MORAL EDUCATION AND CHILD DEVELOPMENT: A RANDOMIZED CONTROLLED TRIAL IN JAPAN*

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Pre-Analysis Plan

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1 Introduction

Children experience many difficulties and hardships in school, which can have long-lasting negative effects on their development. Pressure to perform, course overload, peer pressure, bullying, and anxiety can have a negative impact on academic achievement, but also on the development of socioemotional skills. The COVID-19 pandemic led to school closures and the breakdown of existing social and educational structures, with potentially disruptive effects on the home environment, exacerbating existing problems.

This pre-analysis plan describes an intervention that uses online educational tools in a home-based environment to address social issues that children may be experiencing in school. We raise awareness of social issues and support parents through the provision of moral education using modern educational tools. Our intervention is particularly informative for policy makers because it is very low cost, easy to implement, easily scalable nationwide, and combines the home environment and educational content that are often separated in traditional education. Further, our materials are approved by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). This gives the government an opportunity to improve child development in an easy and inexpensive way.

Our intervention lasts for six weeks and consists of two parts in each week. First, we inform parents about a specific social issue their child may be experiencing via email. Second, we provide children from ages 9 to 15 with a video of a moral education story about that week's social issue and encourage them to think and talk about it. We further test whether the moral education story is more effective when presented by a celebrity rather than a representative teacher. Because our intervention takes place in Japan in which school bullying, low self-confidence, and low average well-being are serious problems, the social issues we target in each week's intervention are (i) *School Life and Friends*, (ii) *Bullying I & II*, (iii) *Self-Confidence*, (iv) *Self-Control*, and (v) *Happiness and Well-Being*. Since the actual content of the intervention can easily be adapted to other country-specific problems, we welcome implementation of our intervention in other countries as well.

The remainder of this pre-analysis plan proceeds as follows. In Section 2, we describe the study design, intervention timeline, hypotheses, sampling frame, assignment to treatment, data

