To Spank or Not to Spank: The Academic Implications of Power Assertive Discipline

An honors thesis for the Department of Economics

Jacquelyn Kercheval

Advisor: David Garman, Department of Economics

Tufts University, 2014

Abstract

The efficacy of a power assertive disciplinary style, in which the parent expresses his/her dominance over the child by employing tactics such as spanking, hitting, and/or removing a privilege, is still debated in the academic literature. This thesis uses data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K) to estimate the impact that a parent's use of power assertive discipline has on his/her child's academic achievement by grade eight. The estimates suggest that the effect that a power assertive disciplinary style has on academic achievement operates through two distinct channels: 1) it inhibits the child's capacity to develop a strong internal locus of control, which translates into poorer academic achievement; and 2) it directly and negatively impacts educational success.

Table of Contents

List of Tables

List of Figures

1. Introduction

Integral to a child's development is the process of socialization, in which the child learns and internalizes the behaviors that are considered socially acceptable within his or her culture (Baumrind, 1996). Although the development of social competence is contingent on a variety of factors, including genetics and child demeanor, parental influence is believed to be one of the most important components of this aspect of child development (Kreig, 2003). Disciplinary actions, or responses that are used by caregivers to encourage the acquisition of appropriate behaviors in their children, are one such example of a specific parent-child interaction that is fundamental to the socialization process (Baumrind, 1996).

One particularly controversial type of parental discipline is power assertive discipline, a subset of which includes corporal punishment (Gershoff, 2002). As of March of 2014, 37 countries around the world, including the majority of Europe, had legally abolished the use of corporal punishment (Global Initiative to End All Corporal Punishment of Children, 2014). However, in the United States, corporal punishment is still legal, and rates of both approval and use are far from inconsequential; about 65% of parents are in favor of the use of corporal punishment, and about 50% actually use corporal punishment to discipline their children (American Psychoanalytic Association, 2013). American acceptance of corporal punishment also extends into the classroom, with the Supreme Court having ruled in favor of the right of teachers to use corporal punishment on their students (*Ingraham v. Wright,* 1977) (Gershoff, 2002).

A wide variety of studies have sought to explain the effects that parental disciplinary style has on a variety of child outcomes, but the literature is still divided; in fact, one review found that 32% of studies suggest that physical punishment is positive, 34% suggest that it is detrimental, and 34% are neutral (Larzelere, 2000). One outcome in particular that is evaluated

in the parenting literature is child academic achievement, and scholars generally assert that parenting styles that include warmth, involvement, and non-abusive treatment of the child tend to yield more positive levels of educational achievement (Glasgow et al., 1997; Krieg, 2003; Eckenrode et al., 1993; Solomon and Serres, 1999). However, the majority of studies evaluate overall parenting style as a predictor of academic achievement without parsing out non-abusive disciplinary style, which is likely to have implications independent of the parent's overall style. As such, this thesis will attempt to contribute to the literature by focusing specifically on parental disciplinary style as a possible predictor of academic success.

In order to better understand the pathway through which discipline affects academic achievement, this thesis will first test two sub-hypotheses: 1) that power assertive discipline hinders non-cognitive skill development, specifically locus of control (denoted as Model 1 in this thesis), and 2) that the reduction in non-cognitive skill development in turn reduces academic achievement (denoted as Model 2). From there, the thesis will then test the overall hypothesis that a power assertive disciplinary style negatively impacts child educational achievement directly, without first utilizing locus of control as a mediator (this estimation is denoted as Model 3).

Section 2 will provide the background literature on parental discipline strategies as a whole, including an overview of parental disciplinary styles and then a review of how discipline impacts locus of control development, how locus of control development impacts educational achievement, and how discipline impacts educational achievement directly. Section 3 will describe and summarize the data used to estimate the models presented in Section 4, which are designed to test both of the sub-hypotheses (Models 1 and 2) and the overall hypothesis (Model

3). The results of the regression analyses will be presented in Section 5, and they will be described in Section 6.

2. Background Literature

2.1. Parental Discipline Strategies: An Overview

Parental disciplinary techniques are classified in the literature as falling within three different styles: love withdrawal, induction, and power assertion (Zussman, 1978). These disciplinary approaches are not necessarily mutually exclusive, but they each impact child development and socialization in a different way (Hart et al., 1992). Power assertive discipline and its developmental effects on the child are still contested in the literature, and this thesis will focus on the implications of that particular disciplinary style as a result. However, a brief overview of all three styles is provided first.

Love withdrawal is an approach to discipline that consists of the removal of parental love and/or attention from the parent-child relationship (Krevans and Gibbs, 1996). Simply ignoring the child is one example of love withdrawal, as is the withholding of any sort of approval or affection on behalf of the parent. This disciplinary style tends to be negatively associated with a child's development of positive social skills (Krevans and Gibbs, 1996). Inductive discipline, which is generally believed to be positively correlated with effective child development and socialization skills, employs reasoning and explanations as a main means through which to deal with child misbehavior (Kreig, 2003). It often involves the use of rationales to back up any consequences that are invoked so that the child plays more of an active role in his/her discipline (Hart et al., 1990; Hart et al., 1992). In many cases, the parent who uses an inductive disciplinary style seeks to help the child better understand how his/her misbehavior impacts the "victims" of that behavior (Krevans and Gibbs, 1996).

Power assertion techniques are those that are used by the parent to establish his or her power over the child in order to reprimand the child and, ideally, reduce his or her misbehavior (Krevans and Gibbs, 1996). The ultimate goal of power assertive discipline is to convey the message that if the child does not comply with the parent's wishes, he or she will "get it" and will be punished (Zussman, 1978). Examples of power assertive techniques include spanking, hitting, removing a privilege, and threatening the child (Grusec and Goodnow, 1994; Zussman, 1978; Hart et al., 1990). Other types of physical punishment, corporal punishment included, also fall beneath the category of power assertion.

Meta-analyses of the literature on the three main disciplinary styles do not all agree on the effects of different types of punishment (Larzelere, 1996; Gershoff, 2002; Paolucci and Violato, 2004; Larzelere and Kuhn, 2005). Even beneath the umbrella of power assertive discipline alone, scholars have not reached a complete consensus. Much of the continued disagreement is likely attributable to the fact that there are many different tactics within that umbrella category and many different levels of severity at which those tactics can be employed. Gershoff (2002), for example, finds that the impacts of power assertive punishment on a variety of developmental metrics are overwhelmingly negative, while the meta-analyses of Larzelere (1996) and Larzelere and Kuhn (2005) suggest that, despite the negative developmental consequences, there may be a few benefits to the usage of that disciplinary style. Overall, though, the literature primarily suggests that power assertive discipline hinders successful child development, and this thesis will seek to parse out the specifics of that relationship in order to measure the effects of parental disciplinary style on eventual academic achievement.

2.2. Effects of Parental Disciplinary Style on Child Locus of Control

Locus of control is part of the class of personality traits known as non-cognitive skills, which are believed to complement cognitive skills, like IQ, in terms of predicting eventual academic success. The scientific definition of "non-cognitive skills" is still being developed, but studies have used an extensive list of terms to describe those "skills," including perseverance, self-control, trust, attentiveness, self-esteem, self-efficacy, productivity, empathy, and self-discipline (Heckman, 2008; Behncke, 2009; Heckman and Kautz, 2013). Locus of control, which is a psychological concept developed by Rotter (1966), is also believed to be one such non-cognitive skill, which is why it will be used as a proxy for that skillset in this thesis.

More specifically, locus of control explains the extent to which an individual believes that a given outcome is attributable to his/her own behavior or inherent characteristics (Rotter, 1966). People who believe that outcomes are beyond their control and have occurred due to chance are said to have an *external* locus of control, and those who attribute an outcome to things within their control, like effort, are said to have an *internal* locus of control (Barón and Cobb-Clark, 2010). Because an internal locus of control encourages the belief that, in the case of a positive outcome, there is a payoff to individual behavior (Barón and Cobb-Clark, 2010), those with an internal locus of control are more likely to be inherently motivated to pursue challenging goals that they have set for themselves than those with an external locus of control (Wang et al., 2010). An individual's locus of control is established at a relatively young age, so the impact of parental influence is very important in its development (MacDonald, 1971).

The literature reaches a clear consensus that parental discipline and non-cognitive skill development are significantly related, and for the majority of non-cognitive skills studied, locus of control included, power assertive discipline is widely believed to negatively impact those skills (Glasgow et al., 1997; Jewell et al., 2008; Gershoff, 2002; Aucoin et al., 2006; Knafo and

Plomin, 2006). MacDonald (1971) finds that a variety of tactics, including some that are often used by power assertive parents—higher displays of parental dominance and greater deprivation of privileges in particular—are associated with an increase in *external* locus of control. Additionally, when a parent frequently reinforces behavior in a negative manner, the child is more likely to develop an external locus of control. Katkovsky et al. (1967) argues that this response likely occurs because denying personal responsibility for a negative outcome allows the child to better protect himself/herself against the threat of future punishment. Janssens (1994) agrees, demonstrating that authoritarian parents (described in part as those who use more power assertive disciplinary techniques) tend to have children who are more externalizing in their behavior.

Although there do exist a number of studies that suggest that more punitive and less nurturing parenting styles are related to the development of an external locus of control, the aforementioned studies are some of the few that explicitly discuss *disciplinary* styles as an antecedent of locus of control. In fact, the literature is quick to admit that relatively little research has been dedicated thus far to what influences locus of control development. The research that does exist tends to take a more holistic approach to the question, analyzing the impact of metrics like parental warmth, parental protectiveness, and overall parenting style on locus of control as opposed to parental disciplinary style specifically. As such, the goal of this thesis is to fill that gap and provide the literature with a concrete explanation of a possible pathway between discipline (specifically power assertive discipline) and internal or external locus of control in children.

2.3. Effects of Locus of Control on Academic Achievement

The study of measures of cognition over the past century has resulted in a human capital literature whose primary focus is on the impact of cognitive skills, like IQ, on development. Beginning with Gary Becker's (1962) seminal paper on human capital, studies on outcomes such as educational achievement, labor market success, and the development of social skills have largely focused on cognitive skills as causal variables and ignored non-cognitive ones. An emerging body of literature, however, suggests that cognitive skills are only part of the picture. Spearheaded by economists like James Heckman, scholars are beginning to assert that non-cognitive skills matter at least as much as cognitive skills when explaining developmental success. The outcomes studied in this literature range from health to education to labor market success to criminality, but this review will focus on the effects of non-cognitive skills, specifically locus of control, on educational outcomes. There is an almost unanimous consensus within the literature that the relationship between non-cognitive skills and educational attainment/achievement is positive.

