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The Effect of Primary School Education on Preventive Behaviours during COVID-19 in Japan

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Abstract: Education plays a critical role in promoting preventive behaviours against the spread of pandemics. In Japan, handwashing education in primary schools was positively correlated with preventive behaviours against COVID-19 transmission for adults in 2020, during the early stages of COVID-19. The following year, the Tokyo Olympics were held in Japan, and a state of emergency was declared several times. Public perceptions of and risks associated with the pandemic changed drastically with the emergence of COVID-19 vaccines. We re-examined whether the effect of handwashing education on preventive behaviours persisted by covering a longer period of the COVID-19 pandemic than previous studies. A total of 26 surveys were conducted nearly once a month for 30 months from March 2020 (the early stage of COVID-19) to September 2022 in Japan. By corresponding with the same individuals across surveys, we comprehensively gathered data on preventive behaviours during this period. In addition, we asked about the handwashing education they had received in their primary school. We used the data to investigate how and to what degree school education is associated with pandemic-mitigating preventive behaviours. We found that handwashing education in primary school is positively associated with behaviours such as handwashing and mask wearing as a COVID-19 preventive measure but not related to staying at home. We observed a statistically significant difference in handwashing between adults who received childhood handwashing education and those who did not. This difference persisted throughout the study period. In comparison, the difference in mask wearing between the two groups was smaller but still statistically significant. Furthermore, there was no difference in staying at home between them. Childhood hygiene education has resulted in individuals engaging in handwashing and mask wearing to cope with COVID-19. Individuals can form sustainable development-related habits through childhood education.

Keywords: childhood education; hygiene; COVID-19; preventive behaviours; staying at home; mask wearing; handwashing; public goods

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1. Introduction

Recently, researchers paid attention to the role of school education in promoting health from the viewpoint of sustainable development [1–3]. Ideally, people should prepare for unexpected events like a pandemic prior to the shock. Education is expected to alter the risk perceptions of individuals and affect the production of health outcomes. Educational level played a critical role in people's preparedness for the COVID-19 pandemic disaster [4]. Risk perception and precautionary behaviour against pandemics can be dynamic over time [5]. However, the effect of education persists for a longer period once the hygiene habit is formed [1,6], which contributes to the sustainability of society.

People can more smoothly cope with its occurrence if they take precautions against epidemic disease. According to Ikeda et al. [7], people highly care about hygiene, such as regular handwashing, in Japan, reducing the risk of contracting an infection. Childhood

education practices are effective in promoting preventive behaviours to reduce the risk. What adult people remember from their childhood is seemingly unrelated to their current behaviours. Various existing works using retrospective surveys found that informal education in primary school and childhood circumstances formed adult preferences and worldviews [8–15]. Lee et al. explored the role of hygiene school education in childhood on regular handwashing behaviours during the COVID-19 pandemic [1]. They found that handwashing education in primary school is positively related to various preventive behaviours in adulthood, not only during the COVID-19 pandemic but also prior to the pandemic. This finding was observed using the dataset collected from April to August 2020 at the early stage of COVID-19.

According to a study of the 2009 (H1N1) influenza pandemic, the government promoted a campaign to educate the public about using hand sanitizers, handwashing techniques, and wearing masks. Accordingly, past experience of the pandemic facilitated handwashing behaviours, which have long-lasting effects on health outcomes [6]. The COVID-19 pandemic continued to influence various aspects of daily life, at least until the end of 2022. People learn about COVID-19 from their experiences and a public campaign. Further, COVID-19 vaccination has been implemented in 2021 throughout Japan, and most people are vaccinated. Hence, the risk of COVID-19 infection is reduced, which influences the degree of engagement in preventive behaviours [16–18].

All in all, the situation has drastically changed since the early stages. It is necessary to consider how and the extent to which the effect of childhood education on preventive behaviours changed using data covering a longer period than Lee et al. [1]. In this short note, we use monthly individual-level longitudinal data to re-examine the findings of Lee et al. [1]. The research question is: how did hygiene practice education in childhood influence preventive behaviours in adulthood during the COVID-19 pandemic period covering March 2020–September 2022.