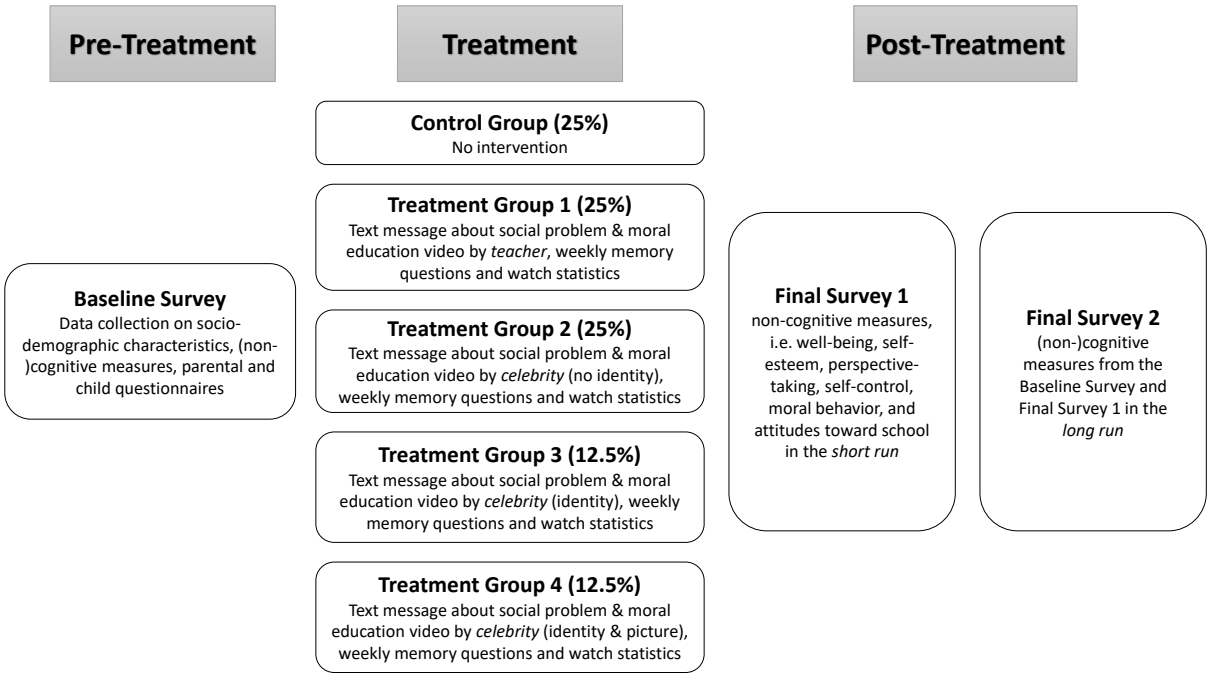

Figure 1: Illustration of Study Design

Source: Authors' presentation. *Note*: This graph describes the study design.

collection, and perform a power calculation. In Section 3, we describe the empirical framework used to test the hypotheses. Finally, in Section 4, we describe the outcome and control variables used in the estimations.

2 Experimental Design

2.1 Study Design

Our intervention will target children and their parents across Japan, who will participate in a total intervention period of six weeks. Parents in the treatment group will receive weekly emails about the prevalence and severity of a specific social issue in Japan, and will be asked to have their children watch a video in which a teacher or celebrity reads a story from a moral education textbook related to the social issue. Both treatment and control groups will be invited to participate in short and long-run post-intervention surveys with treated children and parents receiving additional weekly surveys. An illustration of the study design is shown in Figure 1.

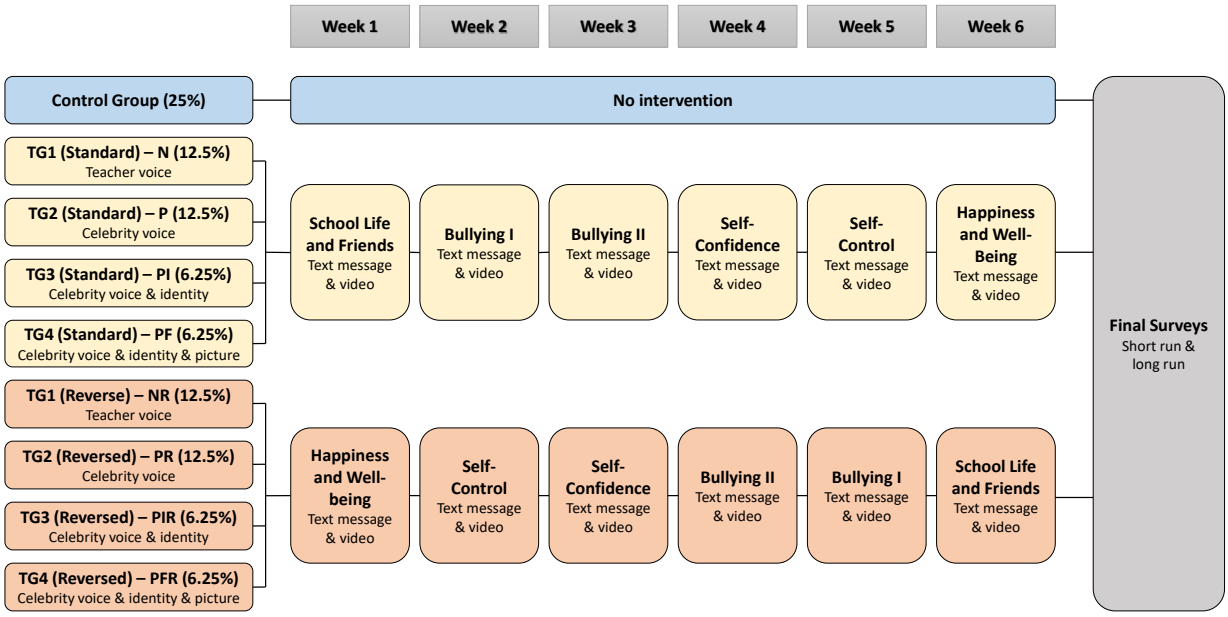

Figure 2: Illustration of Intervention Timeline

Source: Authors' presentation. *Note*: This graph describes the intervention timeline.