One of the very first studies to focus specifically on the role of non-cognitive skills in explaining academic achievement is Heckman and Rubinstein's (2001) evaluation of the General Educational Development (GED) testing program. The authors argue that GED recipients have cognitive skills that are equivalent to those of high school graduates, but once test scores and years of schooling are controlled for, GED recipients actually earn lower wages than those earned by ordinary high school dropouts. This wage differential can be explained by the impact of unobserved non-cognitive skills on output. GED recipients are intelligent enough to pass the exam, but their sub-optimal non-cognitive skills contributed to their inability to complete high school and to their ultimate wage reduction once in the labor force (Heckman and Rubinstein, 2001). Since Heckman and Rubinstein's seminal article, other studies have obtained similar

findings. For example, running a probit regression of the various Big Five personality types on the likelihood of giving the correct answer on a test shows that having greater non-cognitive abilities like performance motivation and self-discipline increases the probability of a correct answer (Borghans et al., 2008).

Focusing on locus of control specifically, the literature clearly suggests that having an internal locus of control is related to higher academic achievement. Individuals who have a greater sense of personal control are more likely to exert more effort towards solving a challenging problem than those who believe that they have no control over the outcome, and they are also more likely to commit to improving their performance in the long term because they believe that it will pay off in the future (Barón and Cobb-Clark, 2010). These increased levels of focus, motivation, and determination yield tangible results in the classroom. Ross and Broh (2000) find that having an internal locus of control in the 10^{th} grade translates to better academic achievement in the 12^{th} grade, and Barón and Cobb-Clark (2010) show that a shift from the 25^{th} to the 75^{th} percentile on the locus of control scale translates to an increase in the probability of completing secondary school by 6.1 percentage points.

Coleman and DeLeire (2003) formalize the relationship between locus of control and education by modeling it in terms of human capital investment. They argue that older children and young teenagers who believe that investing in their own human capital will lead to positive future opportunities will have more success in the classroom because they are more confident in the payoff of their hard work. The authors' findings support this argument; they show that an increase in locus of control of one standard deviation yields a 6.8 percentage point increase in the likelihood of graduating from high school (Coleman and DeLeire, 2003). Although this study evaluates educational attainment (i.e. high school graduation and college attendance) as opposed

to achievement, the human capital theory should also apply to achievement because getting good grades is still an investment in human capital that will pay off in the future.

2.4. Effects of Parental Disciplinary Style on Academic Achievement

The literature has reached a consensus that warm, involved parents generally have children with greater educational success (Glasgow et al., 1997; Krieg, 2003; Eckenrode et al., 1993; Solomon and Serres, 1999). Scholars also agree that, of Diana Baumrind's (1971) parenting style classifications, authoritative parenting (high expectations for the child's behavior but respect for the child's autonomy and self-will) is more conducive to child academic achievement than is authoritarian parenting (the child must unequivocally conform to the parent's conception of "appropriate" behavior) (Steinberg et al., 1989; Steinberg et al., 1992; Roberts Gray and Steinberg, 1999). However, relatively few studies have focused specifically on disciplinary style as a predictor of educational achievement, and those that do often often focus on abuse and maltreatment and exclude non-abusive, power assertive discipline, which is the focus of this thesis, from their analyses (Dodge Reyome, 1994; Eckenrode et al., 1993).

Of the few studies that do look at non-abusive disciplinary style, it becomes clear that more physical and/or power assertive styles are likely to be detrimental to academic success. Solomon and Serres (1999) show that academic achievement is reduced for children who have been subjected to verbal aggression by their parents. Pettit et al. (1997) finds that harsh physical discipline negatively impacts academic performance in kindergarten ($p<0.01$), while inductive discipline ("calm discussion") is positively related to academic performance in grade 6 ($p<0.05$). Beyond those few studies, however, the direct relationship between non-abusive discipline and academic achievement has received relatively little academic attention, and this thesis will

attempt to fill that gap by measuring the relationship directly as well as via locus of control as a mediator.

3. Data

Data for this thesis were obtained from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-1999 (ECLS-K). Conducted by the National Center for Education Statistics, the ECLS-K is a nationally representative survey of children who entered kindergarten during the 1998-1999 school year. It follows the same cohort of children from kindergarten through eighth grade, and it uses a variety of methods to obtain data from parents, teachers, principals, and the children themselves in order to assess the early school experiences of the subjects. 21,260 kindergarteners from across the United States were initially enrolled in the study during the 1998-1999 school year (Tourangeau et al., 2009).

Data were collected in seven different waves of the survey: fall and spring of the child's kindergarten year (1998-1999), both of which contain the full sample of subjects; fall of first grade (1999), which is a 30% subsample of the original cohort; spring of first grade (2000), which is the full sample plus a "freshening" of first grade subjects who were not in kindergarten in the United States during the 1998-1999 school year; spring of third grade (2002), which is the full sample; spring of fifth grade (2004), which is the full sample; and spring of eighth grade (2007), which is the full sample. Because the sample was not freshened after the first grade year, the sample of children in the eighth grade wave is representative of the population cohort as opposed to all eighth graders in the United States (Tourangeau et al., 2009). The National Center for Education Statistics estimates that the seventh wave of the survey is representative of about 80% of eighth graders in the US during the 2006-2007 school year (Tourangeau et al., 2009).

Within the ECLS-K dataset overall, many questions are repeated in certain waves of the survey, but there is no specific algorithm to explain which questions are asked in which wave. To ensure that the dataset used in this thesis is as complete as possible, some variables that are included in the models are created based on responses in multiple waves of the ECLS-K survey, while some are limited to just one wave. Specific information about variable creation can be found in Appendices B and C. In cases in which the ECLS-K survey provides multiple waves of a given variable but this thesis limits that variable to just one wave, the criteria used to select those variables is simply to include only the response from the first wave in which a question is asked. This selection criteria is used for two reasons. Firstly, it attempts to eliminate as much ambiguity as possible by not requiring the reader to be aware of all of the potential variations in waves chosen. In addition, the ECLS-K survey is subject to attrition, so by including variables from as early a wave as possible, the elimination of observations due to attrition is reduced.

Table 1 provides summary statistics for the variables that appear in Model 1 of this thesis. Tables 2 and 3 both correspond with Model 2, and Tables 4 and 5 both correspond with Model 3. Because Models 2 and 3 each have two dependent variables (child reading level and math level), the number of observations in each model differs slightly; as such, different summary statistics are necessary for each model. A more complete explanation of Models 1, 2, and 3 will be provided in Section 4 of this thesis.

Table 1: Model 1 Variables Descriptive Statistics

Variable	Number of obs. (n)	Mean	St. dev.	Min.	Max.	Frequency	Percent
LOC	5871	0.056	0.726	-2.908	1.316	-	-
Power_assert	5871	-0.030	0.725	-0.652	3.165	-	-
South	5871	0.294	0.456	0	1	0: 4,143 1: 1,728	0: 70.57% 1: 29.43%
Autonomy	5871	0.788	0.409	0	1	0: 1,243 1: 4,628	0: 21.17% 1: 78.83%
Consistency	5871	0.555	0.497	0	1	0: 2,614 1: 3,257	0: 44.52% 1: 55.48%
Safe_outside	5871	2.730	0.450	1	3	1: 154 2: 1,279 3: 4,438	1: 2.62% 2: 21.79% 3: 75.59%
Teacher_liked	5871	2.656	0.556	1	3	1: 244 2: 1,531 3: 4,096	1: 4.16% 2: 26.08% 3: 69.77%
Parent_warm	5871	0.741	0.438	0	1	0: 1,519 1: 4,352	0: 25.87% 1: 74.13%
Finances	5871	0.534	1.556	0	12	-	-
Divorce	5871	0.092	0.290	0	1	0: 5,328 1: 543	0: 90.75% 1: 9.25%

Table 2: Model 2 Variables Descriptive Statistics (Reading Level Dependent Variable)

Variable	Number of obs. (n)	Mean	St. dev.	Min.	Max.	Frequency	Percent
Reading_level	5635	8.033	1.159	2	10	0: 0 1: 0 2: 1 3: 0 4: 10 5: 163 6: 370 7: 1,070 8: 1,909 9: 1,694 10: 418	0: 0% 1: 0% 2: 0.18% 3: 0% 4: 0.18% 5: 2.89% 6: 6.57% 7: 18.99% 8: 33.88% 9: 30.06% 10: 7.42%
LOC	5635	0.039	0.727	-2.908	1.316	-	-
Mom_edu	5635	13.862	2.526	8	22	-	-
Fam_income	5635	58.326	37.197	0	150	-	-
Single_par	5635	0.141	0.349	0	1	0: 4,838 1: 797	0: 85.86% 1: 14.14%
Read_child	5635	3.331	0.730	1	4	1: 34 2: 775 3: 2,115 4: 2,711	1: 0.60% 2: 13.75% 3: 37.53% 4: 48.11%
Num_sibs	5635	1.440	1.090	0	11	-	-
Edu_expect	5635	0.785	0.411	0	1	0: 1,213 1: 4,422	0: 21.53% 1: 78.47%
Mother_white	5635	0.762	0.426	0	1	0: 1,340 1: 4,295	0: 23.78% 1: 76.22%
Mother_black	5635	0.075	0.264	0	1	0: 5,211 1: 424	0: 92.48% 1: 7.52%

Table 3: Model 2 Variables Descriptive Statistics (Math Level Dependent Variable)

Variable	Number of obs. (n)	Mean	St. dev.	Min.	Max.	Frequency	Percent
Math_level	5505	7.276	1.226	3	9	0: 0 1: 0 2: 0 3: 25 4: 57 5: 284 6: 1,076 7: 1,689 8: 1,311 9: 1,063	0: 0% 1: 0% 2: 0% 3: 0.45% 4: 1.04% 5: 5.16% 6: 19.55% 7: 30.68% 8: 23.81% 9: 19.31%
LOC	5505	0.030	0.731	-2.908	1.316	-	-
Mom_edu	5505	13.829	2.518	8	22	-	-
Fam_income	5505	57.879	37.103	0	150	-	-
Single_par	5505	0.144	0.351	0	1	0: 4,713 1: 792	0: 85.61% 1: 14.39%
Read_child	5505	3.326	0.732	1	4	1: 35 2: 763 3: 2,078 4: 2,629	1: 0.64% 2: 13.86% 3: 37.75% 4: 47.76%
Num_sibs	5505	1.446	1.090	0	11	-	-
Edu_expect	5505	0.779	0.415	0	1	0: 1,218 1: 4,287	0: 22.13% 1: 77.87%
Mother_white	5505	0.757	0.429	0	1	0: 1,339 1: 4,166	0: 24.32% 1: 75.68%
Mother_black	5505	0.078	0.268	0	1	0: 5,075 1: 430	0: 92.19% 1: 7.81%

Table 4: Model 3 Variables Descriptive Statistics (Reading Level Dependent Variable)