2. Materials and Methods

2.1. Materials

Shortly after the COVID-19 infection was detected in Japan in January 2020, we decided to collect data through online surveys by commissioning the research company INTAGE. INTAGE was chosen for their good reputation due to their abundant experience with academic research. In the early stages of the COVID-19 pandemic (13–16 March 2020), the first wave of queries was conducted to gather 4359 observations. INTAGE recruited participants for the survey from among pre-registered individuals, with a participation rate of 54.7%. Respondents were randomly selected to fill the pre-specified quotas by identifying a representative of the Japanese adult population (aged 18–78 years), and data was collected on household income, age, gender, educational background, and area of residence. This sampling method was chosen because individuals aged 17 years and below were too young to be registered with INTAGE, and data from individuals over 78 years of age could not be reliably collected mainly because they were unlikely to use the Internet. Consequently, the sample population was restricted to those aged 18–78 years.

Longitudinal panel data were constructed as follows. Internet surveys were conducted nearly monthly on 26 occasions ('waves') between March 2020 and September 2022 with the same individuals. Surveys were not conducted for three months between July and September 2020 because of a shortage of research funds. After acquiring additional funding, surveys continued in October 2020 (6th wave) and included an additional question on primary school education to examine the effect of childhood education on preventive measures. The first survey by Lee et al. was conducted between 28 and 30 April 2020 [1]. By comparison, we conducted our first survey one month earlier, between 13 and 27 March. From March to April 2020, the COVID-19 situation in Japan changed drastically, making this a notable distinction [19–22]. During the study period, some respondents stopped taking the surveys and were removed from the sample pool. We limited the samples used for analysis to respondents who participated from the first to the 26th wave to follow

the same individuals. Further, we restricted the sample to those who answered various questions, such as primary household income, job type, and education in primary school. In particular, many respondents did not remember experiencing handwashing education in primary school. Eventually, the number of respondents was reduced to 996, and the total number of observations used in this study was 25,896.

2.2. Hypothesis

Primary school education has been found to cultivate a view of sustainable development even after pupils become adults [12]. The relationship between health and education is closely related to sustainable development [2,3]. According to Lee et al., to cope with the impacts of the COVID-19 pandemic, primary school education is effective in forming the habit of preventive behaviour even after people become adults [9]. To re-examine this finding by Lee et al., we propose the following Hypothesis 1.

Hypothesis 1. *Handwashing practice in primary school has long-term effects on preventive behaviours against COVID-19.*

2.3. Method

For testing the Hypothesis 1, we used regression estimations. Table 1 describes the key variables used in the estimation and reports their means and standard deviations. The survey questionnaire contained basic questions about demographics, such as birth year, gender, educational background, household income, and jobs.

Table 1. Definitions of key variables.

Variables	**Definition**		
	Outcome Variables	**Mean**	**s.d.**
STAYING HOME	In the last week, how consistent were you at 'not going out of home'? Please choose among 5 choices. 1 (not completed at all) to 5 (completely consistent).	4.21	0.91
WEARING MASK	In the last week, how consistent were you at 'wearing a mask'? Please choose among 5 choices. 1 (not completed at all) to 5 (completely achieved).	4.54	0.19
HAND WASHING	In the last week, how consistent were you at 'washing your hands'? Please choose among 5 choices. 1 (not completed at all) to 5 (completely achieved).	2.91	1.29
	Key confounders (independent variables)		
WASHING EDUCATION	Did everyone in your class who was supervised by teachers ensure that they washed their hands in turn? 1 (yes) or 0 (no)	0.48	0.49
SCHOOL UNIFORM	Did you wear school uniforms in primary school? 1 (yes) or 0 (no)	0.20	0.40
	Control variables		
AGES	Respondent's ages	54.9	14.3
INCOME_1	1 if the respondent's household income is below JPY 1 million; otherwise, 0.	0.02	0.14
INCOME_1.5	1 if the respondent's household income is JPY 1–1.99 million; otherwise, 0.	0.07	0.25
INCOME_2.5	1 if the respondent's household income is JPY 2–2.99 million; otherwise, 0.	0.13	0.33
INCOME_3.5	1 if the respondent's household income is JPY 3–3.99 million; otherwise, 0.	0.17	0.37
INCOME_4.5	1 if the respondent's household income is JPY 4–4.99 million; otherwise, 0.	0.14	0.34