2.2 Intervention

Figure 2 illustrates the intervention timeline in detail. The design of each intervention week is as follows. First, parents receive an email about the social issue of the week. In the same email, parents receive a video link to share with their children. After a few days, parents receive a child survey link to share with their children. Finally, parents will receive a parent survey link.

The first week's topic is *School Life and Friends* and informs parents about the problems their children may face in school. A message to the parents emphasizes the growing problem of absenteeism in Japan, which is often the result of problems with friends, a poor child-teacher relationship, or a lack of understanding of the material (nippon.com, 2023; Child Development Science Research, 2024). A follow-up email provides parents with a link to a video in which a narrator reads a story from a moral education textbook. The second week focuses on *Bullying*, with an emphasis on exclusion and gossip. Parents are informed about the prevalence of bullying in Japanese schools and the different forms that bullying can take (e.g. physical violence, hiding things, gossiping) (Ministry of Education, Culture, Sports, Science and Technology, 2019; Children and Families

Agency, 2024). The third week focuses on the negative (long-term) consequences that bullying can have on a child (Oshio et al., 2013; Takizawa et al., 2014; Arseneault, 2018). The fourth week targets *Self-Confidence* with a focus on individuality and dreams. The message explains to parents the lack of self-confidence of Japanese children in international comparison, based on the results of the Programme for International Student Assessment (PISA) (National Institute for Educational Policy Research, 2016; The Nippon Foundation, 2019). It also provides examples of how parents can help improving their child's self-confidence. The fifth week's topic is *Self-Control*. The message explains to parents the concept of self-control as it relates to smartphone use and provides suggestions for parents on how to reduce the amount of time their child spends on the smartphone. The sixth week focuses on *Happiness and Well-Being*, informing parents about Japan's comparatively low average levels of life satisfaction and happiness (UNICEF, 2021; Economic and Social Research Institute, 2024), and providing examples of how children can achieve happiness based on a popular book of Maeno (2017).

While all parents of treated children receive the same message, the video part of the treatment has four arms based on the narrator and the information we provide about her. The videos show a text on a white background with appropriate phonetic aid for Japanese characters, accompanied by the original textbook illustrations. The narrator reads the presented text. The first treatment group (TG1) will watch a video presented by a representative female teacher without revealing her identity or face. The second treatment group (TG2) will watch a video of the same story presented by a female celebrity without revealing her identity or face. The third treatment group (TG3) will watch the same video as TG2, but the name of the celebrity will be revealed. Finally, the fourth treatment group (TG4) will be provided with the name of the celebrity and her picture in the video.

We further divide children into three age groups to provide age-appropriate stories: elementary school grades 4 and 5 (ages 9 to 11), elementary school grade 6 and junior high school grade 1 (ages 11 to 13), and junior high school grades 2 and 3 (ages 13 to 15). Each group will watch a video using stories and illustrations from a moral education textbook approved by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). We chose stories from textbooks that are used in less than 10% of all schools and are therefore unlikely to be known by the children. To further avoid this possibility, stories from textbooks for higher grades were used where appropriate. Furthermore, unlike some other moral education textbooks, the ones we used are con-

sidered politically neutral and thus provide ideal stories for our purpose. The average length of a video is 5:50 minutes. The shortest video is 2:25 minutes and the longest is 11:32 minutes.

To prevent the order and the timing of the video provision from affecting the children's motivation and thus the effectiveness of the intervention (i.e. overlapping with national holidays or important exams), we provide half of each treatment group with a reversed order of messages and videos. Thus, TG1 will be divided into a standard and reversed group with 12.5% of the sample each, TG2 will be divided into a standard and reversed group with 12.5% each, TG3 will be divided into a standard and reversed group with 6.25% each, and TG4 will be divided into a standard and reversed group with 6.25% each.

Finally, the control group (25% of the sample) receives a weekly email informing them that there are no videos for them to watch at this time, but that they will be able to watch them at a later time.

