

# **What can be done to stop bullying among children?**

## **Evidence from Canada**

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### **Abstract**

With the resurgence in concerns on the negative effects of children's bullying behaviors, the need for exploring its complex implications has become evident. This paper contributes to the research in the following ways: first, a simple static economic model is created with the assumption of imperfect detections of bullying while, at the same time assuming that the anti-bullying interference from teachers/parents creates the disutility for the bullies. Then, a dynamic model is developed with two periods. Based on the framework of dynamic model, the habit formation assumption, in which the bully's utility depends on the current relative to the past bullying behavior, is imposed. In this study, I find that the timing of the first detection of bullying and the appropriate education style are critical in deterring it. Further, the National Longitudinal Survey of Children and Youth (NLSCY) is used to test the predictions of the models. By employing methods robust to misspecification that account for self-selection bias and unobserved heterogeneity, the empirical results support the findings of the models: 1) the earlier the bullying is detected, the easier to control it; 2) hostile and punitive parenting behaviors lead to the lower probability of being a bully.

## **1 Introduction**

Bullying among children, which happens frequently<sup>1</sup> and cause severe consequences, has always been a serious social problem. Most bullying behaviors are similar sharing the following characteristics: intention, causing harm or distress to victims, and repetition. In rare cases, bullying can lead to suicide. Kim and Leventhal (2008) revealed the connection between the participation of bullying and the risk of generating suicidal ideas for youths<sup>2</sup>. Besides direct negative impacts of children's bullying behavior on victims and their families, the adverse effects are not only limited to victims. Broun and Taylor (2008) found that being a bully or being bullied at school will deteriorate their educational attainments persistently, but victimization of bullying also has impacts on their earnings in labour market.

Around the world, countries like the United States, Australia, Canada and the United Kingdom have put much focus on eliminating bullying among children. Recently, several school bullying incidents in Ontario, Canada have ignited a round of debate on the topic of anti-bullying. In response, an anti-bullying bill was passed by the Ontario government to stop gender-based bullying at school.

Due to both the ill effects of bullying and the interest of the government on this topic, researchers from various academic fields have carried out studies in this area; however, these researches generally have difficulties providing an answer as to how the children's bullying behavior can be successfully suppressed by their parents, who have

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<sup>1</sup> Dinkes, Kemp, and Baum (2009) show that 32 percent students aged 12 to 18 years old were reported being bullied from 2007 to 2008 in the U.S.. In Canada, almost half of adults were bullied at the time when they were children or teenagers. (Source is from the poll released by Big Brothers and Big Sisters).

<sup>2</sup> Other similar researches include: Hay and Meldrum (2010); Kaminski and Fang (2009).

been long time missing in the anti-bullying mission. In addition, the topic on strict parental controls is widely discussed; this was triggered by the book of Battle Hymn of the Tiger Mother written by Amy Chua (2011). Amy depicted herself as a “tiger mother” in the book, who is characterized by strict parenting behaviors when educating her two young daughters. She also indicated that the academic success of her daughters is the result of her tough parenting style. Although “tiger mother” has received tremendous criticism on her tough parenting, it will be of interest to explore the general relationship between parental behaviors and children’s behaviors in the data.

I set up a series of economic models to explore bullying among children. In the dynamic models, bullying is not perfectly observed and its detection depends on a random shock and other factors. Later, the habit formation assumption is added to dynamic models, which assumes that bullying could potentially develop to be a bad habit without controls. One important conclusion from these models is that earlier detection of bullying contributes to more effective control of bullying. Further, the way of how to inhibit bullying is important in terms of stopping it. Higher disutility generated from bullying punishments will result in more efficient inhibition.

Further Empirical analyses are to test the theoretical conclusions. Data is from the National Longitudinal Survey of Children and Youth (NLSCY) in the empirical study of bullying among children. Bullying behaviors of 4 to 11- year-old children in the data are reported by both their parents and teachers. The same bullying questions are surveyed every two years since the first cycle in 1994/95. Although the data does not provide specific anti-bullying measures taken by teachers at school, parenting behaviors at home are captured by three parenting interaction scores. What I have found from the data is

consistent with the theoretical predictions. Specifically, strict parenting is beneficial for deterring bullying after controlling the unobserved heterogeneity; and bullying detected earlier by either the parent or the teacher has higher propensity to be reported not existing anymore at the end of longitudinal tracking.

Literatures related to bullying among children are rarely from economic area and mainly from other fields such as education and psychology. One related economic paper is that by Broun and Taylor (2008) (I have mentioned this paper in the introduction session), but they failed to provide suggestions on how to stop bullying. Vast literatures<sup>3</sup> focus on evaluations of specific anti-bullying programs around the world. In these literatures, anti-bullying school programs are generally found moderately useful, but certain conditions have to be met for the success of the programs, more importantly, these programs are generally costly to be implemented. It naturally raises a question of what could be done to stop bullying in a less costly way. Based on the proposal of ecological model of school bullying<sup>4</sup>, Lee (2011) argued that ecological elements such as “individual traits, family experiences, parental involvement, school climate, and community environment are significant in influencing the children’s bullying behaviors”. Totura et al. (2009) found that “the student-reported adult monitoring” is associated with the decrease of probability of bullying for students in middle school, which is especially true for girls. Using Japanese data, “psychological factors of youths such as peer influence, attitude in school, self-control of aggressiveness and impulsiveness, self-assertive efficacy against bullying, and etc.” were found to influence adolescents’

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<sup>3</sup> D. Cross, H.Monks, M.Hall, T.Shaw, Y.Pintabona, E.Erceg, G. Halmilton, C. Roberts, S.Waters and L.Lester (2011); Kathleen P. Allen (2010); Jun S.Hong (2008); Unni V. Midthassel, E. Bru and T.Idsoe (2008); M. Samara and P. K. Smith (2008) and etc.

<sup>4</sup> S. Swearer, D.Espelage, T. Vaillancourt and S. Hymel (2010).

bullying behaviors by Ando, Asakura and Simons-Moron (2005). Besides, Jolliffe and Farrington (2011) further indicated that “low affective empathy” is correlated with female youths bullying and “high impulsivity” contributes to youth’s bullying for both genders; however, these literatures employed the data on youths and they failed to provide evidence on interventions of bullying. For example, what can be done to prevent the youth’s bullying-related psychological attitudes when they might have already held these attitudes for a long period? The dynamic formation of the psychological factors was not captured in these psychological studies of bullying among youths.

Same gender and cross gender bullying have been explored by researchers<sup>5</sup>, and differences in bullying behaviors among boys and girls were found significantly large. Ma et al. (2009) found that the academic competence of youths is still negatively related to their bullying behaviors after controlling for demographic characteristics. Also, the principals and teachers’ roles in suppressing bullying were investigated extensively by researchers<sup>6</sup> as well. All the factors associated with child bullying studied in previous researches will be considered in this empirical study. Some current literatures occasionally mentioned parents’ impacts on their children’s behaviors. Rigby (2005) indicated that “perceived expectations of parents” have effects on bullying behaviors only for girls. Christie-Mizell et al. (2011) concluded that more time spent by fathers with their adolescent children decreases the likelihood of bullying. The necessity to increase parents’ awareness about bullying was highlighted by Holt, Kantor and Finkelhor (2008). Recently, a qualitative paper conducted by Powell and Ladd (2010) urgently called for “more research on the topic of family therapy of bullying”. Another qualitative paper

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<sup>5</sup> D.Anagnostopoulos, N. Buchanan, C. Pereira and L. Lichy (2009) and Catherine O’Brien (2011).

<sup>6</sup> J.Dake, J.Price, S. Telljohann and J.Funk (2004); L.Sairanen and K.Pfeffer (2011); M.L.Marshall, K.Varjas, J. Meyers, E. C. Graybill and R.B. Skoczylas (2009); R.M. Novick and J. Isaacs (2010).

which is completed by Sawyer et al. (2011) is “one of the first papers” to capture the “perceptions of parents” of bullied children. Unanimously, all the above- mentioned studies have not so far quantitatively examine the possible causal relationship between parental behaviors and children’s bullying behaviors.

Researches of bullying among children were conducted around the world. In Canada, specific anti-bullying programs were evaluated by Beran, Tutty and Steinrath (2004), and Rawana, Norwood and Whitley (2011). The locations where childhood bullying tends to happen frequently were also assessed by Craig, Pepler and Atlas (2000) and Vaillancourt et al. (2010). Larochette, Murphy and Craig (2010) investigated the school environment and teacher characteristics related to bullying and concluded that although bullying is closely associated with personal characteristics, it appears to be less likely to have racial bullying in the “supportive schools with higher teacher diversities”. In South Africa, “a much higher rate of bullying” was found by Greeff and Grobler (2008). Also, by employing the sample of Hong Kong Chinese Primary schoolchildren, Wong et al. (2008) identified that psychological factors and receiving violent concepts from various channels are related to bullying. In Germany, Marees and Petermann (2010) implied that lower parental education achievements lead to higher likelihood of child’s bullying. This finding sheds lights to the further exploration into the potential channels through which the education levels of parents have impacts on their children’s bullying behaviors.

A closely related paper is written by Burton, Phipps and Curtis (2002), who studied the simultaneous relationship between parental behaviors and children’s behaviors. However, the focus of their paper is on the existence of simultaneous

association between behaviors of parents and children. They did not specifically study the causal relationship between parental style and bullying behaviors of children. Another related literature is by Kim et al. (2009), who studied “time trends and trajectories of bullying” among Korean adolescents. They concluded that children’s “participation in bullying is stable overtime”. However, the longitudinal tracking only lasted for one year and the population they tracked is youth in middle school. In 2010, Lee also carried out a study on bullying by employing the sample of Korean middle school students. He identified two persistent factors related to bullying: 1) “previous victimization experience”; and 2) “fun-seeking tendency”. This evidence is a necessary support for the assumption of my theoretical model that the bully tries to maximize his/her utility when he/she bullies another child. Moreover, the relationship between “parental style and child bullying and victimization experiences at school” is firstly explored by Beorgiou (2008). Beorgious confirmed the existence of the relationship, but he fails to identify which factor is the cause and which one is the result due to the inside knowledge on their possessed by parents.

In sum, the existing literatures have the following limitations: 1) qualitative studies are used that either focus on psychological or behavior sides of children, or a specific anti-bullying program; 2) data is collected within self-initiated experiments and thus has small sample sizes; 3) methodologies do not always correct for potential biases; 4) lacking of formal theoretical models. Also, none of the current literature covers the dynamic development of bullying and the style of interactions of parents with bullies, which could be employed to suppress bullying.

The paper is structured as follows. Section 2 presents several bullying models, based on which theoretical conclusions are derived. In section 3 the data (NLSCY) employed in empirical tests later is described. The empirical analyses are included in section 4. Section 5 contains several robustness checks against various potential biases. Section 6 concludes.

## **2 A simple model**

### **Case 1: A simple static model**

The child is too young to be perfectly rational in the model. Thus, the child highly discounts the future and the child's dynamic problem can be approximated by a static design<sup>7</sup>. The child believes that the parents/teachers are committed to a certain strategy as the response to the child's behavior.

