

Living Environments and Child Development: Comparing Two Groups of Out-of-Home Children*

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Abstract

This paper examines whether living environments matter for child development, using unique data on 210 Korean children from surveys and experiments. We compare two groups of out-of-home children in different environments: traditional orphanage-type institutions and family-like group homes. We exploit arguably random assignment of children to institutions, generated by variation in the relative availability of group homes across regions over the years. We find that children in group homes are more altruistic, emotionally stable, satisfied with school, and forward-looking. Our findings suggest that family-like environments with smaller co-residents and more intimate relationships are beneficial to children separated from their parents.

JEL Classification: H75, I38, J13

Keywords: group home, out-of-home care, child development, cognitive and non-cognitive skills

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1 Introduction

There is increasing evidence that living environments during childhood have long-term persisting effects on later life socioeconomic status and well-being ([Currie, 2009](#); [Oreopoulos, 2003](#); [Ludwig et al., 2013](#)).¹ In this paper, we study children who are separated from their parents, living in out-of-home care institutions. These children might be more vulnerable to surrounding risk factors associated with behavioral and developmental problems and delicately influenced by living environments. Unlike children living with their family, out-of-home children’s living environments are more directly modifiable by policy intervention, so their current situation is worth scrutinizing for any possible improvements from the policymaking perspective.²

In this paper, we compare two different types of out-of-home care institutions in South Korea (hereafter Korea), both of which are publicly subsidized but have different living environments: traditional orphanage-type institutions and new family-like group homes. Theoretically speaking, group homes, which are of a small scale and located in usual family homes, might compensate for children’s lack of parents better and thus are more favorable to child development than traditional institutions. To examine the hypothesis, using our own data from surveys and experiments, we compare the cognitive and non-cognitive skills of children in the two types of out-of-home care institutions and determine if group homes outperform traditional institutions in these dimensions.

Every year, there are thousands of new children who need out-of-home care service for various reasons, such as family breakups, poverty, and child maltreatment.³ In Ko-

¹More related to our current study is [Doyle \(2007\)](#). He found that whether children are placed at foster care or at home matters for long-run lifetime outcomes such as teen pregnancy and employment. This study highlights the non-substitutability of family environment at least for children at the margin of foster care placement in the U.S. On the contrary, using the Swedish data, [Lindquist and Santavirta \(2014\)](#) found no significant association between foster care placement before age 13 and adult criminality.

²For a recent comprehensive literature review on various types of out-of-home care services, please refer to [Gypen et al. \(2017\)](#).

³Out-of-home care services are welfare programs provided to children who are not able to live with their biological families. For example, in 2017, there were 4,850 new children at risk, and among them, 725 were returned to the family, 1,704 were placed in foster care, and 2,421 were admitted to out-of-home child care facilities, mainly traditional orphanages and group homes ([Korea Ministry of Health and Welfare, 2017](#)).

rea, the out-of-home care service is provided in three different formats: institutional care, foster care, and group-home care. Among these, institutional care has accommodated a dominant portion of those children in need of care in its residential institutions, which are traditionally called orphanages. The other two types, as recommended by the Committee of the United Nations Convention on the Rights of the Child (UNCRC) in 2003, have nurtured a small but growing number of children. Since 2003 in Korea, the government has implemented a foster care system which falls into one of three types of care: grandparent, relative, and general foster care (Kang et al., 2014). Over 92% were placed in kinship foster care (hereafter kinship care, defined in this study as a type of foster home provided by someone who is already known to the child and who has a blood relation with the child; specifically, 67% in grandparent foster care and 25% in relative foster care) and 7% in general foster care (Korea Ministry of Health and Welfare, 2018). Because of general emphasis on blood in oriental culture, kinship foster care is much more common in Korea. In particular, unlike general foster care, which is hindered by nepotism based on gene and blood lines in Korean society, group-home care has spread as an alternative to large-scale institutional care. Given the growing importance of group-home care, it is worth comparing different types of institutions with respect to their contributions to child development.

Several studies have attempted to compare out-of-home care children in large-scale traditional institutions with those in group homes.⁴ However, the previous studies involve major limitations in the following two aspects: first, they do not deal with the endogeneity of children's assignment to out-of-home care institutions. While there is no

⁴Chung et al. (2012) argue that group-home care outperforms institutional care in terms of individual children's subjective measures of their own well-being. There is another string of literature evaluating the effect of out-of-home childcare services based on children's psychosocial adjustment and developmental performance. Nho et al. (2008) and Kang et al. (2009) report that children living in institutions are more likely to suffer from institutional illnesses, which are mostly due to these facilities' inability to provide appropriate and individualized care. Nho et al. (2008) reported that a high percentage of foster and group-home care children showed a certain degree of clinical depression and behavioral problems. By implementing the Draw-A-Person (DAP) test of Goodenough (1926) among children in group homes and in large-scale residential institutions, Zlateva and Zdravkova (2013) report that the former is inferred to have better cognitive abilities than the latter.

explicit rule for how children are assigned to institutions, it is known that traditional institutions refrain from accepting those children who have less favorable backgrounds or potential problems (Berger et al., 2009). This is reasonable because these children are hard to control, especially when there are more children in an institution. In fact, our raw data confirm this—we found that group-home children’s initial family background conditions prior to their admission to institutions were less favorable. They were more likely to come from more problematic parents and families. Given these initial differences, we will underestimate any true effects of group homes. However, no previous study has considered this potential bias arising from negative selection into group homes. Second, previous studies have relied on surveys and children’s or caregivers’ survey responses on psychosocial outcomes. Thus, it is reasonable to worry about measurement errors arising from self-reporting bias. Additionally, even when these studies have measured children’s attitudes or preferences, they have usually employed a limited scope of validated psychology measurement methods.

By tackling these unresolved issues, this paper attempts to make two contributions to the literature. Our first contribution is that we attempt to deal with the endogeneity problem with respect to children’s assignment to institutions.⁵ We exploited the fact that group homes have recently increased in number, and the increasing trends are different across regions (metropolitan areas and provinces). In this sense, Korea provides a quasi-natural experimental setting for studying the effects of living environments on out-of-home children because different types of out-of-home facilities with different living environments coexist during the transition period. In addition to this regional variation in the supply of group homes, depending on the incidences of children at risk and graduation rates of existing children from their institutions, there are natural variations in the probability of children’s assignments to group homes as opposed to traditional institutions

⁵Nho et al. (2016) used the propensity score matching to compare children in group homes and those in institutional care facilities. They found that group-home children have more positive outcomes and fewer behavioral problems.

by year and across regions. We exploited this arguably exogenous variation in children's assignment to group homes (versus traditional institutions) to estimate the causal effects of group homes on various aspects of child development, which we measured with the survey tools and experiments mentioned below.

Second, with respect to the limitation of the literature we mentioned earlier, we employed a variety of survey measures as well as lab-experimental methods to understand child development. Specifically, we used the Big Five personality test, the Strengths and Difficulties Questionnaire (SDQ), and Rosenberg's self-esteem scale which are validated in the social psychology literature. We also employed two popular experimental economics tools to measure children's preferences: the dictator game and the time preference experiment. We incentivized the experiments in order to minimize measurement errors and elicit true preferences. In addition, we also used the Raven's progressive matrices test and the Draw-A-Person (DAP) test to measure children's cognitive skills.

To preview our empirical results, we found few differences between children in group homes and those in traditional institutions with respect to cognitive ability, time preferences, personalities, or self-esteem. On the other hand, we found that children in group homes were more altruistic, emotionally stable, satisfied with school, and forward-looking compared to those in traditional institutions. The results suggest that group homes are better for child development especially given the initial conditions of those children assigned to group homes are worse than those of children in traditional institutions. Our findings, despite being far from conclusive, suggest that living in a family-like environment with a small number of co-residents and more intimate relationships is beneficial to children who are separated from their parents.⁶

The rest of this paper proceeds as follows. Section 2 introduces the institutional back-

⁶Our results are qualitatively consistent with those of previous studies in that group homes are more favorable to children than traditional institutions in various aspects. For example, [Nho et al. \(2016\)](#) found that group-home children tend to have more desirable positive outcomes and fewer behavioral problems. [Chung et al. \(2012\)](#) also pointed out that the family-like living environment of group homes is favorable for children.

ground of out-of-home childcare services in Korea. Section 3 explains how we collected our data and introduced our surveys and experiments. Section 4 presents our estimation models, and Section 5 presents the results. Section 6 concludes.

