

# Classroom management, persistent bullying, and teacher practices in a discrete choice model of habit formation

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## Abstract

This paper develops an empirical model of habit formation to assess elementary school children's decision to engage in recurrent (persistent) bullying and to identify the teacher practices most useful in mitigating this type of bullying. The model is estimated using a balanced panel of 460 children from the NICHD Study of Early Child Care and Youth Development for 2000 to 2003. Results lend support to the habit formation hypothesis; in particular, a child's preference to bully, in earlier grades, can influence that child's preference to bully again, in later grades. Teachers' self- and observed efficacy measures of classroom management and instructional practices are found to have a statistically significant impact on a child's likelihood of developing persistent bullying behavior. Results of this paper offer insights into the mechanisms that reinforce or temper persistent bullying, and can inform school-based interventions to improve school safety and the lives and education of students.

**JEL Classification:** D9; I21; C35

## Keywords

habit formation — elementary school bullying — classroom management — teacher practice — discrete choice models — random effects

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## Introduction

Children live in multiple environments: home, neighborhood, school, and community. Within the interaction between children and these environments are risk factors for bullying and/or victimization from bullying. Bullying in the school setting has become a significant public health issue in the United States and worldwide (Perkins, Perkins & Craig, 2009). Current estimates indicate that nearly 30% of U.S. early adolescents have/had moderate or frequent involvement in bullying as a bully, a victim, or both. Bullying involves the use of aggression from a position of power and is often used to establish dominance and status within a peer group (Pellegrini, 2002).

Although many children at some time explore the use of power over others by means of bullying, relatively few children end up bullying at a persistent rate. Schaeffer et al. (2003) first used the terms *persistent* and *desistent* to distinguish children who exhibited bullying behavior for two or more years from those who ceased the behavior at or within one year. The limited studies on persistent bullying indicate that the vast majority of middle and early middle school children who engage in bullying do not continue their behavior in subsequent years; i.e., most bullying is desistent (Hanish & Guerra, 2004; Pepler et al., 2008; Carlson & Cornell, 2008). However, while fewer

in numbers, persistent bullies were found to be responsible for a nontrivial share of the total bullying problems reported in sampled schools. Thus these prior studies supported the notion that successful school intervention efforts to reduce persistent bullying could reap considerable payoffs, by effectively eliminating the origin of much of a school's various forms of aggressive behavior. The purpose of this study is to apply a discrete choice model of habit formation to test for persistent bullying and to assess the relative importance of elementary school teachers' classroom management and instructional practices in reducing the development of persistent bullying. Insights into the mechanisms that reinforce or temper persistent bullying can inform future school-based interventions and serve to improve school safety as well as the welfare and educational development of students.

Teachers are critical in determining the social climate of the classroom. Thus their reactions and attitudes toward student power dynamics are extremely relevant (Twemlow et al., 2006). Teachers' management of the classroom environment is comprised of many interrelated attributes of teacher-student interactions, many of which correlate both with student behaviors as well as learning outcomes (Allen, 2010; O'Connor, 2010). Thus, it is important to ask the following questions: What is the nature of persistent bullying in the classroom? How is it manifested over time? Is there a connection be-

tween persistent bullying and teacher practices? If so, which practices effectively mitigate its development? The amount of reported bullying has been observed to differ, sometimes widely, among individual schools as well as among individual classes within schools (Menesini & Salmivalli, 2017; Dorio et al., 2019). Most often these differences are independent of the level of urbanization in the catchment area of the school, the size of the school and the class (Olweus, 1993), and also of parallel differences in students' home conditions (Roland and Galloway, 2002). While much research has focused on school and classroom-level differences in bullying prevalence (Williford & Zinn, 2018; Dietrich & Cohen, 2019), no research has been conducted to answer the important question about possible influences on persistent bullying associated with teacher practices. Competence in teaching, classroom structure and discipline, and personal caring for students are commonly reported as general and important dimensions of teacher practices (Bouchard & Smith, 2017; Pas et al., 2019), especially within the tradition of school and teacher effectiveness research (Skourdoumbis & Rawolle, 2020). This study will evaluate these three aspects of teacher practices in the context of reducing children's persistent bullying.