For simplicity, I consider a representative child, who only cares about the present and maximize his/her utility by choosing bullying intensity  $b$ . Also, the child has a simple belief about his/her parents/teachers' response to his/her bullying behaviors. The child is aware that not every bullying incident could be detected by parents/educators; however, once the bullying is noticed, he/she believes that the control measures<sup>8</sup>  $P$

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<sup>7</sup>Peter Burton, Shelley Phipps and Lori Curtis (2002) employed the static model to approximate the child-parent dynamic interactions.

<sup>8</sup> The control measures include interactions with the child, persuasion to the child, or even the censure and punishment resulted from the child's bullying behavior. The control measures  $P$  will be approximated by three parental scores later in the empirical testing.



leading to the disutility  $V(P)$  on the child will be implemented. <sup>9</sup> The bullying detection function is:

where  $d$  designates the detection score, a higher  $d$  leads to a higher probability of detecting bullying.  $\gamma$  captures the extent to which parents/educators consistently monitor the child's behavior. The detection score also depends on the bullying intensity ( $b$ ). It is hard to be detected if the bullying happens with relatively lower intensity with all other factors fixed. So, assuming  $\varepsilon$  is a random shock with  $F(\cdot)$  as its cumulative distribution function. If  $d > \varepsilon$ , the bullying is detected. The bullying will be detected with the probability of  $1 - F(d)$ . The child's static bullying problem is:

$$(1)$$

subject to

where  $x$  is the child's characteristics which decides the utility gain of bullying such as psychological, physical, environmental factors and etc.  $u$  is the bullying enjoyment of the child.

The first-order condition,

$$\frac{\partial U}{\partial b} = 0 \quad \text{and} \quad \frac{\partial U}{\partial d} = 0 \quad (2)$$

in which where  $f(\cdot)$  is the probability density function of the shock  $\varepsilon$ , and  $F(\cdot)$ .

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<sup>9</sup>It is hard for a young child to expect that the bullying controls  $P$  are continuously changing with the bullying intensity since the child might not experience many bullying punishments yet. That is why the expected bullying controls  $P$  of the child does not depend on the child's bullying intensity  $b$ .

The optimal bullying intensity could be achieved when the child’s marginal bullying gain is equal to the expected bullying disutility from the bullying controls. By conducting the comparative static analysis on equation (2), it is easy to show that —

***Proposition 1***

When the child optimally decides to bully, higher expected bullying controls  $P$  can lead to the reduction of bullying intensity. If the child believes that he/she will get tougher interactions/punishments of bullying, which will lead to higher disutility to the child, he/she will optimally bully with lower intensity.

**Case 2: A dynamic model without habit formation**

Next, the assumption of static game approximation is relaxed. Now, at any time the child maximizes his/her expected utility by deciding bullying intensity over his/her remaining childhood time (  $\tau$  )<sup>10</sup>. The expected utility of bullying in the first period is:

$$(3)$$

The expected utility of bullying in the second period is:

$$(4)$$

where  $I = 1$ , bullying was detected and punished before time  $t$ ;  $I = 0$ , bullying has never been detected and punished until time  $t$ . This is the scenario that the child does not know what will happen if the bullying was observed since the detection has never occurred.

The child does not have the “bitter” memory of punishments of bullying from parents/teachers. However, for those who have experienced bullying controls the “bitter”

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<sup>10</sup> I divide the remaining childhood to two periods: 1) early childhood with  $\tau_1$  2) late childhood with  $\tau_2$

memories will lead to higher expected disutility following the assumption that  $\beta < 1$ . Given the high discount rate,  $\beta$  takes a smaller value in the range of  $(0, 1)$ . At the beginning of time  $t$ , the child maximizes the sum of the expected utility over the remaining two period's childhood by choosing  $\{b_t, c_t\}$ .

Subject to 
$$c_t + b_t = 1$$
.

For simplicity, I assume that  $\beta < 1$ ,  $\alpha < 1$  and  $a$  is in the range of  $(0,1)$ .

The first order conditions with respect to  $b_t$  and  $c_t$  are, respectively, 
$$\beta u'(c_t) = \alpha u'(b_t) \quad (5)$$

and 
$$u'(c_t) = \alpha u'(b_t) \quad (6)$$

Let me focus on the interior solutions with  $b_t > 0$  and  $c_t > 0$ . By conducting comparative static analysis on (3) & (4), it is easy to show that  $\frac{\partial b_t}{\partial \beta} > 0$ ,  $\frac{\partial c_t}{\partial \beta} < 0$ ,  $\frac{\partial b_t}{\partial \alpha} > 0$ ,  $\frac{\partial c_t}{\partial \alpha} < 0$ ,  $\frac{\partial b_t}{\partial a} > 0$ ,  $\frac{\partial c_t}{\partial a} < 0$ .

**Proposition 2**

In the dynamic model, higher bullying controls and also previous detection and punishment of bullying help to inhibit and suppress bullying intensities in both periods. The taste of “bitterness” of previous bullying detection and resulted punishments increases the expected disutility so that the bullying intensity is reduced in both periods. Compared to the counterfactual case when the bullying has never been detected and controlled until time  $t$ , the detection of bullying before  $t$  is an early detection. Thus, the

analysis suggests that early detection of bullying contributes to inhibit bullying in both periods.

**Case 3: A dynamic model with habit formation**

I assume that the expected first period utility function has the same form as case , which is  $U_1 = \dots$ . Nevertheless, the second period bullying utility function is

$U_2 = \dots$ , which forms a hypothesis that the bullying behavior could evolve into a habit. The second period bullying utility for the child depends on the relative bullying intensity of the second period to the first period. The higher bullying intensity in the first period results in even higher second period bullying intensity in order to increase the utility in the second period. The dynamic model with habit formation assumption is analogues to the consumer habit formation model.

First- order conditions with habit formation are

$$(7)$$

$$(8)$$

Equation (8) could be rewritten as

$$(9)$$

Substitute (9) into (7) and rearrange it as

$$(10)$$

***Proposition 3***

Based on equations (9) & (10), one can show<sup>11</sup> that higher bullying controls have opposite impacts on the bullying intensity in the first period. In the first period, higher bullying controls could increase the expected marginal disutility and inhibit bullying intensity, which is the “current inhibition effect”. However, due to the higher expected bullying controls in the second period, the child will optimally shift bullying intensity from the second period to the first period, which will lead to higher bullying intensity in the first period. This is the “substitution effect”, which means that the higher bullying controls are associated with higher bullying intensity. Given the habit formation assumption, only when the “current inhibition effect” exceeds the “substitution effect”, the higher bullying controls will lead to the reduction of bullying intensities in both periods. The same conclusions could be drawn on the early detection of bullying on the suppression of bullying intensity: if “current inhibition effect” is larger than the “substitution effect”, the early detection could reduce the bullying intensities in both periods.

***Proposition 4<sup>12</sup>***

Under certain conditions<sup>13</sup>, the magnitude of expected disutility as a result of bullying controls and previous “bitter” memories of punishments of bullying has to be large enough so that the higher bullying controls and early detection of bullying can suppress bullying intensities in both periods.

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<sup>11</sup> All the proofs are in the Appendix I.

<sup>12</sup> See proof in Appendix I.

<sup>13</sup>  $\beta=0$ ,  $\beta > 0$  and  $\beta < 0$

### 3 Data

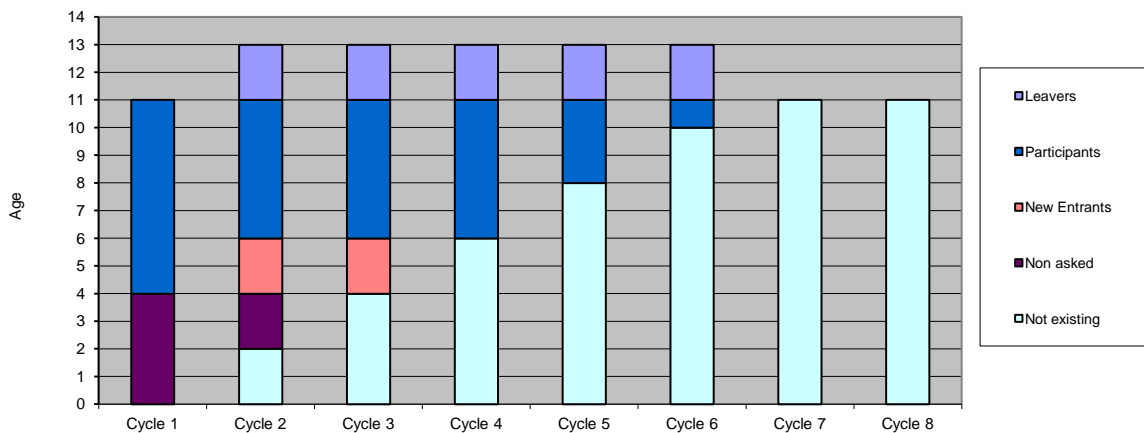
This study uses data from the National Longitudinal Survey of Children and Youth (NLSCY). The NLSCY is a longitudinal survey designed to measure child development and well-being. It includes rich and specific information on the child over time such as his/her health, education, personality, attitudes, behaviors, the Person Most Knowledgeable about the child (PMK), the child's demographic background, and many school-related factors. The data is mainly collected by conducting surveys to children, their PMK, and their school teachers/principals. There are three files in the survey: a primary file reported by the PMK whose child is younger than 16 years old; a self-reported file by the child whose age is 10 years or above; and an education file completed by the child's teachers and principals. Therefore, sometimes the same survey questions regarding the child could be answered by the child himself, his/her PMK or his/her teachers/principals. The various sources of data increase the accuracy of the information.

In 1994, a sample of children aged 0 to 11 years old were surveyed and then followed every two years until 2008. Thus, there are eight cycles, each containing the same group of children with different ages. For example, in cycle eight, the oldest child is 25 years of age. However, most questions in the survey are given to the children within certain age groups. The question I use to identify a bully is "*How often would you say this child: Is cruel, bullies or is mean to others?*" The answers are "(1) never or not true; (2) sometimes or somewhat true; (3) often or very true." The first response of "never or not true" would correspond to non-bullying behaviour, while the other two answers correspond to bullying behaviour. The same question is asked to the child himself, PMK of the child, and the teacher of the child. However, only children who are above 10 years of age could self-respond to the bullying questions, while the PMK and teacher are required to answer the

bullying question for the children aged 4 to 11 years old. Due to the concern that some children might be unwilling to self-identify themselves as bullies and therefore would not accurately describe their own behaviours, the answers from the children’s PMK and teacher are employed.

Although the same bullying question is administered to the PMK/teacher for children from 4 to 11 years old every two years, the composition of the sample is changing every cycle since some children are old enough to be included in the sample and some others grow out of the age range. Figure 1 reveals the age composition of the sample for each cycle. Because the data set uses a frequency of two years, the longitudinal years in which the same child is tracked for a maximum of four cycles. From Figure 1 we can see that the sample comes from the first six cycles of NLSCY.

**Figure 1. Age composition of the sample**



Notes. (i) Leavers are the children who grow out of the age range for the question in the current cycle; (ii) New entrants are those who were in the sample in the previous cycle and just enter in the sample in the current cycle; (iii) Non asked are those who are in the survey but are not old enough for the bullying question; (iv) Not existing are those children who are not in the current survey at all.