2 Institutional Background

The Korean War (1950-1953) resulted in a massive number of children in need of out-of-home care, and they were adopted by individuals from foreign countries or sent to traditional, large-scale orphanages. At that time, institutional care based on large-scale residential facilities was the only policy instrument for out-of-home care in Korea, and this remained true until foster care and group-home care were introduced in 2003 and 2004, respectively. In 2003, the UNCRC recommended that the Korean government made efforts to provide a family-like environment for children in out-of-home care settings. Along with the recommendation, in 2005, the Child Welfare Law was revised to provide legal support for foster care and group-home care. This facilitated children having closer contact with and supervision by intimate caregivers and staff with relatively low caseloads.

Figure 1 shows that the number of children assigned to group homes is increasing in the past 11 years in contrast to the decreasing trend of children in traditional institutions. During the period from 2008 to 2018, the number of children in group homes increased from 1,664 to 2,872, while that in traditional institutions decreased from 16,706 to 11,100. The 2005 reform by the Korean government has changed not only the quantity of those childcare facilities but also the intrinsic purpose of the out-of-home childcare system from “taking care of children in need of care” to “nurturing them at a more family-like environment” (UNCRC, 2003).

Group homes provide a more family-like living environment in various ways. While traditional institutions look much more like schools, group homes are not different in

their appearance from usual family houses. Group homes are private but subsidized by the government. By laws, each group home should be operated by more than two caregivers who nurture 4 to 7 children until they reach 18 years old. Additionally, group homes are required to secure a residential area of more than 82.5 square meters.

In group homes, children are supposed to build a closer relationship with their caregivers. We confirmed this in our data. Figure 2 presents, among the children we surveyed, the proportion of those who refer to their caregivers as family members, such as mother or father. The results reveal significant differences between group homes and traditional institutions. First, panel A of Figure 2 shows that, regardless of gender, children in group homes are more likely to refer to their caregivers as parents or relatives than those in traditional institutions.⁷ The proportion of such children in group homes is about 35%, twice larger than the 17% for traditional institutions. The proportion is slightly higher among girls in both types of institutions.

Second, panel B of Figure 2 shows the same proportion by the number of years since children's admissions to their institutions. Intriguingly, children in group homes are more likely to refer to their caregivers as parents or relatives the longer they stay at their institutions. After three years in a group home, more than a half of the children referred to their caregivers as parents or relatives. In contrast, such a pattern is not observed among children in traditional institutions. It seems that the proportion even decreases slightly after three years, which might reflect the age effect.

⁷The most frequently mentioned family names as pronounced in Korean are "um-ma" (mother), "a-pa" (father), "ee-mo" (aunt), and "sam-chon" (uncle).

3 Data Collection

3.1 Sample Construction

Since there are no publicly available individual data on out-of-home children in Korea, we collected our own data. Initially we planned to collect data on 200 children in total, 100 from group homes and 100 from traditional institutions. We restricted the sample to elementary school children aged from 8 to 13 years old. The age range was chosen deliberately because 1) we wanted to have children who were old enough to understand our experiments, and 2) we wanted to examine the development outcomes of those children who were young enough that their behaviors and attitudes are modifiable by policy intervention.

To construct a sample of children for our study, we took the following two step procedure. We obtained the official rosters of children in 63 group homes and 31 traditional institutions in the Seoul metropolitan area and its neighboring provinces.⁸ Then we added several group homes away from Seoul in order to have more children from group homes for our analysis.⁹ As a result, we have 152 group-home children but after dropping children with missing or incomplete information, 135 children. In the second step, we applied the propensity score matching and selected matched children in traditional institutions. Specifically, we estimated the Probit model with gender, age, years since admission, and counseling service at admission as independent variables and the indicator for affiliation to group homes as the dependent variable. Matching was done without replacement. Our final matched sample includes 135 pairs, but we succeeded in surveying 107 children in group homes and 103 children in traditional institutions who are matched to group-home children in the survey sample. Because of high costs of revising the selection of facilities

⁸We had to restrict the survey region and the target sample size due to our tight research budget.

⁹We collaborated with the safety and security training camp held by the Group Home Association, which invited all group-home children to a nationwide, two-day conference in order to provide a safety and security education program. At the camp, we interviewed 47 elementary school children from 15 group homes. We included these children in our final sample, but in regression analyses, we controlled for the indicator for this group. We also checked the robustness of our results using only our main sample.

and other constraints in the field, we inevitably omit a few children and include those who were excluded in the matched sample.

While the main focus of our study was out-of-home children, we decided to include a sample of in-home but still comparable children as a “benchmark” group. For this purpose, we selected five community childcare centers that provide childcare services for low-income households in Korea and interviewed 81 children in the same age range as our main sample. We tried to ensure that children in the benchmark group were comparable to those out-of-home children in our main sample, but since they are likely to be different from each other on either observable or unobservable characteristics, we do not try to make any causal inferences from comparing them.

Table 1 presents the summary statistics of our sample. Our sample includes 19 traditional institutions and 43 group homes. The number of children per facility is much larger in traditional institutions, 64.6, more than 10 times larger than the average of group homes. There are more caregivers in traditional institutions, but the number of children per caregiver is still higher compared to group homes. In the last column, the corresponding statistics about community childcare centers are presented but they are not very meaningful because children do not live there.

Panel B presents basic characteristics of children which are available in official records. The average age is similar across three types of facilities. As explained before, this is because we fixed the sample of children in group homes first and matched children in the other two types of facilities using basic characteristics including age. The share of girls is 36% in traditional institutions while it is 23% in group homes. We were not successful in matching the gender composition between traditional institutions and group homes.¹⁰ We were informally told that boys are more difficult to handle, so traditional institutions prefer to have girls. Thus, when group homes were newly established, they had to admit

¹⁰There are more boys than girls in out-of-home care in general. There might be various reasons for this from both supply and demand sides. For example, girls might be more likely to be adopted ([Baccara et al., 2014](#)).

more boys.¹¹ Lastly, the average duration since admission is shorter for children in group homes. We found that group-home children entered later than those in traditional institutions. We do not know exactly why this happened, but conjecture that since group homes are of a small scale, they might specialize in a specific age range of children. Then it is likely that we have fewer children who entered group homes earlier than the age range our study focuses on.

3.2 Surveys

We conducted surveys of children in group homes and traditional institutions in July and August 2016 and those in local childcare centers in December 2016 and January and February 2017. All surveys were conducted face-to-face by trained graduate students as enumerators. We carefully set interviews for high-quality information. For example, all the interviews were conducted in an isolated space to ensure that participants' responses and decisions in experiments were not affected by other children. In particular, we separated children from caregivers to eliminate any influences from caregivers.

The surveys were conducted to collect various information on children's non-cognitive skills, daily lives, and backgrounds. Note that some of our respondents are very young children such as first- or second-graders. For them, our interviewers read each question and, if necessary, explained it to make sure they understood it accurately. Children from higher grades were asked to complete and submit their responses by themselves.

There are three sets of questions for children in our survey. The first set includes questions about daily lives, attitudes, and values, such as "Do you like to go to school?", "How do you call your caregiver?" and "Have you thought about what you would like to be when you grow up?" The second set of questions is to collect information on children's personalities. A total of 26 questions are selected from the Big Five inventory questionnaire to measure extroversion, agreeableness, and conscientiousness. Each item

¹¹The assignment process will be explained in detail in the next section.

was rated on a four-point Likert scale. Lastly, the third set is to measure self-esteem using the Rosenberg test with 10 questions.

We conducted surveys on caregivers as well. Caregivers were given the questionnaires and asked to return them later via a regular mail. We could not collect the surveys directly on the spot because caregivers usually had to fill out the questionnaires about multiple children, and there might be additional information they needed to retrieve. There are three sets of questions in the surveys for caregivers. The first set asked about children's family backgrounds and life experiences before they entered the facility. Most items in this questionnaire were difficult to ask directly to children as they were related to sensitive issues, such as parental divorce, domestic violence, and child abuse. We mailed the survey to the principal caregiver and asked him/her to provide the background information about the child when the child was admitted to the facility. We specifically asked the caregiver to refer to the official registration document in order to collect accurate information. The registration document is usually filled out by the child's caseworker. The second set of questions asked about the daily lives of children, such as their bed times, activities during weekends, and studying behaviors. The third set was the Strength and Difficulties Questionnaires (SDQs), which were used to measure the behavioral characteristics of children and clinically evaluate children with respect to emotional symptoms, conduct problems, hyperactivity-inattention, peer problems, and pro-social behavior ([Goodman, 1997](#)).

3.3 Cognitive Ability Tests

To measure children's cognitive development, we conducted two cognitive tests, the DAP and the Raven's progressive matrices test. Both tests have been widely used to measure cognitive ability. The DAP test is designed to assess intellectual abilities of young children. The test is like a play or an art class. Children are simply asked to draw any person they want to draw. They are instructed to draw the person from head to toe, in as much

detail as possible. Each drawing is scored by two independent graders on a 50-point scale based on the standard scoring criteria, and the average of the two graders' scores is used as the child's DAP test score to minimize measurement errors by graders.

