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Relationship Between Fundamental Daily Living Habits and Health Literacy Exhibited by Self-Care Behavior in Sixth-Grade Students of Japanese Elementary Schools

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Abstract

Background: The purpose of this study is to elucidate the relationship between fundamental daily living habits and health literacy exhibited by self-care behaviour in sixth-grade students in Japanese elementary schools by verifying the association of actual status of fundamental daily living habits with awareness of behavioural and health contingencies and healthy behavioural choices.

Methods: In this study, a cross-sectional survey was undertaken with 287 sixth-grade students in Japanese elementary school. The questionnaire consisted of three elements of status of basic lifestyle habits, behavioural and health contingencies, and healthy behavioural choices.

Results: These results indicate that while fundamental daily living habits are formed by including behavioural and health contingencies, the association of awareness of contingencies and behavioural choices with their actual status is not clear. It is found that during childhood, there is a risk of interruption in the awareness about the acquired behaviours and health contingencies, and it is evident that sustaining such awareness is necessary.

Conclusions: This study makes a significant contribution to the literature because there are very few studies on children's fundamental daily living habits from a health literacy viewpoint and it is not clear whether the fundamental daily living habits are associated with self-care ability as health literacy.

Background

Fundamental daily living habits, such as diet, exercise, sleep, and excretion, are central to living an independent life. Some recent studies have reported that childhood daily living habits directly impact daily living habits after school-age[1] and adolescence.[2] Furthermore, they suggested that undesirable daily living habits are likely associated with a subsequent heightened risk of lifestyle-related diseases. This implies that the fundamental habits of daily living, while being necessary behaviors, are also healthy behaviors at the same time. Lifestyle-related diseases rooted in daily living habits are on the rise worldwide, and it has been pointed out that health education in childhood is essential.[3–5]

Since 2000, health literacy, as an explanatory factor for healthy behavior, has received increasing attention. The National Institute of Health (NIH) defined health literacy as "the degree to which individuals can obtain, process, and understand basic health information and services needed to make appropriate health decisions".[6] Health literacy as a concept effectively practices health-protective behavior and instructs patients with chronic diseases on lifestyle management.[7,8] However, Paasche-Orlow and Wolf have pointed out the problem of focusing solely on the abilities and suggested the necessity of capturing the causality between health literacy and health outcomes.[9] Accordingly, they proposed a clear understanding of health literacy in three behavior areas: acquisition and utilization of health information, the relationship between the patient and the medical personnel, and self-care.

Self-care ability as health literacy is a knowledge-based behavior that can be utilized and applied in various situations (Cajita *et al.*, 2016; Marciano and Camerini, 2019).[10,11] The necessity of health literacy education for children was suggested way back in the 1970s by Paulo Freire, Jean Piaget, and Lev Vygotsky; Borzekowski suggested the necessity of health literacy education for children.[12] It is said that children nearly finish acquiring the fundamental habits of daily living through training at home and living in a group by around the age of five.[13] However, as shown by Kennedy and Floriani,[14] while the fundamental habits of daily living acquired are relatively stable until the age of nine to 11 years, beyond that period, they start to deteriorate gradually. Similar trends have been observed in Japan. A longitudinal comparison of fourth- and fifth-grade students over two years in elementary school showed that the behavior's regularity and content gradually diminished as children advanced to higher grades. Quality tends to deteriorate as well.[15] Thus, daily living habits once acquired tend to fade away as early as the elementary school years, and this suggests that fundamental habits of daily living and self-care as health literacy, despite similar behaviors, may not be linear.

Education on fundamental daily living habits in early childhood focuses on learning behavior as "form (pattern)" and aims to habituate by repeatedly executing the form.[16] Such education is important from the standpoint of behavioral independence and, to an extent, life under the supervision of a guardian. It is also likely to function effectively from a health perspective. However, as the range of behavior expands with age, children's daily living habits tend to be affected by various external factors. They may need to adjust their behavior to maintain their health under such circumstances. In modern society, where the childcare environment has become complicated due to the diversification of values, fostering children's health literacy has become even more critical. Abrams *et al.* suggested that adolescent health literacy is a continuum over time, following a developmental trajectory from infancy to adolescence, with more health knowledge and skills acquired as a person grows.[17] However, there are hardly any studies on children's fundamental daily living habits from a health literacy perspective.[18] Further, it is not clear whether fundamental habits of daily living are associated with self-care ability as health literacy.