Habit formation is thought to exert great influence on behavior. It has been offered as a potential answer to questions as diverse as the importance of brand loyalty (Erdem, 1996), labor force participation (Woittiez & Kapteyn, 1998), obesity and overeating (Richards, Patterson, & Tegene, 2007), responsiveness to taxes on sugar-sweetened beverages (Zhen et al., 2011), and the existence of a "gateway" effect between alcohol and illegal drug use (Pacula, 1998). In its most common representation, habit formation is a preference specification according to which the current period utility function for a particular choice depends on a quasi-difference between current and past choices. Under habit persistence, the marginal utility of a current choice increases with the number of like past choices, the cumulation of which characterizes the habit stock (e.g., Pollak, 1970). Intuitively, the greater is one's habit stock, the easier or more likely it is one's choice will be repeated. As Becker and Murphy (1988) point out, habits, either good or bad, are not unbreakable. However, successful reduction of any long-run behavior requires interventions that diminish one's habit stock—the perceived future value of the behavior.<sup>1</sup>

This paper proposes a simple empirical model that tests for habit persistence from children's choices to engage in bullying in elementary school grades 3 to 6, and employs a unique data set to evaluate the relative importance of teacher practices in mitigating the likelihood of persistence of this behavior as

children age. Using a dynamic random coefficient logit (RCL) model similar to Erdem (1996) and Richards et al. (2007), children's choices to bully are characterized as a function of multiple time-varying attributes of the classroom environment defined over a range of observed teacher practices. This "attribute-based" RCL model is uniquely suited to identify and assess habit persistence when persistence is shaped by potentially multiple exogenous influences. Viewing time-varying choice as a function of multiple time-varying attributes of that choice allows the researcher to project observed behavior from choice space to attribute space. Herein, for the problem of persistent bullying, the dynamic RCL model conveys two distinct advantages over existing methods employed in the habit formation literature.<sup>2</sup> First, it is a parsimonious representation of a complex decision process. While existing literature models identify and test for habit persistence of an observed behavior, these models do not identify or test for multiple underlying influences on the formation of habit persistence.<sup>3</sup> Second, as Heckman (1981) noted, an important empirical problem is the confounding of unobserved heterogeneity and habit persistence. Without controlling for heterogeneity, past choices may appear to be a determinant of current behavior solely because they are a proxy for temporally persistent heterogeneous preferences. Thus if heterogeneity is present in the true model and not accounted for, estimated habit effects will be biased. The RCL model outlined in Section 2 below accounts for child-specific heterogeneity both in preferences and attribute perceptions (Erdem, 1996, p. 361). That is, children's preferences are assumed to differ such that unobserved child-specific heterogeneity is accounted for both in the distribution of children's bullying preferences as well as the distribution of each teacher's influence on a child's preference to bully. Combined with a highly detailed 3-year balanced panel of child, family, and school variables from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development, the dynamic RCL model is able to test not only whether sample children's choice preferences for bullying are habit persistent, but also which teacher practices serve to temper or reinforce this persistence. By fully accounting for child-specific heterogeneity, the model is able to control for the fact that children do not have similar tastes and perceptions, and therefore is

<sup>2</sup>Commonly used models to test the habit formation hypothesis from individual or household-level micro data include dynamic versions of linear demand and expenditure systems (Zhen et al., 2011; Khare & Inman, 2006; Liao & Chern, 2007), discrete choice models (Keane, 1997; Baltas & Doyle, 2001; Thunström, 2010), and single equation demand and lagged dependent variable models (Chamberlin, 1978; Kaushal & Rhodes, 2015; Harris & Kessler, 2019).

<sup>3</sup>Chamberlin's (1978) significance test of lagged exogenous variables on habit formation is an exception. However, as Erdem & Sun (2001) noted, tests for habit persistence in lagged exogenous variable models are sensitive to the specification of unobserved heterogeneity as well as functional form of model variables. If unobserved heterogeneity is not accounted for, Chamberlin's test may indicate significant lagged influences on current behavior, but the researcher would not know whether this is due to habit formation, unobserved heterogeneity, or both, without imposing potentially strong exclusion restrictions on a subset of lagged exogenous variables.

<sup>1</sup>As in Becker (1992), the shaping of long-run behaviors is particularly applicable to children. Children spend their early years under the care of parents and other figures of authority who determine, often repetitively, what they eat, read, observe, and hear. The enormous influence this has on children's stocks of chosen behaviors explains the close link between adults and children in many long-run attitudes and choices, including socialization and educational attainment, and propensities to eat certain foods, exercise, attend church, smoke, drink, and divorce (see also Koh & Wong, 2017).

able to estimate most accurately the marginal effectiveness of teacher practices that play a critical role in the management and prevention of persistent bullying within schools.