2.3 Hypotheses

The main goal of this intervention is to improve child development through the use of moral education. Therefore, our first hypothesis is as follows:

Hypothesis 1 (H1)**.** *Compared to children in the control group, treated children will show improvements in non-cognitive and cognitive skills.*

Because we target specific social issues and encourage children to reflect on the morality of each week's story and discuss the implications with their parents, we expect to see improvements in socioemotional skills. Therefore, the second hypothesis is as follows:

Hypothesis 2 (H2)**.** *Compared to children in the control group, treated children will show improvements in well-being, self-esteem, perspective-taking, self-control, moral behavior, and attitudes toward school.*

Our moral education stories will be presented by a representative teacher and a celebrity, respectively. Because the celebrity is more experienced in entertaining her audience and keeping her listeners attentive, we expect stronger improvements in non-cognitive and cognitive skills for children who watched videos presented by a celebrity. Therefore, the third hypothesis is as follows:

Hypothesis 3 (H3)**.** *Compared to children who watched videos presented by a representative teacher (TG1), children who watched videos presented by a celebrity (TG2 & TG3 & TG4) will show greater improvements in non-cognitive and cognitive skills, greater video engagement, and better recall.*

Although we expect the celebrity to be able to engage children more with the videos, it is a priori unclear whether the celebrity's presentation skills or their identity and thus knowledge of their fame leads to greater engagement. However, we believe that disclosing the celebrity's identity will lead children to engage more with the contents provided and thus the fourth hypothesis is as follows:

Hypothesis 4 (H4)**.** *Compared to children who watched videos presented by a celebrity but did not know the identity of the celebrity (TG2), children who knew about the celebrity's identity (TG3 & TG4) will show greater improvements in non-cognitive and cognitive skills, greater video engagement, and better recall.*

Many studies that use celebrities to present educational materials not only disclose the identity of the celebrity, but also show pictures or videos of the celebrity. In our intervention, we present a picture of the celebrity with the video in TG4. We hypothesize that the additional disclosure of the celebrity's face in this particular educational intervention is more likely to distract children from the actual content, which addresses more serious issues, and thus we expect a weaker treatment effect for TG4 compared to TG3. Therefore, our fifth hypothesis is as follows:

Hypothesis 5 (H5)**.** *Compared to children who watched videos presented by a celebrity and knew the identity of the celebrity but did not see the celebrity's picture (TG3), children who saw the celebrity's picture (TG4) will show weaker improvements in non-cognitive and cognitive skills, less video engagement, and worse recall.*

To summarize, we expect the following ranking of the different groups after the intervention with respect to non-cognitive and cognitive skills: control group $<$ TG1 $<$ TG2, TG4 $<$ TG3. Given our hypotheses, it is a priori unclear whether children in TG2 or TG4 will perform better.

We will also conduct heterogeneity analyses by gender and age group. It may be that our intervention has different effects on boys than on girls because both the representative teacher and

the celebrity are women. It is also possible that the gender of the celebrity, and in particular her profession, has a different effect on boys than on girls. In both cases, the direction of the effect is a priori unclear. Further, it is possible that moral values are more developed in older children and therefore our intervention has weaker effects for them compared to younger children (Chowdhury and Schildberg-Hörisch, 2020).

We will also conduct heterogeneity analyses by socioeconomic background, as it is likely that this educational intervention will have stronger effects on disadvantaged children, who are more likely to suffer from the targeted social issues (Cascio and Schanzenbach, 2013; Cornelissen et al., 2018). Further, it is possible that the chosen celebrity has a different effect on disadvantaged children, whose interests and role models may be very different from those of advantaged children. However, the direction of this effect is a priori unclear.

We expect to perform additional exploratory analyses which we will use to identify potential channels and mechanisms of our main results. The primary goal of these analyses is to understand the channels through which such an educational intervention can improve child development and, in the case of a rejection of a hypothesis, why our intervention did not produce the results we expected.