Accordingly, the purpose of this study was to elucidate the relationship between fundamental habits of daily living and health literacy exhibited by self-care behavior in sixth-grade students of Japanese elementary schools, by verifying the association of the actual status of habits of daily living with an awareness of behavioral and health contingencies and healthy behavioral choices.

Research Method

Method and subjects

This study used a cross-sectional survey.

For two years, an anonymous self-report questionnaire was distributed to 287 sixth-grade students in a public elementary school in Japan, which was approved by the elementary school principals' association. After a two-week retention period, responses were collected through homeroom teachers. To conduct the

survey, a written request to participate was distributed to the guardians in the form of a letter from the school principal explaining the study's purpose, voluntary participation, and privacy protection. For ethical considerations, the study's purpose and non-compulsory participation were explained to the children of the researchers.

Questionnaire

The questionnaire consisted of the following three elements: actual status of diet, sleep, excretion, and exercise; awareness of contingencies of diet, sleep, excretion, exercise, and health; and healthy behavioral choices.

Actual status

The single-choice method was used with four options from “very healthy” to “unwell” to enable physical health evaluation on a four-point scale. A similar single-choice method was used for mental health with four options, from “very happy” to “depressed.” For sleep, questions comprised six items that included wake-up time, bedtime, and sleep status, and for sleep status, the multiple-choice method was used. For diet, the questions were on time, quantity, and appetite for breakfast, lunch, afternoon snacks, dinner, and late-night snacks, respectively. The quantity of dietary intake was evaluated on a 3-point scale, whereas appetite was evaluated on a 4-point scale. For excretion, a single-choice method was used with options on the frequency and nature of defecation. For exercise, a multiple-choice method was used with five options for status.

Awareness of behavioral and health contingencies

There were five items on behavioral and health contingencies for questions on a diet, such as “I think eating is important for health” and “I eat as much as I like whenever I want,” and a multiple-choice method was used. Likewise, for excretion, four items, such as “It is necessary to defecate once a day” and “I think defecation is related to health.” For exercise, four items, such as “I think exercise is necessary for good health” and “I feel good if I move my body or perform physical activities” were used. Furthermore, for both excretion and exercise, a multiple-choice method was used.

Healthy behavioral choices

In clarifying intentionally selected behavior, the subjects were asked, “What specifically do you do for your health?” For diet, five items such as “I eat nutritionally balanced foods,” and “I eat at regular times” were used. For excretion, four items such as “I go to the toilet at a fixed time every day” and “I eat a lot of vegetables” were created. For exercise, four items such as “I exercise outside as much as possible” and “I do not perform physical activities as much as possible to avoid getting tired” were used. Furthermore, for all areas, a multiple-choice method was adopted.

Results

The questionnaire was distributed to 287 sixth-grade students in Japanese elementary schools, and responses from 245 students were collected (85.4% response rate). After excluding incomplete responses from three students, an analysis was performed on the responses of 242 students (84.3% valid response rate). Of the respondents, 122 were boys, 100 were girls, and 20 did not provide gender information.

Habits of daily living and health status

Students who responded as “very healthy” or “healthy” accounted for 89.3% of the respondents, while 78.9% replied that they were “very happy” or “feel calm.” For sleep, the mean duration is 8.5 hours, and while 24.8% responded that they “slept soundly,” 35.1% responded that they “cannot sleep.” Only two students reported skipping breakfast. Of the respondents, 81.8% ate afternoon snacks, while 23.1% reported eating late-night snacks. The quantity of dietary intake during lunch tended to be lower than that during dinner, and appetite showed a similar trend. Regarding excretion, 86.8% of the students reported a defecating frequency once per day or two, and the majority reported a normal stool. Regarding exercise, 48.4% reported sports activities in clubs or outside the school.