Table 1. *Cont.*

Variables	Definition		
	Outcome Variables	**Mean**	**s.d.**
INCOME_5.5	1 if the respondent's household income is JPY 5–5.99 million; otherwise, 0.	0.12	0.32
INCOME_6.5	1 if the respondent's household income is JPY 6–6.99 million; otherwise, 0.	0.09	0.28
INCOME_7.5	1 if the respondent's household income is JPY 7–7.99 million; otherwise, 0.	0.06	0.24
INCOME_8.5	1 if the respondent's household income is JPY 8–8.99 million; otherwise, 0.	0.04	0.20
INCOME_9.5	1 if the respondent's household income is JPY 9–9.99 million; otherwise, 0.	0.05	0.22
INCOME_11	1 if the respondent's household income is JPY 10–11.99 million; otherwise, 0.	0.04	0.19
INCOME_13.5	1 if the respondent's household income is JPY 12–14.99 million; otherwise, 0.	0.03	0.18
INCOME_17.5	1 if the respondent's household income is JPY 15–19.99 million; otherwise, 0.	0.02	0.15
INCOME_25	1 if the respondent's household income is over JPY 20 million; otherwise, 0.	0.01	0.11

Note: We used other variables such as time-point dummies, educational background dummy, job dummies, number of deaths, and the number of infected people in residential prefectures. However, these variables are not shown in Table 1 to save space.

We aim to assess how handwashing education influences adult preventive behaviours. For this purpose, we use regression estimation. To put it more precisely, the estimation method was the ordinary least squares model. The estimated function takes the following form:

$$Y_{it} = \alpha_0 + \alpha_1 \text{ WASHING EDUCATION}_{it} + \alpha 2 \text{ SCHOOL UNIFORM}_{it} + \alpha 3 \text{ AGES}_{it} + \alpha 4 \text{ INCOME}_{it} + XB + k_t + u_{it}$$

Y_{it} is the outcome variable. Its suffixes "i" and time point "t" are individual and time point, respectively. α denotes the regression parameters. Y_{it} is the outcome variable captured by the three proxy variables STAYING HOME, HANDWASHING, and WEARING MASK. Existing studies found that age and income level are key factors in promoting staying at home during the COVID-19 pandemic [23]. Hence, we include AGES and INCOME dummies in the function. X is the vector of other control variables, and B is the vector of its coefficients. u_{it} is the error term. The behaviour of individuals depends on the situation. For instance, residents were strongly requested to stay at home during states of emergency. There were also cycles of increasing and decreasing numbers of new infections, which were common in all parts of Japan [19–22]. k_t represents the characteristics of the situation at each time point. To control this, we used 25 time-point dummies.

Regarding $Y_{it,}$ the respondents were asked the following questions about preventive behaviours:

'Within a week, to what degree have you practiced the following behaviours? Please answer based on a scale of 1 (I have not practiced this behaviour at all) to 5 (I have completely practiced this behaviour)':

(1) Staying at home;
(2) Wearing a mask;
(3) Washing my hands thoroughly.

The answers to these questions served as proxies for the following variables for preventive behaviours: staying at home, frequency of handwashing, and degree of mask wearing. Larger values indicate that respondents are more likely to engage in preventive behaviours.

The key confounding variable is WASHING EDUCATION, which is '1' if teachers supervised pupils to ensure that they washed their hands during primary school; otherwise, it is '0'. In this study, 48% of respondents had experienced handwashing practice in primary school (Table 1). Previous studies have found that the experience of wearing

school uniforms during primary school is positively correlated with pro-social inclinations in adulthood [9]. Therefore, the experience of school uniforms may be correlated with preventive behaviours in adulthood, so SCHOOL UNIFORM is also included as a confounding variable. The statistical software used in this study was Stata/MP 15.0.

3. Results

3.1. Baseline Estimation

In Table 2, the results cover the whole study period between March 2020 (the first wave) and September 2022 (the 26th wave).

Table 2. Dependent variables are preventive behaviours (data: 1st to 26th waves).