Variable	Number of obs. (n)	Mean	St. dev.	Min.	Max.	Frequency	Percent
Reading_level	5138	8.061	1.148	2	10	0: 0 1: 0 2: 1 3: 0 4: 8 5: 137 6: 314 7: 977 8: 1,730 9: 1,575 10: 396	0: 0% 1: 0% 2: 0.02% 3: 0% 4: 0.16% 5: 2.67% 6: 6.11% 7: 19.02% 8: 33.67% 9: 30.65% 10: 7.71%
Power_assert	5138	-0.037	0.716	-0.652	3.658	-	-
LOC	5138	0.056	0.718	-2.908	1.316	-	-
Mom_edu	5138	13.947	2.527	8	22	-	-
Fam_income	5138	59.515	37.226	0	150	-	-
Single_par	5138	0.130	0.337	0	1	0: 4,468 1: 670	0: 86.96% 1: 13.04%
Read_child	5138	3.337	0.724	1	4	1: 29 2: 687 3: 1,946 4: 2,476	1: 0.56% 2: 13.37% 3: 37.87% 4: 48.19%
Num_sibs	5138	1.424	1.061	0	10	-	-
Edu_expect	5138	0.800	0.400	0	1	0: 1,027 1: 4,111	0: 19.99% 1: 80.01%
Mother_white	5138	0.778	0.416	0	1	0: 1,143 1: 3,995	0: 22.25% 1: 77.75%
Mother_black	5138	0.068	0.252	0	1	0: 4,788 1: 350	0: 93.19% 1: 6.81%

Table 5: Model 3 Variables Descriptive Statistics (Math Level Dependent Variable)

Variable	Number of obs. (n)	Mean	St. dev.	Min.	Max.	Frequency	Percent
Math_level	5010	7.316	1.217	3	9	0: 0 1: 0 2: 0 3: 20 4: 47 5: 239 6: 954 7: 1,526 8: 1,211 9: 1,013	0: 0% 1: 0% 2: 0% 3: 0.40% 4: 0.94% 5: 4.77% 6: 19.04% 7: 30.46% 8: 24.17% 9: 20.22%
Power_assert	5010	-0.033	0.720	-0.652	3.658	-	-
LOC	5010	0.049	0.721	-2.908	1.316	-	-
Mom_edu	5010	13.912	2.519	8	22	-	-
Fam_income	5010	59.077	37.160	0	150	-	-
Single_par	5010	0.133	0.340	0	1	0: 4,344 1: 666	0: 86.71% 1: 13.29%
Read_child	5010	3.331	0.727	1	4	1: 30 2: 677 3: 1,906 4: 2,397	1: 0.60% 2: 13.51% 3: 38.04% 4: 47.84%
Num_sibs	5010	1.428	1.060	0	10	-	-
Edu_expect	5010	0.795	0.404	0	1	0: 1,029 1: 3,981	0: 20.54% 1: 79.46%
Mother_white	5010	0.773	0.419	0	1	0: 1,138 1: 3,872	0: 22.71% 1: 77.29%
Mother_black	5010	0.070	0.256	0	1	0: 4,657 1: 353	0: 92.95% 1: 7.05%

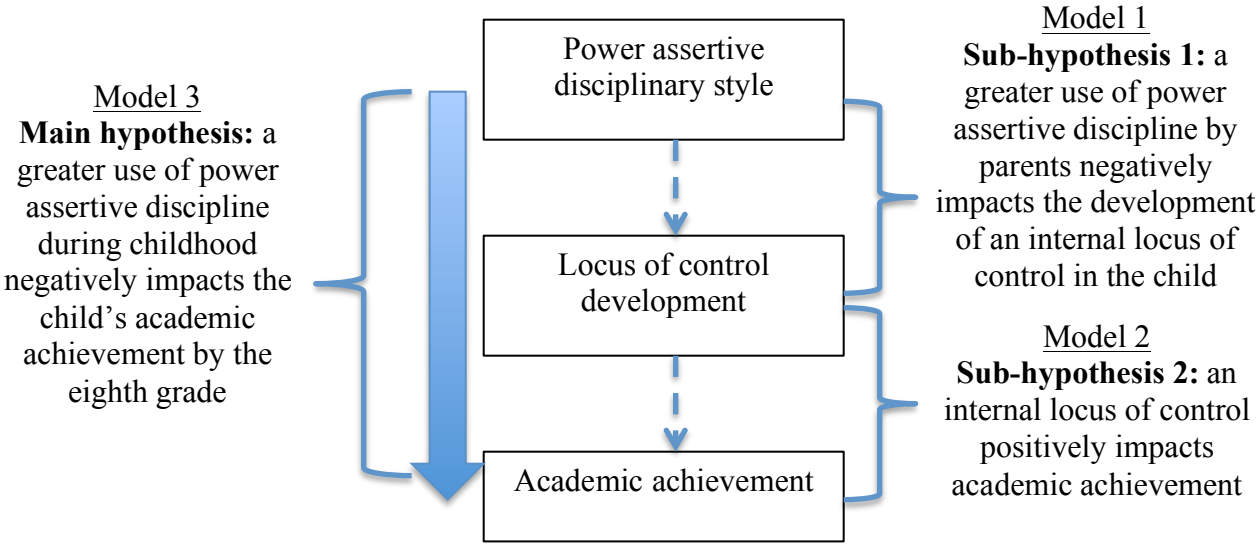
The descriptive statistics of the variables in both models do not deviate extensively from what might be expected of a standard cross-section of children in the United States. However, it is worth noting that, as previously mentioned, the number of observations varies slightly across models, which is attributable to the attrition that occurs over the course of the study.

4. Economic and Statistical Models

This thesis will test the overall hypothesis that a parent's use of power assertive discipline during childhood negatively impacts his/her child's academic achievement by the eighth grade. The direct impact of parental disciplinary style on academic achievement will be modeled (in Model 3) in order to evaluate this overall hypothesis, but this thesis will also seek to explain one

potential *pathway* through which parental discipline might impact educational achievement. To do so, a series of two sub-models is created. The first sub-model (denoted as Model 1) will measure the impact of parental discipline on non-cognitive skill development (specifically locus of control), and the second sub-model (denoted as Model 2) will measure the impact of locus of control on educational achievement. The overarching structure is as follows:

Figure 1: Overall Structure



The models related to the sub-hypotheses (Model 1 and Model 2) will be described first, because they serve as the foundation for the overall hypothesis. Finally, the structure of the model used to test the overall hypothesis (Model 3) will be explained.

4.1. Model 1, Sub-hypothesis 1: Locus of Control Development on Power Assertive Discipline—Basic Model

To estimate the relationship between a power assertive disciplinary style and locus of control development, the following model will be used:

Model 1: $$LOC = \beta_0 + \beta_1(power\_assert) + \beta_2(autonomy) + \beta_3(consistency) + \beta_4(safe\_outside) + \beta_5(teacher) + \beta_6(parent\_warm) + \beta_7(finances) + \beta_8(divorce) + \varepsilon$$

The dependent variable in this model, *LOC*, is a factor that is created from four underlying observed, ordinal variables, each of which explains a slightly different facet of locus of control. Those variables measure how much a child believes he/she has control over life, how important the child perceives chance to be, how much the child values hard work, and whether the child believes that he/she can succeed without being hindered by someone else. A more specific explanation of the underlying variables is discussed in Appendix B. The factor captures overall locus of control by explaining the correlation between those variables, and a higher value of *LOC* implies a more internal locus of control.

Power_assert is the key independent variable in Model 1. It is created based on the tendency of a parent to respond to a child's misbehavior by using the power assertive tactics of spanking, hitting, and or/removing a privilege from the child (Grusec and Goodnow, 1994; Zussman, 1978; Hart et al., 1990). A higher value of *power_assert* implies that a given parent had a greater tendency to use at least one of the three power assertive tactics to respond to the child's misbehavior.

The controls included in the model have all been noted in the literature as possible predictors of locus of control development. *Autonomy*, which is a very basic measure of the amount of autonomy that a parent affords his/her child, is believed to be an important antecedent to positive locus of control development (Carton and Nowicki, 1994; Coleman and DeLeire, 2003). In addition, consistency of parental behavior is modeled by *consistency*, which is an important predictor of locus of control development in both the disciplinary and overall parent behavior realms (Carton and Nowicki, 1994; Coleman and DeLeire, 2003). Growing up in a safe, warm environment in which the child is well supported is also believed to be important to positive locus of control development, so the safety of the child's neighborhood (*safe_outside*) and the warmth of

the child's relationship with his/her teacher (*teacher*) and parent(s) (*parent_warm*) are also included as controls (Carton and Nowicki, 1994; Coleman and DeLeire, 2003). In contrast, experiencing stressful life events and drastic life changes are likely to negatively impact a child's locus of control (Carton and Nowicki, 1994; Coleman and DeLeire, 2003); as such, a measure of the family's financial instability (*finances*) and whether the parents divorced between the child's kindergarten and eighth grade years (*divorce*) are also included as controls.

In this model, β_1 is the coefficient of primary interest because it represents the impact that the use of power assertive discipline has on locus of control development. Sub-hypothesis 1 predicts that the use of power assertive disciplinary techniques is negatively correlated with the development of an internal locus of control, so this model will test:

H_0: $\beta_1 \geq 0$
H_A: $\beta_1 < 0$

4.2. Model 1, Sub-hypothesis 1: Locus of Control Development on Power Assertive Discipline—Estimation

In order for OLS to produce an estimate for β_1 that is consistent, each of the explanatory variables must be uncorrelated with the error term, ε (Studenmund, 2006). However, in Model 1, it is possible that this classical assumption is violated, specifically due to simultaneity between the development of locus of control and parental disciplinary style. The literature suggests that parental discipline likely impacts locus of control, but it cannot be ruled out a priori that locus of control does not also influence parental discipline. For example, if a child has a very external locus of control and, as a result, struggles to take responsibility for the outcomes of his/her behavior, it is possible that a parent might discipline that child differently. In short, it is unlikely that the manner in which a parent chooses to discipline a child is completely independent of the child's behavior and skills.

If this interdependence between parental discipline and locus of control does in fact exist, then simultaneity will bias the estimate of β_1 because Corr $_{\text{parental discipline, } \varepsilon} \neq 0$, which would violate the classical assumption of no endogenous explanatory variables in the model. As a result, OLS would attribute some of the variation in locus of control that is actually due to the change in ε to parental discipline instead, biasing the estimate of β_1.