Estimation results lend broad support for the habit formation/mitigation hypothesis involving persistent bullying. In particular, when teachers care about students, organize their classrooms so that positive teacher-student relationships develop, and manage student learning and behavioral issues in positive, educative ways, students are significantly less likely to engage in persistent bullying (bullying that lasts for two or more consecutive school years). In contrast, persistent bullying is significantly more likely in classrooms marked by teachers' over-reliance on punitive methods of behavior control, lack of student involvement, or lack of understanding or responsiveness to student needs.

The remainder of the paper is organized as follows. The next section discusses properties of the random coefficients mixed logit model and the test for habit formation. Section 3 describes the data and empirical specification, and reports empirical results. Section 4 concludes.

## Model

Consider the following random coefficients logit model (RCL) as derived from a random utility framework. Let the utility,  $u_{it}$ , that child  $i$  obtains at time  $t$  from engaging in school bullying be a function of family, neighborhood, and school variables,  $z_{it}$ , and mean level of utility, or bullying-specific preferences,  $\gamma_{it}$ :

$$u_{it} = \sum_l \alpha_l z_{itl} + \gamma_{it} + \xi_{it} \quad (1)$$

Similar to Berry (1994) and Erdem (1996), unobserved bullying-specific preferences are assumed to vary in part with teacher-specific practices,  $x_{itk}$ , measuring the  $k^{th}$  practice of child  $i$ 's teacher at time  $t$ , aimed at shaping and/or directing child  $i$ 's attitudes, values, and behaviors within the current classroom environment:

$$\gamma_{it} = \sum_k \beta_{ik} x_{itk} \quad (2)$$

Teacher practice  $x_{itk}$  is measured on a real interval that is common across classrooms and time periods. Bullying-specific preferences are assumed to vary such that unobserved child-specific heterogeneity is reflected in the distribution of each  $x_{itk}$ 's influence on child  $i$ 's utility:

$$\beta_{ik} = \beta_k + \mu_{ik} \quad N(0, \sigma_\beta^2) \quad \forall k \quad (3)$$

As in Brownstone and Train (1998), the elements of Equation (3) can be interpreted in terms of an error components model of choice-item attributes, whereby children's bullying-specific preferences are assumed to differ according to their ranking of utility-altering item attributes, specifically, teacher

practices.<sup>4</sup> In addition, the heterogeneity assumption in Equation (3) reflects a general pattern of bullying choice by way of the unobserved, random component of the utility function specified in Equation (2).

In this basic RCL framework, however, child utility depends only on current bullying choice. Erdem (1996) and Richards et al. (2007) introduced state-dependent preferences in RCL models by allowing utility to reflect "habit persistent" choice behavior over time. Incorporating this extension, let bullying-specific preferences vary with time according to differences in observed teacher practices between a child's present and past bullying choice occasions:

$$\gamma_{it} = \sum_k \beta_{ik} x_{itk} + \sum_k \lambda_{ik} (x_{itk} - x_{ik,t-1} d_{i,t-1}) \quad (4)$$

where  $d_{i,t-1} = 1$  if child  $i$  engages in bullying at time  $t-1$ , and 0 otherwise. Because children are also heterogeneous with respect to their preferences for deviations from past bullying choices, each  $\lambda_{ik}$  is assumed to be given by  $\lambda_{ik} = \lambda_k + v_{ik}$ , where  $v_{ik} \sim N(0, \sigma_\beta^2)$ , for each of the  $k$  observed teacher practices. Therefore, it is assumed in this model that children's bullying-specific preferences depend not only on the common measured attributes of the current teacher-student environment, but also on the common attributes of the child's previous classroom environment. In Equation (4), if  $\lambda_{ik} > 0$ , child  $i$  derives greater utility from bullying at time  $t$  when teacher attribute  $x_{itk}$  exceeds the level of the same  $k^{th}$  attribute experienced at  $t-1$ . Hence, if  $\lambda_{ik} > 0$ , the child is bullying *persistent* with respect to the  $k^{th}$  classroom attribute. Conversely, if  $\lambda_{ik} \leq 0$ , child  $i$  is bullying *desistent* with respect to an increase in the  $k^{th}$  attribute. With a panel of observed measures of teaching and classroom management practices and effectiveness, the above model is able to analyze associations between teacher practices aggregated at the classroom level and the occurrence of bullying at the individual level. More importantly, the model is able to identify those attributes that are associated with persistence of bullying behavior over time while allowing for child-specific heterogeneity.

