise time may also be similar to that of Korean female college students.

Hypothesis 2-2

The exercising time of CI female students will be similar to that of U.S. female college students.

Since CI students spend a lot of time exercising and receive American education every day, their exercising time may be similar to that of U.S. college students. The need to consider more fully the contribution of experiences with peers to internalization and body image is especially crucial during adolescence when peer relationships play an increasingly prominent role in well-being and adjustment (Hartup, 1996). Table 1 displays the possible outcomes of our study.

Table 1. Sixteen possible outcomes

Outcome	H1-1	H1-2	H2-1	H2-2	Conclusion
1	Accept	Accept	Accept	Accept	Indeterminate
2	Accept	Accept	Accept	Reject	Exercising time similar to Korean
3	Accept	Accept	Reject	Accept	Exercising time similar to U.S.
4	Accept	Accept	Reject	Reject	Indeterminate
5	Accept	Reject	Accept	Accept	Body image similar to Korean
6	Accept	Reject	Accept	Reject	Body image and exercising time similar to Korean
7	Accept	Reject	Reject	Accept	Body image similar to Korean but exercising time similar to U.S.
8	Accept	Reject	Reject	Reject	Body image similar to Korean

9	Reject	Accept	Accept	Accept	Body image similar to U.S.
10	Reject	Accept	Accept	Reject	Body image similar to U.S. but exercising time similar to Korean
11	Reject	Accept	Reject	Accept	Body image and exercising time similar to U.S.
12	Reject	Accept	Reject	Reject	Body image similar to U.S. female
13	Reject	Reject	Accept	Accept	Indeterminate
14	Reject	Reject	Accept	Reject	Exercising time similar to Korean
15	Reject	Reject	Reject	Accept	Exercising time similar to U.S.
16	Reject	Reject	Reject	Reject	Indeterminate

2.2 Chi-Squared Test

The chi-squared test used in our study determines whether there is a statistically significant difference between the two groups' choices. Suppose the null hypothesis, which states that no statistical difference exists between two groups (e.g., male vs. female), is true. In that case, the test statistic computed from the observations across both gender groups follows the χ^2 distribution. A higher chi-square statistic means a more significant difference between the two groups.

We can use p-values to determine whether the correlation is statistically significant. The confidence level is equivalent to $(1 - \text{the significance level})$. If the significance level is 0.01, the corresponding confidence level is 99%. The correlation is statistically significant if the p-value is less than the significance level.

To determine whether the two groups are similar, we compare the p-value to the significance level. If the null hypothesis is true, we expect the same proportion of data in each group regardless of the other. Having obtained the expected values, we compare them with the two groups' observed values. To do this, we calculate the chi-square statistic.

Let us explain with a more specific example.

We wish to know whether there is an association between becoming an ARMY (BTS fans) and the gender of the participants. For example, two groups of non-K-pop fans undergo two weeks of viewing a video of BTS every day. One group consists of 100 male participants, and the other consists of 90 female participants. After two weeks, we asked them whether they had become an ARMY. For males, 50 replied 'Yes,' and 50 replied 'No,' and for females, 70 replied 'Yes,' and 20 replied 'No.' We can display this data in a 2×2 contingency (frequency) table, shown in table 2.

We test the equivalent null hypothesis of (the

proportion of eventual BTS fans in the male group = that in the female group) and (the proportion of eventual non-BTS fans in the male group = that in the female group). To test this hypothesis, we compare what to expect if the hypothesis were true with what we observed. We observed 120 out of the total 190 participants who became an ARMY (63%). Therefore, if there is no association between becoming an ARMY and the gender of the participants, we expect 63% of each gender group to become an ARMY:

63% of 100 = 63 males should become an ARMY, and

63% of 90 = 57 females should become an ARMY.

Table 2. Becoming a fan (observed)

Gender	Became an ARMY		
	Yes	No	Total
Male	50	50	100
Female	70	20	90
Total	120	70	190

We observed 70 out of the total 190 who did not become an ARMY (37%). Therefore, if there is no association between becoming an ARMY and the gender of the participants, we expect 37% of each gender group not to become an ARMY:

37% of 100 = 37 males should not become an ARMY, and 37% of 90 = 33 females should not become an ARMY.

We can draw the contingency table (table 3), where the figures are the expected frequencies.