Awareness of behavioral and health contingencies

Regarding the questions relating to diet and health contingencies, 90.5% responded that “I think eating is important for health,” while very few chose the other four options including negative diet and health contingencies, accounting for less than 6.1%. Regarding the questions about defecation and health contingencies, 48.8% responded that “I think defecation is related to health”; a higher percentage of students (61.6%) responded to the awareness about regularity by selecting “‘It is necessary to defecate once a day.” The negative response to the contingency “If I do not feel pain, it does not matter if I do not defecate” was cited by 7.0% of the respondents. The response to the awareness of exercise and health contingencies' exercise is necessary for health was cited by 74.4% of the respondents. Negative responses to exercise and health contingencies were cited by 0.4% of the respondents (Table 1).

Choice of healthy behavior

The proportions of children's behavioral choices regarding diet, excretion, and exercise are shown in Table 2. For diet, about half of the children selected “I eat nutritionally balanced foods” and “eat meals at a fixed time,” while for excretion, 19.0% selected “I go to the toilet at a fixed time every day.” For exercise, 55.4% responded, “I exercise outside as much as possible.”

Association of awareness on daily living habits and health contingencies with a healthy behavior choice

For each of the areas of diet, excretion, and exercise, a chi¯square test was conducted by dividing the respondents into two groups based on the presence or absence of awareness of the associated health contingencies and the presence or absence of healthy behavior choice.

Diet

Awareness of diet and health contingencies was significantly associated with the presence or absence of a “nutritionally balanced diet” ($\chi 2=4.8$, $p<0.05$). In the group with an awareness of the contingency, many exhibited healthy behavior choices.

Excretion

Awareness of excretion and health contingencies was found to be significantly associated with the presence or absence of “I eat a lot of vegetables” ($\chi^2=4.5$, $p<0.05$). Many students in the group were aware of the contingency and reported eating many vegetables. However, there is no association between awareness of the contingency and the idea that it is necessary to defecate once a day. Conversely, the idea that it is necessary to defecate once a day is found to be significantly associated with the reported status of once-a-day defecation ($\chi^2=25.9$, $p<0.01$).

Exercise

The awareness of exercise and health contingencies is found to be significantly associated with the behavior of “I do not perform the physical activity as much as possible to avoid getting tired” ($\chi^2=6.5$, $p<0.05$). Further, the response to not performing physical activities was significantly lower in the group supporting the idea that exercise is essential for health.

The effect of awareness of contingencies and healthy behavioral choice on the status of health

Two-way analysis of variance (ANOVA) was performed using the presence or absence of awareness of behavioral and health contingencies and the presence or absence of healthy behavioral choices as independent variables. Moreover, health status, physical health level, and mental health level are dependent variables to analyze health status associated with awareness and behavior.

Diet

Two-way ANOVA was performed using awareness of contingencies and choice of “nutritionally balanced diet” behavior as independent variables, and quantity of dietary intake, appetite, physical health level, and mental health level as dependent variables. The quantity of dietary intake was rated from 3 (large amount) to 1 (small amount). While appetite was rated from 4 for “excellent” to 1 for “none at all.” The results indicated no significant differences in the quantity of dietary intake, but appetite showed significant differences among breakfast, lunch, and dinner (the corresponding results in that order are $F=4.28$, $p<0.05$; $F=8.09$, $p<0.01$; $F=5.70$, $p<.01$). Of the groups with awareness on contingency, the group selecting “balanced diet” shows a significantly high appetite.

Physical health level was rated from 4 for “very healthy” to 1 for “unwell,” while mental health level was rated from 4 for “very happy” to 1 for “depressed.” The results indicate that awareness of contingencies has significant differences depending on the mental health level ($F=4.73$, $p<0.05$). Of the groups with awareness on contingency, mental health level and physical health level are high for the group selecting “balanced diet.”

Excretion

Two-way ANOVA was performed using awareness of contingencies and choice of “I go to the toilet at a fixed time every day” behavior as independent variables, and frequency of defecation, physical health level, and mental health level as dependent variables. The frequency of defecation was rated from 4 for “once a day” to 1 for “often no defecation in four days or more.” The results indicated no significant differences in any of the options.