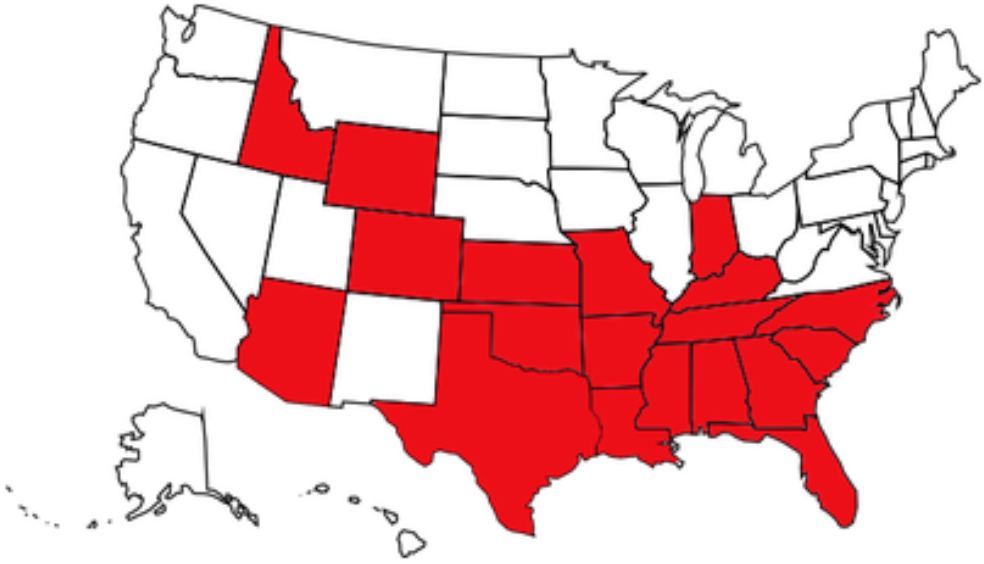
To investigate whether simultaneity is present in the equation, the Hausman test is used to test for the endogeneity of parental discipline. The results in Appendix A suggest that parental discipline is likely to indeed be endogenous in the model. The bias caused by endogeneity in a model can be mitigated by using Two-Stage Least Squares (2SLS) to estimate the model with an instrument for parental discipline. In this thesis, the variable *south* will be used as an instrument for *power_assert*. *South* is a dummy variable that equals 1 if the child and primary respondent lived in the south during any of the years of the longitudinal study. Whether or not the family lived in the south is a plausible instrument for parental disciplinary style because a strong case can be made that it satisfies the requisite conditions for being an instrument (Dougherty, 2011):

1) The reduced form equation for Stage 1 of 2SLS (Table 7, page 27) shows that living in the south is positively correlated with power assertive discipline, with a coefficient of 0.387 and a p-value of p = 0.000. This level of significance suggests that *south* remains correlated with power assertive discipline even after controlling for other variables.
2) The literature on locus of control has not suggested that geographic region is at all related to locus of control development. This supports the argument of this thesis that the only impact that living in the south has on locus of control is *through* its impact on parental disciplinary style. As such, living in the south will not experience the same endogeneity bias that *power_assert* would experience because *south* does not belong in the structural

equation for locus of control, and living in the south is exogenous to the locus of control equation ($corr_{south, \varepsilon} = 0$). One counterargument to the strength of this instrument might be that living in the south could be significantly correlated with variables such as religion, which are not controlled for in the locus of control equation and might therefore cause *south* to be correlated with the error term. However, the literature does not indicate that religion is a predictor of locus of control development, so the possibility of endogeneity through that pathway is very low.

Beyond this technical argument, the use of living in the south an instrument for parental disciplinary style also makes sense logically. Although what goes on within the household is a private affair, public perception and tolerance of more power assertive disciplinary styles (corporal punishment included) will likely impact how parents handle misbehavior in the home as well. One proxy for public tolerance of corporal punishment is the legal environment surrounding discipline in schools, which is established at the state level. To date, 19 states allow corporal punishment in schools, primarily in the form of spanking with a wooden or fiberglass paddle (De Neis, 2012). Figure 2 shows that the majority of the states that legally allow physical discipline in schools are in the south, and it is not allowed in any northeast, north-central, or far west states.

Figure 2: States in which Physical Punishment in Schools is Permitted (red)



Source: The Center for Effective Discipline, 2010

Besides being more permissive of power assertive punishment *legally*, southern states are also more likely to be permissive of those types of punishment in *practice* (Table 6).

Table 6: Ten States with the Greatest Prevalence of Corporal Punishment in Schools, 2005-2006

State	**Percentage of students struck by educators**
Mississippi	7.5
Arkansas	4.7
Alabama	4.5
Oklahoma	2.3
Louisiana	1.7
Tennessee	1.5
Texas	1.1
Georgia	1.1
Missouri	0.6
Florida	0.3

Source: Derived from The Center for Effective Discipline, 2010

Given the fact that corporal punishment laws are established at the state level, it would be desirable to use state-level legality as the instrument for parental discipline. However, in the public release of the ECLS-K data set, the identification of a given family's residence is only provided at the regional level. As a result, *south* is the most accurate instrument possible given the data limitations, and it matches what the gold standard state-level instrument would be for over 40 states. Using *south* as an instrument for *power_assert* therefore produces an estimate for power assertive discipline that only measures the part of parental disciplinary style that 1) varies depending on whether the family lived in the south and 2) is not endogenous.

4.3. Model 2, Sub-hypothesis 2: Academic Achievement on Locus of Control Development

The following models can be estimated to measure the impact of locus of control on educational achievement (reading and math proficiencies):

Model 2:

$$reading\_level = \alpha_0 + \alpha_1(LOC) + \alpha_2(mom\_edu) + \alpha_3(fam\_income) + \alpha_4(single\_par) + \alpha_5(read\_child) + \alpha_6(num\_sibs) + \alpha_7(edu\_expect) + \alpha_8(mom\_white) + \alpha_9(mom\_black) + \varepsilon$$

$$math\_level = \theta_0 + \theta_1(LOC) + \theta_2(mom\_edu) + \theta_3(fam\_income) + \theta_4(single\_par) + \theta_5(read\_child) + \theta_6(num\_sibs) + \theta_7(edu\_expect) + \theta_8(mom\_white) + \theta_9(mom\_black) + \varepsilon$$

The dependent variables in the equations in Model 2 are cognitive assessment scores in reading and math, respectively. The tests were administered during the spring of the 2006-2007 school year, which, if the child remained on the standard academic track, was eighth grade. A trained test administrator was present to time and proctor the assessments, which were designed to measure whether a given child had achieved the important academic goals that should be conveyed in standard middle school curricula. For both reading and math, the cognitive assessments consisted of two stages in order to ensure that each child was tested at the

appropriate level. The first stage was a routing assessment to determine whether the child's levels of reading and math were "high" or "low" (note: reading and math were measured in separate assessments). The child's performance on the routing assessment would dictate the level of the second-stage assessment that the child was given. Children were timed and given 80 minutes to complete both the routing test and the second-stage level test (Tourangeau et al., 2009).

The four aspects of reading comprehension that were tested are general level of understanding of the text; a more complete understanding of what is being read, beyond just the sounds of the words; connecting concepts from the text with personal knowledge; and evaluating and analyzing literary devices that appear within the text. These four aspects are broken up into the 10 different proficiency levels that are actually reported in the *reading_level* variable, all of which are listed in Appendix C. The math assessment also tested four different areas of mathematical content: "number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and pattern, algebra, and functions" (Tourangeau et al., 2009, p. 2-4). *Math_level* breaks those four assessment areas into the 9 different proficiency levels that are reported in the variable, and those proficiency levels can be seen in detail in Appendix C (Tourangeau et al., 2009).

The key independent variable in this model is locus of control (*LOC*), and the education literature describes a number of other factors that might also impact academic achievement. Parental education is believed to be a strong indicator of child educational achievement (Barón and Cobb-Clark, 2010), and *mom_edu* measures the highest level of education that the child's mother achieved. Household income and the number of parents living in the household with the child are two possible indicators of the family's ability to invest in the child's education (Davis-

Kean, 2005; Barón and Cobb-Clark, 2010), and they are included in the model as *fam_income* and *single_par*, respectively. The frequency with which a parent reads to a child can also be a proxy for parental investment in the child's educational success, and Barón and Cobb-Clark (2010) suggest that reading to a young child (*read_child*) has a direct impact on his/her educational achievement. Family size, represented by *num_sibs*, is believed to impact eventual educational achievement, as do parental expectations of long-term child educational achievement (*edu_expect*) (Davis-Kean, 2005). Race is believed to possibly be correlated with educational achievement (Davis-Kean, 2005), and so maternal race is also controlled for in Model 2.

The coefficients of interest in this model are α_1 and θ_1, which describe the impact that locus of control has on reading and math achievement, respectively. Sub-hypothesis 2 predicts that a more internal locus of control should be correlated with increased academic achievement, meaning that the following hypothesis tests will be tested (for reading and math):

Reading achievement:

H_0: $\alpha_1 \leq 0$

H_A: $\alpha_1 > 0$

Math achievement:

H_0: $\theta_1 \leq 0$

H_A: $\theta_1 > 0$

This model meets all of the classical assumptions necessary to produce consistent estimates using OLS. Although one might posit that perhaps simultaneity between educational achievement and locus of control is possible (i.e. doing better in school makes a child believe that he/she has more control over outcomes), using a Hausman test for endogeneity with *south* as the instrument suggests that locus of control is not endogenous. Therefore, OLS will be used to estimate the model.

4.4. Model 3, Overall Hypothesis: Academic Achievement on Power Assertive Discipline

Both of the aforementioned models investigate the pathway connecting parental disciplinary style to educational achievement by evaluating the role of locus of control as a mediator. In addition to those two sub-hypotheses, the overall hypothesis that power assertive parental discipline negatively impacts educational achievement will also be tested, using the following basic models (reading and math proficiencies):

Model 3:

$$reading\_level = \psi_0 + \psi_1(power\_assert) + \psi_2(LOC) + \psi_3(mom\_edu) + \psi_4(fam\_income) + \psi_5(single\_par) + \psi_6(read\_child) + \psi_7(num\_sibs) + \psi_8(edu\_expect) + \psi_9(mom\_white) + \psi_{10}(mom\_black) + \varepsilon$$

$$math\_level = \omega_0 + \omega_1(power\_assert) + \omega_2(LOC) + \omega_3(mom\_edu) + \omega_4(fam\_income) + \omega_5(single\_par) + \omega_6(read\_child) + \omega_7(num\_sibs) + \omega_8(edu\_expect) + \omega_9(mom\_white) + \omega_{10}(mom\_black) + \varepsilon$$

The key independent variable in this model is *power_assert,* and the hypotheses to be tested are:

Reading achievement:

H_0: $\psi_1 \geq 0$

H_A: $\psi_1 < 0$

Math achievement:

H_0: $\omega_1 \geq 0$

H_A: $\omega_1 < 0$

OLS will be used to estimate both the reading proficiency and the math proficiency models.

In sum, the modeling in this thesis will test the hypothesis that power assertive parental discipline is negatively correlated with educational achievement by 1) creating and testing two sub-hypotheses (Model 1 and Model 2), and 2) testing the relationship between parental discipline and educational achievement directly (Model 3). The first sub-hypothesis uses Two-Stage Least Squares estimation to test the hypothesis that power assertive discipline is negatively related to the development of an internal locus of control, using region of residence (specifically living in the south) as an instrument for power assertive discipline. The second sub-hypothesis

uses OLS to determine whether an internal locus of control is positively correlated with academic achievement, represented in terms of highest proficiency levels achieved in both reading and math. The overall hypothesis (Model 3) uses OLS to regress both reading and math proficiencies on parental disciplinary style to determine whether a power assertive disciplinary style negatively impacts educational achievement.