Table 3. Becoming a fan (expected)

Gender	Became an ARMY		
	Yes	No	Total
Male	63	37	100
Female	57	33	90
Total	120	70	190

Having obtained these expected values, we compare them with what we observed. To do this, we calculate the χ^2 statistic shown below.

$$\chi^2 = \sum (\text{Observed} - \text{Expected})^2 / \text{Expected} \quad \text{Eq. 1}$$

Subtract each expected value from the corresponding observed value. Square this result, then divide by the corresponding expected value. Calculate this quantity for each cell in the table and find the sum. Thus, the value of χ^2 is 15.33.

The χ^2 statistic is small when the null hypothesis (no difference) is true since we calculate the expected values assuming the null hypothesis is true. The term (Observed - Expected) will be small if the observed data lies close to the expected data.

Since our chi-square statistic is 15.33, the p-value is less than 0.01. Therefore, we reject the null hypothesis. That is, there is a statistical difference between becoming an ARMY with respect to the gender of the participants.

2.3 Data Analysis

Chadwick International (CI) was founded in Songdo International City, Republic of Korea, in 2010. According to Mr. Hill, the Head of School, CI has 1400 students enrolled from PK to grade 12 as of 2022.

CI high school consists of 380 students, and 160 students are females. The high school has 59% Korean, 18% American, and 23% international students, according to the passports submitted during the application. Female students are 77% Korean, 16% American, and 7% international. The community is inclusive and welcoming. However, Korean students mainly engage with and speak Korean with each other. Also, some students, including myself, submitted American or international passports but have Korean parents and are fluent in Korean. Furthermore, the school celebrates Korean holidays. Therefore, school culture is considered more Korean, especially for Korean students.

On the other hand, school education is ever so American. The school schedules academic curriculum and semesters according to the U.S.

academic calendar, and the faculty follows academic integrity guidelines based on the U.S. educational system. In addition, the school continuously educates equality and inclusion regarding race, gender, sexual orientation, personal interests, etc., via club recruitments and educational events.

The survey of this study was conducted through Google Forms in December 2021. Finally, 30 responses were found to be valid and were used in this study (table 4). Invalid responses are cases where the respondents are not Koreans nor females.

One of the critical variables of this study is education. Therefore, if the impact of education is significant, if the period of attending CI is short, the educational effect may be insufficient, and respondents' responses may be similar to those of Korean female college students. In the case of this study, 80% (24 out of 30) of the respondents had attended school for three years or more. Therefore, we judged that there was enough attending time for the effects of American education to occur.

Table 4. Descriptive statistics

Variables	N	Min	Max	Mean	Standard deviation
Grade	30	9	12	10.43	0.97
Duration at CI [®]	30	1	4	3.37	1.15
Body weight	30	0	2	0.47	0.57
Muscle	30	1	2	1.43	0.50
Body image	30	2	4	2.50	0.63
Image perceived by others	30	2	4	2.47	0.57
Hours of weight training [®]	30	1	3	1.73	0.98
Hours of cardiovascular activities [®]	30	1	5	3.33	1.29

[®]In this study, unlike Lee and Moon (2018)'s, which uses a continuous variable, for the convenience of the students (respondents) in answering the survey, the range of responses was determined, and the maximum value of the range was used as the variable value. For example, if the student selected '2-3 hours' as their exercising time, the variable value was entered as 3.

Since weight perception and body image are categorical variables, the average has no special meaning. In the table above, the continuous variable relates to hours of exercise. The exercise was divided into weight training and cardiovascular activities in the survey conducted. However, in this case, for the convenience of the respondents, the range of each option was given as well. Therefore, the meaning of the average was diluted.

3. Discussion

Although our study is an international comparison, Korean and U.S. female college students were not directly surveyed. Instead, data from Lee and Moon (2018) were used. An integrated display of the survey responses of our study and the data from Lee and Moon (2018) is shown in table 5 and 7.

The results of the chi square test using the table 5 are shown in table 6 below. In the case of Lee and Moon (2018), Korean and U.S. female college students responded differently to the three questions other than regarding their own body image. Our study found that CI students' responses to "I think I am very under-weighted" question were also similar to Korean and U.S. female college students as shown in table 6. Please refer to the appendix for more on detailed survey questions.

On the other hand, when looking at the first "I'm trying to Lose my weight" question, CI female students showed a statistically significant difference from Korean female college students at a significance level of 5%. The same results were demonstrated for the second "I'm trying to Lose my muscle mass" question. The interpretation of these results will be comprehensively explained with the exercising behaviors below (table 8).