2.4 Sampling

Sampling Frame. This randomized controlled trial (RCT) is part of a larger project aimed at studying the disruptive effect of the COVID-19 pandemic on the home and learning environment of children and its potential solutions. Families invited to participate in the larger project were drawn from the residential registry ensuring a regionally balanced distribution. We conducted a baseline survey in January and February 2023 in which around 3,300 families participated. For the current intervention, we sent invitations on May 19, 2024 to 2,684 families with at least one registered child in grade 4 of elementary school to grade 3 of junior high school (ages 9 to 15). Of these invitations, 73 emails were returned to the sender and 38 families declined to receive emails, leaving us with 2,573 potential participants.

Statistical Power. We present our power calculations for a statistical power of 80%, a significance

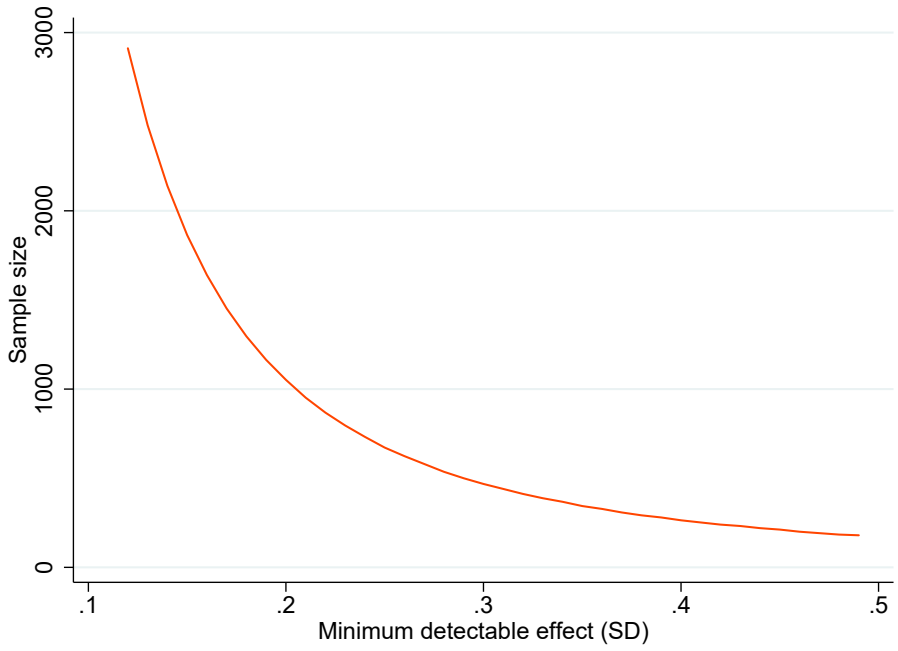

Figure 3: Power Calculation

Source: Authors' presentation based on own calculations. *Note*: This graph presents the necessary sample size to detect minimum detectable effects (MDEs). A two-sided test is assumed. Statistical power is 80%, significance level is 5%, outcome standard deviation is assumed to be 1, and the treatment group is three times the size of the control group (i.e. 75% vs. 25% of the sample).

level of 5%, a two-sided test, an outcome standard deviation of 1, and a treatment to control ratio of 3:1 (i.e. 75% vs. 25% of the sample) for various minimum detectable effects (MDEs) in Figure 3). A common MDE of 0.2 SD is detectable with a sample size of 1,052. This number decreases to 672 if we want to detect an MDE of 0.25 SD, and to 468 for an MDE of 0.3 SD. If the direction of the effect is clear a priori, we may instead assume a one-tailed test, which will detect an MDE of 0.2 SD with a sample size of 828.

Some of our analyses will also be powered to detect even smaller effects if we are able to collect multiple observations per child, as is possible for watch statistics and recall questions for example.