5. Results

5.1. Model 1, Sub-hypothesis 1: Locus of Control Development on Power Assertive Discipline—2SLS Results

The Two-Stage Least Squares results for Model 1 are presented in Table 7. The table contains results from both stages of analysis: Stage 1, which regresses a power assertive parental disciplinary style on all exogenous variables in the system to generate an instrument, and Stage 2, which regresses child locus of control on parental disciplinary style (instrumented by living in the south).

Table 7: Model 1 2SLS Results

VARIABLES	STAGE 1 *Power_assert*		STAGE 2 *LOC*	
	Coefficient (Std. Err.)	Standardized coefficient	Coefficient (Std. Err.)	Standardized coefficient
South	0.387***		-	-
	0.020		-	
Power_assert	-	-	-0.122**	-0.120
	-		(0.053)	
Autonomy	0.075***	-	0.231***	-
	(0.023)		(0.024)	
Consistency	-0.055***	-	0.036*	-
	(0.018)		(0.019)	
Safe_outside	-0.091***	-0.067	0.081***	0.056
	(0.018)		(0.020)	
Teacher	-0.046***	-0.036	0.037**	0.028
	(0.016)		(0.017)	
Parent_warm	-0.096***	-	0.003	-
	(0.021)		(0.022)	
Finances	0.026***	0.050	-0.009	-0.020
	(0.006)		(0.006)	
Divorce	-0.024	-	-0.146***	-
	(0.031)		(0.032)	
Constant	0.375***		-0.454***	
	(0.069)		(0.075)	
Observations	5,871		5,871	
R-squared	0.0769		0.028	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Standardized coefficients are included for non-dummy independent variables

The Stage 1 results in Table 7 indicate the viability of the use of *south* as an instrument for *power_assert*. The coefficient on *south* is statistically significant at the 1% level, suggesting that it is in fact a strong predictor of disciplinary style. More specifically, the coefficient is positive, which indicates that if a family lived in the southern region of the United States during any of the waves of the survey, the parents were more likely to use a power assertive disciplinary style. It is also important to note that the table displays regular standard errors as opposed to robust standard errors because no significant difference was found between the standard errors and their robust counterparts.

Standardized, or "beta", coefficients are presented in addition to the OLS coefficient estimates for the independent variables that are not dummy variables. Standardized coefficients allow the estimated coefficient to be described in terms of its standard deviation, which can be useful when the OLS coefficient is not intuitively interpretable. Factors are one type of variable whose OLS estimates are not intuitive, and because the dependent variable in Model 1 is a factor, standardizing the coefficients of the independent variables makes their impacts on locus of control more sensible. For example, the standardized coefficient of *finances* in Stage 1 is 0.050, which means that a one-unit increase in the standard deviation of *finances* yields an increase of 5.0% of one standard deviation of *power_assert.*

With the exception of parents' marital status, all of the control variables in Stage 1 are significant at the 1% level. A parent is more likely to use power assertive disciplinary tactics if the family has experienced more years of financial stress, while power assertive discipline is less likely among parents who are consistent in parental behavior, live in a safe neighborhood, have a child who likes his/her teacher, and have a warm relationship with the child. One interesting Stage 1 result is that the relationship between parental encouragement of autonomy and the use of power assertive discipline is significantly positive, which might not seem intuitive at first. One possible explanation of this result might be that a parent who seems to be highly encouraging of a child's autonomy (by enrolling the child in numerous extracurricular activities) might actually just not want to have to "deal" with the child in person. This lack of patience might also manifest as an increased tendency to use power assertive tactics, which likely require less effort from the parent than would an inductive approach to discipline. In addition, the way that this variable was defined (see Appendix B for specific variable creation information) means that it is likely to be correlated with measures of class and income; more specifically, the ability to enroll a child in

extracurricular activities might be precluded by a low income. *Autonomy* was the best proxy that could be created based on the limitations of the data set, but its relationship with parental disciplinary style and locus of control should be interpreted cautiously as a result of its imperfect definition.

With *south* established as a viable instrument, Stage 2 of 2SLS can be used to test the first sub-hypothesis, which hypothesizes that the use of power assertive disciplinary techniques will negatively impact the development of an internal locus of control. The estimate of *power_assert* in this model is in fact negative and significant ($p<0.05$), meaning that power assertive discipline hinders internal locus of control development. More specifically, the standardized coefficient on *power_assert* implies that an increase in the standard deviation of power assertive parental discipline by one unit yields a decrease of 12.0% of one standard deviation in the child's internal locus of control.

Many of the controls included in this model also significantly impact the way in which a child's locus of control develops. Having a parent who encourages autonomy and who is consistent in his/her behavior yields an increased likelihood of the development of an internal locus of control ($p<0.01$ and $p<0.1$, respectively). In addition, a child is more likely to develop an internal locus of control if he/she is raised in a neighborhood in which it is safe to play outside ($p<0.01$) and/or if the child likes his/her teacher ($p<0.05$). These factors are all indicative of a supportive, safe, consistent childhood environment, which is well established in the literature as an antecedent of positive locus of control development. On the other hand, if a child's parents separated between his/her kindergarten and eighth grade years, that child is significantly less likely to develop an internal locus of control ($p<0.01$). Both father absence and life stressors are

believed to preclude the positive development of locus of control (Carton & Nowicki, 1994), so the negative directionality of this relationship is both logical and expected.

5.2. Model 1, Sub-hypothesis 1: Robustness Check

To confirm the validity of the model and its results, a few robustness checks were performed. More specifically, the dependent variable (locus of control) and key independent variable (parental disciplinary style) were altered, creating three additional equations to estimate using 2SLS (*south* was still used as an instrument). In each of the three robustness checks, the variables used as controls in the original model were not altered; only *LOC* and *power_assert* were manipulated in different combinations.

CHECK A: $LOC = \rho_0 + \rho_1(parent\_spanker) + \rho_n(\text{controls from original model}) + \varepsilon$

CHECK B: $Unstoppable = \eta_0 + \eta_1(power\_assert) + \eta_n(\text{controls from original model}) + \varepsilon$

CHECK C: $Unstoppable = \lambda_0 + \lambda_1(parent\_spanker) + \lambda_n(\text{controls from original model}) + \varepsilon$

Parents were asked whether, if their child got angry enough to hit them, they would respond by spanking the child in three different waves of the survey: spring of kindergarten year, spring of third grade, and spring of fifth grade. In this thesis, a parent is defined as a "spanker" if he/she responded "yes" to that question in at least one out of the three waves of the survey, and *parent_spanker* is a dummy variable that equals 1 if the parent is defined as a spanker in this context. Whether or not a parent is a "spanker" was chosen for the robustness check for two reasons: first, the literature is still debating the efficacy of spanking as a disciplinary tool, so its independent effect on locus of control development is worth noting; and second, when *power_assert* is compared to the three underlying power assertive behaviors that comprise it (spanking, hitting, and removing a privilege), the factor is most highly correlated with spanking.

Like *parent_spanker*, *unstoppable* is the underlying variable in *LOC* that is most highly correlated with that factor. It is also a good indicator of locus of control intuitively, because it measures the level at which the child subjects (in the eighth grade) agree with the statement: "Every time I try to get ahead, nothing or nobody can stop me from doing so." A high level of agreement with this statement indicates that the child has a high internal locus of control, and in that manner, the robustness check will confirm that *LOC* is in fact a good measure of locus of control overall.

Running 2SLS on all three robustness checks reaffirms the structural validity of the original model. In Stage 1 of all three "CHECK" equations, *south* is significantly (and positively) correlated with the dependent variable at the 1% level, indicating that it continues to be a viable instrument even when the parental discipline measure is altered. Results for Stage 2 of 2SLS for all three equations are presented in Table 8.

Table 8: Stage 2 of 2SLS on Robustness Check Equations

VARIABLES	CHECK A *LOC*	CHECK B *Unstoppable*	CHECK C *Unstoppable*
Parent_spanker	-0.217***	-	-0.235***
	(0.083)	-	(0.087)
Power_assert	-	-0.120**	-
	-	(0.055)	-
Autonomy	0.241***	0.157***	0.160***
	(0.023)	(0.025)	(0.024)
Consistency	0.054***	0.002	0.009
	(0.018)	(0.020)	(0.019)
Safe_outside	0.081***	0.039*	0.033*
	(0.019)	(0.020)	(0.019)
Teacher	0.041**	0.028	0.032*
	(0.016)	(0.018)	(0.017)
Parent_warm	0.004	-0.010	-0.007
	(0.021)	(0.023)	(0.022)
Finances	-0.007	-0.011*	-0.010*
	(0.006)	(0.006)	(0.006)
Divorce	-0.144***	-0.087**	-0.098***
	(0.031)	(0.034)	(0.032)
Constant	-0.412***	2.653***	2.731***
	(0.083)	(0.079)	(0.087)
Observations	6,439	5,964	6,542
R-squared	0.028	0.010	0.009

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The significance of the relationship between the key independent variable and the dependent variables in all three robustness check equations suggests that the primary model regressing *LOC* on *power_assert* is capturing a real relationship. Having a parent who is defined as a "spanker" is negatively correlated with both *LOC* and *unstoppable* at 1% significance. Not only do these results support the directionality of the effect of power assertive discipline overall on locus of control development, but it also is an interesting finding given the continued debate in the literature over the efficacy of spanking. In addition, when *unstoppable* is regressed on *power_assert* in CHECK B, the relationship is also negative with 5% significance. Altering the specification of the original model in these three ways does change the impact of some of the control variables on the dependent variables, but in the cases in which those controls have

significant coefficients in CHECKs A, B, and C, the directionality of their impact on *LOC* and/or *unstoppable* is the same as it is in the original model.

5.3. Model 2, Sub-hypothesis 2: Academic Achievement on Locus of Control—OLS Results

The OLS results for Model 2 are presented in Table 9. This model tests the sub-hypothesis that a more internal locus of control is positively correlated with academic achievement, so the coefficient of interest is the impact of *LOC.* Academic achievement in both reading and math are presented and compared. The model uses regular standard errors because the difference between those standard errors and robust standard errors is not significant.