Exercise

As for the benefits of exercise, dietary intake, appetite, physical health level, and mental health level were targeted. A similar two-way ANOVA was performed using awareness of contingencies and the presence or absence of a choice of “exercise outside” behavior as independent variables and the benefits (positive consequences) as dependent variables. The results indicate significant differences for breakfast volume, dinner volume, late-night snacks volume, lunch appetite, and dinner appetite (the corresponding results in that order are: $F=3.76$, $p>0.05$; $F=2.71$, $p<0.05$; $F=3.16$, $p<0.05$; $F=4.73$, $p<0.01$; $F=4.70$, $p<0.01$). Of these, breakfast volume, afternoon snack volume, and late-night snack volume showed significant interactions ($F=7, 36$, $p<0.01$; $F=5.26$, $p<0.05$; $F=5.50$, $p<0.05$). Figure 1 shows the interaction impact on breakfast volume due to the presence or absence of “awareness of exercise affecting health” and the presence or absence of “exercise outside as much as possible.” Among the groups with an awareness of contingencies, the breakfast intake volume was higher in the group selecting “I exercise outside as much as possible.” The group not selecting “perform physical activities outdoors as much as possible” behavior shows a lower breakfast intake volume.

Conversely, among the groups without awareness of contingencies, breakfast intake volume was lower in the group selecting “perform physical activities outdoors as much as possible” behavior. The group not selecting “perform physical activities outdoors as much as possible” behavior shows a higher breakfast intake volume. The contradictory association between this choice of behavior and the quantity of dietary intake observed in the group without awareness of contingencies was observed for afternoon snacks and late-night snacks.

Discussion

The study results indicate that about 90% of sixth-grade students in elementary school are in good health and exhibit good mental health status. While 80% of the children maintained good daily living habits concerning diet and excretion, the proportion of sleep was 65%, and the proportion of exercise habits was 50%. In a study on sixth-grade students in elementary schools in Taiwan, Shih *et al.* found that 90% of the children were in good health and thought it was quite normal.[18] For daily living habits, both the behaviors of refraining from sugar-rich foods and exercising regularly apply to 40% of the children. In contrast, for each of the behaviors separately, the proportion was 49.6%. Thus, the results indicate that while sixth-grade students in elementary schools generally have good health, their daily living habits are not healthy.

According to Borzekowski,[12] healthy literacy skills can alter existing and future behaviors. With greater health literacy, children and adolescents can take more control and ownership of their own habits and decisions. This implies that health literacy enables altering behavioral choices in tune with changes in circumstances. The environment does not change significantly for school-going children when they are under the protection of their parents. While it is difficult to differentiate between acquired habits of daily living and self-care behavior exhibited as health literacy, it can be said that it shows the difference between the two in terms of causal understanding of behavior and consequences. In this study, regarding awareness of behavioral and health contingencies, the proportion for diet was 90%, the proportion for exercise was 74.4%, and that for excretion was 48.8%. We find an interesting point of agreement in this study with the results reported by Nakagawa = in a study on mothers' training and pre-school children's daily activities.[19] Specifically, while 80–90% responded that diet and exercise training was provided, excretion was only 40%. The proportions of training in various areas are very close to the findings in this study regarding the proportions of awareness of contingencies in each area. This likely shows that there are efforts to impart contingencies during the training stage on fundamental habits of daily living. However, for excretion, based on the observation of the circumstances where the awareness of contingencies as in “excretion is necessary for health” and normative awareness as in “It is necessary to defecate once a day” remains mixed. It could be conveyed simultaneously that efforts are likely made without being conscious of behavioral contingency awareness. Moreover, there is a gap between the proportions of awareness on behavioral and health contingencies and health status, indicating that the awareness of contingencies is not directly reflected in health status. Accordingly, the relationship between awareness of contingencies and behavioral choices was analyzed next.