## Data and empirical implementation

Data for this study come from the National Institute of Child Health and Human Development Study of Early Child Care and Youth Development (NICHD-SECCYD, 2001), a longitudinal study of the linkages between child behavior and development, particularly as it relates to early child rearing and care, schooling, and after school care. Families were recruited shortly after the birth of the subject child in 1991 from 10 geographically dispersed areas of the U.S., both urban and rural, and data were collected prospectively from birth to age 15. All sample children had a mother who was over 18 at the time of birth, had no disabilities or health conditions requiring

<sup>4</sup>Consistent with Arrow (1958), preferences imply an ordering of different options in terms of expected levels of utility.

a hospital stay exceeding seven days postpartum, and lived in a home where English was the first language. Details of the recruitment methods and sampling strategy are available at SECCYD (2006). The initial sample included 1,364 children. Although the sample is not nationally representative, it is representative of the demographics of the 10 areas from which the sample was recruited. The NICHD-SECCYD is the only U.S. longitudinal dataset that includes extensive information about parenting, marriage, employment, income, and participation in public programs, as well as other relevant topics, such as detailed assessments of children's health and scholastic abilities, social and behavioral attributes (including bullying) and qualities of their home, school, and after school environments. The present analysis uses data from phase 3 of the NICHD study, which followed sample children from grades two through six.

### Dependent Variable

Unique to the phase 3 data is the subsample of 895 children who completed (with at least one parent/caregiver present) a detailed questionnaire intended to measure each child's involvement with bullying at their current school. The questionnaire was given to children on three separate occasions: grade 3 (children approximately age 9), grade 5 (age 11), and grade 6 (age 12). Children's self-reported involvement with bullying was measured using the *Kids in My Class at School* questionnaire (U.S. Department of Health and Human Services, 2010). Created specifically for use in the SECCYD, the *Kids* questionnaire was adapted from an instrument developed by Ladd et al. (1997) to study the impact of bullying involvement upon various measures of children's elementary school adjustment. Participation in bullying measured by the *Kids* questionnaire has been found to be comparable to measures by the more widely used Olweus Bullying Survey (Kochenderfer & Ladd, 1996; 1997; Henrich & Shahar, 2014).

The *Kids* questionnaire asked children to consider the extent of their involvement in bullying in their class or around school by choosing a number from 1 to 5 (never; hardly ever; sometimes; most of the time; and always) in response to the following questions: In the past two weeks, did you ever: (1) pick on anyone at school; (2) say mean things to anyone at school; (3) say bad things about someone to other kids at school; and/or (4) hit anyone at school. An overall bullying score was then calculated as the average of responses to the four items (Cronbach's alpha = 0.76 – 0.85 across the three waves indicating good internal reliability).

In accordance with previous studies utilizing NICHD bullying data (e.g., Fanti & Georgiou, 2013; Fanti et al., 2009), the present analysis defines and measures child bullying involvement, *Bully*, as a binary variable, which equals one in the indicated year if a sample child's *Kids* score was at least one standard deviation above the sample mean. This cutoff criterion is equivalent to the "sometimes or more" average response (across all bullying questionnaire items) threshold advocated by Solberg & Olweus (2003) as a sufficient and

useful lower bound at which "... bullies differ markedly and in clearly different ways from 'non-involved' students in conceptually related variables" (p. 239). The Solberg & Olweus threshold has been used extensively to identify bullies for general prevalence assessments (UNICEF, 2007; Currie et al., 2008), and by studies associating bullying involvement with various measures of maladjustment (Demaray & Malecki, 2003; Veenstra et al., 2005; Henrich & Shahar, 2014). While not perfect, this consensus cutoff reflecting presence/absence of bullying has shown good test-retest reliability and construct validity (Kyriakides et al., 2006; Gonçalves et al., 2016), can be reproduced unambiguously by researchers (using like surveys), and permits comparisons across studies of child and adolescent bullying. Definitions, means, and standard deviations of all model covariates are presented in Table 1. The sample consists of 460 observations on child, school, and family variables with no missing data for the years 2000, 2002, and 2003. Table 1 shows that approximately 12% of sample children were involved in bullying in grade 3, 20% in grade 5, and 14% in grade 6. These sample rates are comparable to the 15-20% U.S. prevalence rate reported by the U.S. Department of Education (NCES, 2014; 2019), and by Kann et al. (2018).

### Control Variables

A set of basic sociodemographic background characteristics of the subject children, their families, and their current schools enter the empirical model as control variables. Child and family variables include child gender (*Boy*), ethnicity (*Non-white*), *Mother's* and *Father's Education* (in years completed), *Household Income* (in thousands of nominal dollars), and whether or not the child lives at home with both parents (*Dad Home*). Sample families' residence location was controlled for by using an NICHD-computed variable measuring the proportion of households within the family's current residence block who have an income-to-needs ratio less than 1.0 (*Block Income-to-Needs*). Income-to-needs is the ratio of household income to the appropriate poverty threshold (NICHD-SECCYD, 2006). Finally, variables controlling for the subject child's current school included teacher's education in years completed (*Teacher's Education*), principal's total years of administrative experience (*Principal's Experience*), and teacher's monthly salary (*Teacher's Salary*).