	(1) **HAND WASHING**	**(2)** **WEARING MASK**	**(3)** **STAYING HOME**
WASHING EDUCATION	0.197 *** (0.126–0.267)	0.109 *** (0.051–0.167)	0.072 (−0.032–0.186)
SCHOOL UNIFORM	0.026 (−0.067–0.119)	0.026 (−0.065–0.061)	−0.002 (−0.193–0.100)
AGES	0.344 ** (0.084–0.678)	0.262 ** (−0.019–0.543)	0.778 *** (0.318–1.237)
INCOME_1		<Default>	
INCOME_1.5	−0.083 (−0.352–0.184)	0.068 (−0.183–0.321)	0.302 (−0.098–0.703)
INCOME_2.5	0.024 (−0.260–0.308)	−0.015 (−0.280–0.248)	0.118 (−0.330–0.567)
INCOME_3.5	−0.067 (−0.344–0.209)	0.025 (−0.262–0.312)	0.009 (−0.420–0.439)
INCOME_4.5	−0.127 (−0.3429–0.174)	0.008 (−0.254–0.270)	0.136 (−0.231–0.503)
INCOME_5.5	−0.050 (−0.312–0.211)	0.070 (−0.194–0.335)	0.158 (−0.280–0.597)
INCOME_6.5	0.038 (−0.275–0.352)	0.081 (−0.179–0.342)	−0.027 (−0.489–0.434)
INCOME_7.5	−0.038 (−0.364–0.288)	0.004 (−0.293–0.302)	−0.007 (−0498–0.482)
INCOME_8.5	−0.171 (−0.548–0.206)	0.133 (−0.200–0.466)	−0.269 (−0.763–0.224)
INCOME_9.5	0.142 (−0.168–0.452)	0.168 (−0.145–0.482)	−0.366 (−0.842–0.109)
INCOME_11	0.052 (−0.261–0.366)	0.144 (−0.119–0.408)	0.080 (−0.318–0.480)
INCOME_13.5	0.034 (−0.288–0.356)	0.135 (−0.180–0.450)	−0.093 (−0.625–0.438)
INCOME_17.5	0.334 (0.013–0.655)	0.365 (0.069–0.663)	0.108 (−0.486–0.703)
INCOME_25	0.248 (−0.165–0.663)	0.045 (−0.321–0.412)	−0.143 (−0.916–0.629)
Control variables	Yes	Yes	Yes
Adj R^2 Obs.	0.11 25,896	0.19 25,896	0.14 25,896

Note: Numbers without parentheses are coefficients of the confounding variables. The numbers within parentheses are at a 95% CI. For convenience of interpretation, the values of AGE are multiplied by 100. The model includes various control variables, such as time point dummies (time-fixed effects), educational background dummy, gender dummy, job dummies, the number of deaths, and the number of infected people in residential prefectures. However, these results have not been reported. "Yes" means that these variables are included. ** $p < 0.05$ *** $p < 0.01$.

Table 2 shows the estimation results and coefficients of confounders. We found a positive correlation for WASHING EDUCATION for all dependent variables. The relationship between WASHING EDUCATION and both HAND WASHING and WEARING MASK were found to be statistically significant, whereas STAYING HOME is not. The coefficient of HAND WASHING is 0.198, meaning that those who experienced hand-washing education in primary school are more likely to wash their hands by 1.987 points on a 5-point scale compared to those who did not. The effect of handwashing education on HAND WASHING was approximately two times larger than that of WEARING MASK (0.109). We did not find statistical significance for SCHOOL UNIFORM on any dependent variable. Ages are statistically significant with a positive sign. This implies that older people are more likely to exhibit preventive behaviours because their probability of being infected is higher. As for income dummies, most of the results did not show statistical significance, so income level is not associated with preventive behaviours. Overall, handwashing education in childhood promotes the hygiene practices of handwashing and wearing masks but does not promote staying at home.