The Raven test is also a widely used test to measure cognitive ability, especially non-verbal or abstract reasoning abilities. Children were asked to solve two sets of standard, progressive matrices, with each set containing 12 problems. Each problem comprised eight specific geometric figures followed by one empty space. Children were asked to find the pattern in the eight figures and choose one of six available options to fill in the empty place. Each correct answer was scored as one point for a maximum of 24 points.

3.4 Experiments

We conducted two experimental games, the dictator game and the time preference game. Each game had two subgames, and we randomized the ordering of the subgames. Given that the games are played through a one-on-one conversation with the experimenter rather than by using a laboratory computer, the experimenter-demand effect was a concern. Keeping this concern in mind, we set the rules of conduct for experimenters as strictly as possible by writing a very specific script so that the same terms and gestures were used to describe the games across the board. The one-on-one format was the only feasible format given that our experiment participants were as young as eight years old and not familiar with the games that we conducted.

Before starting, we mentioned that the games had no right answers and encouraged children to make their choices based on their preferences (for example, "whatever you like"). Second, in order to increase the credibility of the games (especially where there were future monetary payoffs), we handed out the business card of one of the coauthors of this paper to each participant, following [Andreoni and Sprenger \(2012\)](#). We told the children to call if their payments did not arrive on time.

We used the dictator game in order to measure the altruism or pro-social attitudes

of children. Children played two versions of the dictator game. The first game was the standard dictator game in which the dictator gives a certain share of an endowment to an anonymous partner. Since our subjects were children, we were not allowed to give them money in cash. Thus, we used “culture coupons.”¹² The endowment was four culture coupons, and one coupon was worth 1,000 KRW (approximately 1 USD). Thus, the dictator’s choice was discrete, from zero to four coupons. Every child was supposed to make a choice. Each child was asked to allocate these coupons in two different-colored envelopes, blue or white. The coupons in the blue envelope would go to the partner, and the coupons in the white envelope would go to the dictator him/herself. After the child finished allocating the coupons into the two envelopes, the experimenter took the blue envelope and told the child to take the white envelope. The experimenter did not know the child’s choice and did not open any envelopes in front of the child. The second version of the dictator game was the same as the first version except that the children were told that their partner would be a child in a similar situation, either in a group home or in a traditional institution. We use two colored envelopes, as before, this time white and red. Again, the children knew that they could keep for themselves the coupons they put in the white envelope.

We measured time preferences of children based on the so-called multiple price list game by using a deck of cards on which the date and amount of a payoff to be received were written. Given its complex structure, some young children might not fully understand how the game works. Therefore, before starting the main game, we conducted a few practice sessions with a deck of practice cards with dates and payoffs that were different from those in the real game.

There were two subgames. In the first game, we asked each child to choose between receiving two culture coupons today and three culture coupons a month later. We presented a calendar to lower-grade students in order to make sure that they actually under-

¹²Culture coupons are almost the same as cash. They can be freely used offline, such as at convenience stores, theaters, book stores, and fast food restaurants. They can also be used for online shopping.

stood when exactly “one month later” would be. After making a choice, the selected card representing his/her choice was given to the child, and the other card was kept aside. We asked each child again to choose between receiving two culture coupons today and four culture coupons a month later, and then we gave the children the cards they chose. The two cards selected by each child were shuffled, and one card was randomly selected. The child was promised to receive the amount of coupons chosen on the date indicated on the card. The second game was exactly the same as the first game except that the choice was between receiving the coupons a month later or two months later. With these games, we can identify hyperbolic discounters ([Ashraf et al., 2006](#)).

4 Empirical Analysis

We examined various outcomes of child development among out-of-home children and compared children in group homes with those in traditional institutions. Our estimation equation is as follows:

$$Y_{ij} = \beta \cdot GROUP_j + W_{ij}\gamma + X_{ij}\delta + \epsilon_{ij} \quad (1)$$

where the dependent variable, Y_{ij} , is one of the child development outcomes that we measured by surveys or experiments for child i in out-of-home childcare facility j . The facility was either a group home or a traditional institution in our sample. The indicator, $GROUP_j$, equals one if the facility is a group home and zero otherwise. Thus, the coefficient for the indicator would represent the average difference of children in group homes from those in traditional institutions about the outcome.

As we mentioned in the introduction, children’s assignments to group homes or traditional institutions are likely endogenous. That is, children assigned to group homes are likely to be different from those assigned to traditional institutions from the beginning of

their admission to the facilities. In this case, the OLS estimate for β would be biased.¹³

We tried to address the concern of endogeneity in two ways. First, we controlled for a set of variables, W_{ij} , representing children's initial conditions and family histories, which were constructed based on the caregivers' responses to our life-event survey, along with basic demographic characteristics (age, gender, and years since admission) in X_{ij} .¹⁴ Table 2 shows all 14 variables we collected via the survey and compares them across group homes, traditional institutions, and in-home children. Overall, we found that, consistent with our expectation, children assigned to group homes have less desirable family backgrounds than those assigned to traditional institutions, suggesting that the assignment is endogenous. In the last row, we calculated the first principal component for 14 variables as a summary statistic. We found that the principal component for group homes is very different from that for institutional care; children in group homes have significantly more adverse life experiences than those in traditional institutions. (Obviously, both groups have less favorable family backgrounds than in-home children from low-income households.) Accounting for these initial differences in family backgrounds, in the regression analyses below, we controlled for these family life event variables.

As a second measure to deal with the endogeneity of the assigned facility type, $GROUP_j$, we use child-specific assignment probability to a group home as the instrumental variable (IV). The idea behind our IV is that group homes (the number of total slots or capacity) have recently increased in Korea, and these increasing trends are different across different

¹³We conducted the Durbin-Wu-Hausman test for endogeneity but found for many outcomes, the null hypothesis of no endogeneity cannot be rejected. This could be attributed to the smallness of our sample. Although the statistical test does not indicate endogeneity, it turns out that the OLS and IV estimates are very different. The results are presented in Online Appendix Table 1.

¹⁴It should be interesting to examine the dynamic effects of the exposure to a family-like environment in group homes. In theory, this can be done by interacting the group-home indicator with the number of years since admission. However, this specification is not feasible because our sample size is small and the age range is pretty narrow.

regions.¹⁵ Specifically, we construct the following variable for our IV:

$$Z_{ij} = \frac{G_{k(j),t(i,j)}}{G_{k(j),t(i,j)} + T_{k(j),t(i,j)}} \quad (2)$$

where $t(i, j)$ represents the year when child i was assigned to facility j and $k(j)$ is the province where facility j is located. $G_{k(j),t(i,j)}$ is the number of total slots in all group homes in province $k(j)$ and year $t(i, j)$. Likewise, $T_{k(j),t(i,j)}$ is the number of total slots in all traditional institutions in the same province and the same year. Therefore, Z_{ij} represents the relative supply of group homes where and when child i was assigned to facility j . Note that the variable is different among children in the same facility depending on their admission year and different among children admitted in the same year across provinces.

The regional variation in the relative supply of group homes is driven by each province's fiscal condition, the incidences of children at risk and graduation rates of existing children from their institutions. We exploit this arguably exogenous variation in the probability of children's assignments to group homes across regions and years.

Figure 3 shows that our IV is relevant to our endogenous variable, the probability of a child's assignment to a group home.¹⁶ Using the administrative data on out-of-home children, it shows that when there are relatively more group homes in a certain province in a certain year, children who newly appear in need of out-of-home care in the same province in the same year are more likely to be assigned to group homes. We focused on the nine provinces that our sample covers from 2000 to 2016. In our sample, children were assigned to their facilities during the period from 2004 to 2016. The horizontal axis represents the changes in the ratio of group-home capacities to all out-of-home care facilities' capacities by province and year. That is, the variable is the first difference of Z_{ij}

¹⁵Online Appendix Figure 1 compares the relative availability of group homes across provinces over time from 2008 to 2016. There is a common national trend, but provinces are different from each other in terms of the relative growth of group homes to traditional institutions.

¹⁶Note that if we have a sufficient number of children who were assigned to traditional institutions where or when group homes were not available, then we could identify the expected outcome without selection, so obtain the consistent estimate of the treatment effect. However, in our sample, there are only 11 children admitted to traditional institutions before 2008, so this empirical strategy is not feasible.

aggregated over province and year. The vertical axis represents the changes in the ratio of group-home children to all out-of-home children by province and year. The graph shows a clear positive correlation between the two variables, supporting the relevance of our IV; when there are more group homes, more children are assigned to group homes. Note that the two variables are the changes over years within provinces. Therefore, the changes should reflect new group homes and children who are newly assigned to group homes.