Table 9: Model 2 OLS Results

VARIABLES	READING ACHIEVEMENT *Reading_level*		MATH ACHIEVEMENT *Math_level*	
	Coefficient (St. Err.)	Standardized coefficient	Coefficient (St. Err.)	Standardized coefficient
LOC	0.322***	0.202	0.296***	0.177
	(0.020)		(0.021)	
Mom_edu	0.075***	0.164	0.076***	0.157
	(0.007)		(0.007)	
Fam_income	0.003***	0.086	0.004***	0.110
	(0.000)		(0.000)	
Single_par	-0.149***	-	-0.188***	-
	(0.044)		(0.046)	
Read_child	0.083***	0.052	0.062***	0.037
	(0.020)		(0.021)	
Num_sibs	-0.018	-0.017	-0.001	-0.001
	(0.013)		(0.014)	
Edu_expect	0.336***	-	0.369***	-
	(0.036)		(0.039)	
Mom_white	0.185***	-	0.040	-
	(0.039)		(0.041)	
Mom_black	-0.280***	-	-0.516***	-
	(0.062)		(0.066)	
Constant	6.212***		5.545***	
	(0.102)		(0.109)	
Observations	5,635		5,505	
R-squared	0.203		0.198	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Standardized coefficients are included for non-dummy independent variables

The estimates of the impact of *LOC* on reading and math proficiency are both positive and significant. The directionality of the coefficients implies that a more positive (internal) locus of control yields greater academic achievement, measured in terms of proficiency level in reading and math achieved by the eighth grade. More specifically, when the coefficients on the locus of control factor are standardized, the results suggest that a one-unit increase in the standard deviation of *LOC* is correlated with an increase of 20.2% of one standard deviation of *reading_level* and an increase of 17.7% of one standard deviation of *math_level.*

The impacts of the other explanatory variables on academic achievement are worth noting as well, as is the fact that the relationships between each of the explanatory variables and the academic achievement outcomes do not vary much between math and reading. Maternal education level, household income, the frequency with which the parent read to the child when the child was younger, and parental expectations of the child's academic success are all positively correlated with both reading and math proficiency (with significance at the 1% level). The directionality of all of these relationships is in line with both the literature and intuition; higher parental education and higher household income would likely create an environment in which investment in the child's education is both more likely and more feasible, and reading to the child frequently and having high expectations of his/her success are likely to instill in the child a sense of independent pride in his/her own education.

In accordance with human capital-based explanation is the finding that being raised by a single parent is negatively related to child educational achievement. This might suggest that a single parent is less likely to have the resources necessary to invest in the child's intellectual capital, in addition to the fact that less adult attention and/or mentoring is available for the child. The results also demonstrate that the number of siblings that a child has does not significantly

impact the child's math or reading proficiency levels. The insignificance of this result could be attributable to the argument that having many siblings can yield both positive and negative externalities: positive in the sense that maybe there will be some knowledge spillover between siblings, and negative in the sense that family resources need to be divided amongst more children.

Another interesting finding is that the results of both regressions in Table 9 do not paint a completely consistent picture of the relationship between race and academic achievement. Reading proficiency is significantly and positively related to having a mother who is white, but in the case of math proficiency, having a mother who is white has no significant effect on proficiency level reached. If the child's mother is black, on the other hand, both reading and math proficiencies are significantly and negatively impacted, but by very different magnitudes. However, these results should be interpreted with caution; imperfect controls for a parent's socioeconomic background could result in inconsistent estimates of the impact of maternal race.

5.4. Model 3, Main Hypothesis: Academic Achievement on Parental Disciplinary Style—OLS Results

Model 3 estimates the direct impact that parental disciplinary style has on educational achievement. Again, educational achievement is measured in terms of reading and math proficiency levels achieved by grade eight. Table 10 presents the OLS results for both the reading achievement and the math achievement models, and regular standard errors are used because they are not significantly different from robust standard errors.

Table 10: Model 3 OLS Results

VARIABLES	*Reading_level*		*Math_level*	
	Coefficient (St. Err.)	Standardized coefficient	Coefficient (St. Err.)	Standardized coefficient
Power_assert	-0.047**	-0.030	-0.050**	-0.029
	(0.021)		(0.023)	
LOC	0.330***	0.206	0.295***	0.175
	(0.020)		(0.022)	
Mom_edu	0.078***	0.171	0.073***	0.152
	(0.007)		(0.008)	
Fam_income	0.003***	0.084	0.004***	0.117
	(0.000)		(0.001)	
Single_par	-0.136***	-	-0.156***	-
	(0.046)		(0.050)	
Read_child	0.084***	0.053	0.061***	0.036
	(0.021)		(0.022)	
Num_sibs	-0.022	-0.021	0.001	0.000
	(0.014)		(0.015)	
Edu_expect	0.320***	-	0.362***	-
	(0.038)		(0.041)	
Mom_white	0.206***	-	0.058	-
	(0.041)		(0.044)	
Mom_black	-0.203***	-	-0.440***	-
	(0.070)		(0.075)	
Constant	6.170***		5.568***	
	(0.108)		(0.117)	
Observations	5,138		5,010	
R-squared	0.204		0.190	

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Standardized coefficients are included for non-dummy independent variables

The estimates from both the reading proficiency equation and the math proficiency equation support the overall hypothesis that power assertive discipline directly and negatively impacts academic achievement ($p<0.05$ for both reading and math proficiencies). More specifically, the standardized coefficient of *power_assert* implies that a one standard deviation increase of *power_assert* yields a decrease of 3.0% of one standard deviation of the child's reading proficiency level and a decrease of 2.9% of one standard deviation of the child's math proficiency level. In both models, *LOC* is significant ($p<0.01$), and an internal (larger) locus of

control positively impacts both reading and math proficiency levels. An increase in one standard deviation of *LOC* yields a 20.6% increase and a 17.5% increase in one standard deviation of reading and math proficiency levels, respectively.

Model 3 uses the same controls as Model 2 (which regresses educational achievement on locus of control), and the impacts of those controls on educational achievement in Model 3 are very similar to the impacts explained in Model 2. As seen in Table 10, maternal education level, household income, frequency with which the parent read to the child, and the height of the parent's expectations of the child's eventual level of educational achievement all still significantly ($p<0.01$ in all cases) and positively impact both reading and math proficiency levels. Also similar to the results found in Model 2 are the relatively inconclusive impacts of race (specifically, having a white mother or a black mother) on educational achievement. In terms of reading proficiency, both Model 2 and Model 3 find a significantly negative impact of having a black mother on achievement. However, Model 2 demonstrates a positive relationship between having a white mother and reading proficiency while Model 3 suggests that having a mother who is white has no significant impact on reading levels. More agreement is found between the models in the case of math achievement; both suggest that having a white mother does not significantly affect math proficiency but having a black mother significantly and negatively impacts the likelihood of a higher math proficiency.

6. Discussion

This thesis contributes to the academic achievement literature because, although some scholars do in fact posit that the relationship between physical discipline and academic performance is negative (Pettit et al., 1997; Solomon and Serres, 1999), that literature generally evaluates discipline that is either abusive or within the context of a greater parenting style (i.e.

measures such as warmth and support). This thesis focuses specifically on non-abusive, power assertive discipline and its impacts, and as such, it offers a targeted description of the effects of disciplinary style in particular.

In addition to adding to the literature on the specific impacts of disciplinary style on academic achievement, this thesis also seeks to better explain the actual *pathway* through which parental discipline might influence reading and math proficiency levels. The two-step model (the combination of Models 1 and 2) that incorporates non-cognitive skill development (specifically locus of control) as a mediator between parental disciplinary style and academic achievement is a tool that the literature has not yet used to analyze that relationship. Bridging the two bodies of literature through the creation of two separate but linked models adds insight to the overall relationship between discipline and achievement and also fills gaps in the two individual research areas.

Regarding Model 1, which evaluates the relationship between parental discipline and locus of control development, no other papers were found that controlled for simultaneity between parental disciplinary style and child non-cognitive skill development. However, both intuition and the endogeneity test performed in this thesis suggest that simultaneity bias is a valid concern, so the use of Two-Stage Least Squares likely presents a more consistent estimate than many of those which can be found in the literature. Table 11 compares the estimates of the model that were obtained using 2SLS with those that would have been obtained were OLS used instead. Although a few of the estimates are similar, the difference between the coefficients on *power_assert* produced by 2SLS and OLS is very large (-0.122 vs. -0.041), which suggests that it is important to account for endogeneity of *power_assert*.

Table 11: Model 1 2SLS versus OLS Results

VARIABLES	2SLS (Stage 2) *LOC*	OLS *LOC*
Power_assert	-0.122**	-0.041***
	(0.053)	(0.013)
Autonomy	0.231***	0.239***
	(0.024)	(0.023)
Consistency	0.036*	0.041**
	(0.019)	(0.019)
Finances	0.081***	-0.011*
	(0.020)	(0.006)
Safe_outside	0.037**	0.089***
	(0.017)	(0.019)
Teacher	0.003	0.040**
	(0.022)	(0.017)
Parent_warm	-0.009	0.009
	(0.006)	(0.021)
Divorce	-0.146***	-0.145***
	(0.032)	(0.032)
Constant	-0.454***	-0.493***
	(0.075)	(0.071)
Observations	5,871	5,871
R-squared	0.028	0.035

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Additionally, a number of scholars discuss the relative dearth of research on the antecedents of locus of control development, and while there is a relatively substantial body of literature describing the relationship between parental discipline and non-cognitive skills in general, this thesis contributes to the literature specific to locus of control. The finding that power assertive parental discipline and internal locus of control are negatively related should provide child development professionals with a better understanding of some of the predictors of locus of control.

When all three models are evaluated together, the findings suggest that the use of power assertive discipline by parents negatively impacts educational achievement through two pathways, both of which are independent and significant. Because *power_assert* significantly impacts *LOC*, which in turn remains significant when estimated as a predictor of academic

success, Models 1 and 2 suggest that parental disciplinary style affects educational achievement through its effects on the child's successful (or unsuccessful) development of locus of control. In addition, however, when parental discipline is measured as a direct predictor of academic success in Model 3 (controlling for locus of control), its direct effect on both reading and math proficiency levels is also significant. Therefore, this thesis suggests that the negative impacts of the use of power assertive discipline on educational achievement are two-fold: both through its overall reduction of non-cognitive skills *and* by directly impeding academic success.

Another important finding to note is the consistent significance ($p<0.01$ in all cases) of locus of control as a predictor of educational achievement both in Model 2, when parental disciplinary style is not controlled for, and in Model 3, when *power_assert* is included in the equation. This finding suggests that the impact of a child's locus of control on his/her educational achievement is also two-fold. As Models 1 and 2 show, part of the impact that locus of control has on educational achievement is attributable to its relationship with parental disciplinary style. Because power assertive discipline negatively impacts internal locus of control development (Model 1) but is not controlled for in Model 2, part of the significance of the impact of locus of control on academic achievement can be explained by the influence that parental discipline has on locus of control. However, Model 3 demonstrates that locus of control also impacts reading and math proficiencies independently of parental discipline; even when the use of power assertive tactics is controlled for in the third model, locus of control still continues to have a significantly positive impact on academic success.