Lastly, looking at other people's perception of their own body, CI female students differed from Korean female college students (5% significance level) as well as U.S. female college students (1% significance level) (table 6). Since this question seeks judgment based not on a respondent's perspective but on the culture in which the respondent belongs, it is natural for Korean female CI students to respond more similarly to Korean female college students. However, in the case of the CI sample, the fact that

no student selected choice 1 (very under-weighted) or choice 2 (somewhat under-weighted) or both out of 5 choices for three questions, as shown in table 5, seems to have had an effect.

Table 5. Integrated survey responses: Categorical variables

Questions		Korea		CI		U.S.	
		N	%	N	%	N	%
I'm trying to	Lose my weight	149	77	17	57	74	60
	Maintain my weight	38	20	12	40	49	39
	Gain my weight	5	3	1	3	1	1
Total		192	100	30	100	124	100
I'm trying to	Lose muscle mass	4	2	0	0	1	1
	Maintain muscle mass	64	33	17	57	61	46
	Build muscle mass	125	65	13	43	70	53
Total		193	100	30	100	132	100
I think I am	Very underweight	1	1	0	0	0	0
	Somewhat underweight	14	7	0	0	8	6
	Normal	109	56	17	57	78	58
	Somewhat overweight	54	28	11	37	46	34
	Very overweight	16	8	2	6	3	2
Total		194	100	30	100	135	100
Other people would see me as	Very underweight	6	3	0	0	1	1
	Somewhat underweight	35	18	0	0	15	11
	Normal	107	55	17	57	96	73
	Somewhat overweight	36	19	12	40	15	11
	Very overweight	10	5	1	3	5	4
Total		194	100	30	100	132	100

Note: Reconstruction of table 1 from Lee and Moon (2018)

Table 6. Chi-square test results

Questions	Hypothesis	Chi-square statistics	Conclusion
I'm trying to lose/maintain	CI = Korea	6.27**	Reject (5% significance)

/gain my weight	CI = U.S.	1.22	Accept
I'm trying to lose/maintain/build muscle mass	CI = Korea	6.49**	Reject (5% significance level)
	CI = U.S.	1.23	Accept
I think I am very underweight/some-what underweight/normal/somewhat overweight/very overweight	CI = Korea	3.10	Accept
	CI = U.S.	3.43	Accept
Other people would see me as very underweight/some-what underweight/normal/somewhat overweight/very overweight	CI = Korea	12.10**	Reject (5% significance level)
	CI = U.S.	16.58***	Reject (1% significance level)

*, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

Table 7. Integrated survey responses: Numerical variables

Questions	Korea		CI		U.S.	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Weight training	0.8	1.8*	1.7**	0.9	1.5	1.8*
Cardiovascular activities	1.5	2.7*	3.3**	1.2	3.2	2.7*

*The research of Lee and Moon (2018) has no information on variance. Therefore, after assuming the same variance between the two groups; Korean and the U.S., the variance was calculated through inverse calculation of their t-statistic. This is a limitation of our research.

**In this study, unlike Lee and Moon (2018)'s, which uses a continuous variable, for the convenience of the students (respondents) in answering the survey, the range of responses was determined, and the maximum value of the range was used as the variable value. For example, if the student selected '2-3 hours' as their exercising time, the variable value was entered as 3.

Table 8. Hours of exercise t-test results

Questions	Hypothesis	t statistics	Conclusion
Weight	CI = Korea	3.91***	Reject (1%

training	CI = U.S.	0.99	Accept
	CI = Korea	5.66***	Reject (1% significance level)
Cardiovascular activities	CI = U.S.	0.28	Accept

*, **, *** denote significance at the 10, 5 and 1 percent level, respectively.

The test results showed that CI female students spent more time exercising than Korean college students. The results were similar to U.S. female college students. Combining this with the analysis of body image described earlier, CI female students were closer to U.S. college students in terms of their behaviors regarding weight and muscle. As a result, the exercise method and duration were similar with U.S. female college students. Overall, our results approach outcome 11 (table 1).