### Classroom Variables

An extensive education literature demonstrates that teachers' practices across three general dimensions: (1) instructional methods, (2) teacher-child interactions, and (3) classroom structure and discipline play a major role in shaping numerous child behavioral and developmental outcomes (Howes, 2000; Mashburn et al., 2008), including bullying (Nickerson & Rigby, 2017). The NICHD-SECCYD data uses two distinct survey instruments to assess teachers' practices in the above three dimensions: the *Teacher Self-Efficacy Questionnaire* (TSEQ; Bandura, 1997), and the *Student Teacher Relationship Scale* (STRS; Pianta, 1992).

Variable	Definition	Mean (Standard Deviation)		
		Year		
		2000 N=460	2002 N=460	2003 N=460
<b>Endogenous Variables</b>				
<i>Bully</i>	Subject child scored at least one standard deviation above the sample mean in the indicated year on the <i>Kids</i> bully involvement survey; 1=yes, 0=no.	0.12 (0.33)	0.2 (0.4)	0.14 (0.35)
<b>Child and Family Variables</b>				
<i>Boy</i>	Subject child is male; 1=yes, 0=no.	0.51 (0.5)		
<i>Nonwhite</i>	Subject child is nonwhite; 1=yes, 0=no.	0.19 (0.4)		
<i>Mother's Education</i>	Mother's education in years completed.	14.24 (2.54)		
<i>Father's Education</i>	Father's education in years completed.	14.5 (2.72)		
<i>Household Income</i>	Total household income in 1000s of nominal dollars.	77.0 (68.27)	84.91 (76.95)	87.17 (84.75)
<i>Dad Home</i>	Subject child's father lives at home; 1=yes, 0=no.	0.71 (0.46)	0.68 (0.46)	0.68 (0.47)
<i>Block Income-to-Needs</i>	Proportion of families of the subject child's residence block with an income/needs ratio < 1.	0.08 (0.88)	0.07 (0.91)	0.08 (0.84)
<b>School Variables</b>				
<i>Teacher's Education</i>	Subject child's teacher's education in years completed.	16.928 (1.03)	16.93 (1.02)	16.98 (1.06)
<i>Teacher's Salary</i>	Teacher's monthly salary in 1000s of nominal dollars.	3.93 (1.3)	3.91 (1.4)	3.96 (1.4)
<i>Principal's Experience</i>	Principal's administrative experience in years.	9.95 (7.23)	10.16 (8.14)	10.83 (6.16)
<b>Class Level Variables</b>				
<i>Discipline</i>	Teacher's total raw rating of self-effectiveness in keeping class order.	21.39 (3.52)	21.74 (3.44)	21.68 (3.34)
<i>Instruction</i>	Teacher's total raw rating of self-effectiveness in instruction.	51.53 (9.64)	52.17 (9.96)	51.96 (10.02)
<i>Teacher-Student Closeness</i>	Teacher's total raw rating of teacher-student relationships and fostering a positive class environment.	63.42 (9.26)	62.54 (9.05)	61.17 (9.2)
<i>Teacher-Student Conflict</i>	Teacher's total raw rating of observed teacher-student conflict and overall disciplinary methods.	11.62 (6.04)	11.35 (5.67)	11.07 (5.64)

**Table 1.** Variable Names, Definitions, and Sample Statistics

One of the best-documented scales of instructional methods, classroom structure, and discipline is teachers' own sense of efficacy (Henson, Kogan, & Vacha-Haase, 2001). Grounded largely within social cognitive theory (Duncan, 2009), self-efficacy is conceptualized as "an individual's per-

ceived expectancy of obtaining valued outcomes through personal effort" (Fuller et al., 1982, p. 7). As the concept is applied to the activity of teaching, self-efficacy is conceptualized as teachers' belief that they can bring about desirable improvements in student outcomes. Teachers with a strong

sense of efficacy perceive they are able to positively affect student learning, accept responsibility for nurturing and motivating students, and are motivated at improving their teaching skills until students make tangible progress (Newman, Rutter, & Smith, 1989).