Figure 3 clearly shows that the IV is correlated with the endogenous variable (we will confirm this below), the indicator for whether a child is assigned to a group home, but it does not guarantee the other necessary condition for the IV estimation—the validity condition of IV. The condition requires that the IV should affect the outcome variable only through the endogenous variable. That is, there should be no direct effect. In our context, the relative availability of group homes in a certain province in a certain year where and when a child is separated from parents and to be placed in a facility should not be correlated with the child’s development outcomes. It is conceivable that children in traditional institutions perform badly and, as a policy response, the local government increases its budget for group homes. This cannot be directly tested because we do not have data on government spending for out-of-home care institutions. Also group homes might have expanded faster in provinces where there were potentially more better-quality group-home managers. However, we believe that the introduction of group homes in Korea was initiated by the national government and the growth rate for each province depended on its fiscal condition rather than children’s developmental status.¹⁷ Still one

¹⁷We have checked whether there is any correlation between the growth of new group homes and the fraction of problematic children. To do that, we use the statistics from the Ministry of Health and Welfare on the number of out-of-home care children by their cause of incidence. We operationally define children with two specific causes (delinquency and domestic violence) as “problematic” children and calculate the fraction of problematic children in each province and each year. Then, first, we check the correlation between the average fraction of problematic children until 2007 and the growth rate of group homes (in terms of individual slots) from 2008 to 2016. We compare before and after 2007 because group homes started to grow in 2008 and the official classification of the cause of incidence changed in 2008. The results show that the correlation is small and negative (-0.0194). Second, we check the contemporaneous correlation between the average fraction of problematic children between 2008 and 2016 and the growth rates of group homes

should take our results below with a grain of salt.

5 Empirical Findings

5.1 Cognitive Skills

First, we present the results for cognitive skills. Table 3 presents the results for the DAP and Raven tests. First, in the top panel of the table, we present the sample means of the test scores for children from group homes and traditional institutions, which are our main comparison groups, and those for in-home children as a benchmark group. All test scores are standardized to have a mean of zero and a standard deviation of one (z scores). The mean scores by group show that children in group homes have, on average, lower scores than not only in-home children but also children in traditional institutions, although the differences between group homes and traditional institutions are not statistically significant.

The regression results confirm that there is no systematic difference between group homes and traditional institutions. For the DAP test score, the coefficient estimate for group homes is positive and marginally significant. The estimate for the Raven score is even negative, although it is not statistically significant.¹⁸ The Cragg-Donald Wald F statistic is over 30, suggesting that the IV is not weak. Thus, we ensure that the relevance condition for our IV is satisfied.

There are some interesting results for control variables. First, we found that girls performed better in the DAP test, while there is no difference in the Raven test. Second, we found that the cognitive skills measured by the Raven test increase with age. The

during the same period. We find the correlation is again negative, (-0.0859), and not significant.

¹⁸One might think that the effect could be heterogeneous over the distribution of the test score. For example, a larger group-home effect may exist among lower-ability children. Unfortunately, this kind of analysis such as quantile regression is not feasible in our small sample. Instead, in Online Appendix Table 2, we compared the standard deviations of continuous outcomes including test scores between group homes and traditional institutions and found no significant difference.

age effect is weak for the DAP score. The results suggest that the two tests might measure different aspects of cognitive skills. Third, and more importantly for the purpose of this paper, we found that children who experienced unfavorable life events, such as parents' divorce or mental problems did worse in both cognitive skill tests.¹⁹ Children in our sample are on average 11 years old and have been in their facilities for three to four years. Thus, our results show that the life-event effect is robust and persistent over time. Whether the effect is extended to adulthood is an important question for future research.

5.2 Preferences for Giving and Time Preferences

Tables 4 and 5 report the results from the dictator games and the time preference games, respectively. For the results of the dictator games, we looked at two outcomes, the share of giving (out of the endowment) and the indicator of whether the dictator gave nothing to the partner.²⁰ The second outcome is particularly interesting because giving nothing is a benchmark as the predicted outcome in rational choice theory. Table 4 presents the results; columns (1) and (2) present the results of the first game, when the partner was completely anonymous, and columns (3) and (4) present the results of the second game, when the partner was anonymous but from a similar situation as the dictator. Therefore, the choice in the first game was related to altruism while the choice in the second game involved not only altruism but also a kind of empathy.

As in Table 3, we present the sample means of the dependent variables by group in the top panel. One notable finding here is that children in group homes were less likely to give nothing to their partners. The regression results also show that group-home children were less likely to give nothing than children in traditional institutions in both versions of the dictator game. The difference is not only statistically significant but also quite large, more than 25 percentage points.

¹⁹The results are available upon request from the corresponding author.

²⁰Some of our dependent variables are binary. We estimate the bivariate Probit model using biprobit in Stata and, in Online Appendix Table 3, find the results are qualitatively similar.

Some results for control variables are worth noting here. First, consistent with the findings in the literature, we found that there was a gender difference in giving; girls shared more than boys, and girls were less likely to share nothing. Second, somewhat surprisingly, the effects of negative life events were also significant for preferences for giving. We found almost consistently that children with negative life experiences, such as parents' divorce or domestic violence shared less and were more likely to share nothing with others. Lastly, unlike cognitive ability, we do not find any systematic differences between out-of-home and in-home children in terms of preferences for giving.

Table 5 presents the results from the time preference games. It shows the results for four games and whether the children chose an earlier option, for example, 2 dollars now rather than 3 dollars a month later or 2 dollars a month later rather than 4 dollars two months later. Unlike the results for the dictator games, we found few significant differences between children in group homes and those in traditional institutions.²¹ Regarding life-event variables, we find that children with negative life experiences tend to prefer an earlier option. For example, children with drug addicted or alcoholic parents are more likely to prefer 2 dollars now to 3 or 4 dollars a month later. On the other hand, children with hospitalized parents are less likely to choose an earlier option. More research is warranted to identify the mechanisms in which early life experiences affect time preferences.

5.3 Personalities, Behavioral Problems, and Attitudes

Table 6 presents the results for self-esteem and Big Five personality assessments. Table 7 reports the results for the SDQ. All dependent variables are standardized to have a mean of zero and a standard deviation of one. Prior to the standardization, the survey responses for the variables were coded in the Likert scale.

²¹Using our four game results, we can construct the indicators for self-control (hyperbolic discount) and future bias. We can also construct a variable representing those who made dynamically inconsistent choices. We estimated the same regression model with these variables as the dependent variable but found no significant results.

Looking at the results for group homes, we see in Table 7 that group-home children are less likely to have any emotional problems. Recall that the questions for self-esteem and personalities were answered by children themselves while the SDQ questions were answered by caregivers.²² For all the other outcomes, we found no statistically significant difference between group homes and traditional institutions.

Regarding the results for the control variables, the results are somewhat mixed. For example, we find that children who live apart from parents are lower in extroversion (for example, enjoy being with people less) and lower in agreeableness (less warm or less friendly). However, children with alcoholic parents tend to have higher self-esteem. Also, in Table 7, we see that as children become mature, they are more likely to be pro-social and less likely to be hyperactive or have conduct problems. Children who have experienced domestic violence are less likely to be pro-social and more likely to be hyperactive and have conduct problems or problems with peers.

Lastly, Table 8 presents the results for four outcome variables that we constructed using children's responses to survey questions. As before, all dependent variables are standardized to have a mean of zero and a standard deviation of one. Prior to the standardization, the survey responses for the variables were coded in the Likert scale. We examined four outcome variables, two related to schools and two related to children's future orientations. Two variables related to schools are, first, how much children like to go to school and, second, how well they follow up with their classes. The result in column (1) shows that children in group homes like to go to school significantly more than children in traditional institutions. However, we did not find any significant difference regarding their subjective evaluations about performance in classes. We also found that girls like to go to school more. Another interesting finding is that children who have stayed longer in facilities like to go to school more and think they follow their classes better.

²²This might explain why the SDQ results for in-home children are so different from those for out-of-home children. For in-home children, caregivers are typically family members. It is possible that family members do not objectively evaluate their children. Of course, our results might suggest that in-home children are indeed less likely to have any behavioral or emotional problems.