Assignment to Treatment. We will randomly assign children into control and treatment groups stratified by grades, gender, and relative age (i.e. birth month).[1] If possible, we will also ensure

[1] Because children who turn six years before April 1st must enroll into elementary school, children born at different times in a year have different relative ages in their grades (see also Akabayashi et al., 2023).

balance based on socioeconomic background. 25% will be assigned to the control group, 12.5% to TG1 (standard), 12.5% to TG1 (reverse), 12.5% to TG2 (standard), 12.5% to TG2 (reverse), 6.25% to TG3 (standard), 6.25% to TG3 (reverse), 6.25% to TG4 (standard), and 6.25% to TG4 (reverse) (see Figure 2).

Data Collection. We collect data from the baseline survey, video engagement and recall questions, parental surveys, and final surveys in the short and long run via SurveyMonkey.[2] The baseline survey was conducted in January and February 2023 and collected basic sociodemographic background, child characteristics, and (non-)cognitive measures. The intervention takes place in June and July 2024. The final survey for the short run will be conducted one week after the end of the intervention. The final survey for the long run will be conducted in January and February 2025.

3 Empirical Framework

Empirical Analysis. We will test hypotheses 1 and 2 using the following specification:

$$y_i = \alpha + \beta^{(1,2)} \mathbb{1}(\text{TG}k_i = 1) + \gamma r_i + \mathbf{x}_i' \boldsymbol{\delta} + \epsilon_i, \quad k \in \{1, 2, 3, 4\}, \tag{1}$$

where y_i is an outcome variable of child i (or its parent). $\mathbb{1}(\cdot)$ is an indicator function. $\beta^{(1,2)}$ is the treatment effect of being in any treatment group $\text{TG}k$ with $k \in \{1, 2, 3, 4\}$ and 0 otherwise. r_i indicates whether child i watched the videos in reversed order, $\mathbf{x}_i$ is a vector of control variables, $\boldsymbol{\delta}$ is a coefficient vector, and ϵ_i is an idiosyncratic error term. Depending on the outcome variable, hypotheses 1 and 2 imply $\text{H}_0 : \beta^{(1,2)} = 0$.

Hypothesis 3 can be tested using the following specification:

$$y_i = \alpha + \beta_1^{(3)} \text{TG1} + \beta_2^{(3)} \mathbb{1}(\text{TG}k_i = 1) + \gamma r_i + \mathbf{x}_i' \boldsymbol{\delta} + \epsilon_i, \quad k \in \{2, 3, 4\}, \tag{2}$$

where $\beta_1^{(3)}$ is the treatment effect of being in treatment group TG1 and $\beta_2^{(3)}$ is the treatment effect

[2] SurveyMonkey is an online platform that allows users to easily create, distribute, and analyze surveys for purposes such as market research, customer feedback, and research.

of being in either treatment group TG2, TG3, or TG4. Depending on the outcome variable, hypothesis 3 implies $H_0 : \beta_1^{(3)} = \beta_2^{(3)}$.

Hypothesis 4 can be tested using the following specification:

$$y_i = \alpha + \beta_1^{(4)}\text{TG1} + \beta_2^{(4)}\text{TG2} + \beta_3^{(4)}\mathbb{1}(\text{TG}k_i = 1) + \gamma r_i + \mathbf{x}_i'\boldsymbol{\delta} + \epsilon_i, \quad k \in \{3, 4\}, \tag{3}$$

where $\beta_1^{(4)}$ is the treatment effect of being in treatment group TG1, $\beta_2^{(4)}$ is the treatment effect of being in treatment group TG2, and $\beta_3^{(4)}$ is the treatment effect of being in either treatment group TG3 or TG4. Depending on the outcome variable, hypothesis 4 implies $H_0 : \beta_2^{(4)} = \beta_3^{(4)}$.

Finally, hypothesis 5 can be tested using the following specification:

$$y_i = \alpha + \beta_1^{(5)}\text{TG1} + \beta_2^{(5)}\text{TG2} + \beta_3^{(5)}\text{TG3} + \beta_4^{(5)}\text{TG4} + \gamma r_i + \mathbf{x}_i'\boldsymbol{\delta} + \epsilon_i \tag{4}$$

where $\beta_1^{(5)}$ is the treatment effect of being in treatment group TG1, $\beta_2^{(5)}$ is the treatment effect of being in treatment group TG2, $\beta_3^{(5)}$ is the treatment effect of being in treatment group TG3, and $\beta_4^{(5)}$ is the treatment effect of being in treatment group TG4. Depending on the outcome variable, hypothesis 5 implies $H_0 : \beta_3^{(5)} = \beta_4^{(5)}$.