The present study uses raw scores from both TSEQ subscales to measure effectiveness of teachers' practices in the areas of instructional methods (*Instruction*), and overall classroom structure, management and discipline (*Discipline*). The TSEQ was administered to all sample children's core third, fifth and sixth grade teachers, and was designed to provide a multifaceted picture of teacher-rated effectiveness in instruction, classroom management, and motivation and discipline of children (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). The *Instruction* subscale measures teachers' use instructional methods and techniques that encourage higher level thinking skills among students in their class. Teachers with a high *Instruction* self-efficacy score place high value on the productive use of classroom instruction time as well as activities intended to insure sustained child engagement in the classroom. A high *Instruction* score also indicates a teacher's preference for pacing of classroom activities so that they are developmentally appropriate. Correspondingly, teachers with a high *Discipline* self-efficacy score place high value on instructional methods that communicate clear expectations about students' actions and behavior. A high *Discipline* score indicates a teacher's preference for a classroom environment that is highly ordered, but responsive and sensitive to students' needs.

To account for teacher-child interactions, raw scores from both subscales of the STRS were used to measure quality of teacher-child interactions by way of two variables: *Teacher-Student Closeness* and *Teacher-Student Conflict*. The STRS, likewise administered to all core third, fifth and sixth grade teachers, assessed the quality of the teacher-child relationship within the school/classroom environment. Items on the STRS were based both on independent observer observations of teacher-child interactions and on teachers' own descriptions of subject children's behaviors towards them (Pianta & Nimetz, 1991). The *Closeness* subscale measures the amount of warmth and open communication present in the teacher-child relationship. The *Conflict* subscale measures the extent to which this relationship is marked by antagonistic, excessively punitive, or otherwise disharmonious or neglectful interactions. The STRS evidences both convergent and discriminant validity (Pianta, 2005). Scores on the STRS have correlated with other observational measures of the quality of teacher-child relationships as well as with concurrent ratings of child behavior problems, aggressiveness, frustration tolerance, school work habits and social competence (e.g., Birch & Ladd, 1997; Howes & Hamilton, 1992; Howes & Ritchie, 1999; Pianta & Nimetz, 1991). In addition, higher STRS *Closeness (Conflict)* scores have correlated with more (less) secure peer relationships (Howes & Ritchie, 1999).

Independent Variable	Full Sample (N=920)	Class Size >30 (N=370)
<i>Constant Term</i>	-4.64*** (1.77)	
Child and Family Variables		
<i>Boy</i>	0.43** (0.18)	
<i>Nonwhite</i>	0.54* (0.31)	
<i>Mother's Education</i>	-0.02 (0.03)	
<i>Father's Education</i>	-0.07* (0.039)	
<i>Household Income</i>	-0.1 (0.06)	
<i>Dad Home</i>	-0.63*** (0.20)	
<i>Block Income-to-Needs</i>	0.02** (0.01)	
School Variables		
<i>Teacher's Education</i>	-0.17* (0.089)	
<i>Teacher's Salary</i>	-0.03 (0.019)	
<i>Principal's Experience</i>	-0.15** (0.051)	
Predicted Random Coefficients		
<i>Discipline</i>	-0.12** (0.02)	-0.11** (.04)
<i>Instruction</i>	-0.03** (0.015)	-0.01* (0.006)
<i>Teacher-Student Closeness</i>	-0.03*** (0.01)	-0.03*** (0.01)
<i>Teacher-Student Conflict</i>	0.20*** (0.06)	0.33*** (0.1)
<i>Lag Discipline</i>	-0.27** (0.05)	-0.26** (0.09)
<i>Lag Instruction</i>	-0.21*** (0.08)	-0.15** (0.07)
<i>Lag Teacher-Student Closeness</i>	-0.20*** (0.07)	-0.27*** (0.06)
<i>Lag Teacher-Student Conflict</i>	0.05** (0.02)	0.08*** (0.02)
Number of groups ( <i>M</i> )	40	16
Log likelihood	-402.12	
Chi-square	26.95***	
LR test vs logistic regression	36.21***	

Note: Standard errors of the fitted parameters are in parentheses. Significant at: \* less than 10%; \*\* less than 5%; \*\*\* less than 1%.