As shown in the Hypothesis 1, we re-examine the finding of Lee et al. [1]. For this purpose, we should conduct an examination by using a sample period when the situation was more emergent and correct information about COVID-19 was scarce. Hence, the sub-sample is restricted to the period March 2020 (first wave)—March 2020 (5th wave). We conducted a re-estimation using the sub-sample. The results of the control variables, AGES, and household income dummies are almost the same as in Table 2. So, we did not report it in Table 3. We see from Table 3 that the significant positive signs of WASHING EDUCATION are almost identical to those in Table 2. Therefore, the results of Tables 2 and 3 make it evident that handwashing practices in schools promote handwashing and wearing a mask but not staying at home during the early stage of COVID-19.

Table 3. Dependent variables are preventive behaviours (data: 1st to 5th waves).

	(1) **HAND WASHING**	**(2)** **WEARING MASK**	**(3)** **STAYING HOME**
WASHING EDUCATION	0.196 *** (0.103–0.289)	0.121 * (−0.008–0.251)	0.037 (−0.069–0.136)
SCHOOL UNIFORM	−0.029 (−0.127–0.069)	−0.069 (−0.190–0.051)	−0.013 (−0.135–0.109)
Control variables	Yes	Yes	Yes
Adj R^2 Obs.	0.11 4980	0.17 4980	0.14 4980

Note: Numbers without parentheses are coefficients of the confounding variables. The numbers within parentheses are at a 95% CI. The model includes various control variables, such as time point dummies (time-fixed effects), gender dummy, educational background dummy, dummies for household income, job dummies, the number of deaths, and infected persons in residential prefectures. However, these results have not been reported. "Yes" means that these variables are included. * $p < 0.10$. *** $p < 0.01$.

3.2. Changes in Preventive Behaviours

Figures 1–3 show that preventive behaviours drastically increased during the early stage of COVID-19, especially during the first state of emergency, as indicated by the solid vertical line. Subsequently, in Figures 1 and 2, handwashing and mask wearing were maintained at high levels throughout the study period. This is in contrast with the findings in Japan that precautionary behaviour in response to the 2009 (H1N1) influenza pandemic fluctuated [5].

Those who experienced handwashing practices in primary school were more likely to engage in handwashing and mask wearing during the COVID-19 pandemic. The effect of handwashing education on mask wearing was smaller and less statistically significant than that on handwashing. This may be because handwashing education is more likely to form a habit of washing hands than wearing masks. Wearing masks in crowded places is effective

in mitigating pandemics, whereas wearing masks in open air is much less effective [24]. People wear masks outdoors, partly because of peer pressure.

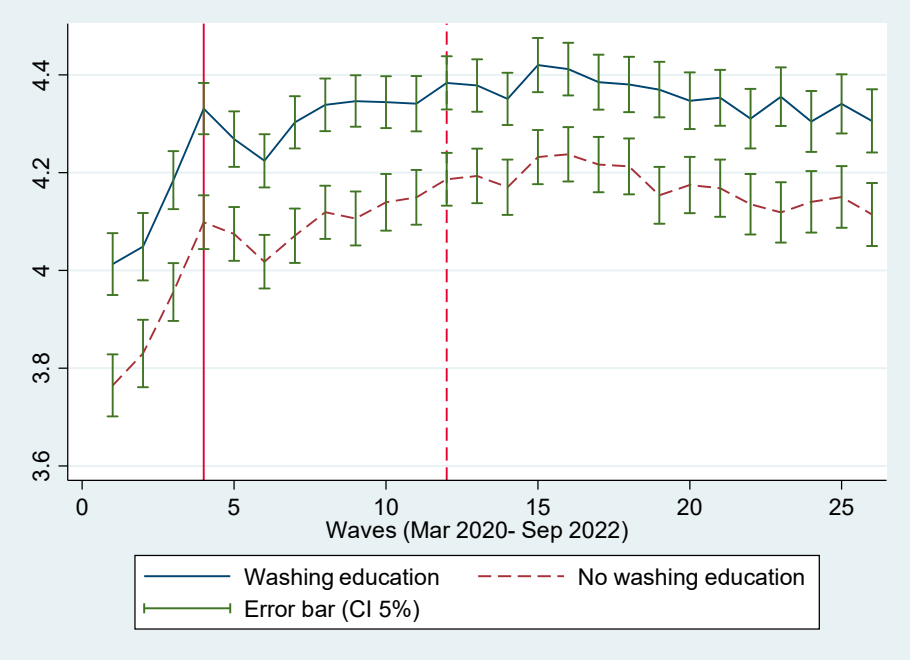

Figure 1. Handwashing behaviour. Note: The solid vertical line indicates when the first state of emergency was declared in Japan. The dashed vertical line shows when the COVID-19 vaccination was implemented.