The last two variables we examined are important as they are related to how children perceive their futures. The first question, for which the results are presented in column (3), is how often children think about the type of the house they will live in in the future. While the first question is specific so that children can understand it easily, the second question, in column (4), is more general: how often children think about what kind of person they want to be when they become adults. The results show that group-home children think about the second question more often than those in traditional institutions. It is important for children to think about their futures because it makes them invest in their human capital today. In this sense, it is intriguing to find that children in group homes are more forward-looking. However, we do not know about the exact channels for the difference that group homes make. Our hypothesis is that group homes are closer to a family-like environment and that internal relationships within group homes between children and caregivers or among children are stronger than those in traditional institutions. Such relationships are longer lasting so that children might become less myopic and more forward-looking. Finding the exact causal channels in which living environments in group homes affect children's attitudes is an important area for future research.²³

6 Conclusions

We compared two different types of out-of-home care institutions in Korea: traditional orphanage-type institutions and new family-like group homes. Our main research question was whether group homes better compensated for children's lack of family by providing a more family-like living environment as the proponents argued. We examine various aspects of children by conducting not only surveys but also psychological tests

²³Our paper's objective is limited to testing whether a family-like living environment of group homes benefits child development but we do not have any explicit theoretical model for the hypothesis. However, to explore the channels of the effects that we found, we have controlled for the number of children per caregiver. In addition, we have tried to control for whether the child calls the caregiver as a family member. The results are presented in Online Appendix Table 4. We find the results are qualitatively similar after controlling for those additional variables.

and economic experiments. To the best of our knowledge, our study is the first in the literature to examine such a comprehensive set of child outcomes for children in out-of-home care.

Our findings suggest that group homes are better for children's development than traditional institutions. We find that group-home children are more altruistic, emotionally stable, satisfied with school, and forward-looking. The results are even stronger given that children with more adverse initial conditions are more likely to be assigned to group homes. If there are significant initial gaps, our findings suggest that children in group homes develop more quickly than those in traditional institutions.

There might be multiple mechanisms behind our results. First, the number of children in orphanages is much higher than that of group homes. Thus, consistent with the standard model of child quantity-quality tradeoff ([Becker and Lewis, 1973](#)), the competition for resources can become fiercer as the number of children increases, raising the possibility of opposition to altruism. Second, as implied by the finding that group-home children call their caregivers as family members, caregivers in group homes may act in a parental capacity. Parents-like caregivers are likely to be more altruistic, and they may also teach children to be more altruistic ([Doepke and Zilibotti, 2017](#)). Also, altruistic caregivers may balance investment in education with investment in health, making children healthier not only physically but also mentally ([Ehrlich and Yin, 2013](#)). Lastly, a family-like environment and a longer relationship between children and caregivers may make group-home children more forward-looking. This is consistent with the theoretical prediction of the model by [Bhatt and Ogaki \(2012\)](#) where tough-love parents try to make children have a higher discount factor.

On the other hand, we find no significant difference in many other outcomes, such as cognitive skills, time preferences, and Big Five personalities. Thus, our results should not be interpreted as showing that group homes are absolutely advantageous than traditional institutions. Since in this paper we aim to examine whether a family-like environment

matters for any aspects of child development among out-of-home children, we cannot explain why group homes are advantageous in some aspects but not in others.

We want to mention a few caveats to the findings of the current study. First, there might be some limitations to the external validity of our findings. Our study compares children in group homes and those in traditional orphanage facilities, so we need to be cautious about deriving any direct implications about in-home children. In this regard, our main message should be limited to the importance of family-like environments to out-of-home children. Also cognitive and non-cognitive development of children depends on not only living environments but also educational institutions and cultural backgrounds. Thus, we need to be careful about applying our findings to other countries since institutional settings differ substantially across countries.

Second, in order to compare the two different types of institutions from the policy-making perspective, one needs to take into account the costs as well. Group homes are of a smaller scale than traditional institutions, so if other things are equal, could be more costly given the lack of economies of scale.²⁴ While our findings in this paper show that group homes are beneficial to children, in order to derive fair policy implications, more in-depth studies are warranted to better evaluate costs and benefits of the two institutions.

Lastly, it is worth noting that the results in our study are limited to child outcomes. Whether the results we found will be persistent to adulthood is an important question needing further investigation in future studies.

²⁴According to [Nho et al. \(2016\)](#) and [Woo et al. \(2015\)](#), the average expenditure per child is *smaller* in group homes than in traditional institutions. [Woo et al. \(2015\)](#) estimate the average monthly expenditure per child is about 1,900 USD for traditional institutions (1 USD = 1,100 Korean won), larger than 1,355 USD for group homes. However, they show that the expenditure after subtracting the labor costs of caregivers is larger for group homes.

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Table 1: Summary Statistics of Facilities and Children

	(1)	(2)	(3)
	Out-of-home children		In-home Children
	Traditional	Group home	
Panel A: Facilities			
Number of facilities in sample	19	43	5
Number of children per facility	64.6	5.8	34.2
Number of caregivers per facility	18.8	2.3	3.2
Children per caregiver	3.5	2.6	11.0
Panel B: Children			
Number of children in sample	103	107	81
Age	10.9 (1.7)	11.0 (1.6)	10.7 (1.6)
Girl	0.36 (0.48)	0.23 (0.43)	0.47 (0.50)
Years since admission	4.3 (3.0)	2.9 (2.2)	–

Note: For facilities, the sample mean or frequency is presented. For children, the sample mean and standard deviation in parentheses are presented. The variable of years since admission is missing for 3 children at traditional institutions and for 12 children at group homes.

Table 2: Life Events Survey Results

	(1)		(2)		(3)	
	Out-of-home children				In-home Children	
	Traditional		Group home			
	N	1 if yes	N	1 if yes	N	1 if yes
Abandoned child	99	0.25	71	0.31	0	–
Lived apart from parents	87	0.33	71	0.46	81	0.30
One of parents dead	74	0.14	62	0.26	81	0.06
Both parents dead	93	0.06	62	0.03	0	–
Divorced parents	83	0.73	65	0.86	80	0.35
Parents lost a job	45	0.42	49	0.69	75	0.37
Parents bankrupt	35	0.34	39	0.44	78	0.19
Parents in prison	61	0.21	60	0.13	80	0
Drug addicted/alcoholic parents	54	0.20	54	0.28	78	0.08
Hospitalized parents	71	0.18	62	0.19	80	0.13
Mentally ill parents	69	0.33	60	0.17	79	0.03
Parents runaway	79	0.56	55	0.55	79	0.22
Spousal abuse	53	0.32	44	0.36	80	0.06
Domestic violence/child abuse	78	0.55	62	0.55	79	0.06
Principal component (1st)		-1.22		0.80		

Note: In the life events surveys, the possible response to each question is either "yes", "no", or "uncertain". We present the proportion of those who answered "yes" among those who answered "yes" or "no". N represents the number of the valid responses. For in-home low-income household children, the first and fourth questions are not asked.

Table 3: Cognitive Test Results

	(1) Raven	(2) DAP
Mean of dependent variable		
Group home	-0.0496	-0.2808
Traditional	-0.0239	-0.0798
<i>In-home (low-income)</i>	<i>0.0947</i>	<i>0.4691</i>
Group home	-0.2251 (0.3684)	0.7399* (0.4116)
Girl	-0.2623 (0.1664)	0.6569*** (0.1667)
Age	0.2464*** (0.0384)	0.0852* (0.0437)
Years since admission	-0.032 (0.0284)	0.0329 (0.0325)
Constant	-2.2979*** (0.5095)	-0.9351* (0.5634)
Cragg-Donald Wald F statistic	36.7	36.5
Observations	193	194
R-squared	0.3271	0.2080

Note: The dependent variable is the Raven test score (z score) in column (1) and the DAP test score (z score) in column (2). All specifications control for the indicator for the July 7 event sample, 14 life-event variables, and the indicators for missing values in the life-event variables. Robust standard errors are presented in parentheses. Significance: *** 1%, ** 5%, * 10%.

Table 4: Dictator Game Results

	(1) Anonymous Share	(2) Zero	(3) Anonymous & Similar Share	(4) Zero
Mean of dependent variable				
Group home	0.4151	0.1698	0.3868	0.1509
Traditional	0.3981	0.2330	0.4053	0.2427
<i>In-home (low-income)</i>	<i>0.4135</i>	<i>0.1852</i>	<i>0.3272</i>	<i>0.2716</i>
Group home	0.1721 (0.1236)	-0.2971* (0.1749)	0.2513** (0.1260)	-0.3141* (0.1715)
Girl	0.1103** (0.0530)	-0.1770** (0.0700)	0.1151** (0.0488)	-0.1707** (0.0693)
Age	0.0502*** (0.0131)	-0.0168 (0.0170)	0.0274** (0.0133)	-0.0215 (0.0174)
Years since admission	-0.0039 (0.0103)	0.0130 (0.0143)	-0.0013 (0.0103)	0.0101 (0.0157)
Constant	-0.0414 (0.1636)	0.1301 (0.2399)	0.1267 (0.1736)	0.2969 (0.2448)
Observations	194	194	194	194
R-squared	0.1932	0.1844	0.1532	0.2088

Note: The dependent variable is the share of giving in columns (1) and (3) and the indicator of whether the child gives zero in columns (2) and (4). All specifications control for the indicator for the July 7 event, 14 life-event variables, and the indicators for missing values in the life-event variables. Robust standard errors are presented in parentheses. Significance: *** 1%, ** 5%, * 10%.