Table 2. Random-Coefficients Logit Model Parameter Estimates

## Results

Random coefficient logit (RCL) estimates of the probability of *Bully* are reported in Table 2. Assuming the random effects in Equation (4) represent  $m = 1, \dots, M$  cluster-level realizations from a multivariate normal distribution with mean 0 and variance  $\Sigma$ , the probability that child  $i$  engages in bullying in classroom  $m$  at time  $t$  is given by

$$Pr(Bully_{iim} = 1 | \gamma_m) = H(z_{iim}\alpha + x_{iim}\beta_m) \quad (5)$$

where  $H(\cdot)$  is the logistic cumulative distribution function. In Table 2, random effects are specified at  $M$  levels identified by classes of common size (i.e., total number of students). To facilitate comparability among random effects, all teacher practices variables were converted to percentiles. Estimation of (5) is accomplished using the *xmlogit* procedure in Stata 15. Because the RCL model is a generalization of a non-random coefficient discrete choice approach, the most direct test of the RCL model's validity is to compare log-likelihood function values between the random and nonrandom specifications. Based on the log-likelihood value reported in Table 2, a likelihood ratio test statistic for the null hypothesis that all coefficients are constant is 36.21, rejecting the null hypothesis in favor of the RCL specification with a p-value less than 0.01. Estimated standard errors of the random effects (in parentheses), though admittedly conditional on the values of estimated model parameters, also indicate good relative precision.

Results of the control variables indicate that subject children who are female, who reside in less impoverished neighborhoods, or live in dual-parent households are less likely to engage in bullying at school. Also less likely to bully are children who attend schools led by more experienced principals. There is somewhat weaker evidence that children who are nonwhite, have a less educated father, or who attend schools staffed with less educated teachers are more likely to be involved in school bullying.

The first four rows of predicted random effects in Table 2 provide insight into children's current (period  $t$ ) conditional marginal utility of bullying choice ( $\beta_{tk}$ 's) by teacher attribute  $k$  as identified by class size. Children with teachers who exhibited higher *Closeness* scores, i.e., teachers who exhibited a greater amount of warmth, attentiveness, and open communication toward their students, were significantly less likely to engage in bullying in that class. In addition, bullying is less likely to occur in classrooms staffed by teachers who prefer more organized and well-structured classrooms (*Discipline*) and/or teachers who place high value on productive and engaging classroom instruction (*Instruction*). In contrast, the likelihood of classroom bullying is significantly higher for sample teachers who exhibit greater levels of *Teacher-Student Conflict* in the form of detachment/disengagement, excessive anger, or over control. These period  $t$  effects appear to vary somewhat as class size increases. In particular, the last column of Table 2 shows that the positive effect of *Teacher-Student Conflict* on child bullying choice increases

substantially among sample classes with 30 or more children; whereas the choice effects of *Discipline*, *Instruction*, and *Teacher-Student Closeness* remain unchanged or weaken slightly.

Whether or not a particular teacher attribute serves to mitigate bullying persistence involves examining the sign and significance of each of the period-lagged attribute distance measures. As defined by Erdem (1996), a positive state dependence, or "habit persistence" parameter suggests that the average child is more prone to bullying in recurrent periods because their conditional utility of bullying rises, the greater the current teacher attribute is from the previous period. From the lagged-distance parameter estimates in Table 2, it is apparent that teachers' classroom management and practices have a strong effect on children's preferences to continue or not continue bullying activity. Children's perceptions that teachers exhibit warm, friendly, and encouraging mannerisms toward their students (*Lag Teacher-Student Closeness*) inhibit persistent bullying. In addition, good classroom management practices that encourage well-organized and structured, yet attentive student learning environments (*Lag Discipline*), and/or productive and engaging instruction (*Lag Instruction*), are similarly linked to less persistent bullying. Conversely, a lack of student support by teachers characterized by expressions of anger, over control, or neglect or disengagement (*Lag Teacher-Student Conflict*) significantly increases the likelihood of bullying persistence. However, the relative magnitudes of the lagged coefficients in Table 2 suggest that the persistence tempering effects of *Lag Instruction*, *Lag Discipline*, and *Lag Teacher-Student Closeness* markedly outweigh the persistence reinforcing effect of *Lag Teacher-Student Conflict*. Indeed, the non-lagged coefficient estimate for *Teacher-Student Conflict* indicates that this conflict has a much stronger effect on children's current (period  $t$ ) choice to bully. Finally, results in the last column of Table 2 suggest that the persistence mitigating effect of *Lag Teacher-Student Closeness* strengthens as class size increases, whereas the mitigating effect of *Lag Instruction* strengthens as class size decreases.<sup>5</sup>

Table 2 results coincide with previous studies showing that teachers who outwardly expressed an interest in students' well-being, who adopted safe and consistent disciplinary approaches, and who acknowledged students' personal needs observed less bullying in and around their classrooms over time (Ttofi & Farrington, 2012; Grumm & Hein, 2013). Thus as in Sullivan et al. (2004), just as parenting practices create a context and culture for development that either promotes bullying or does not, so too do teachers' classroom management practices contribute to a context or culture that either promotes or discourages persistent bullying. The theory and evidence that people may form habits in their behavior is not new (Heien & Durham, 1991); however, identifying causes in this intertemporal linking of preferences is. The results in

<sup>5</sup>Convergence problems prevented separate models to be estimated using male and female-only subsamples to investigate gender-related differences in predicted random effects.