Three covariates are employed to capture the parental controls and interaction with their children. They are the hostile parenting score, consistency score, and punitive

score. The three interaction scores are derived using three sets of weighted items<sup>14</sup> in order to separately depict the extent of the hostile, consistent, and punitive parenting behaviors with higher scores indicating higher levels of different kinds of interactions. The three parental scores are used to represent the measures parents employed to stop bullying which is denoted as P in the theoretical model. Moreover, other covariates, controlling for the children’s demographic characteristics, such as health, personality, family background, and school- related factors<sup>15</sup> are also included in the empirical regressions.

Table 1 lists the summary statistics for the distributions of the two samples separately reported by the PMKs and teachers. Both samples are from the pooled data from each cycle of NLSCY. The PMK reported sample is pooled from cycle 1 to cycle 6, while the teacher reported sample is from cycle 1 to cycle 4 since the teacher file is not available after cycle 4 in the data. In the table, I find more children aged 5 and under are included in the PMK reported sample compared to the one reported by the teacher. It is because some children under 5 might not go to school. Furthermore, the percentage of bullies reported by PMK is less than that reported by the teacher by 3%. Among the bullies, there is more percentage of boys in the teacher reported sample versus the PMK reported sample.

**Table 1. Descriptive statistic summaries of the PMK reported sample and teacher reported sample**

	PMK reported total sample	PMK reported bully	Teacher reported total sample	Teacher reported bully
Age	(%)	(%)	(%)	(%)
4	10.9	13.2	2.4	1.6

<sup>14</sup> The specific questions of each score are listed in the Data Appendix.

<sup>15</sup> The specific questions of all the covariates are listed in the Data Appendix.



5	25.3	22.1	8.8	7.3
6	9.8	9.9	17.1	15.3
7	8.6	9.1	14.8	14.6
8	11.1	12.1	15.2	17.0
9	10.1	10.8	13.5	14.3
10	12.6	12.2	15.1	16.4
11	11.5	10.7	13.3	13.6
Bully	11.3		14.5	
Girls	49.4	44.3	49.8	40.4
Total Observations	55348	6274	17783	2574

Notes. (i) The descriptive statistics is based on the pooling data from cycle 1 to cycle 6 of NLSCY for PMK - reported sample, and cycle 1 to cycle 4 for teacher-reported sample due to the drop of the teacher file after cycle 4. (ii) All the questions related to each variable are outlined in the Data Appendix.

I provide the statistical summaries of the key variables of parenting behaviors in Table 2. I also compare the parental interaction styles of bullies with that of non-bullies. The bullies' PMKs are more hostile and punitive when interacting and educating the bullies compared to that of non-bullies' PMKs. These statistical evidences could be explained by the PMK's in-depth knowledge about their children. If the PMK knows that his/her child always misbehaves, he/she will be more hostile and averse when interacting with the child to stop him/her from doing something wrong.

**Table 2. Descriptive statistics of the key variables of interest**

	PMK reported total sample	PMK reported bully	PMK reported non-bully
<b>Average lag hostile score</b>	8.80 (3.67)	9.32*** (3.90)	8.73 (3.64)
<b>Average lag punitive score</b>	8.59 (2.15)	8.77*** (2.15)	8.56 (2.15)
<b>Average lag consistency score</b>	15.03 (3.29)	14.96 (3.38)	15.04 (3.28)

Notes. (i) The descriptive statistics is based on the pooling data from cycle 1 to cycle 6 of NLSCY for PMK reported sample. (ii) All the questions related to each variable are outlined in the Data Appendix. (iii) The covariates of parenting behaviors were reported by PMK and thus were only available in the PMK reported file. (iv) The standard deviation is included in the bracket. 5. The mean equality test was conducted on the PMK reported bully versus PMK reported non-bully with \*\*\* representing significance at 1%, \*\* 5%, \*10%.

In Table 3, the descriptive statistics of other covariates are compared between the PMK reported bullies and those of non-bullies. Compared to the non-bullies, more percentage of bullies are obese or overweight, has no religion, cannot concentrate for long, and has been diagnosed with psychological difficulties. Striking evidence is found in the overall health of the bullies. Generally, one might speculate that children who are in excellent health tend to have extra energy and thus more likely to bully. However, the statistics show that a lower percentage of bullies have excellent health compared to that of non-bullies. Moreover, a larger proportion of bullies have fair and poor health conditions. As well, for the family-related characteristics, higher percentage of bullies is from families with lower household income, more children, and frequent home violence.

**Table 3. Descriptive Statistics of other covariates of PMK reported and teacher reported samples**

	<b>PMK reported bully</b>	<b>PMK reported non-bully</b>
<b>Obese &amp; Overweight (%)</b>	50.7	48.8
<b>Religion (%)</b>	79.3	84.5
<b>Average siblings</b>	1.45	1.33
<b>Annul household income (grouped) (%)</b>		
Less than 30,000	28.7	20.7
Between 30,000 and 40,000	14.2	13.4
40,000 or more	57.1	65.9
<b>Violence at home (%)</b>		
Often	0.7	0.3
Sometimes	3.8	1.6
Seldom	9.8	5.7
Never	85.6	92.4
<b>Overall health (%)</b>		
Excellent	49.5	57.8
Very good	33.1	30.1
Good	14.6	10.6
Fair	2.4	1.3
Poor	0.3	0.1
<b>Psychological problem (%)</b>	4.5	1.1
<b>Cannot concentrate (%)</b>		
Never	37.6	63.9
Sometimes	49.6	31.2
Often	12.8	4.9
<b>Lag grad (%)</b>		
Very well	47.3	48.2
Well	27.2	27.6

Average	21.9	21.1
Poorly	3.4	2.8
<b>Observations</b>	<b>6274</b>	<b>49074</b>

Notes. (i) The descriptive statistics is based on the pooling data from cycle 1 to cycle 6 of NLSCY for PMK reported sample. (ii) All the questions related to each variable are outlined in the Data Appendix. (iii) The family-related covariates and the children’s characteristics are reported by PMK and thus are only available in the PMK reported file.

## 4 Empirical Strategies

### 4.1 Empirical model

By carrying out the multivariate analysis, I test whether the parental interactions or parental education styles have significant impacts on the children’s bullying behavior as predicted in the theoretical model that higher controls from parents/educators will inhibit bullying.

The investigation of causal relationship between parenting styles (measured by parental scores in the regression) and children’s bullying behaviors requires caution to some identification problems which could potentially bias the causal relationship. There are two sources of endogenous problems associated with the covariates of parenting scores: 1) the correlation between the parenting scores and unobserved variables left out in the error term. This could happen either when the parenting scores were measured with measurement errors or when important covariates related to the parenting scores are unobserved and stay in the error term; 2) the other source of endogeneity is the simultaneity and reversed causality, which means that the parental behaviors and children’s bullying behaviors are simultaneously dependent on one another. I will employ

fixed effects method to reduce the measurement error and omitted variable problems while employing the lagged parenting scores to eliminate the simultaneity problems<sup>1</sup>.

The cross-sectional logit model will suffer from the bias of unobserved heterogeneity discussed above. The NLSCY used in the regression is panel data which could save the estimated results from the potential bias. For panel data, the presence of individual effects could eliminate the potential bias of correlations between the unobserved characteristics and the covariates in the model and then produce the consistent estimates.

$$\begin{cases} y_{it} = 1 & \text{if } y_{it}^* > 0 \\ y_{it} = 0 & \text{if } y_{it}^* \leq 0 \end{cases} \quad i = 1, \dots, N, \quad t = 1, \dots, T. \quad (4.1)$$

I estimate the above fixed effects panel logit model (4.1) where  $y_{it}$  for bullying,

$y_{it}$  for non-bullying.  $\alpha_i$  is the fixed effect specific to each individual  $i$  is a vector of parental interaction covariates including lagged parental hostile score, lagged parental punitive score, and lagged parental consistency score.  $\beta$  and  $\gamma$  are unknown parameters and  $\epsilon_{it}$  is a vector of other variables controlling for the child's economic and demographic characteristics and school environment.  $\epsilon_{it}$  is a random error.  $\beta$  and  $\gamma$  are estimated by maximizing the conditional likelihood function:

$$L = \prod_{i=1}^N \Pr \left( y_{i1}, \dots, y_{iT} \mid \sum_{t=1}^T y_{it} \right)$$

The conditional likelihood function will sweep away the fixed effect  $\alpha_i$ . Furthermore, the fixed effects logit model regression requires the variations in both the dependent variable and covariates. The consistent estimates come from the changing of the variables from

time to time for individuals. Only those individuals whose bullying status varies from one time to another are used in the estimation. Moreover, for the covariates which are constant overtime, their estimated coefficients are unable to be regressed.

#### **4.2 Findings from the regressions**

The regression results from equation 4.1 are shown in Table 4. Since the parental control variables are reported by Person-Most- Knowledgeable about the child (PMK)<sup>16</sup>, I use the sample of children whose bullying behaviors are identified by their PMK. The first seven columns in Table 4 contain the results of the fixed effects logit regressions with different model specifications, while column 8 reports the results of the logit regression on the pooling sample from cycle 1 to cycle 6.

Only the characteristics of the children and the family-related factors<sup>17</sup> are included in column 1 of Table 4, while columns 2 to 7 gradually include the lagged parenting scores. Lagging parenting scores by one cycle<sup>18</sup> could reduce the endogenous problems of these variables due to the simultaneous relationship between the parental behaviors and the children's behaviors. Column 8 reports the findings of the logit regression on the overall pooling sample with the same model specification as that in

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<sup>16</sup> Around 90% cases are the child's mother.

<sup>17</sup> I did not include the school-related covariates in the regression due to the lack of sufficient variations in these variables required to produce the fixed effects logit estimates as well as the problems of missing observations. I will justify this issue later for robustness of the results in Section 6.

<sup>18</sup> The short available cycles in the longitudinal data set allows for the variables to be lagged only by one cycle.

column 7 in order to reveal the differences in the estimated coefficients from the two methodologies.

With decreasing magnitudes, the estimated coefficients on the lagged hostile score in columns 2 to 7 are all significantly negative at 1%, which is in line with the prediction in the theoretical model that higher parental controls contribute to the inhibition of bullying. Higher hostile score means that the PMK is stricter and more adverse in educating the child with frequent interactions and controls. According to the estimates in column 7 of Table 4, a one standard deviation increase in the lagged parental hostile score will lead to the reduction in the likelihood of the child to be a bully by around 13.9% ( $3.67 \times 0.038 = 0.139$ ). Similar results are found for the parental punitive score in all the fixed effects logit models. The lagged punitive score is estimated to be -0.033 at 10% significance level in column 7, indicating that harder punishments of PMKs given to the children when they make mistakes could lead to the inhibition of bullying. Specifically, a one standard deviation increase in the lagged parental punitive score results in the 7.1% decrease in the probability of the child to be a bully.

The consistency score mainly measures whether or not the PMKs will do something to control their children's wrong doing behaviors. Ignoring the children's bad behaviors will cause lower consistency score. The consistency score focuses on the PMKs' attitudes towards their children's behaviors, while the hostile and punitive scores measure the methods of disciplining and parental controls. How to stop their children is not addressed from the consistency score. Sometimes, higher consistency score could be a signal of the ineffective parenting behavior. For example, a PMK with higher consistency score could be the PMK who always disciplines his child for the same

problems over and over again, which means the PMK could not control the problems at one time and the previous attempts of control all failed. Table 5 listed the correlations among the three parenting scores. The hostile and punitive scores are positively correlated with each other and the consistency score is negatively correlated with the punitive and hostile scores, which means that the PMKs with lower hostile and punitive scores tend to discipline their children for the same problems repeatedly. This evidence supports the speculation that higher consistency score reflects ineffective parental behaviors.