A significant association was observed between awareness of contingencies and healthy behavioral choices. However, even though 90% of the children are aware of diet and health contingencies, the proportion of children selecting desirable dietary behavior is only 50%. While about half of them were aware of excretion and health contingencies, only 19% of them selected the behavior of going to the toilet at a fixed time every day. Moreover, while 74.4% of the children were aware of exercise and health contingencies, only about half were engaged in physical activities such as fitness clubs or sports clubs outside the school. While being significantly associated with healthy behavioral choices, such awareness on behavioral and health contingencies had a low rate of leading to appropriate behavioral choices. Self-efficacy, which is an expectation of one's own ability in addition to the expectation of results, is necessary for prompting behavior, and many of the children's exercise intervention programs involve self-efficacy interventions.[20,21] However, it is necessary to pay attention to environmental factors, physiological functions, and reasons for awareness of contingencies that do not lead to appropriate behavioral choices. Specifically, in the case of diet, even if the individuals do not select a good diet intentionally, a good diet is arranged through an adult's efforts, leading to normal physiological functions working positively, and intentional individual behavior is often unnecessary. For example, the excretion results reveal that, while only 19% of the children go to the toilet intentionally, about 70% notably defecate once a day.

Moreover, although about half of the children were intentionally involved in physical activities, a more significant proportion (60%) reported feeling good after exercise. In this way, it was found that behavior and consequences were not linked during this period. Only the behaviors that produce good results without any intention do become habits, whereby there is a risk that behavioral and health contingency awareness weakens. However, it is likely that among the behaviors, those that do lead to habituation without any accompanying awareness of contingencies are prone to fade away due to external factors, as the range of activities increases in the upper grades. For example, if mealtime and bedtime are delayed because of attending cram school (test preps), affecting the digestive function, then the bowel movement that naturally occurs if one has enough sleep, often does not occur in the morning. It is surmised that the behavior that has been habituated only due to the physiological desire to go to the toilet prompted by bowel movement will not be initiated in the absence of such physiological desire. Hamana and Hayabuchi reported that the number of children who defecate every day is fewer in fourth graders than in second graders, which corroborates our hypothesis.[22]

Furthermore, Marques *et al.* have reported that, despite an increase in children's health aspirations as they move up in school, they tend not to make the necessary effort.[23] Children's behavior that begins to fade from school-age deteriorates further when they enter middle and high school.[24] These findings indicate that self-care education as health literacy in school children needs to be taught separately from health status and physical sensations at that stage. Further, it is a stage of health education with characteristics that are different from those of other periods.

Lastly, we discuss self-care implications in health literacy from the perspective of the association of health status, behavior and health contingencies, and behavioral choices. Although only partially, there is a significant association of health status with behavioral and health contingencies and behavioral choice. Awareness of diet and health contingencies and dietary choice behavior are reflected in appetite and physical health levels. The awareness of exercise and health contingencies and exercise are reflected in the quantity of dietary intake, appetite, and level of physical health. Moreover, in the groups with and without awareness of exercise and health contingencies, by setting exercise and dietary intake quantity as dependent variables, some interesting interactions were observed. Specifically, among the groups with an awareness of exercise and health contingencies, the quantity of dietary intake was significantly lower in the group with no exercise, while among the groups without awareness of exercise and health contingencies, dietary intake was significantly higher in the group with no exercise. This suggests that the awareness of contingency as a consequence of behavior likely leads to consistency in multiple healthy behaviors aimed at health. The normative knowledge of “appropriate diet is indispensable” causes the same dietary behavior irrespective of circumstances and does not lead to behavioral change. However, based on the results, it can be inferred that the awareness that exercise is linked to health leads to a different thought of diet. This area of a different dimension needs to be adjusted when not exercising. The differences in the quantity of dietary intake likely occurred as a consequence. In daily living activities, one action does not directly reflect one outcome. Like exercise reflecting on diet and sleep, and diet and exercise reflecting on excretion, multiple areas are intertwined, producing a cyclic effect. Health literacy

supports the choice of behavior appropriate under such complex circumstances.[3] Fairbrother *et al.* also reported similar observations and pointed out the importance of the association between action and thought.[25] A person's behavior is selected by reflecting on the current circumstances to attach meaning to their actions.