Table 2 indicate there are theoretical reasons to suggesting that bullying in elementary school, once started, can persist; and that teachers' practices not only influence bullying directly (i.e., in their current classrooms), but also indirectly via their influence on children's potential for habitual bullying—extending into future grades. These results are important as they suggest that bullying is not a myopic problem which occurs in relations between bully-student and bullied-student, but is a complex dynamic problem that can be addressed in part by managing the trajectory of the social/instructional environment of the class.<sup>6</sup>

## Conclusion

Using a unique panel of 460 children from the NICHD Study of Early Child Care and Youth Development for 2000 to 2003, this paper examined how children's bullying choice, when younger, can affect their choice to bully again, when older. Empirical results are consistent with the hypothesis that children who develop a habit of positive peer relations when younger are more likely to continue these positive relations in later years. Given the limited time span of the data employed in this paper, one must, of course, take great care in generalizing these findings. However, the classroom is an important social arena in young elementary school children's lives where patterns of interpersonal relations are constantly being negotiated and refined. Researchers and practitioners have long recognized that for many children, grades 3-6 represent an important transition period between elementary and middle school (Biancarosa & Snow, 2004). Grades 3-6 also are a time when peer relations begin to exert an increasing influence on children's long-standing behavior (e.g., Eccles, Wigfield, & Schiefele, 1998). Thus, studies that improve our understanding of how teachers' practices contribute to children's social and behavioral development at this critical juncture are timely and warranted.

Random effects logit estimates in Table 2 reflect children's decision to engage in bullying in the current period, conditional on family and school sociodemographics and on current and past teacher practices. Children's conditional marginal utility of bullying choice was specified to be influenced by two effects: (1) the influence of the levels of common teacher attributes of the child's current class experience; and (2) the influence of the levels of common teacher attributes of the child's previous (year) class experience. Table 2 estimates of these effects indicated that the likelihood of current as well as recurrent bullying is significantly lower (non-habit persistent) in classrooms lead by teachers who were caring, who preferred highly organized and student-focused instruction, and who preferred disciplinary practices that were firm but sensitive to students' needs. In contrast, the likelihood of current

and recurrent bullying is significantly higher (habit persistent) in classrooms with higher observed levels of teacher-student conflict, detachment, or excessive discipline. Several of the aforesaid influences increased in magnitude and significance as sample class sizes increased to 30 or more students. Findings in this paper are in line with previous studies showing that teachers' self-rated aspects of their practices (Muijs, 2017) as well as of the school's professional culture in terms of school leadership experience (Bevilacqua et al., 2017), and teacher affiliation and collaborative activities (Roland & Galloway, 2004; Ertesvag & Roland, 2015) are related to student-reported involvement in school bullying. Thus, as in Guo et al. (2012), schools that devote more resources to teacher education and professional development programs focused on increasing teachers' self-efficacy not only benefit students academically through improved teacher practices, but also by counteracting the emergence of bullying through improved classroom climate.

While this paper examines child habit formation over a relatively short time span, there may also be longer-term effects. An important topic for future research is to determine whether the short-term effects identified herein can persist into later years, a question frequently posed in several branches of literature including delinquency and crime prevention (Witt & Dryden-Witte, 2001) and workplace bullying (Matthiesen & Einarsen, 2015). For instance, the findings in this paper are not inconsistent with those in Pellegrine (2002), Kim et al. (2009), and Chaux et al. (2009), who found that that development of bullying or aggressive behavior when young can persist for years, particularly if the behavior is believed to foster social inclusion. On the other hand, Barboza (2009) found that while bullying among younger children appeared to exhibit a positive temporal factor, this factor tended to fade as children aged, purportedly due increased exposure to, and acceptance of, more adult-oriented social norms. Thus early childhood experiences and habits that form as a result of a "contextual" margin may have large impacts later in life and should be considered in the design of models of behavior.

## Acknowledgments

Helpful comments and suggestions of two anonymous referees are gratefully acknowledged.

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<sup>6</sup>Childhood experiences can greatly influence behavior over a person's entire life because it may not pay to try to greatly change habits when the environment changes. Childhood-acquired habits then continue, even though these would not have developed if the environment when growing up had been the same as the environment faced as an adult (Becker, 1992, p. 335).



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