The estimates on the consistency score in column 2 of Table 4 is significantly positive at 10% level, which shows that frequent parental controls are associated with higher probability of the child being a bully. However, while either the hostile or the punitive score are controlled, the consistency score is estimated to be insignificant from zero at 10%, which is the case that the effective parental controls are captured by the hostile and punitive scores. In sum, the empirical results support that higher P, which could be captured by more hostile and punitive parental controls to the children upon the detection of their bad behaviors in the empirical model, will suppress bullying significantly.

The logit regression in column 8 produces significantly positive estimates on the lagged hostile and consistency scores, which could be biased by the unobserved individual heterogeneity. Some important variables, which have significant impacts on children's bullying behavior and are also correlated with the parenting styles, could be left out in the error terms. Consequently, in the context of identifying the causal relationship between the parenting behaviors and children's bullying behaviors, the fixed

effects are necessary to control for the unobserved heterogeneity. After including some other covariates (PMK's immigrant status, province of residence, size of residence and the PMK's working status) in the logit regression<sup>19</sup>, the estimate on the lagged consistency score is not significant from zero at 10%. This could serve as evidence that parental behaviors are indeed correlated with some uncontrolled covariates which are associated with the children's bullying behaviors.

All the other variables on the children's characteristics and family background controlled in the model are associated with the children's bullying behaviors through affecting their tolerance level or attitudes towards bullying. Most of the covariates were found to be significantly different from zero and the effects are easy to be understood and make sense. However, I want to mention three interesting points which could trigger further investigations.

First, the relationship between body weight and the bullying behavior were found to be insignificant from zero in the fixed effects logit models<sup>20</sup>, which rules out the claim that obese or overweight children aged from 4 to 11 years old tend to bully more. This finding contributes to the literature<sup>21</sup> on the obesity and bullying. Secondly, I find that the children who have religious believes will have less probability to be bullies. Few researchers have linked the religion with the children's bullying behavior. It is possible that the religion dummy actually captures the effects of some covariates that are omitted from the model, but it is also possible that religion has a restriction power on the children's behavior. This topic requires further exploration. Last but not least, compared

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<sup>19</sup> The regression result is reported in the column (4) of Table 15 in the Appendix II.

<sup>20</sup> The variable of obese dummy was also found to be insignificant from zero.

<sup>21</sup> Ian Janssen, Wendy M. Craig, William F. Boyce and William Pickett, PhD (2004). L J Griffiths1, D Wolke,A. S. Page, J. P. Horwood and the ALSPAC Study Team (2006); Tilda Farhat, Ronald J. Iannotti and Bruce G. Simons-Morton;



to the children whose health condition is excellent, those, who are in a very good or good health condition, will be more likely to bully. This shows that the deterioration of the children's health condition from excellent to very good and good is associated with higher probability to be bullies. But no differences in the bullying behaviors were revealed between the children with either the fair or weak health condition and those with excellent health condition. It excludes the statement that the children are too weak to have energy to bully. On the contrary, the result shows that the children in the very good health condition are more likely to be bullies by around 24% relative to those in the excellent health condition based on the results in column 7. One might suspect the overall health variable might capture some mental health condition. However, the results are from the model after controlling for the psychological problems. The finding raises a question: is the physical health condition actually related to the children's mental tolerance, emotion, temper control and attitudes, which will then affect their behaviors? Definitely, my suspicion needs further robust explorations in the future.

**Table 4-** The results of regressions on the sample of PMK reported bullying behaviors

	(1) Fixed effects logit	(2) Fixed effects logit	(3) Fixed effects logit	(4) Fixed effects logit	(5) Fixed effects logit	(6) Fixed effects logit	(7) Fixed effects logit	(8) Logit on total sample
<b>Parenting behaviors</b>								
Lag Hostile		-0.050*** (0.011)			-0.046*** (0.011)		-0.038*** (0.012)	0.047*** (0.012)
Lag Punitive			-0.065*** (0.017)			-0.057*** (0.018)	-0.033* (0.019)	-0.003 (0.019)
Lag Consistency				0.023* (0.012)	0.008 (0.013)	0.014 (0.013)	0.006 (0.013)	0.027** (0.013)
<b>Children's Characteristics</b>								
Age	-0.064*** (0.020)	-0.063*** (0.020)	-0.070*** (0.020)	-0.063*** (0.020)	-0.060*** (0.020)	-0.067*** (0.020)	-0.063*** (0.020)	-0.011 (0.024)
Obese & overweight	0.013 (0.074)	-0.001 (0.075)	0.021 (0.075)	0.009 (0.075)	0.001 (0.076)	0.013 (0.075)	0.003 (0.076)	0.143* (0.077)

Very good health dummy	0.243*** (0.083)	0.255*** (0.085)	0.254*** (0.085)	0.246*** (0.085)	0.243*** (0.085)	0.244*** (0.085)	0.242*** (0.085)	0.199** (0.085)
Good health dummy	0.386*** (0.116)	0.405*** (0.117)	0.411*** (0.117)	0.380*** (0.117)	0.386*** (0.118)	0.391*** (0.117)	0.391*** (0.118)	0.468*** (0.114)
Fair health dummy	0.197 (0.320)	0.084 (0.333)	0.238 (0.322)	0.179 (0.328)	0.108 (0.337)	0.208 (0.330)	0.125 (0.337)	0.401 (0.261)
Poor health dummy	-0.286 (0.700)	-0.199 (0.710)	-0.299 (0.705)	-0.309 (0.702)	-0.223 (0.711)	-0.314 (0.706)	-0.242 (0.712)	-0.495 (0.720)
Psychological problem	0.743*** (0.273)	0.764*** (0.274)	0.742*** (0.273)	0.738*** (0.273)	0.757*** (0.275)	0.727*** (0.273)	0.746** (0.274)	0.971*** (0.221)
Cannot concentrate	0.797*** (0.062)	0.777*** (0.063)	0.787*** (0.063)	0.783*** (0.063)	0.777*** (0.063)	0.783*** (0.063)	0.780*** (0.063)	0.757*** (0.053)
Lag Grade	-0.068 (0.044)	-0.024 (0.045)	-0.053 (0.044)	-0.052 (0.045)	-0.020 (0.045)	-0.047 (0.045)	-0.022 (0.045)	-0.032 (0.045)
<b>Family Background</b>								
Household income	-0.127*** (0.033)	-0.133*** (0.033)	-0.132*** (0.033)	-0.123*** (0.033)	-0.129*** (0.034)	-0.128*** (0.034)	-0.132*** (0.034)	-0.077*** (0.030)
Siblings	0.235*** (0.040)	0.241*** (0.041)	0.240*** (0.040)	0.235*** (0.040)	0.238*** (0.041)	0.239*** (0.040)	0.240*** (0.041)	0.153*** (0.033)
Violence Dummy	0.663*** (0.226)	0.642*** (0.230)	0.683*** (0.228)	0.709*** (0.228)	0.685*** (0.232)	0.721*** (0.230)	0.689*** (0.232)	0.689*** (0.214)
Religion Dummy	-0.280*** (0.102)	-0.290*** (0.103)	-0.282*** (0.102)	-0.296*** (0.102)	-0.297*** (0.103)	-0.290*** (0.103)	-0.296*** (0.103)	-0.279*** (0.097)
P Values	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N	3763	3693	3721	3674	3654	3671	3651	16733

Notes.

1. The samples are from Cycle 1 to Cycle 6 of National Longitudinal Survey of Children and Youth.
2. Standard errors are included in the bracket.
3. Significance level is represented by \*\*\* 1%, \*\* 5%, \* 10%.
4. The hostile, punitive, consistency scores and the grade are lagged by one cycle to correct for the endogenous problem.
5. The dummy variable obese & overweight takes value 1 indicating the child is either obese or overweight, and 0 for normal weight. The obese & overweight dummy is based on the kids Body Mass Index Charts which take age, gender, height and weight into consideration.
6. Household income variable has six scales and higher scale represents higher income range.
7. The default health dummy is the excellent health dummy.
8. Violence dummy is equal to one if there is no violence or seldom violence at home.
9. The logit regression in column (8) is based on the pooling data from cycle 1 to cycle 6 of NLSCY for PMK reported sample.

Table 6 reports the regression results on boys and girls separately. The regressions in Table 6 employed the same model specification in column 7 of Table 4. The first two columns of Table 6 lists the results of fixed effects logit regressions on girls and boys and last two columns report the logit regression results on girls and boys. Comparing column

1 with column 2 in Table 6, I find that the lagged punitive and hostile parenting behavior works more effectively on girls to stop bullying. Although the probability of bullying for boys will be reduced by around 12.6% with a one standard deviation increase in the lagged parental hostile score, the magnitude of the effect is less than the equivalent estimated effect of 18.8% for girls. Additionally, the lagged punitive score are estimated to have insignificantly positive effects on boys and significantly negative effects on girls with a high magnitude. However, the logit regression results in column 4 reveal the strong biases on the lagged hostile and consistency scores from the unobserved individual characteristics for boys.

According to the estimates in columns 1 and 2 of Table 6, there are some obvious gender differences in the relationship between the other controlled covariates and the bullying probability. The probability of bullying for girls decreases with the increase of ages. However, that is not the case for boys. Also, the boys who are identified to have the psychological problems tend to have higher probability to bully; however, this is not true for girls. At last, religion is estimated to affect boys' bullying behavior but not for girls.

**Table 6**-The results of regressions on the girls and boys of PMK reported bullying behaviors

	(1) Fixed effects logit on girls	(2) Fixed effects logit on boys	(3) Logit on girls in the total sample	(4) Logit on boys in the total sample
<b>Parenting behaviors</b>				
Lag Hostile	-0.052*** (0.018)	-0.034* (0.018)	0.022 (0.018)	0.071*** (0.016)
Lag Punitive	-0.072*** (0.027)	0.009 (0.029)	-0.016 (0.030)	0.010 (0.025)
Lag Consistency	-0.020 (0.019)	0.030 (0.019)	0.004 (0.019)	0.053*** (0.016)
<b>Children's Characteristics</b>				
Age	-0.094*** (0.029)	-0.037 (0.029)	-0.027 (0.035)	0.005 (0.033)
Obese & overweight	0.004	-0.008	0.176	0.107

	(0.109)	(0.109)	(0.112)	(0.105)
Very good health dummy	0.201* (0.124)	0.304** (0.121)	0.037 (0.122)	0.350*** (0.116)
Good health dummy	0.428*** (0.167)	0.315* (0.172)	0.201 (0.154)	0.744*** (0.161)
Fair health dummy	-0.004 (0.502)	0.292 (0.456)	0.036 (0.394)	0.779** (0.363)
Poor health dummy	-1.039 (0.933)	0.557 (1.07)	0.260 (1.048)	-1.316* (0.760)
Psychological problem	0.526 (0.388)	1.073*** (0.413)	1.029*** (0.358)	0.976*** (0.273)
Cannot concentrate	0.802*** (0.094)	0.763*** (0.088)	0.771*** (0.078)	0.763*** (0.071)
Lag Grade	0.063 (0.067)	-0.095 (0.064)	0.013 (0.068)	-0.083 (0.058)
<b>Family Background</b>				
Household income	-0.111** (0.050)	-0.166*** (0.047)	-0.076* (0.041)	-0.078* (0.041)
Siblings	0.217*** (0.056)	0.266*** (0.061)	0.146*** (0.047)	0.161*** (0.046)
Violence dummy	0.594* (0.325)	0.953*** (0.361)	0.963*** (0.313)	0.392* (0.242)
Religion Dummy	-0.020 (0.153)	-0.536*** (0.146)	-0.170 (0.151)	-0.365*** (0.124)
P Values	0.000	0.000	0.000	0.000
N	1808	1843	8381	8352

Notes.