7. Conclusion

Returning to the original, overarching question of whether power assertive parental discipline negatively impacts academic achievement, the three models presented in this thesis

combine to allow for a rejection of a hypothesis of zero or positive effects. Not only does the use of power assertive discipline by parents directly inhibit a child's academic potential, but it also negatively impacts educational achievement by making it more difficult for the child to develop an internal locus of control (which, in turn, is negatively related to academic achievement). The strength of the results in conjunction with the robustness checks performed on Model 1 combine to make a strong case for significance of the negative impact of a power assertive parental disciplinary style on both child non-cognitive skill development and on academic achievement.

However, one important caveat to these findings is the fact that the sample population in the ECLS-K survey experienced substantial attrition over the course of the survey. 21,260 kindergarteners participated in the first round of the survey, but as time continued, the number of participants in each wave decreased (Tourangeau et al., 2009). The result of this attrition is that the number of observations in all of the models in this thesis are between 5,000 and 7,000 subjects, because all of the dependent variables (*LOC*, *reading_level*, and *math_level*) are derived from final-wave survey questions. Future research should investigate possible bias due to attrition, but this attrition seems more likely to be related to decisions of parents than to decisions of children. If so, it is not clear that attrition will bias the estimates in this study because locus of control and reading and math proficiencies are all child-level variables.

As the global opinion on the use of corporal punishment and other power assertive tactics becomes increasingly negative but the majority of parents in the United States continue to view those tactics positively, it is important to better understand the long-term implications of their use. The findings in this thesis suggest that power assertive discipline, corporal punishment included, has overwhelmingly negative developmental effects on children; not only does it impede their development of non-cognitive skills like locus of control, but it also reduces their

reading and math proficiency levels by grade eight. State policies on corporal punishment should be reevaluated in light of these findings.

8. Appendix A

This appendix provides the results of the endogeneity test explained in Section 4.2. A Hausman test was run on Model 1 to determine whether parental disciplinary style is in fact endogenous in the locus of control equation. The test first predicts the residuals created by regressing parental disciplinary style on its instrument (*south*) and all of the controls used in the locus of control equation actually being estimated in Model 1 (*autonomy, consistency, finances, safe_outside, teacher,* and *parent_warm*). The significance of those residuals as a predictor of the entire locus of control model (denoted *vhat* in Table 12) is a measure of endogeneity. The greater the significance of the residuals, the greater the chance that the variable used to predict those residuals (in this case, parental disciplinary style) is endogenous.

Table 12: Results of Hausman Test for Endogeneity in Model 1

VARIABLES	*LOC*
	Coefficient (St. Err.)
Power_assert	-0.135*** (0.052)
Autonomy	0.223*** (0.022)
Consistency	0.027 (0.018)
Finances	-0.014** (0.006)
Safe_outside	0.081*** (0.018)
Teacher	0.043*** (0.016)
Parent_warm	0.010 (0.020)
vhat	0.105** (0.053)
Constant	-0.489*** (0.071)
Observations	6,745
R-squared	0.032

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Vhat is significant at the 5% level according to the Hausman test, which merits the use of 2SLS to reduce estimation bias in the endogenous equation.

9. Appendix B

This section provides a more detailed explanation of each of the variables in Model 1:

$$LOC = \beta_0 + \beta_1(power\_assert) + \beta_2(autonomy) + \beta_3(consistency) + B_4(safe\_outside) + \beta_5(teacher) + \beta_6(parent\_warm) + \beta_7(finances) + \beta_8(divorce) + \varepsilon$$

Each variable and a breakdown of the round in which it was asked, the respondent population, the specific question it asked, and its answers are listed in Table 13. All variables are cleaned in the same way: responses such as "not applicable" and "refused" are recoded as missing so that the values that those responses are arbitrarily assigned in the ECLS-K survey (the values are often -7 and -9) do not skew results. Any additional clarification in terms of variable construction is discussed below the table.

Table 13: Model 1 Variable Creation Information

Variable name	Year(s) asked	Population asked	Specific question(s) asked in ECLS-K survey	Breakdown of survey responses
LOC	Spring of 8th grade	Children	1) I have enough control over the direction my life is going.	Where 1 = strongly disagree to 4 = strongly agree 1: 3.44% 2:13.07% 3: 46.1% 4: 37.38%
			2) Chance and luck are not very important for what happens in my life.	1: 7.23% 2: 27.99% 3: 41.86% 4: 22.91%
			3) In my life, hard work is more important than good luck for success.	1: 2.40% 2: 8.23% 3: 49.09% 4: 40.28%
			4) Every time I try to get ahead, nothing or nobody can stop me from doing so.	1: 5.20% 2: 20.59% 3: 53.39% 4: 20.83%
Power_assert	Spring of kinder-garten year (wave 2), spring of third grade (wave 5), and spring of fifth grade (wave 6)	Parents	If [child] got so angry that [he/she] hit you, what would you do? Would you: Spank (wave 2) Spank (wave 5) Spank (wave 6) Hit back (wave 2) Hit back (wave 5) Hit back (wave 6) Remove privilege (2) Remove privilege (5) Remove privilege (6)	Parents could either respond yes or no. Yes: 19.53% Yes: 22.58% Yes: 20.04% Yes: 3.22% Yes: 4.51% Yes: 5.50% Yes: 34.02% Yes: 61.64% Yes: 67.90%
Autonomy *Note: the questions and responses listed here are the underlying responses used to create the dummy, not the summary statistics for the dummy itself. See Table 1 in the data section for that breakdown.*	Spring of kinder-garten year	Parents	Outside of school hours, has [child] ever participated in: - Dance lessons? - Organized athletic activities, like basketball, soccer, baseball, or gymnastics? - Music lessons, for example, piano, instrumental music or singing lessons? - Art classes or lessons, for example, painting, drawing, sculpturing?	 Yes: 19.72% Yes: 52.46% Yes: 12.11% Yes: 12.14%

Table 13 (continued): Model 1 Variable Creation Information

Variable name	Year(s) asked	Population asked	Specific question(s) asked in ECLS-K survey	Breakdown of survey responses
Consistency *Note: the questions and responses listed here are the underlying responses used to create the dummy, not the summary statistics for the dummy itself. See Table 1 in the data section for that breakdown.*	Spring of kinder-garten year, spring of third grade, and spring of fifth grade	Parents	If [child] got so angry that [he/she] hit you, what would you do? Would you talk to [him/her] about what [he/she] did wrong? Wave 2 Wave 5 Wave 6	 Yes: 74.42% Yes: 81.00% Yes: 82.10%
Safe_outside	Spring of kinder-garten year	Parents	How safe is it for children to play outside during the day in your neighborhood?	1 (not at all safe): 3.66% 2 (somewhat safe): 26.58% 3 (very safe): 69.76%
Teacher	Fall of kinder-garten year	Parents	Children sometimes have problems adjusting to kindergarten. On average, during the first two months of this school year, did [child] say [he/she] liked [his/her] teacher?	1 (never): 5.25% 2 (once a week): 24.79% 3 (more than once a week): 69.96%
Parent_warm *Note: the questions and responses listed here are the underlying responses used to create the dummy, not the summary statistics for the dummy itself. See Table 1 in the data section for that breakdown.*	Spring of kinder-garten year	Parent	[Child] and I often have warm, close times together.	1 (completely true): 73.06% 2: 20.21% 3: 4.74% 4 (not at all true): 0.12%
Finances	Fall of kinder-garten year	Parents	All parents were asked: "Since {CHILD} was born, was there any time in which {his/her} family had serious financial problems or was unable to pay the monthly bills?"	Yes: 23.31%
			If the respondent said no, that observation was given a value of 0 in *finances*. If the respondent said yes, he/she was asked: "During how many years or months since {he/she} was born has {CHILD}'s family had serious financial problems?" The value indicated here is what comprises *finances.*	

Table 13 (continued): Model 1 Variable Creation Information

Variable name	Year(s) asked	Population asked	Specific question(s) asked in ECLS-K survey	Breakdown of survey responses
Divorce *Note: the questions and responses listed here are the underlying responses used to create the dummy, not the summary statistics for the dummy itself. See Table 1 in the data section for that breakdown.*	Fall of kinder-garten year and spring of eighth grade year	Parent	Kindergarten: Indicate whether you and [child's mother/father] are currently married, separated, divorced, widowed, or have never been married. Eighth grade: Indicate whether you and [child's mother/father] are currently married, separated, divorced, widowed, or have never been married.	Married: 70.31% Separated: 4.84% Divorced: 9.15% Widowed: 0.90% Never married: 14.65% Married: 74.56%% Separated: 4.08% Divorced: 12.11% Widowed: 2.04% Never married: 6.92%

LOC: Child's level of locus of control

- This variable was created using factor analysis, which is a technique used to try to describe a set of observable variables by creating a series of hypothetical constructs called factors. The factors are created by explaining the correlation between the observed variables. The purpose of factor analysis is to simplify a model's specification by creating a number of factors that is fewer than the total number of observed variables to try to more succinctly explain the model. For this thesis, one factor was created to try to concisely capture child respondents' locus of control based on four underlying variables. Each variable seeks to describe a different aspect of locus of control, but what the factor does is allow for the creation of a single measure which ideally explains locus of control overall.
- The four observed variables are described in Table 13, but they are actually changed slightly from how they appear in the original dataset. In the original survey, the ECLS-K asks the children how much they agree with the following four statements:

    - 1) I don't have enough control over the direction my life is taking.
    - 2) Chance and luck are very important for what happens in my life.
    - 3) In my life, good luck is more important than hard work for success.
    - 4) Every time I try to get ahead, something or somebody stops me.
- Each of those statements is indicative of an individual with a reduced sense of control over outcomes; namely, one who has an external locus of control. In the ECLS-K dataset, responses can range form 1 (strongly disagree) to 4 (strongly agree), so in the way that the question is framed by the ECLS-K survey, higher values indicate a more *external* locus of control. However, it makes more sense for an observation of the *LOC* that is of a greater magnitude to represent a more positive locus of control. As such, the 4 questions were rephrased to:
    - 1) I have enough control over the direction my life is going.
    - 2) Chance and luck are not very important for what happens in my life.
    - 3) In my life, hard work is more important than good luck for success.
    - 4) Every time I try to get ahead, nothing or nobody can stop me from doing so.
- In order to reflect the change in directionality of the questions and ensure that a response of "4" represents agreement with an *internal* locus of control, responses were recoded so that an answer of 1 in the ECLS-K becomes 4, 2 becomes 3, 3 becomes 2, and 4 becomes 1.
- Factor analysis therefore allows for the creation of a factor that measures the correlation between 4 different variables that seek to explain a positive (internal) locus of control. The factor loadings on *LOC* are as follows:

Table 14: Factor Loading for *LOC*

Variable	*LOC*	Uniqueness
1) I have enough control over the direction my life is going.	0.4860	0.7638
2) Chance and luck are not very important for what happens in my life.	0.5429	0.7053
3) In my life, hard work is more important than good luck for success.	0.5764	0.6678
4) Every time I try to get ahead, nothing or nobody can stop me from doing so.	0.4472	0.8000

Power_assert: Level of parental usage of power assertive discipline

- This variable was also created using factor analysis. The factor was created to try to succinctly summarize a parent's tendency to use more power assertive disciplinary styles when punishing his/her child, specifically based on a parent's use of spanking, hitting the child back, and removing a privilege from the child.
- In the original ECLS-K survey, parents were asked the following question during three different waves of the survey:

  "If [child] got so angry that he/she hit you, what would you do?"
- The survey asked whether a parent would respond by using any of 11 different specific disciplinary behaviors, and the parent was asked to indicate yes or no for each disciplinary response. The three disciplinary tactics measured in this factor (spank the child, hit him/her back, and take away a privilege) are all considered power assertive in the literature, and because this question was asked three times throughout the survey, the factor captures 9 different observed variables (3 waves for each of the 3 disciplinary

behaviors). The breakdown of the parent's answers (either yes or no) to each behavior is shown in Table 13.