Implications

This study focused on the connection between fundamental habits of daily living and self-care ability as health literacy, and investigated the actual status. The results indicate that in sixth-grade elementary school children, while 90% were in good health, their daily living habits were not healthy. Regarding awareness of behavioral and health contingencies, 90% of the children were aware of dietary contingencies, 74.4% were aware of exercise contingencies, and 48.8% were aware of excretion contingencies. The results indicate that while training to form fundamental daily living habits, efforts were made to impart education involving causality of behavior. However, there is no evidence of any connection between awareness of contingencies and healthy behavioral choice, and the connection to the actual status was found to be limited. However, thoughts on the causal relationship between behavior and health show a connection to behavior beyond the respective areas, specifically, diet and exercise connected to the excretory system. There are basic patterns of thoughts leading to the formation of habits to prevent lifestyle-related diseases later.

While it is likely that self-efficacy has a mediating role in the connection between awareness of contingencies and behavioral choice,[20,21] the results of this study suggest that the normalcy of physical functions of children and involvement of parents in daily living could also be factors for such influence. Specifically, it is easier for children in this period to maintain their health, even in the absence of intentional behavior. These factors may become risk factors for weakening awareness of behavior and consequence contingencies, suggesting that measures different from those for other periods are necessary for health education in school-aged children. Specifically, regarding school-aged children, it is necessary to make them understand that their current behavior related to diet, exercise, and sleep will reflect on their health in the future. Moreover, regarding the fundamental habits of daily living accompanied by the awareness of contingencies, it is likely that preparations for reinforcers other than physical sensations could be an effective measure for preventing interruptions in awareness of contingencies.

Limitations

This study is limited in generalizing the results, as it relies on a survey of one facility in Japan. The facility was a public school. While the deliberations are based on the assumption of educational level in Japan, they are not applicable for studying the effects of differences in education, which is evident in global health inequalities. Moreover, the study utilized a cross-sectional survey and provided inferences on causality based on the results. In the future, it will be necessary to consider a longitudinal study design to provide more evidence.

Declarations

Ethics approval and consent to participate: The research was performed in accordance with the Declaration of Helsinki. Overall research approval for the study was obtained from the elementary school principals' association of Yokohama-City, which has the authority to provide approval for human studies for education. Permission was taken from the participating school. Informed consent was obtained from parents of eligible children. A separate questionnaire with an informed consent form and request letter from the school was sent to parents through their children.

Consent for publication: Not applicable.

Availability of data and materials: The data that support the findings of this study are available on request from the corresponding author, NT.

Competing interests: The authors have no conflict of interest to declare.

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Authors' contributions: N.T. and A.N. conducted the survey in the field. A.W. and Y.K. mainly analyzed and interpreted the data on fundamental daily living habits. M.K. and Y.F. analyzed and interpreted the data on health literacy. N.T. wrote the main manuscript text and A.W. prepared tables 1,2 and figure 1 All authors read and approved the final manuscript.

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References

1. Ziesmann A, Kiflen R, De Rubeis V, Smith BT, Maguire JL, Birken CS, et al. The Association between early childhood and later childhood sugar-containing beverage intake: A prospective cohort study. Nutrients. 2019;11(10):2338. doi:10.3390/nu11102338
2. Movassagh E, Baxter-Jones A, Kontulainen S, Whiting S, Vatanparast H. Tracking dietary patterns over 20 years from childhood through adolescence into young adulthood: The Saskatchewan Pediatric Bone Mineral Accrual Study. Nutrients. 2017;9(9):990. doi:10.3390/nu9090990
3. Bröder, J., Okan, O., Bauer, U, Bruland D, Schlupp S, Bollweg TM, et al. Health literacy in childhood and youth: A systematic review of definitions and models. BMC Public Health. 2017;17(1):1-25. doi:10.1186/s12889-017-4267-y
4. Kostecka M. The influence of pre-school children's diets on the risk of lifestyle diseases. A pilot study. Roczniki Państwowego Zakładu Higienity. 2018;69(2):139-145.
5. Bröder J, Okan O, Bauer U, Schlupp S, Pinheiro P. Advancing perspectives on health literacy in childhood and youth. Health Promot Int. 2019;35(3):575-585. doi:10.1093/heapro/daz041