1. The samples are from Cycle 1 to Cycle 6 of National Longitudinal Survey of Children and Youth.
2. Standard errors are included in the bracket.
3. Significance level is represented by \*\*\* 1%, \*\* 5%, \* 10%.
4. The hostile, punitive, consistency scores and the grade are lagged by one cycle to correct for the endogenous problem.
5. The dummy variable obese & overweight takes value 1 indicating the child is either obese or overweight, and 0 for normal weight. The obese & overweight dummy is based on the kids Body Mass Index Charts which take age, gender, height and weight into consideration.
6. Household income variable has six scales and higher scale represents higher income range.
7. The default health dummy is the excellent health dummy.
8. Violence dummy is equal to one if there is no violence or seldom violence at home.
9. The logit regressions in columns (3) & (4) are based on the pooling data from cycle 1 to cycle 6 of NLSCY for PMK reported sample.

### 4.3 Program Evaluation---The effects of early detection

In this section, I examine the other conclusion from the theoretical model which suggests that early detection of bullying plays a role in the inhibition of bullying. The challenge regarding the empirical test is that there is no variable available in the data that reveals the timing of the detection; specifically whether or not it is early to detect the bullying.

By loose definition, I call it early detection if it is not long since the child first started bullying and the early detection is associated with lower intensity of bullying and also fewer bullying incidents for the child. First, I need to justify the proposition that the early detection is associated with lower intensity of bullying and the habit of bullying is formed gradually with intensity from low to high. By running multinomial logit regression on the pooled data, I find that the relative log odds of the bullying intensity of often bullying versus sometimes bullying increases with age by fixing all other variables. This empirical evidence supports the assumption that the bullying intensity develops from low to high gradually. Therefore, the low bullying intensity is a necessary condition for the early detection of bullying.

Given that in NLSCY the same child's bullying behavior was reported separately by his/her PMK and teacher, the data shows that in some cases the reported bullying answers do not coincide from the two parties<sup>22</sup>. It could be the case that the child is detected to have bullying behavior by the PMK but not by the teacher, while the other situation is that the child is reported to bully by the teacher but not by the PMK. There are several scenarios that lead to the detection of bullying only by one party.

First, I argue that either the PMK or teacher did not tell the truth. Maybe both of them had detected the bullying, but one of the parties was unwilling to reveal it. Generally, the teacher has no valid and strong incentive to hide the truth. But the PMK might not want to make her child to look bad and avoid reporting the child's bullying behavior. Another case could be that the PMK was concerned about some negative effects on the child which might be caused if she identified the child's bullying behavior.

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<sup>22</sup> The statistical results of the discrepancy in the identification of the same child's bullying behavior from the PMK and teacher are in Table 7 of Appendix II.

If PMKs indeed tried to hide truth on their children's bullying, the PMKs would consistently not report bullying for every cycle. However, I find that some PMKs, who did not report the bullying behavior of their children early on, actually reported bullying in later cycles<sup>23</sup>, which reduces the possibility of the scenario of not telling truth.

Second, negligence could be another reason why one of the parties did not identify the bullying. When the bullying happens with relatively lower intensity and has less severe negative effects on both the bullies and the victims, the bullying behaviour is not likely to be detected in time. During the early stage of bullying, the intensity of bullying is relatively low and thus harder to be detected. In other words, the negligence of bullying by only one of the parties could be the result of early stage. Consequently, the detection of bullying by only one party could be treated as an early detection.

Third, one can also argue that it is the lacking of opportunity that leads to the failure of the detection of bullying by one party. If the child tends to bully at specific places such as the school playground, classroom, home or residential playground, these restricted places will prevent one party from detecting the bullying. However, if the bullying is very serious and cause direct and severe consequences, the party who observed it first will inform and communicate with the other party to cooperate in dealing with the bullying. Conversely, a minor bullying incident with lower intensity enables the party who have detected it thinks he/she could manage controlling it so that he/she will not bother to inform the other party. Thus, this scenario also points to the possibility of the bullying happening at the early stage and with lower intensity. In sum, I argue that the

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<sup>23</sup> The percentage of PMKs who did not identify the bullying behaviors of their children actually reported it in later cycles is listed in Table 8 of Appendix II.

detection of bullying only by one party is the result of early detection when the bullying has lower intensity and develops at an early stage.

I create a dummy variable equaling to one if the child is first reported to be a bully by only one party, who is either his/her PMK or teacher; equaling to zero if the child is firstly reported to bully by both parties together. This dummy is treated as the early detection indicator. Another variable implying the results of the suppression of bullying is created as well. If the bully is tracked with time and observed finally not to have bullying behaviors anymore by both PMK and teacher, the outcome variable is equal to 1 indicating the bullying is stopped successfully. Otherwise, the bullying still exists and is not stopped. The interest lies in the effects of the early detection of bullying on the suppression of bullying.

Ideally, I need to compare the outcomes of bullies whose bullying behaviors were detected earlier to their counterfactuals of bullies whose bullying behaviors were not detected earlier in order to find the treatment effects of early detection on the suppression of bullying. I employ the propensity score matching estimator for the average treatment effect. The treatment group and control group are matched based on the propensity score to maximize the elimination of the selection biases.

First, under the assumption of a logistic distribution I estimated the propensity score to be

$$\text{—————} \quad (4.3)$$

in which  $p_i$  is the propensity score of the treatment ( early detection of the child i's bullying behavior conditional on  $X_i$  . Vector  $X_i$  contains a set of observed variables listed in Table 9 related to the probability of the treatment assignment. After maximizing the

likelihood function I get the estimated coefficients. The propensity score is estimated as  $p_i$  for each child. Then, the caliper matching technique, which randomly selects one nonparticipant that matches on the propensity score with the participant in a common-support region, is conducted. At last, the average treatment effect is calculated based on the following equations.

$$\tau = \frac{1}{n_T} \sum_{i=1}^{n_T} Y_i - \frac{1}{n_C} \sum_{j=1}^{n_C} Y_j$$

where  $\tau$  is the average treatment effect on treated,  $n_T$  is the number of children in the treated group,  $n_C$  is the number of children in the control group,  $i$  represents the treatment cases,  $j$  denotes the control cases,  $D_i$  indicates the child  $i$  is in the treatment group,  $1 - D_i$  implies child  $i$  is in the control group.  $Y_i$  is the outcome variable for the child  $i$  and indicates whether the bullying behavior is successfully stopped in the end. The weight  $w_{ij}$  if the control case  $j$  is matched with the treatment case  $i$ , otherwise  $w_{ij} = 0$ . Similarly,  $w_{ji}$  if the treatment case  $i$  is matched with the control case  $j$ , otherwise  $w_{ji} = 0$ . With estimated positive average treatment effect, the analysis indicates that the early detection of bullying can suppress the children's bullying behaviors.

**Table 9- covariates used to conduct the matching**

(1) Children's characteristics	(2) Parenting behaviors	(3) Family background	(4) School related factors
Age	Hostile score	Household income	Class size
Gender	Consistency score	Welfare status	Teachers rarely



			overlook physical aggression
Obese	Punitive score	Number of siblings	Teachers rarely overlook verbal aggression
Grade		Times of changing residence	Percentage of high income families in school
Overall health		Single mother family	Teacher's strictness on the homework
Psychological problem			Misbehaving of the class
Cannot concentrate			Verbal conflicts among students in school
Immigrant status			Physical conflicts among students in school

**Notes.**

1. All the questions related to each variable are listed in the Data Appendix. 2.
2. The values of these variables are taken from the cycle when the child was firstly detected to bully by one party.
3. The variables in the first three columns are reported by the child's PMK, while variables in the last column are reported by the child's teacher.

#### **4.4 Results from the program evaluation**

I matched the bullies with early detection to the bullies without early detection based on the predicted propensity score calculated from model 4.3<sup>24</sup>. One disadvantage associated with propensity score matching is that it is based on observables and cannot address selection bias caused by the unobserved heterogeneity. However, the abundant information available in the data related to the children contributes to the mitigation of the hidden bias. In addition, the sensitivity analysis for the treatment effect to the confoundedness of the unobserved variables will be carried out later.

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<sup>24</sup> The robustness of the treatment effects also depends on the correct specification of the logistic regression before matching. Here, the logistic regression passed the simple specification test.

Before matching, there are 2107 bullies with early detection in the treatment group and 350 bullies without early detection in the non-treatment group. Employing the caliper one- to-one matching with replacement, the sample size for each group is reported in Table 10. Note that the children in the samples are aged from four to 11 years old. Therefore, at the early stage of the children's growth, the detection of bullying is more likely to be the early detection.

As mentioned above, if a bully was indicated to be a non-bully by his/her PMK and teacher in the last cycle I observed, I treat the outcome of the bullying as having been successfully stopped. Based on the matched bullies, the average treatment effect on the treated (ATT) and the average treatment effect (ATE) are calculated respectively. The results are listed in Table 10. From columns (1) to (4), the ATT and ATE associated with different calipers (0.05, 0.01, 0.004, and 0.0007) are reported. Unanimously, compared to the outcome of bullying without early detection, the bullying with successful inhibition in the end is significantly higher by around 7% to 9% for all the population of children whose bullying behaviors are detected earlier. Also, the effect of early detection of bullying on the subgroup of all children with similar characteristics as those in the treatment group is higher than that for all the children, which is indicated by the higher magnitudes of ATT relative to that of ATE. As narrowing down the common- support matching area by decreasing the caliper distance, both ATT and ATE decrease. However, the significant positive suppression effects from the early detection on bullying are valid regardless of the choice of matching distance. The early detection of bullying can increase the odds of stopping bullying for all children by around 6.68% according to the results in column 4 of table 10. This empirical result supports the conclusion derived

from the theoretical model which states that the earlier the bullying is detected by his/her parent/educators the easier it is to suppress it. Furthermore, I employ the same strategy to test whether the early detection of bullying by PMKs differs from that by teachers in the control of bullying. However, the results are not significantly different between the early detection by PMKs and by teachers. It could be explained by the quick communication of the two parties with the information about the child shared by PMKs and teachers. In conclusion, there is no evidence to support the advantage of who first detects the bullying; nevertheless, what matters is the time of the detection.