Our intervention provides parents with messages and children with videos. Although we are able to measure participation and thus compliance with the intervention by using watch statistics and asking memory questions, perfect compliance cannot be measured. Therefore, all treatment effects must be interpreted as intent-to-treat (ITT) effects.

Homoscedasticity is unlikely to hold in our context. Therefore, we will allow for heteroscedasticity of any kind by using robust standard errors in all regressions (Huber et al., 1967; White, 1980, 1982).

Heterogeneity Analysis. As described before, we will perform estimations separately by gender, age groups, and socioeconomic background.

Robustness. To test robustness of our results, we will estimate the main effects with and without control variables. We will further test whether attrition throughout the intervention and potential non-compliance affect our results. Finally, we will use other (non-)parametric methods to test ro-

bustness of our results. Any additional non-preregistered robustness checks will be clearly marked.

4 Variables

4.1 Outcome Variables

Our data allows us to distinguish three sets of outcome variables. Cognitive measures will be collected at baseline and in the long run, non-cognitive measures will be collected in the baseline, short, and long run, and recall questions and watch statistics after each week's video will allow us to gain information about participation and thus compliance with the intervention. The outcomes of interest will be as follows:

Short Run (Final Survey 1).

- *Well-being*: Simplified Japanese version of the WHO-5 well-being index (Inagaki et al., 2013).
- *Self-esteem*: Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1965). The Japanese version is validated by Mimura and Griffiths (2007).
- *Perspective-taking*: A scale measuring empathy in school children (Hasegawa et al., 2009).
- *Self-control*: A self-regulation rating scale of (Kashiwagi, 1988; Tsukamoto, 2010) that is based on the work of Kendall and Wilcox (1979) and Humphrey (1982).
- *Moral behavior*: Moral Foundations Questionnaire (MFQ) (Graham et al., 2011). The Japanese version is validated by Murayama and Miura (2019).
- *School attitude*: School Liking and Avoidance Questionnaire (SLAQ) (Ladd and Price, 1987). The Japanese version is validated by Homma (2021).

Long Run (Final Survey 2).

- *Mathematical achievement*: Using a mathematical ability test (Shikishima et al., 2013; Yamaguchi et al., 2019).

- *Linguistic achievement*: Using a Japanese ability test (Shikishima et al., 2013; Yamaguchi et al., 2019).

- *SDQ*: A socioemotional measure of behavioral problems based on parents' responses to the Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997), obtained as the sum of the subscales conduct problems, emotional symptoms, hyperactivity, and peer relationships. The Japanese version is validated by Matsuishi et al. (2008).

- *QOL*: A quality of life measure from the KINDL^{R} (Ravens-Sieberer et al., 2006), obtained as the sum of the subscales physical health, emotional well-being, self-esteem, family, friends, and school. The Japanese version is validated by Matsuzaki et al. (2007).

- All non-cognitive measures that are also measured in the short run.

Memory Questions and Watch Statistics.

- Recall questions about the content of the video.

- Response to an open-ended question about thoughts and feelings about the video as a measure of engagement.

- Watch statistics that measure whether a child clicked on the video (extensive margin) and, if so, how often and for how long the child watched the video (intensive margin).

Mathematical and Japanese ability as well as SDQ and QOL are also measured in the baseline survey and thus be controlled for in the corresponding estimations.[3]

4.2 Control Variables

To correct for any remaining difference between the control and the treatment groups, we will control for the age and gender of the child, number of siblings, socioeconomic background, and region. Where available, we will also control for pre-intervention outcomes.

[3]For a detailed description of these measures, see Akabayashi et al. (2023).

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