Table 5: Time Preference Experiment Results

	(1) Present \$2 vs \$3	(2) Present \$2 vs \$4	(3) Early \$2 vs \$3	(4) Early \$2 vs \$4
Mean of dependent variable				
Group home	0.6075	0.3551	0.4206	0.1776
Traditional	0.5340	0.2549	0.5049	0.2136
<i>In-home (low-income)</i>	<i>0.3951</i>	<i>0.1605</i>	<i>0.4074</i>	<i>0.1728</i>
Group home	-0.0413 (0.2076)	0.1168 (0.2230)	-0.3853 (0.2352)	0.0628 (0.1995)
Girl	-0.1661** (0.0816)	-0.0899 (0.0848)	-0.0506 (0.0920)	0.0570 (0.0774)
Age	-0.0109 (0.0215)	-0.0316 (0.0210)	0.0034 (0.0240)	-0.0218 (0.0184)
Years since admission	0.0332** (0.0149)	-0.0030 (0.0161)	-0.0230 (0.0180)	0.0093 (0.0133)
Constant	0.2572 (0.2852)	0.4561 (0.2804)	0.4978 (0.3059)	0.3455 (0.2512)
Observations	195	194	195	195
R-squared	0.2598	0.1452	0.1067	0.1365

Note: The dependent variable is the indicator of whether the child chose the earlier payment in each of four time-preference questions. Column (1) is about the choice between \$2 now and \$3 one month later. Column (2) is the choice between \$2 now and \$4 one month later. Column (3) is about the choice between \$2 one month later and \$3 two months later. Column (4) is the choice between \$2 one month later and \$4 two months later. All specifications control for the indicator for the July 7 event sample, 14 life-event variables, and the indicators for missing values in the life-event variables. Robust standard errors are presented in parentheses. Significance: *** 1%, ** 5%, * 10%.

Table 6: Rosenberg and Big Five Personality Results

	(1)	(2)	(3)	(4)
	Rosenberg Self-esteem	Extraversion	Big Five Personalities Agreeable	Conscientious
Mean of dependent variable				
Group home	-0.0985	-0.0502	-0.1162	-0.0998
Traditional	0.0710	0.0981	0.0306	0.0907
<i>In-home (low-income)</i>	<i>0.0321</i>	<i>-0.0597</i>	<i>0.1063</i>	<i>0.0103</i>
Group home	-0.7026 (0.4653)	-0.0572 (0.4296)	0.1275 (0.4060)	-0.1369 (0.4154)
Girl	-0.2836 (0.2007)	-0.0168 (0.1871)	0.1033 (0.1686)	-0.1616 (0.1935)
Age	-0.0403 (0.0533)	-0.0533 (0.0488)	-0.0461 (0.0510)	0.0086 (0.0510)
Years since admission	0.0010 (0.0358)	0.0719** (0.0340)	0.0255 (0.0301)	0.0336 (0.0336)
Constant	0.9453 (0.6017)	0.5360 (0.5813)	0.2165 (0.6406)	-0.1815 (0.6133)
Observations	188	187	188	188
R-squared	0.1664	0.1817	0.2016	0.2003

Note: The dependent variable is the z score of the response to the Likert-scale question for each measure. All specifications control for the indicator for the July 7 event sample, 14 life-event variables, and the indicators for missing values in the life-event variables. Robust standard errors are presented in parentheses. Significance: *** 1%, ** 5%, * 10%.

Table 7: Strengths and Difficulties Questionnaire (SDQ) Results

	(1) Pro-social	(2) Hyperactive	(3) Emotional	(4) Conduct	(5) Peers
Mean of dependent variable					
Group home	-0.1534	0.2986	0.1599	0.1692	0.2079
Traditional	-0.2107	0.1108	0.1317	0.2880	0.0906
<i>In-home (low-income)</i>	<i>0.4146</i>	<i>-0.4413</i>	<i>-0.3247</i>	<i>-0.5253</i>	<i>-0.3237</i>
Group home	-0.3123 (0.4043)	0.2136 (0.4148)	-0.7097* (0.4303)	0.1252 (0.5068)	-0.5697 (0.4963)
Girl	-0.2058 (0.1753)	0.0055 (0.1797)	0.0261 (0.1712)	0.0923 (0.2031)	0.0617 (0.2344)
Age	0.1059** (0.0499)	-0.1348*** (0.0427)	-0.0361 (0.0424)	-0.1535*** (0.0430)	-0.0212 (0.0472)
Years since admission	-0.0524 (0.0359)	0.0150 (0.0352)	-0.0577* (0.0341)	0.0152 (0.0383)	-0.0672 (0.0435)
Constant	-0.8317 (0.6309)	1.1815* (0.6635)	0.8504 (0.6153)	1.0919* (0.6125)	0.5712 (0.7073)
Observations	175	175	175	175	175
R-squared	0.1686	0.2560	0.1915	0.2658	0.1494

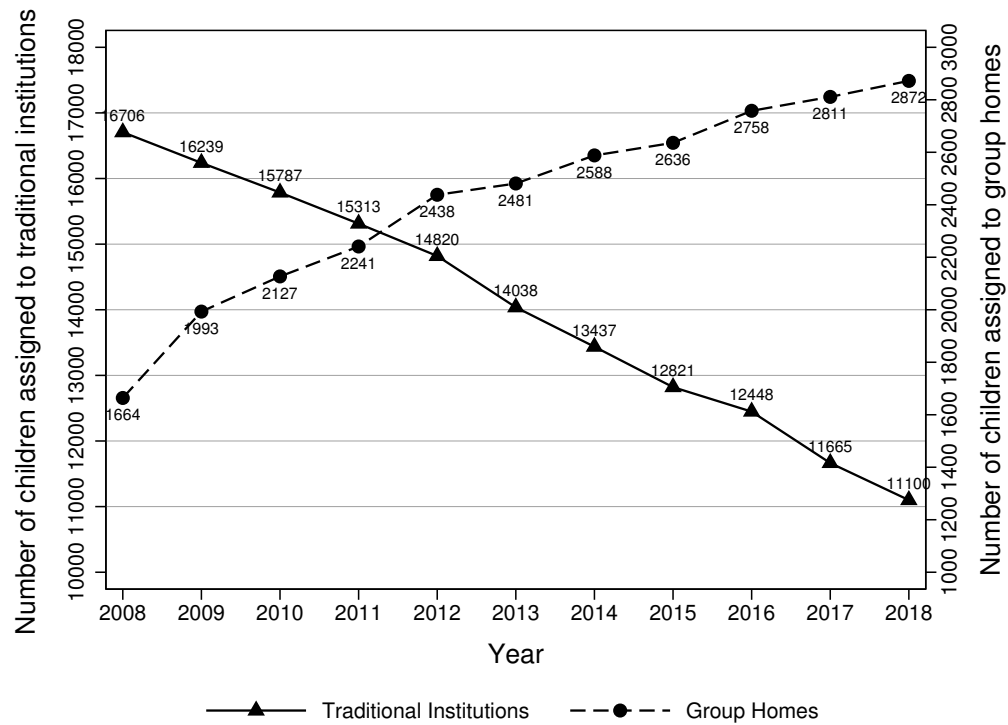
Note: The dependent variable is the z score of the response to the Likert-scale question for each measure. All specifications control for the indicator for the July 7 event sample, 14 life-event variables, and the indicators for missing values in the life-event variables. Robust standard errors are presented in parentheses. Significance: *** 1%, ** 5%, * 10%.