6. Institute of Medicine. Health literacy: a prescription to end confusion. Washington DC: National Academies Press; 2004.
7. Poureslami I, Nimmon L, Rootman I, Fitzgerald MJ. Health literacy and chronic disease management: Drawing from expert knowledge to set an agenda. Health Promot Int. 2017;32(4):743-754. doi:10.1093/heapro/daw003
8. Van der Heide I, Poureslami I, Mitic W, Shum J, Rootman I, FitzGerald JM. Health literacy in chronic disease management: A matter of interaction. J Clin Epidemiol. 2018;102:134-138. doi:10.1016/j.jclinepi.2018.05.010
9. Paasche-Orlow MK, Wolf MS. The causal pathways linking health literacy to health outcomes. Am J Health Behav. 2007;31(1):19-26.
10. Cajita MI, Cajita TR, Han HR. Health literacy and heart failure: A systematic review. J Cardiovasc Nurs. 2016;31(2):121-130. doi:10.1097/JCN.0000000000000229
11. Marciano L, Camerini AL, Schulz PJ. The role of health literacy in diabetes knowledge, self-care, and glycemic control: A meta-analysis. J Gen Intern Med. 2019;34(6):1007-1017. doi:10.1007/s11606-019-04832-y
12. Borzekowski DL. Considering children and health literacy: A theoretical approach. Pediatr. 2009;124(3):S282-S288.
13. Sunaga S, Aoki S, Hotta N. A study on growth and health of children III. Bulletin of Faculty of Education, Mie University. 2016;67:169-174. (In Japanese)
14. Kennedy C, Floriani V. 'Translating research on healthy lifestyles for children: Meeting the needs of diverse populations. Nurs Clin North Am. 2008;43(3):397-417. doi:10.1016/j.cnur.2008.04.001
15. Sakata Y, Takata Y, Kimura H, Changes in lifestyle habits, psychosomatic complaints, and self-esteem among elementary school students in X prefecture. Sch Health. 2016;12:35-39. doi:10.20812/jash.SH_075
16. Matsuda J. Forming fundamental habits of daily living in early childhood: Its meanings of today and the issues for early childhood care and education. Annual Bulletin of the Shimoda Utako Research Institute for Woman. 2014;51:67-76. (In Japanese)
17. Abrams MA, Klass P, Dreyer BP. Health literacy and children: introduction. Pediatr. 2009;124:S262-S264. doi:10.1542/peds.2009-1162A
18. Shih SF, Liu CH, Liao LL, Osborne RH. Health literacy and the determinants of obesity: A population-based survey of sixth-grade school children in Taiwan. BMC Public Health. 2016;16(1):1-8. doi:10.1186/s12889-016-2879-2
19. Nakagawa Y. A study on training of mothers and daily activities of pre-school children. J Child Health. 1989;8(5):537-544. (In Japanese)
20. Olander EK, Fletcher H, Williams S, Atkinson L, Turner A, French DP. What are the most effective techniques in changing obese individuals' physical activity self-efficacy and behaviour: a systematic review and meta-analysis. Int J Behav Nutr Phys Act. 2013;10(29):1-15. doi:10.1186/1479-5868-10-29

21. Samdal GB, Meland E, Eide GE, Berntsen S, Abildsnes E, Stea TH, et al. Participants at Norwegian Healthy Life Centres: Who are they, why do they attend and how are they motivated? A cross-sectional study. Scand J Public Health. 2018;46(7):774-781. doi:10.1177/1403494818756081.
22. Hamana R, Hayabuchi H. A survey of eating habits and fatigue symptoms among elementary-school children in Fukuoka: Difference of grade and sex. Bulletin of the Faculty of Human Environmental Science, Fukuoka Women's University. 2003;35:47-54. (In Japanese)
23. Marques A, Loureiro N, Avelar-Rosa B, Naia A, De Matos MG. Adolescents' healthy lifestyle. Jornal de Pediatria. 2020;96(2):217-224. doi:10.1016/j.jped.2018.09.002
24. Johnson RK, Lamb M, Anderson H, Pieters-Arroyo M, Anderson BT, Bolaños GA et al. The global school-based student health survey as a tool to guide adolescent health interventions in rural Guatemala. BMC Public Health. 2019;19(1):1-9. doi:10.1186/s12889-019-6539-1
25. Fairbrother H, Curtis P, Goyder E. Making health information meaningful: Children's health literacy practices. SSM Population Health. 2016;16(2):476-484. doi:10.1016/j.ssmph.2016.06.005

Tables

Due to technical limitations, tables are only available as a download in the Supplemental Files section.