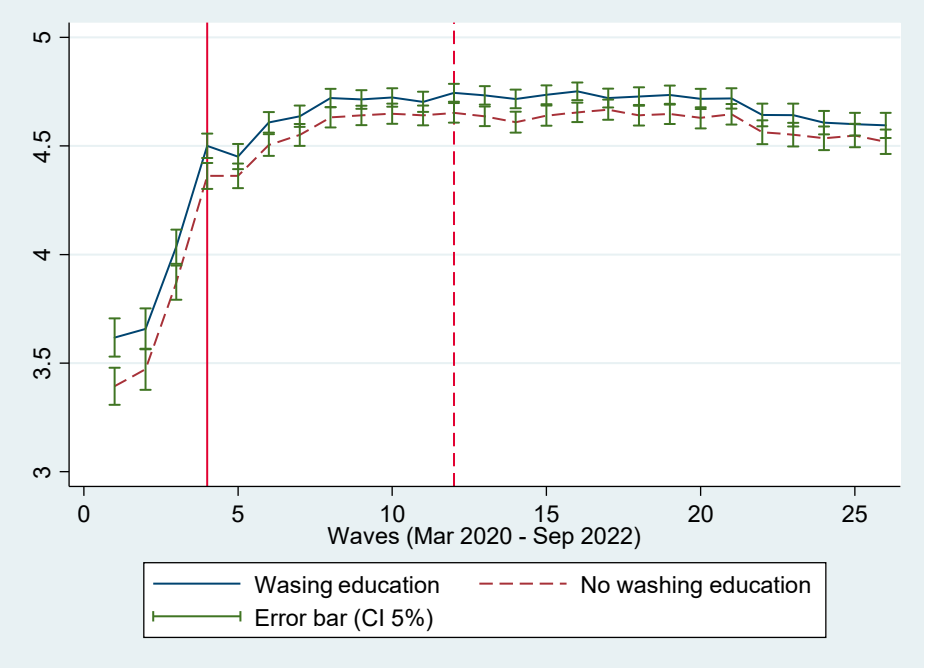

Figure 2. Mask-wearing behaviour. Note: The solid vertical line indicates when the first state of emergency was declared in Japan. The dashed vertical line shows when the COVID-19 vaccination was implemented.