Table 8: Attitudes to School and Future

	(1)	(2)	(3)	(4)
	Like school	Follow class	Future house	Future career
Mean of dependent variable				
Group home	0.6337	0.5700	0.6702	0.8298
Traditional	0.5051	0.5510	0.6139	0.7525
<i>In-home (low-income)</i>	<i>0.6543</i>	<i>0.6875</i>	<i>0.6625</i>	<i>0.7125</i>
Group home	0.5033** (0.2321)	-0.1779 (0.2494)	0.0280 (0.2083)	0.3784** (0.1492)
Girl	0.2249*** (0.0839)	0.0943 (0.0899)	-0.1083 (0.0776)	0.0449 (0.0731)
Age	-0.0220 (0.0238)	-0.0252 (0.0228)	0.0159 (0.0211)	0.0193 (0.0169)
Years since admission	0.0356* (0.0188)	0.0183 (0.0175)	-0.0019 (0.0159)	0.0047 (0.0128)
Constant	0.3593 (0.3379)	0.7546** (0.2947)	0.5027* (0.2826)	0.4607** (0.2309)
Observations	187	185	182	182
R-squared	0.1439	0.1797	0.1961	0.1697

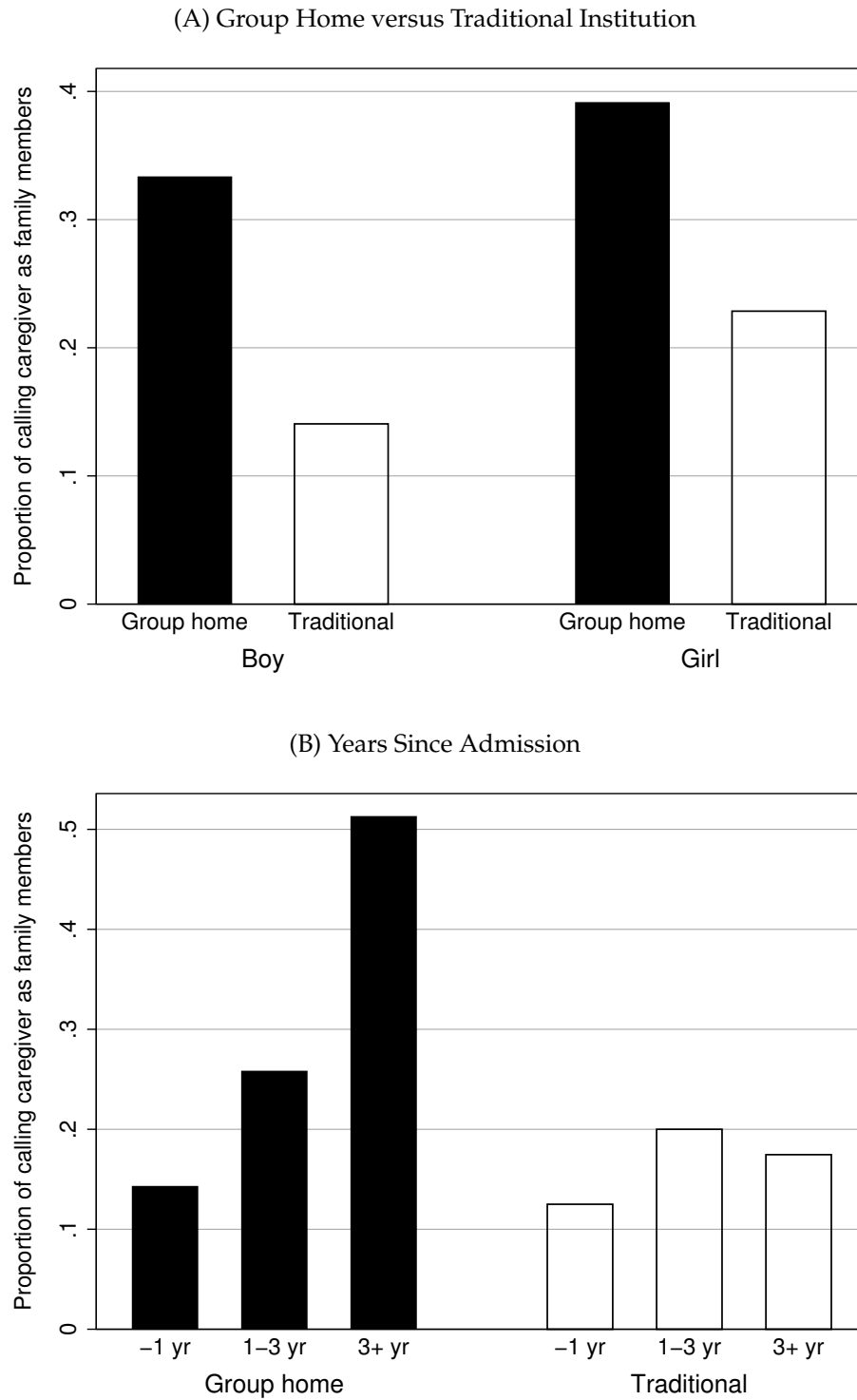
Note: The dependent variable is the indicator for a positive response to each Likert-scale question. For Like school and Follow class variables, the indicator is one if the response is somewhat agree or strongly agree. For Future house and Future career variables, the indicator is one if the response is often or very often. All specifications control for the indicator for the July 7 event sample, 14 life-event variables, and the indicators for missing values in the life-event variables. Robust standard errors are presented in parentheses. Significance: *** 1%, ** 5%, * 10%.

Figure 1: Trends of Out-of-Home Children at Group Homes and Traditional Institutions, 2008-2018



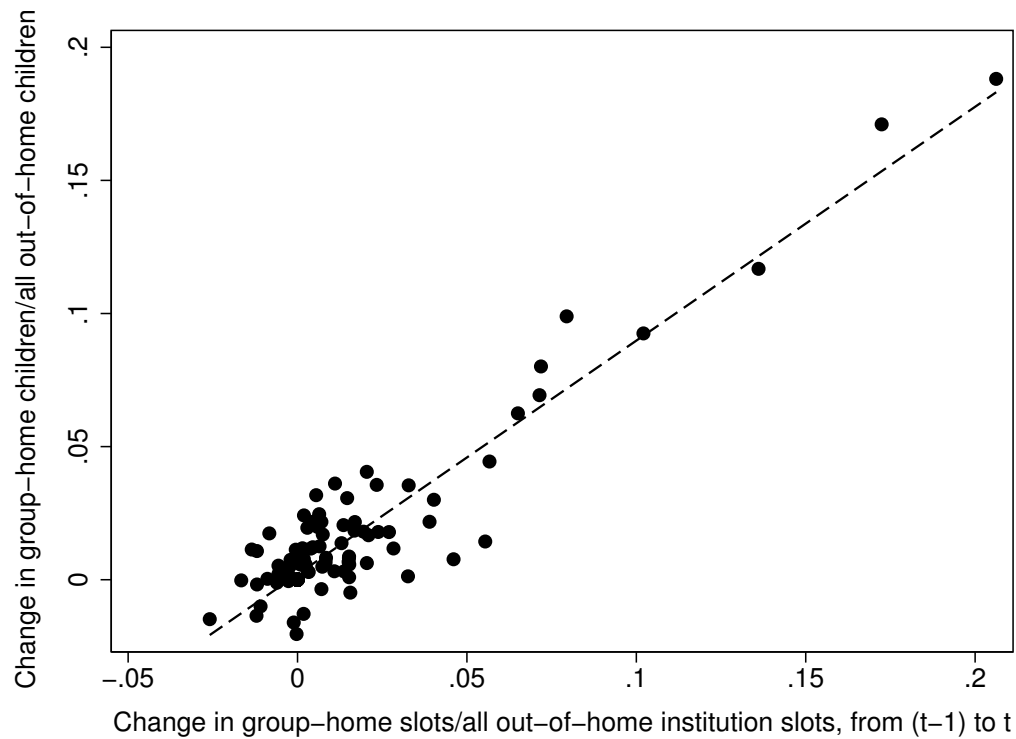
Source: Korea Ministry of Health and Welfare, *Annual Report on Current Status of Out-of-Home Care Children*, various years.

Figure 2: Children Calling Caregivers as Family Members



Note: The graphs show the proportions of children who call their caregivers as family members such as mother, father, aunt, or uncle, as opposed to Mr., Ms., or teacher.