**Table 10- average effects of early detection on the inhibition of bullying behavior with different calipers**

	(1) Caliper=0.05	(2) Caliper=0.01	(3) Caliper=0.004	(4) Caliper=0.0007
Average treatment effect on the treated (ATT) (%)	9.63** (0.047)	9.25** (0.042)	8.38* (0.045)	6.82* (0.041)
Average treatment effect (ATE) (%)	9.04** (0.042)	8.72** (0.038)	8.25** (0.040)	6.68* (0.036)
Matched sample	(349) [2107]	(345) [2086]	(292) [1620]	(283) [1363]

**Notes.**

1. \*\*\* representing significant at 1% level, \*\* significant at 5%, \* significance at 1%.
2. The standard errors produced by bootstrapping with 1000 replications are in the parentheses.
3. The sample size of the control group is in parentheses and the sample size of the treatment group is in square brackets.

## 5 Robustness Check

### 5.1 Omitted school-related characteristics

One concern about the robustness of the estimates of multivariate analysis reported in Tables 4 and 6 is that none of the school characteristics was controlled. I did not include the school-related covariates for the following two reasons: 1) the school-related

variables reported by teachers and principals are only available from Cycle 1 to Cycle 4 in NLSCY. When merged with the parent-reported covariates from Cycle 1 to Cycle 6, the school variables have many missing values which will reduce the regression sample size significantly and result in sample selection biases; 2) over years, many of the school-related covariates are relatively stable, which could not lead to the change of the bullying status of children across years. Fixed effects logit estimation requires the variations in both dependent variable and covariates across years.

Table 11 presents the variations in each school covariate<sup>25</sup> over years. As expected, the average variations of most school characteristics are relatively small and around 60%. For these school-related covariates, 40% of the sample does not change through years. But the following variables: class size, the strictness of the teacher, class's disciplinary environment and the school's income distribution vary significantly with years.

**Table 11- Variation dynamics of school-related covariates**

	Variations from C1 to next cycle (%)	Variations from C2 to next cycle (%)	Variations from C3 to next cycle (%)	Average variations across cycles (%)	Sample size
<b>Class size</b>	91.9	94.7	93.7	<b>93.4</b>	16606 (30751)
<b>Teacher strict</b>	77.4	77.0	80.7	<b>78.4</b>	14631 (32726)
Class easily disrupted	58.0	55.3	65.0	59.4	18004 (29353)
<b>Class misbehaves with absence of teacher</b>	65.2	67.2	68.0	<b>66.8</b>	18007 (29350)
Teachers overlook physical problem	53.3	55.3	56.7	55.1	17950 (29407)
Teachers	62.6	64.1	62.5	62.9	17944

<sup>25</sup> The specific questions related to these variables are outlined in the Data Appendix.

overlook verbal aggression					(29413)
<b>High income families in school (%)</b>	82.9	79.8	82.9	<b>81.9</b>	18265 (29092)
Physical conflicts disciplined by principal (%)	54.9	59.0	60.7	58.2	21765 (25592)
Verbal conflicts disciplined by principal (%)	57.1	53.7	59.2	56.7	21740 (25617)

**Notes.**

1. The number of missing values was listed under each sample size in the bracket.
2. The variations were calculated conditional on the variations in the bullying status.
3. The statistics were from the pooled sample from cycle 1 to cycle 4 of NLSCY.

Next, I controlled for these ‘dangerous’ school-related variables in the regressions. The results are reported in Table 12. Column (1) of Table 12 summarizes the fixed effects regression results from the bench model without the school controls from cycle 1 to cycle 4. The estimates in the bench model are consistent with what we have seen in the column (7) of Table 4 with estimated coefficients on the lagged hostile and punitive scores being significantly negative. However, as I gradually add the school-related covariates in the fixed effects regression bench model, the sample size dropped dramatically so that the majority of variables are estimated to be insignificant from zero. None of the school characteristics are found to have impacts on the likelihood of being a bully. The logistic regression, which does not suffer from the small sample size problem, also indicates that except for the disciplining variable of the physical conflicts, none of the other school characteristics are related to the probability of being a bully. Although the magnitudes of the estimates on the parenting style in the logistic regressions with school-related factors are different from those reported in column (8) of Table 4 in terms

of magnitudes, they carry the same signs and significance level. As a result, the robustness check indicates that my results do not suffer from the potential omitted variable bias caused by the missing school-related variables, which is mainly due to the evidence that the school environment is relatively stable over time and does not lead to the change of the bullying behaviors of the children.

**Table 12-Fixed effects and logit regressions with school characteristics**

	Fixed effects (1)	Fixed effects (2)	Fixed effects (3)	Logit (5)
Lag hostile	-0.043** (0.019)	-0.029 (0.041)	-0.035 (0.060)	0.108*** (0.024)
Lag punitive	-0.074** (0.037)	-0.049 (0.077)	-0.036 (0.127)	-0.037 (0.041)
Lag consistency	0.009 (0.021)	0.074* (0.043)	0.087 (0.073)	0.066*** (0.023)
Age	-0.088*** (0.027)	-0.054 (0.071)	0.062 (0.111)	-0.097** (0.047)
Obese & overweight	0.042 (0.109)	0.366* (0.215)	0.377 (0.325)	0.224 (0.144)
Household income	-0.194*** (0.050)	-0.237** (0.103)	-0.347** (0.155)	-0.125** (0.053)
Psychological problem	0.458 (0.390)	-0.176 (0.666)	-0.927 (0.783)	1.035*** (0.382)
Very good health dummy	0.308*** (0.123)	0.060 (0.248)	-0.129 (0.402)	0.015 (0.164)
Good health dummy	0.598*** (0.169)	0.638** (0.300)	0.715* (0.427)	0.741*** (0.206)
Fare health dummy	0.157 (0.427)	-1.522 (1.011)	-0.785 (1.450)	0.786 (0.676)
Poor health dummy	-0.005 (0.937)	14.97 (1161.691)	14.74 (1173.83)	0.272 (1.096)
Lag grade	-0.019 (0.069)	0.123 (0.152)	0.234 (0.242)	-0.016 (0.081)
Violence dummy	0.433 (0.349)	0.764 (0.674)	2.119* (1.221)	0.196 (0.337)
Cannot concentrate	0.879*** (0.092)	1.086*** (0.182)	1.248*** (0.277)	0.774*** (0.099)
Religion Dummy	-0.476*** (0.152)	-0.269 (0.317)	0.586 (0.493)	-0.500*** (0.170)
Siblings	0.257*** (0.060)	0.366*** (0.132)	0.509*** (0.198)	0.204*** (0.064)
Class size		-0.008 (0.025)	-0.002 (0.036)	0.014 (0.016)
Teacher strict			0.077 (0.128)	0.002 (0.053)
Class misbehaves			0.082 (0.184)	0.080 (0.096)
% of high income families at school			-0.099 (0.127)	-0.011 (0.055)

Overlook physical conflicts				-0.076 (0.134)
Overlook verbal conflicts				0.044 (0.132)
Class easily disrupted				0.082 (0.100)
Frequency of disciplining physical fighting				-0.233* (0.121)
Frequency of disciplining verbal conflicts				0.182 (0.116)
P values	0.000	0.000	0.000	0.000
N	1843	543	311	4772

Notes.

1. The samples are from Cycle 1 to Cycle 6 of National Longitudinal Survey of Children and Youth.
2. Standard errors are included in the bracket.
3. Significance level is represented by \*\*\* 1%, \*\* 5%, \* 10%.
4. The hostile, punitive, consistency scores and the grade are lagged by one cycle to correct for the endogenous problem.
5. The dummy variable obese & overweight takes value 1 indicating the child is either obese or overweight, and 0 for normal weight. The obese & overweight dummy is based on the kids Body Mass Index Charts which take age, gender, height and weight into consideration.
6. Household income variable has six scales and higher scale represents higher income range.
7. The default health dummy is the excellent health dummy.
8. Violence dummy is equal to one if there is no violence or seldom violence at home.
9. The logit regression in column (8) is based on the pooling data from cycle 1 to cycle 6 of NLSCY for PMK reported sample.

## 5.2 Sensitivity analysis by employing IV regressions

Burton, Phipps and Curtis (2002) implements two instrumental variables to correct for endogenous problems associated with parental scores due to the simultaneity between the parental behaviors and children's behaviors. In this study, the longitudinal data enables the previous parental behaviors to be employed and the endogeneity problem is therefore corrected; whereas it will be meaningful to check robustness of the results with IV regressions.

The two instruments used by Burton, Phipps and Curtis (2002) are: 1) PMK is attending school rather than in the job market; and 2) the neighborhood education level measured by proportion of people aged 15 above having lower than high school education. I conduct IV regressions by employing the same instruments and the results are listed in Table 13. Column 1 of Table 13 reports estimates of a simple two- stage

linear probit regression, while columns 2 and 3 list the two-step estimators proposed by Newey (1987) and Maximum likelihood probit estimators with IV variables, respectively. The joint significance test from the first stage in column 1 suggests that the instruments are weak. Furthermore, the Durbin-Wu-Hausman test fails to reject the exogeneity of lagged hostile score in the regression. As well, the exogeneity hypothesis is not rejected in the regressions of column 2 and 3 in Table 13. The results imply that the lagged hostile score does not suffer from the endogenous problem. Given that the instruments implemented are tested to be weak and the lagged parental scores are exogenous, the positive estimates on the lagged hostile score in the IV regressions reported in Table 13 are suspicious and should not be relied on.

**Table 13- Estimations with instrumental variables**

	(1) 2SLS linear Probit model	(2) Newey's two-step probit	(3) MIE of probit with endogenous variable
	Two IVs: PMK studying at school and neighborhood education	Two IVs: PMK studying at school and neighborhood education	Two IVs: PMK studying at school and neighborhood education
<b>Parenting behaviors</b>			
Lag Hostile	0.070 (0.093)	0.335 (0.484)	0.243*** (0.094)
<b>Children's Characteristics</b>			
Age	-0.003 (0.003)	-0.018 (0.014)	-0.008 (0.019)
Obese & overweight	0.004 (0.009)	0.022 (0.047)	0.014 (0.027)
Very good health dummy	0.0005 (0.009)	0.012 (0.050)	0.006 (0.031)
Good health dummy	0.031 (0.025)	0.137 (0.126)	0.055 (0.163)
Fair health dummy	0.027 (0.048)	0.108 (0.197)	0.050 (0.159)
Poor health dummy	-0.170 (0.164)	-0.857 (0.944)	-0.547** (0.261)
Psychological problem	0.186*** (0.070)	0.492* (0.300)	0.213 (0.513)
Cannot concentrate	0.076*** (0.013)	0.372*** (0.067)	0.182 (0.285)
Lag Grade	-0.055 (0.066)	-0.267 (0.343)	-0.187*** (0.048)
<b>Family Background</b>			



Household income	-0.009 (0.007)	-0.039 (0.037)	-0.015 (0.047)
Siblings	0.008 (0.011)	0.047 (0.057)	0.016 (0.066)
Violence dummy	0.112*** (0.035)	0.429*** (0.136)	0.217 (0.305)
Religion Dummy	-0.035*** (0.012)	-0.175*** (0.058)	-0.087 (0.130)
constant	-0.436 (0.722)	-3.887 (3.742)	-2.538*** (0.178)
P values	0.000	0.000	
P value forWald test of exogeneity		0.432	0.394
P value for Durbin-Wu-Hausman test	0.356		
P value for the joint significance test	0.519		
P value for overidentification test	0.473		
N	8788	8788	8788

Notes.