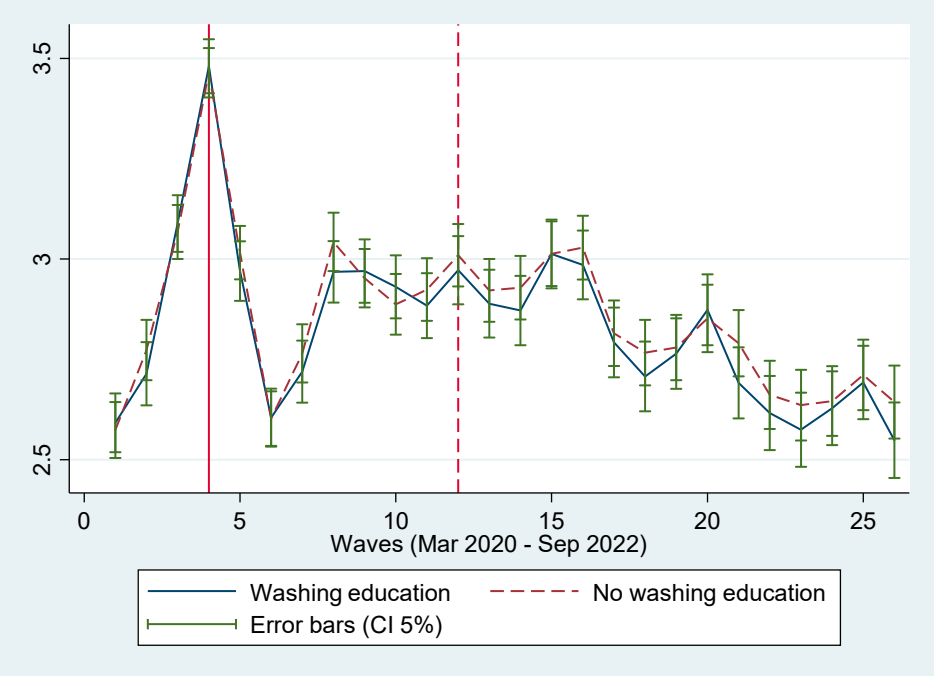

Figure 3. Staying at home behaviour. Note: The solid vertical line indicates when the first state of emergency was declared in Japan. The dashed vertical line shows when the COVID-19 vaccination was implemented.

Handwashing education played a critical role in forming lasting habits of health-protective behaviours such as handwashing and mask wearing. By contrast, Figure 3 shows the fluctuating cycles of staying at home. Furthermore, people became overall less likely to stay at home after the COVID-19 vaccine was implemented, as indicated by the dashed vertical line. People are unlikely to form a habit of staying at home, which is congruent with Ibuka et al. [5]. There was no difference in staying at home between those who had experienced hygiene education practices and those who did not.

4. Discussion

4.1. Implication

The purpose of this study is to consider how school practices in primary schools influenced preventive behaviours during the COVID-19 pandemic using data covering March 2020 to September 2022. Preventive behaviours reduce not only one's own risk of being infected but also the risk of infecting others. Therefore, preventive behaviours against pandemic spread can be considered an investment for the public good (i.e., measures that can benefit the whole society) [25]. Lee et al. found that handwashing led people to display preventive behaviours even before COVID-19 [1]. Considering their and our findings together, hygiene education resulted in a habit of hygiene preventive behaviours that persisted regardless of pandemic severity.

Various programmes and interventions attempted to cultivate children's handwashing behaviour. However, there were variations in how effective these interventions were [26–28]. Unfortunately, we did not ask how the handwashing practice was performed in primary school. The frequency and timing of handwashing are critical to its effectiveness. Directly after returning to the school from outside or before taking lunch, handwashing is considered effective. Furthermore, we should consider which type of practice is more inclined to persist even after becoming adults. A closer examination of the methods of intervention in primary school should be addressed in future studies.

Apart from learning from handwashing practice in primary school, various factors may have influenced staying at home. For instance, there is an argument that older and

poorer people were less likely to stay at home during the peak of the pandemic because they could not sufficiently acquire food and basic services online [23]. As shown in Table 2, we found that older people are more likely to stay home, while household income level is not corrected by staying at home. In our interpretation, the fact that the probability of being infected is higher for older people gave them motivation to stay at home. Migrant workers in China tended to spend longer time at home after the pandemic was effectively contained because they suffered from various discriminations that disallowed them from going outside [29]. Such possible detrimental effects of the pandemic have not been examined in Japan. Due to the lack of information about nationality, we could not investigate how discrimination influenced preventive behaviours. In future work, we should investigate the relationship between discrimination and staying at-home behaviours, both for immigrants and other types of minorities.

Lee et al. [1] found that handwashing education is positively associated with various preventive behaviours, including wearing masks and staying at home. In contrast to Lee et al., this study found clear differences in educational impact according to the type of preventive behaviour. In the questionnaire used by Lee et al., detailed questions about primary school education and various preventive behaviours were included. The respondents may have perceived the researchers' intentions, which may have influenced their responses. For example, their questions about hygiene practice in primary school may have functioned as a 'nudge' that unintentionally influenced respondents to meet the goals of the researchers and respond accordingly. In our study, questions about preventive behaviours were included in all waves, whereas questions about primary school education were blended into various questions only in the 6th wave onward. Hence, before the 6th wave, respondents may not have perceived our goal to associate childhood education with preventive behaviours. In order to directly compare our results with those of Lee et al., we analysed data from the 1st to the 5th waves, which are almost equivalent to the period they studied, conducting estimations using the same specifications (Table 3).