This study expands its scope by applying the theory of self-congruity (Litvin and Kar, 2004; Quester et al., 2000; Sung and Choi, 2012), which was limited to studies relating cultural factors with body image, on the study of the influence of education. Since CI female students had similar way of thinking with Korean female college students regarding others' perception of their appearance, this study supports that the body image presented by the media affects female students' ideal body image. However, since CI female students showed similar responses with U.S. female college students regarding their body image and exercising behaviors, the degree to which media exposure had little effect on value perception is interpreted as supporting the study of Lee and Moon (2018), which states that Korean and U.S. female college students have different criteria of evaluating their appearances. This, in turn, affects their exercising behaviors. This study has its academic significance in subdividing the scope of applying the theory of self-congruity by introducing the educational environment as an influencing variable of exercising behaviors.

Furthermore, although the general standards of beauty are similar worldwide, it is meaningful that this study empirically revealed the influence of culture on women's body image formation and that the educational environment affects the impact of body image on exercising behaviors. As pointed out by Jung and Lee (2006), this study is conducted by

applying the influence of education on the study of body image under collectivist culture. According to the results of our study, education has a significant impact on female students' body image formation. Therefore, this research suggests introducing education programs for healthy body image formation.

4. Conclusion

This study aims to examine the effects of culture and education on body image formation by separating the influence of culture and education on body image formation of Korean female students who attend an American high school that offers American education. The study also aims to shed light on the differences between the exercising behaviors of CI female students and Korean female college students in different educational environments and CI female students and U.S. female college students in two different cultural areas.

The results showed that CI female students showed similar perceptions with Korean female college students only regarding others' perception of their appearance and at the same time similar perceptions with U.S. female college students regarding their body image and exercising behaviors. In other words, it can be said that social and cultural communication related to appearance directly affects the behavior of teenage women but also indirectly affects the formation of social norms. The results of this study support that the cultural factor has different influences on how female students evaluate their body image, as stated in studies that apply the theory of self-congruity (Litvin and Kar, 2004; Quester et al., 2000; Sung and Choi, 2012). According to individualistic and collectivist cultures, cultural factors explain the causality of this difference, and western societies were considered to have a high tendency toward individualism (Markus and Kitayama, 1991). However, the results of our study differ from those of previous studies that point out that Korean female students are relatively dissatisfied with their appearance compared to U.S. female students (Park, 2000; Jung and Lee, 2006; Kim and Kim, 2007). We conclude that school education changes the students' body image as shown in our

paper.

Another methodological uniqueness also deserves a note. We combine our data with those from previous literature. Our innovative hybrid method is helpful for researchers under research budget constraints. In short, our innovative hybrid approach is both cost efficient and purpose-rational.

The limitations of this study are as follows. First, the survey respondents for testing the hypotheses are limited to female high school students who attend an international school in Incheon, South Korea. We are not able to survey both female high school students in Korea and the U.S. Instead, we use the college students' data from Lee and Moon (2018). Also, there is a possibility that the influence of socio-cultural communication may work differently depending on age groups. For example, in the growing stage, adolescents are physically changing and psychologically sensitive. In this regard, it is necessary to pay attention to the interpretation of our study results.

Second, in our study, unlike Lee and Moon's, which uses a continuous variable, for the convenience of the students (respondents) in conducting the survey, the range of responses was asked, and the maximum value of the range was used as the variable value. As the survey was conducted online, meaningful research results could be derived; however, there is a possibility that the accuracy may decrease.

Third, the research of Lee and Moon (2018) has no information on variance. Therefore, after assuming the same variance between the two groups, the variance was calculated through inverse calculation from the t-statistic. In other words, there may be differences between the accurate results based on precise information on variance and the results of applying the variance calculated through inverse calculation of the t-statistic, which is directly related to the purpose of our study. Therefore, in the follow-up study, it is suggested to directly survey all respondents to calculate the accurate variance to analyze the groups accordingly and investigate the differences between them.

Lastly, this study investigates the influence of culture and education on body image formation and exercising behaviors. However, the study cannot

determine the types and aspects of educational environments that affect body image formation and exercise behaviors. Therefore, as a follow-up study, it is considered meaningful to investigate the causal relationships between education systems, body image formation, and exercise behaviors.

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Appendix

Questionnaire:

Part A. Demographic questions

Do you consider yourself a Korean female student?
I am in grade ?
How long have you been attending Chadwick International?

Part B. Body Image questions (5-point Likert scale)

At present, I'm trying to Lose my weight.
At present, I'm trying to Lose my muscle.
I think I am very under-weighted.
When looking at me, most other people would think I am very under-weighted.

Part C. Exercising behaviors (Numerical variable)

On average, how much time do you spend on weight training in a week?
On average, how much time do you spend on cardiovascular activities in a week?