1. The robust standard errors of the estimates are employed.
2. The liml and gmm estimators are similar to the 2sls estimators.
3. The same regressions were also applied to the punitive score and the results are similar as the ones above.
4. Regressions with the province of residence and other parental characteristics as well as the size of residence were also employed and the results are consistent with the reported ones in Table 16.

### 5.3 Sensitivity analysis of hidden bias in the matching

The matching method employed in section 4 to evaluate the treatment effect of early detection of bullying on stopping bullying is based on the conditional independence assumption. The independence assumption does not allow the unobserved factors that affect selection into treatment to also influence the outcome variable. If the assumption is violated, the matching results will not be robust to hidden bias. Although it is unable to identify whether the independence assumption is violated, I can check the sensitivity of the average treatment effect to the potential deviations from the assumption by

conducting the test proposed by Rosenbaum (2002). Rosenbaum bounds provide evidence on whether the significant results depend on the untestable assumption.

The test results are shown in Table 14. If the bullying most likely to be detected early are more likely to be stopped, then the estimated treatment effects are overestimated. Since my treatment effects are found to be positive, I only need to worry about the overestimation case. The reported p-critical+ are less than 1% for  $\Gamma \leq 2$ , less than 5% for  $\Gamma = 1$  and less than 10% for  $\Gamma = 1.5$ . The result is insensitive to the selection bias. The findings indicate that the treatment effect is not undermined by the unobserved selection bias.

**Table 14- Rosenbaum Bounds for early detection of bullying treatment effects**

Gamma	p-critical+	p-critical-
1	0.019548	0.019548
1.5	0.095277	1.0e-08
2	0.000072	1.1e-16
2.5	4.1e-09	0
3	6.5e-14	0
3.5	0	0
4	0	0
4.5	0	0
5	0	0
5.5	0	0
6	0	0
6.5	0	0
7	0	0

Notes.

1. Gamma is odds of differential assignment due to unobserved factors.
2. P-critical+ is the significance level under the assumption of overestimation of treatment effect. p-critical- is the significance level under the assumption of underestimation of treatment effect.
3. The test is conducted on the matching with caliper radius=0.01.

#### 5.4 Multinomial and ordered logit regressions

The original bullying question in NLSCY has three answers: 1) never bully; 2) sometimes bully; and 3) often bully. In the previous regressions, I created a bullying dummy with one indicating a bully (sometimes or often bully) and zero as a non-bully (never bully). With the original three-scale discrete bullying variable, I run the multinomial logit regressions. The multinomial logit regression is a cross-sectional regression and the results in columns (1) & (2) of Table 15 are generally consistent with the results of the logit regression in column (8) of Table 4. The higher lagged hostile and consistency scores are related to the reduction in the log odds of sometimes bullying to often bullying and the increase in the log odds of sometimes bullying to never bullying. No effects of the lagged punitive score are found on the children's bullying behaviours. The ordered logit regression results reported in column (3) of Table 15 are similar to those of multinomial logit regressions. Consistently, all of the cross-sectional regressions tell an opposite story that the more hostile parenting scores lead to the increase of the probability of being a bully, which is biased by the unobserved individual characteristics.

**Table 15-** The results of multinomial logit and ordered logit regressions of PMK reported bullying

	(1) Multinomial logit with never bullying as the base outcome	(2) Multinomial logit with often bullying as the base outcome	(3) Ordered logit regression	(4) Logit regression
	<b>Sometimes bullying behavior</b>	<b>Sometimes bullying behavior</b>		
<b>Parenting behaviors</b>				
Lag Hostile	0.045*** (0.0112)	-0.074* (0.044)	0.048*** (0.012)	0.046*** (0.013)
Lag Punitive	-0.004 (0.020)	-0.035 (0.081)	-0.003 (0.020)	-0.005 (0.020)
Lag Consistency	0.024* (0.013)	-0.105** (0.051)	0.029** (0.013)	0.018 (0.013)
<b>Children's Characteristics</b>				

Age	-0.016 (0.024)	-0.162* (0.096)	-0.010 (0.665)	-0.018 (0.025)
Obese & overweight	0.136* (0.078)	-0.229 (0.316)	0.146* (0.077)	0.142* (0.078)
Very good health dummy	0.208** (0.087)	0.300 (0.332)	0.198* (0.085)	0.200** (0.087)
Good health dummy	0.474*** (0.117)	0.167 (0.380)	0.469*** (0.114)	0.482*** (0.118)
Fair health dummy	0.435* (0.264)	1.008 (1.351)	0.348 (0.256)	0.481* (0.268)
Poor health dummy	-0.474 (0.761)	1.062 (1.426)	-0.529 (0.720)	-0.538 (0.706)
Psychological problem	0.903*** (0.232)	-1.204*** (0.448)	1.002*** (0.222)	0.864*** (0.239)
Cannot concentrate	0.739*** (0.054)	-0.548** (0.241)	0.767*** (0.054)	0.769*** (0.056)
Lag Grade	-0.027 (0.045)	0.179 (0.133)	-0.033 (0.044)	-0.022 (0.046)
<b>PMK's characteristics</b>				
PMK immigrant dummy				-0.531*** (0.167)
PMK staying at home				0.013 (0.092)
<b>Family Background</b>				
Household income	-0.062** (0.030)	0.349*** (0.115)	-0.081*** (0.030)	-0.088*** (0.032)
Siblings	0.140*** (0.033)	-0.316** (0.134)	0.156*** (0.033)	0.154*** (0.034)
Violence dummy	0.691*** (0.219)	0.006 (0.581)	0.688*** (0.212)	0.728*** (0.215)
Religion Dummy	-0.298*** (0.098)	-0.689* (0.383)	-0.271*** (0.096)	-0.243** (0.105)
Quebec				-0.266** (0.12)
EI				-0.099 (0.110)
MS				0.086 (0.108)
Newfoundland				-0.650*** (0.176)
British Columbia				-0.106 (0.144)
Alberta				0.164 (0.119)
Size of residence				-0.531*** (0.167)
Cut 1			3.890	
Cut 2			7.415	
P Values	0.000	0.000	0.000	0.000
N	16733	16733	16733	16073

Notes.

The samples are from Cycle 1 to Cycle 6 of National Longitudinal Survey of Children and Youth.

1. Standard errors are included in the bracket.

2. Significance level is represented by \*\*\* 1%, \*\* 5%, \* 10%.
3. The hostile, punitive, consistency scores and the grade are lagged by one cycle to correct for the endogenous problem.
4. The dummy variable obese & overweight takes value 1 indicating the child is either obese or overweight, and 0 for normal weight. The obese & overweight dummy is based on the kids Body Mass Index Charts which take age, gender, height and weight into consideration.
5. Household income variable has six scales and higher scale represents higher income range.
6. The default health dummy is the excellent health dummy.
7. Violence dummy is equal to one if there is no violence or seldom violence at home.

### **5.5 Several robustness checks in the early detection experiment**

Researchers argue that the time spent by parents with children will affect the child's bullying behaviour. Based on this argument, I added the parent involvement variable in my regression model as well as the propensity score matching. Nevertheless, the inclusion of this variable does not alter the results. At last, in order to rule out the possibility that the bullying victimization experience contributes to the bullying behavior later, I also control for the children's previous victimization experience in the model, but no effects are found on their bullying behavior later.

## **6 Conclusions**

In this paper, I develop several models to examine the children's bullying behavior, which aim to provide some evidence on the relationship between educators' (parents/teachers) and children's bullying behaviors. Two assumptions are made whereby the child tends to bully for utility and the bullying is inhibited by the disutility resulted from the interactions between the child and educators. The models also account for the imperfect perceiving of bullying by educators. The dynamic model predicts that during the evolvement of the child's bullying behavior, the timing of detection and control of

bullying is important in order to effectively stop it. If a child's bullying behavior had been developing without detection and control for a long period, it will be harder to deter it. If all the other factors are held constant, then the earlier the educators detect the child's bullying and implement corresponding controls to the bullying, the more effective it is to suppress it. Another important conclusion from the model is that the higher disutility generated from controls/punishments will lead to more effective inhibition of bullying.

Based on the theoretical results, an empirical analysis is conducted by employing data of National Longitudinal Survey of Children and Youth (NLSCY) in Canada. After controlling other covariates and the unobserved heterogeneity, the fixed effects regressions show the significant effects of the parenting styles on the inhibition of bullying. The hostile and punitive parental behaviors are found to be significantly effective in stopping bullying. This could be due to the higher disutility generated by the punitive and hostile parental interactions, which is consistent with the model's prediction. Moreover, the treatment effect of earlier detection of bullying is also evaluated by employing the propensity score matching. The treatment group covers the bullies whose bullying behaviors are detected by educators at an earlier stage, while the control group includes those with the late detection of bullying. The percentage of bullies whose bullying behaviors disappear in the end in the treatment group is significantly higher over that in the control group. This empirical evidence is robust to the potential unobserved heterogeneity bias and supports the effects of earlier detection on the effective suppression of bullying.

This paper highlights the significant roles the parent (mainly the mother) play in stopping bullying among children. Society often has blamed school system for failing to

prevent bullying among children. However, no matter where the bullying incident happens, each act of bullying is not a static incident; instead, the child's bullying behavior could potentially evolve into a habit. It is not only the school but also the parents that can suppress the formation of the children's bullying habits. Educators might be inclined to ignore small bullying, which have not caused severe consequences. I argue that the initial neglect of bullying by parents/teachers is detrimental to the eventual control of bullying. It is less difficult and more effective to stop bullying at its early stages.

My paper also shows empirical evidence that the hostile and punitive parenting styles can reduce the probability of bullying of children. It could be the case that the hostile and punitive parenting lead to higher disutility of bullying on the part of the child. Hostile and punitive parental behaviors might be bad for the children's overall well-being<sup>26</sup>. However, a lack of tough controls on the child's bullying could potentially enable the bullying behavior. The focus of this paper is to reveal the evidence of the inhibition effects of parental controls on the child's bullying. It is beyond the power of this paper to specifically imply how parents should deal with bullying given that the interactions between parents and children are very complicated and unique. This paper just provides a preliminary result about the parenting behaviors against bullying. Future researches on how to educate children are still needed.

This paper has the following policy implications. First, the significant role played by parents in the prevention of bullying among children needs to be recognized. For example, the government could launch an awareness campaign to highlight the

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<sup>26</sup> Currie (2006) showed that the children will be less likely to be satisfied with life if they have difficulties in communicating with their parents.

responsibility of the parents in stopping child bullying. Second, similar to school anti-bullying programs, a specific anti-bullying action package could be designed and taught to parents. Special attention and training could be placed on the careful monitoring of the child's behavior and detecting bullying as early as possible. Thirdly, parents and schools could cooperate and inform each other in order to closely monitor the child's behavior and effectively interact with children.

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## Appendix I

### *Proof of Proposition 3*

Equations (9) & (10) determines the optimal solutions of                      Equation (10) implies that the expected marginal utility of                      is equal to the expected marginal disutility when the optimal solutions are satisfied, which means the expected marginal total utility is zero (                      ).