Staying at home was not significantly correlated with handwashing education during childhood. This might be because staying at home is a different type of preventive behaviour than handwashing. People stay at home only when their benefits exceed their costs. People sacrifice various experiences through outdoor activities in the real world if they stay at home. In economic terms, this sacrifice is considered an 'opportunity cost' of staying home. As the opportunity cost is not reduced even if one experiences handwashing education in childhood, individuals will stay at home only if their benefits outweigh their costs, regardless of hygiene education. Additionally, staying at home weakens social ties and reduces social capital because of a reduction in social interaction through face-to-face communication. As is widely acknowledged, social ties and social capital are positively associated with health status [30–32]. Therefore, it is important to distinguish staying at home from other preventive behaviours.

The formation of handwashing habits through hygiene education in childhood reduces its psychological costs. In this case, people do not need to change their lifestyle to engage in basic preventive behaviours such as handwashing, regardless of the severity of the pandemic. Basic hygiene practices in childhood have reduced stress during the pandemic.

4.2. Strength

We constructed longitudinal data to cover a longer period than previous studies in Japan, where preventive behaviours were not enforced with penalties [1,4,5]. Lee et al. did not examine the effects of the emergence and spread of the COVID-19 vaccine on preventive behaviours [1]. The preventive behaviours of individuals were thought to change in response to the emergence of the COVID-19 vaccine. However, individuals continued to wash their hands and wear masks long after vaccine implementation. This clearly suggests these preventive behaviours are stable.

4.3. Limitation

We should compare the effects of handwashing education before and after primary school if the causality between handwashing education and preventive behaviour is scrutinised. This paper analysed the effects of primary school education on preventive behaviour during COVID-19. Therefore, the causality is ambiguous. This holds true for the previous work(s) [1]. However, hygiene practice in the school is considered a natural experiment because public primary schools cannot be chosen, so it is exogenously determined whether handwashing education is adopted. To extend the frontier of existing works to consider the long-term effects of hidden curriculum in school [8–12], we deal with a health issue to conduct fact-finding research. Subsequent researchers should scrutinise the rough findings in our study to identify causality in a more sophisticated manner or using long-term panel data covering periods before and after primary school.

Many respondents did not remember experiencing handwashing education in primary school. We have deleted them from the data pool used for analysis. There was a difference in the characteristics of respondents who answered the questionnaire and those who did not. This may have resulted in selection biases. Furthermore, answers to the questionnaire seem to depend not only on the facts but also on the respondent's misapprehension. Therefore, recall bias may occur. Another variable of school education would show statistical significance if biases had a significant effect on the results. However, SCHOOL UNIFORM is not significantly correlated with preventive behaviours, which is clearly different from the results of WASHING EDUCATION. This suggests, to a certain extent, that the biases are minor.

Wearing masks is less effective in the open air than indoors [24]. In contrast to Lee et al. [1], we used only three proxies for preventive behaviours. Therefore, we did not scrutinise how handwashing and mask wearing changed in different situations.

In contrast to handwashing, the benefit of wearing a mask depends on the situation. Wearing masks in the open air has limited effectiveness [24]. In mid-summer, wearing masks increased the risk of heatstroke. In this situation, the cost of wearing a mask is higher than its benefits. It is, therefore, important to examine mask-wearing behaviour in various situations in future studies.

5. Conclusions

Preventive behaviours play a vital role in coping with unexpected pandemics such as COVID-19. We concluded that people could form sustainable development-related habits through childhood hygiene practice education. The contribution of this paper is to bridge childhood education with long-term sustainability by considering preventive behaviours during the COVID-19 pandemic. However, due to a limitation of the dataset, we could not scrutinise the causality between hygiene practice in childhood education and preventive behaviours in adulthood. This is the remaining issue to be addressed in a future study.

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Institutional Review Board Statement: This study was conducted with the exante approval of the Ethics Committee of the Graduate School of Economics, Osaka University, and all methods were carried out in accordance with the relevant guidelines and regulations. The ethics approval number of Osaka University for this study is R021014. Informed consent for study participation was obtained from all subjects.

Informed Consent Statement: Not applicable.

Data Availability Statement: The datasets used and analysed in this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

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