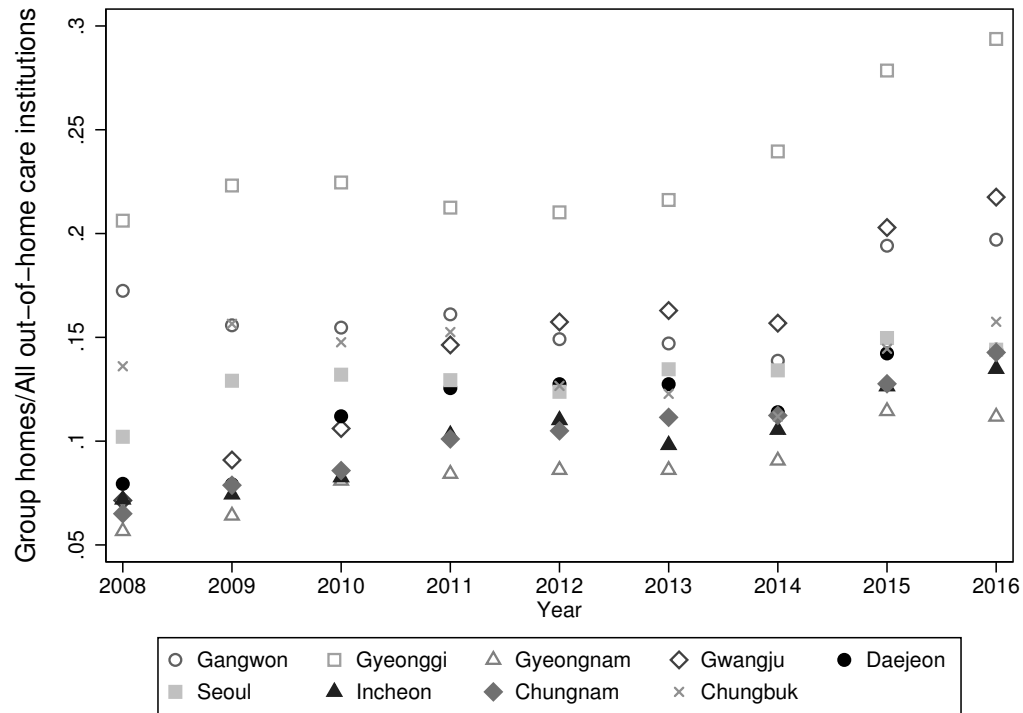
Figure 3: Assignments of Out-of-Home Children to Group Homes and Traditional Institutions



Note: The horizontal axis represents the change in the ratio of group-home slots to all out-of-home care institution slots from year $(t-1)$ to t . The vertical axis represents the change in the ratio of group-home children to all out-of-home care institution children from year $(t-1)$ to t . The data include 9 provinces where our sample institutions are located and the time period is from 2000 to 2016.

Online Appendices
(Not for Publication)

Figure A1: Regional Trends of Relative Availability of Group Homes



Note: The trends of the relative availability of group homes are for 4 metropolitan areas (Seoul, Incheon, Gwangju and Daejeon) and 5 provinces (Gangwon, Gyeonggi, Gyeongnam, Chungnam and Chungbuk) where our sample institutions are located. The relative availability of group homes is defined as the slots of group homes divided by the total slots of all out-of-home care institutions (group homes and traditional institutions).

Table A1: OLS Results

		(1) Baseline	(2) OLS
Table 3.	Raven	-0.2251 (0.3684)	-0.0697 (0.1633)
	DAP	0.7399* (0.4116)	0.1451 (0.2005)
Table 4.	Share to anonymous	0.1721 (0.1236)	-0.0037 (0.0606)
	Zero to anonymous	-0.2971* (0.1749)	-0.1119 (0.0808)
	Share to anonymous and similar	0.2513** (0.1260)	-0.0084 (0.0585)
	Zero to anonymous and similar	-0.3141* (0.1715)	-0.1905** (0.0838)
Table 5.	Present \$2 vs \$3	-0.0413 (0.2076)	0.2194** (0.0924)
	Present \$2 vs \$4	0.1168 (0.2230)	0.0850 (0.1083)
	Early \$2 vs \$3	-0.3853 (0.2352)	-0.1256 (0.1065)
	Early \$2 vs \$4	0.0628 (0.1995)	-0.0145 (0.0888)
Table 6.	Self-esteem	-0.7026 (0.4653)	-0.1793 (0.2206)
	Extraversion	-0.0572 (0.4296)	-0.1047 (0.2062)
	Agreeable	0.1275 (0.4060)	0.0825 (0.1861)
	Conscientious	-0.1369 (0.4154)	-0.0999 (0.2072)
Table 7.	Pro-social	-0.3123 (0.4043)	-0.0397 (0.2107)
	Hyperactive	0.2136 (0.4148)	0.1797 (0.1932)
	Emotional	-0.7097* (0.4303)	-0.0751 (0.2070)
	Conduct	0.1252 (0.5068)	-0.3212 (0.2232)
	Peers	-0.5697 (0.4963)	0.2042 (0.2099)
Table 8.	Like school	0.5033** (0.2321)	0.2162* (0.1096)
	Follow class	-0.1779 (0.2494)	0.0924 (0.1007)
	Future house	0.0280 (0.2083)	-0.1301 (0.1011)
	Future career	0.3784** (0.1492)	0.1049 (0.0876)

Table A2: Comparison of Standard Deviations

	(1) Traditional	(2) Group home	(3) p-value
Raven	0.9955	1.0055	0.9201
DAP	1.0065	0.8859	0.1955
Share to anonymous	0.3000	0.3045	0.8804
Share to anonymous and similar	0.3074	0.2698	0.1850
Self-esteem	1.0764	0.9872	0.3889
Extraversion	1.0200	0.9533	0.4998
Agreeable	0.9858	0.9098	0.4232
Conscientious	1.0304	0.9609	0.4854
Pro-social	0.9933	0.8752	0.2376
Hyperactive	0.9510	0.9603	0.9224
Emotional	0.9655	1.0561	0.3938
Conduct	1.0059	1.0096	0.9669
Peers	0.9545	1.0497	0.3663

Table A3: Probit Estimation Results

		(1) Bivariate Probit	(2) Marginal Effect
Table 4.	Zero to anonymous	-0.4611 (0.5746)	-0.0974
	Zero to anonymous and similar	-0.8396 (0.5572)	-0.1846
Table 5.	Present \$2 vs \$3	-0.2189 (0.3220)	-0.0652
	Present \$2 vs \$4	0.0914 (0.7161)	0.0283
	Early \$2 vs \$3	-1.5116*** (0.2197)	-0.4995
	Early \$2 vs \$4	0.0278 (1.1413)	0.0065
Table 8.	Like school	1.4974*** (0.2275)	0.4693
	Follow class	-0.8857*** (0.2485)	-0.2786
	Future house	0.5790* (0.3160)	0.1813
	Future career	1.7460*** (0.2861)	0.3787

Table A4: Controlling for Potential Channels

		(1)	(2)	(3)
		Baseline	(1) + Children per caregiver	(2) + Calling mommy
Table 3.	Raven	-0.0798 (0.3250)	-0.2271 (0.3628)	-0.2469 (0.3274)
	DAP	0.4864 (0.3412)	0.7249* (0.3887)	0.3520 (0.3922)
Table 4.	Share to anonymous	0.1303 (0.0961)	0.1727 (0.1232)	0.2210* (0.1290)
	Zero to anonymous	-0.2679* (0.1385)	-0.2978* (0.1742)	-0.3234* (0.1781)
	Share to anonymous and similar	0.2275** (0.1086)	0.2521** (0.1249)	0.2165* (0.1257)
	Zero to anonymous and similar	-0.2525* (0.1444)	-0.3142* (0.1717)	-0.2843 (0.1846)
Table 5.	Present \$2 vs \$3	0.0345 (0.1783)	-0.0419 (0.2093)	-0.0129 (0.2079)
	Present \$2 vs \$4	0.0736 (0.1864)	0.1167 (0.2239)	0.1484 (0.2265)
	Early \$2 vs \$3	-0.2123 (0.1950)	-0.3857 (0.2368)	-0.3324 (0.2411)
	Early \$2 vs \$4	0.0803 (0.1701)	0.0638 (0.1985)	0.2014 (0.1991)
Table 6.	Self-esteem	-0.4171 (0.3894)	-0.6997 (0.4488)	-0.8783* (0.4744)
	Extraversion	0.0622 (0.3408)	-0.0563 (0.4253)	-0.2815 (0.4560)
	Agreeable	0.0988 (0.3108)	0.1287 (0.4028)	0.1549 (0.4250)
	Conscientious	-0.0428 (0.3149)	-0.1354 (0.4096)	-0.3472 (0.4322)
Table 7.	Pro-social	-0.0657 (0.3322)	-0.3259 (0.4006)	-0.2334 (0.4065)
	Hyperactive	0.2545 (0.3622)	0.2046 (0.4069)	0.1179 (0.3953)
	Emotional	-0.6896* (0.3640)	-0.7197 (0.4429)	-0.7492* (0.4425)
	Conduct	0.2023 (0.4212)	0.1334 (0.5142)	0.1445 (0.5164)
	Peers	-0.4339 (0.4044)	-0.5862 (0.4790)	-0.5468 (0.4941)
Table 8.	Like school	0.4521** (0.1858)	0.4920** (0.2197)	0.4286* (0.2258)
	Follow class	-0.0807 (0.1893)	-0.1708 (0.2417)	-0.1678 (0.2509)
	Future house	0.1942 (0.1833)	0.0280 (0.2079)	0.0847 (0.2179)
	Future career	0.4185*** (0.1322)	0.3779** (0.1514)	0.4389*** (0.1567)