By fixing other variables constant, comparative static analysis is conducted on equation (10):

$$\frac{\partial}{\partial x} \left( \frac{\partial U}{\partial x} - \frac{\partial U}{\partial y} \right) = 0$$

Thus,

$$\frac{\partial}{\partial x} \left( \frac{\partial U}{\partial x} - \frac{\partial U}{\partial y} \right) = 0 \tag{11}$$

By the second order condition,  $\frac{\partial^2 U}{\partial b^2} < 0$ . According to the second order condition  $\frac{\partial^2 U}{\partial b^2} < 0$ , it could be shown that  $\frac{\partial b}{\partial c} > 0$ . Also, it is easy to show that  $\frac{\partial b}{\partial c} > 0$ . When  $\frac{\partial b}{\partial c} > 0$  and  $\frac{\partial b}{\partial c} > 0$  since  $\frac{\partial b}{\partial c} > 0$ .

Thus,  $\frac{\partial b}{\partial c} > 0$ . The sign of A is ambiguous, which depends on the comparison of the absolute value between  $\frac{\partial b}{\partial c}$  and  $\frac{\partial b}{\partial c}$ . The first term  $\frac{\partial b}{\partial c}$  represents the marginal effect of bullying controls in the second period on the expected marginal total utility in the first period. I call the first term as “substitution effect” because it captures that the child will optimally shift the bullying intensity from the second period to the first period if the bullying controls in the second period are high. Higher bullying punishments in the second period will increase the first period’s marginal utility of bullying and then increase the optimal bullying intensity of bullying in the first period. However, the second term  $\frac{\partial b}{\partial c}$  is the “current inhibition effect”, which represents the inhibition effect of an additional bullying control in the first period on the bullying intensity in the first period. The increase in the bullying controls in the first period is associated with the reduction of the first period’s bullying intensity.

Only when the “current inhibition effect” exceeds the “substitution effect”, the higher bullying controls in both periods will lead to the suppression of bullying intensity in both periods<sup>27</sup>.

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<sup>27</sup> I am aware that the above analysis is based on the assumption that in both periods the expected bullying controls are consistent and carry the same value upon the detection of bullying. However, if the expected bullying controls are independent as  $b_1$  and  $b_2$ , then  $\frac{\partial b_1}{\partial b_2} = 0$  and  $\frac{\partial b_2}{\partial b_1} = 0$ . Higher bullying controls in the second period will make children optimally bully with higher intensity in the first period and due to the

***Proof of Proposition 4***

Following equation (11),

If  $|b_{11}| < |b_{21}|$ , then  $\frac{\partial b_{11}}{\partial \beta} > 0$  and  $\frac{\partial b_{21}}{\partial \beta} < 0$

Assume  $\beta=0$ ,  $b_{11} = b_{21}$  and  $b_{12} = b_{22}$

$$\frac{\partial b_{11}}{\partial \beta} = \frac{\partial}{\partial \beta} \left( \frac{b_{11} - b_{21}}{\beta} \right) = \frac{b_{11} - b_{21}}{\beta^2}$$

$$\frac{\partial b_{21}}{\partial \beta} = \frac{\partial}{\partial \beta} \left( \frac{b_{21} - b_{11}}{\beta} \right) = -\frac{b_{11} - b_{21}}{\beta^2}$$

$$\frac{\partial b_{12}}{\partial \beta} = \frac{\partial}{\partial \beta} \left( \frac{b_{12} - b_{22}}{\beta} \right) = \frac{b_{12} - b_{22}}{\beta^2}$$

$$\frac{\partial b_{22}}{\partial \beta} = \frac{\partial}{\partial \beta} \left( \frac{b_{22} - b_{12}}{\beta} \right) = -\frac{b_{12} - b_{22}}{\beta^2}$$

Thus,

$$|b_{11}| < |b_{21}| \Leftrightarrow \frac{b_{11} - b_{21}}{\beta} < \frac{b_{21} - b_{11}}{\beta}$$

$$\Leftrightarrow b_{11} - b_{21} < b_{21} - b_{11}$$

$$\Leftrightarrow 2b_{11} < 2b_{21}$$

$$\Leftrightarrow b_{11} < b_{21}$$

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habit formation, the second period's bullying intensity will increase with the increase of the first period's bullying intensity.

(12)

Thus, from inequality (12), it is obvious that if the bullying intensity in the first period is bigger than one, higher value of  $\beta$  will make the inequality will be more likely to hold by fixing all other variables constant so that  $\beta > 1$  and  $\beta < 1$

## Appendix II

**Table 5 - Correlation among the parental scores**

	Lag hostile score	Lag punitive score	Lag consistency score
Lag hostile score	1.00		
Lag punitive score	0.475	1.00	
Lag consistency score	-0.279	-0.200	1.00

**Table 7-Discrepancies in the reports of bullying by the PMK and the teacher with age**

Age (%)	Both reported bully	Bully by PMK, non-bully by teacher	Non-bully by PMK, bully by teacher
Under 6	8.29	10.40	7.71
6	14.00	16.11	14.29
7	17.14	15.31	13.80
8	18.29	16.11	17.21
9	13.71	14.74	15.18
10	14.57	14.97	17.53
11	14.00	12.34	14.29
Total observations	350	875	1232

Notes. 1. The results are based on the sample of children who were firstly reported to bully by either PMK or the teacher or both.

**Table 8- The percentage of PMKs who did not identify the bullying behaviors of their children actually reported it in later cycles**

	Cycle 1	Cycle 2	Cycle 3	Cycle 4
Only PMK not reported	28.63	36.12	18.82	18.46

bullying <sup>28</sup> (%)				
PMK reported later <sup>29</sup> (%)	25.60	27.18	24.30	22.05
Only teacher not reported bullying (%)	24.59	21.14	14.40	13.55
Teacher reported later (%)	25.91	13.78	10.00	13.03

## Data Appendix

### Survey questions of the covariates

Q1. Hostile parenting: this factor score was derived using the following weighted items:

How often do you get annoyed with your child for saying or doing something he/she is not supposed to?

Of all the times you talk to your child about his/her behavior, what proportion is praise?

Of all the times you talk to your child about his/her behavior, what proportion is disapproval?

How often do you get angry when you punish your child?

How often do you think the kind of punishment you give your child depends on your mood?

How often do you feel you have problems managing your child in general?

How often do you have to discipline your child repeatedly for the same thing?

Q2. Consistency parenting: this factor score was derived using the following weighted items:

When you give %him/her% a command or order to do something, what proportion of the time do you make sure that %he/she% does it?

If you tell %him/her% %he/she% will get punished if %he/she% doesn't stop doing something, and %he/she% keeps doing it, how often will you punish %him/her%?

How often does %he/she% get away with things that you feel should have been punished?

How often is %he/she% able to get out of a punishment when %he/she% really sets %his/her% mind to it?

<sup>28</sup> Those reported to bully only by teachers not PMKs. The percentage is the ratio of the number children reported only by teachers over those reported by both parties.

<sup>29</sup> The percentage is measured by the ratio of those originally not reported to bully by PMK but later the PMK reported them to bully.



How often when you discipline %him/her%, does %he/she% ignore the punishment?

- Q3. Punitive parenting: this factor score was derived using the following weighted items:
- [When %FNAME% breaks the rules or does things that %he/she% is not supposed to, how often do you:] Raise your voice, scold or yell at %he/her%?
  - [When %FNAME% breaks the rules or does things that %he/she% is not supposed to, how often do you:] Calmly discuss the problem?
  - [When %FNAME% breaks the rules or does things that %he/she% is not supposed to, how often do you:] Use physical punishment?
  - [When %FNAME% breaks the rules or does things that %he/she% is not supposed to, how often do you:] Describe alternative ways of behaving that are acceptable?

Q4. Grade: Based on your knowledge of %his/her% school work, including %his/her% report cards, how is %fname% doing in: How is %he/she% doing overall?

- 1 Very well
- 2 Well
- 3 Average
- 4 Poorly
- 5 Very poorly

Q5. Welfare: Thinking about your total household income, from which of the following sources did your household receive any income in the past 12 months? Provincial or Municipal social assistance or welfare

- 1 Yes
- 2 No

Q6. Overall health: In general, would you say his/her health is:

- 1 Excellent
- 2 Very good
- 3 Good
- 4 Fair
- 5 Poor

Q7. Psychological problems: Does child have any of the following long-term conditions that have been diagnosed by a health professional: Emotional, psychological or nervous difficulties?

- 1 Yes
- 2 No

Q8. Violence at home: How often does %he/she% see adults or teenagers in your house physically fighting, hitting or otherwise trying to hurt others?

- 1 Often
- 2 Sometimes
- 3 Seldom
- 4 Never

Q9. Cannot concentrate: How often would you say that %FNAME%: Can't concentrate, can't pay attention for long?

- 1 Never or not true
- 2 Sometimes or somewhat true
- 3 Often or very true

Q10. Teacher strict: How often do you monitor homework in the following ways: by having parent(s)/guardian(s) sign a homework book/note?

- 1 Never
- 2 Rarely
- 3 Sometimes
- 4 Usually
- 5 Always

Q11. Overlook physical conflicts (reported by teachers): Please indicate the extent to which you agree with each of these statements regarding the disciplinary policies of your school: Teachers in this school rarely overlook physical aggression among students.

- 1 Strongly disagree
- 2 Disagree
- 3 Neither agree nor disagree
- 4 Agree
- 5 Strongly agree

Q12. Overlook verbal conflicts (reported by teachers): Please indicate the extent to which you agree with each of these statements regarding the disciplinary policies of your school: Teachers in this school rarely overlook verbal aggression among students.

- 1 Strongly disagree
- 2 Disagree
- 3 Neither agree nor disagree
- 4 Agree
- 5 Strongly agree

Q13. Class misbehaves: Overall, with the exception of a few individual students, the class as a whole: Misbehaves when I am called to the door or must attend to other interruptions.

- 1 Strongly disagree
- 2 Disagree
- 3 Neither agree nor disagree
- 4 Agree
- 5 Strongly agree

Q14. Class easily disrupted: Overall, with the exception of a few individual students, the class as a whole: Is easily distracted by the disruptive behavior of a few.

- 1 Strongly disagree
- 2 Disagree

- 3 Neither agree nor disagree
- 4 Agree
- 5 Strongly agree

Q15. Frequency of disciplining physical fighting (reported by the principals): Listed below are a number of different disciplinary problems that may occur in a school. How often do you have to discipline students because of: Physical conflicts among students?

1. Never
2. Rarely
3. Sometimes
4. Usually
5. Always

Q16. Frequency of disciplining verbal conflicts (reported by the principals): Listed below are a number of different disciplinary problems that may occur in a school. How often do you have to discipline students because of: Verbal conflicts among students?

1. Never
2. Rarely
3. Sometimes
4. Usually
5. Always

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<sup>i</sup> In order to clearly disentangle the two potential sources of endogeneity, I ran several cross-sectional regressions with and without lagging the parenting scores and also compared the results with those of fixed effects regressions with and without lagging the parenting scores. Without fixed effects, both regressions with and without lagging the parenting behaviors are qualitatively similar and show that higher controls leading to higher probability of being a bully. However, the magnitude is much smaller for the regression with lagged parental scores. This shows that only controlling for the simultaneity problem is not enough to correct the bias. Then, I only controlled the fixed effects and did not correct for the simultaneity problem. The results are mixing, which indicate that higher punitive score will reduce the probability of being a bully and higher hostile will increase the probability instead. Finally, after controlling both the fixed effects and simultaneity problems, both higher hostile and punitive scores lead to the reduction in the probability of being a bully for the child. (The empirical results will be illustrated in details later.)