Figures

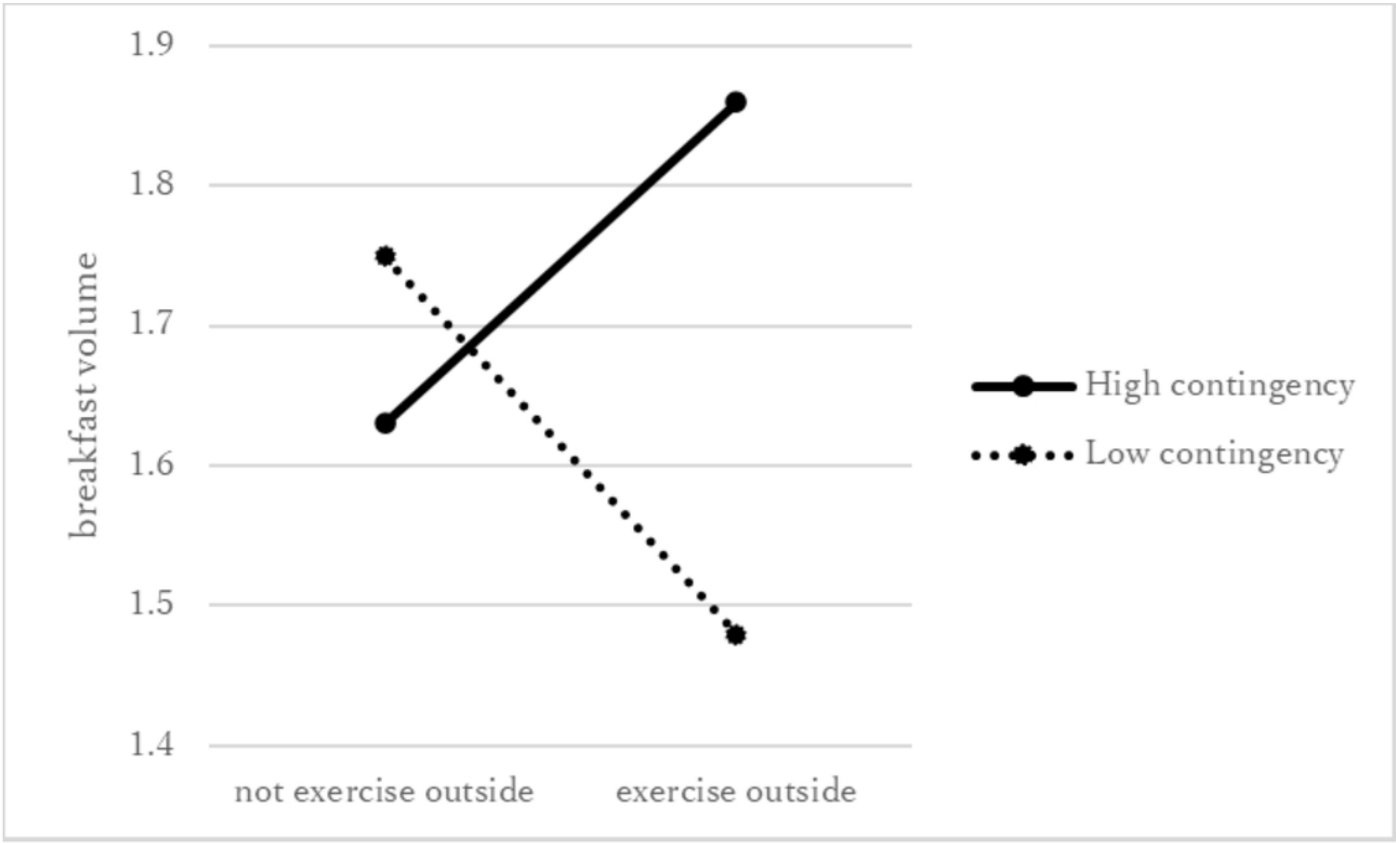

Figure 1

The effects of interaction between exercise outside and awareness of contingencies between exercise and health on breakfast volume

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- table1.png
- table2.png