- The factor loadings on *power_assert* are as follows:

Table 15: Factor Loading for *power_assert*

Variable	*Power_assert*	Uniqueness
Would you spank child: wave 2	0.4758	0.7736
Would you spank child: wave 5	0.5531	0.6941
Would you spank child: wave 6	0.5285	0.7207
Would you hit child back: wave 2	0.1866	0.9652
Would you hit child back: wave 5	0.2809	0.9211
Would you hit child back: wave 6	0.3640	0.8675
Would you remove child's privilege: wave 2	0.0845	0.9929
Would you remove child's privilege: wave 5	0.1022	0.9896
Would you remove child's privilege: wave 6	0.0907	0.9918

Autonomy: Dummy for whether the parent grants his/her child a high level of autonomy

- This is a dummy variable that indicates whether, by the spring of the child's kindergarten year, the parent had decided to enroll the child in either a dance class, a sport, a music class, or an art class (all outside of school hours). The underlying assumption behind this variable is that by placing the child in at least one of those classes outside of school hours, the parent is encouraging his/her intellectual and extracurricular exploration and independence. Parents could respond to the following questions with either a "yes" or a "no":
    - Outside of school hours, has [child] ever participated in:

        - Dance lessons?
        - Organized athletic activities, like basketball, soccer, baseball, or gymnastics?
        - Music lessons, for example, piano, instrumental music or singing lessons?
        - Art classes or lessons, for example, painting, drawing, sculpturing?
    - If the parent responded yes to *any* of those four questions (at least one), then he/she was denoted as "encouraging autonomy" and was labeled as "1" in *autonomy.* In essence, if a parent enrolled his/her child in any of the extracurricular activities listed above, that parent was believed to encourage autonomy more than a parent who decided not to enroll the child in any activities at all.

Consistency: Dummy for whether a parent is highly consistent in his/her behavior

- This is a dummy variable that uses one of the 11 possible disciplinary responses in the ECLS-K survey to measure the consistency with which a parent chooses to discuss behavioral infractions with his/her child. Specifically, it focuses on the parent's response to the question:
    - "If [child] got so angry that he/she hit you, what would you do? Would you talk to [him/her] about what [he/she] did wrong?"
- That question is asked three times throughout the course of the survey, and *consistency* equals 1 if the parent indicated in all three waves that, yes, he/she would talk to the child about his/her misbehavior.

Safe_outside: Level of safety if the child were to play outside in his/her neighborhood

- These variables appear exactly as they are presented in the ECLS-K dataset. Beyond the standard cleaning applied to all variables, nothing is changed.

Teacher: Level at which a child liked his/her teacher in kindergarten

- This variable appears exactly as it is presented in the ECLS-K dataset. Beyond the standard cleaning applied to all variables, nothing is changed.

Parent_warm: Dummy variable for a warm and caring parent-child relationship

- This is a dummy variable that attempts to capture the warmth of the parent-child relationship. The ECLS-K survey asks the respondent to rank the statement, "[Child] and I often have warm, close times together," as completely true (1) to not at all true (4). The dummy was created by recoding the responses that ranged from mostly true (2) to not at all true (4) as 0. This means that *parent_warm* equals 1 only for the "warmest" parents in the survey.

Finances: Number of years that the family had serious financial problems between the child's birth and kindergarten year

- This variable appears exactly as it is presented in the ECLS-K dataset. Beyond the standard cleaning applied to all variables, nothing is changed.

Divorce: Dummy for whether parents separated between the child's kindergarten and eighth grade years

- This is a dummy variable that captures whether a child's parents went from being married to separated over the course of the survey (between the child's kindergarten and eighth grade years). The underlying variables are parents' marital status in kindergarten and again in eighth grade. *Divorce* was created to equal 1 if the respondent indicated that the parents were married when the child was in kindergarten but that they were either separated, divorced, or widowed by the spring of the child's eighth grade year. The

dummy equals 0 if the parents were married when the child was in both kindergarten and eighth grade.

10. Appendix C

This section provides a more detailed explanation of each of the variables in Models 2 and 3 (with the exception of *power_assert*, which appears in Model 3 but is explained in Table 13 in Appendix B). Each variable and a breakdown of the round in which it was asked, the respondent population, the specific question it asked, and its answers is listed in Table 16. Again, all variables are cleaned in the same way: responses such as "not applicable" and "refused" are recoded as missing so that the values that those responses are arbitrarily assigned in the ECLS-K survey (the values are often -7 and -9) do not skew results. Any additional clarification in terms of variable construction is discussed below the table.

Model 2:

$$reading\_level = \alpha_0 + \alpha_1(LOC) + \alpha_2(mom\_edu) + \alpha_3(fam\_income) + \alpha_4(single\_par) + \alpha_5(read\_child) + \alpha_6(num\_sibs) + \alpha_7(edu\_expect) + \alpha_8(mom\_white) + \alpha_9(mom\_black) + \varepsilon$$

*The same equation is also run with *math_level* as the dependent variable, to account for any variation across academic subjects

Table 16: Models 2 and 3 Variable Creation Information

Variable name	Year(s) asked	Population asked	Specific question(s) asked in ECLS-K survey	Breakdown of survey responses
Reading_level	Spring of 8th grade	Children	--	0 (non-mastery of the lowest proficiency level): 0% 1 (letter recognition): 0% 2 (beginning sounds): 0.01% 3 (ending sounds): 0% 4 (sight words): 0.26% 5 (comprehension of words in context): 4.06% 6 (literal inference): 8.16% 7 (extrapolation): 19.37% 8 (evaluation): 33.60% 9 (evaluating nonfiction): 27.76% 10 (evaluating complex syntax): 6.77 %
Math_level	Spring of 8th grade	Children	--	0 (non-mastery of the lowest proficiency level): 0% 1 (number and shape): 0% 2 (relative size): 0% 3 (ordinality, sequence): 0.58% 4 (addition/subtraction): 1.41% 5 (multiplication/division): 6.42% 6 (place value): 21.61% 7 (rate and measurement): 30.64% 8 (fractions): 22.13% 9 (area and volume): 17.22%
LOC	Spring of 8th grade	Children	1) I have enough control over the direction my life is going.	Where 1 = strongly disagree to 4 = strongly agree 1: 3.44% 2:13.07% 3: 46.1% 4: 37.38%
			2) Chance and luck are not very important for what happens in my life.	1: 7.23% 2: 27.99% 3: 41.86% 4: 22.91%
			3) In my life, hard work is more important than good luck for success.	1: 2.40% 2: 8.23% 3: 49.09% 4: 40.28%
			4) Every time I try to get ahead, nothing or nobody can stop me from doing so.	1: 5.20% 2: 20.59% 3: 53.39% 4: 20.83%

Table 16 (continued): Models 2 and 3 Variable Creation Information

Variable name	**Year(s) asked**	**Population asked**	**Specific question(s) asked in ECLS-K survey**	**Breakdown of survey responses**
Mom_edu	Compo-site variable created by NCES	Parents	What was the highest grade or year of school that [child's] mother has completed?	1 (8th grade or below): 4.53% 2 (9th-12th grade): 8.82% 3 (high school diploma/equivalent): or vocational/technical program): 28.63% 4 (vocational/technical program): 6.48% 5 (some college): 26.82% 6 (Bachelor's degree): 16.26% 7 (graduate/ professional school; no degree): 1.99% 8 (Master's degree): 4.67% 9 (doctorate/ professional degree): 1.80%
Fam_income	Spring of kinder-garten year	Parents	What was the total income of all persons in your household over the past year, including salaries or other earnings, interest, retirement, and so on for all household members?	--
Single_par *Note: the questions and responses listed here are the underlying responses used to create the dummy, not the summary statistics for the dummy itself. See Tables 2-5 in the data section for that breakdown.*	Fall of kinder-garten year	Parents	Composite variable created by NCES, so no specific question is associated with it. It seeks to explain family structure (number of parents and whether there are siblings).	1 (2 parents plus siblings): 65.85% 2 (2 parents, no siblings): 9.64% 3 (1 parent plus siblings): 15.68% 4 (1 parent, no siblings): 6.92%
Read_child	Fall of kinder-garten year	Parents	How often do you read books to [child}? Would you say not at all, once or twice, 3-6 times, or every day?	1 (not at all): 1.18% 2 (once or twice a week): 18.66% 3 (three to six times a week): 35.12% 4 (every day): 45.04%

Table 16 (continued): Models 2 and 3 Variable Creation Information

Variable name	Year(s) asked	Population asked	Specific question(s) asked in ECLS-K survey	Breakdown of survey responses
Num_sibs	Fall of kinder-garten year	Parent	Composite variable created by NCES, so no specific question is associated with it. It seeks to create a continuous variable explaining the number of siblings each child subject has.	--
Edu_expect *Note: the questions and responses listed here are the underlying responses used to create the dummy, not the summary statistics for the dummy itself. See Tables 2-5 in the data section for that breakdown.*	Fall of kinder-garten year (wave 1), fall of 1st grade (wave 3), spring of 1st grade (wave 4), spring of 3rd grade (wave 5), spring of 5th grade (wave 6), spring of 8th grade (wave 7)	Parent	How far in school do you expect [child] to go? Please tell us how far you expect [him/her] to go in school rather than how far you would like for [him/her] to go. Would you say you expect [him/her]: 1: To receive less than a high school diploma? 2: To graduate from high school? 3: To attend two or more years of college? 4: To finish a four- or five-year college degree? 5: To earn a master's degree or equivalent? 6: To finish a Ph.D., MD, or other advanced degree?	*Note: this is the breakdown only for wave 1. The variable itself is made up of responses from 5 other waves; these responses are provided as context.* 1: 0.34% 2: 9.17% 3: 14.06% 4: 47.47% 5: 13.45% 6: 14.80%
Mom_white	Fall of kinder-garten year	Parent	Composite variable created by NCES, so no specific question is associated with it. It seeks to measure whether the child's mother is white.	White: 66.84%
Mom_black	Fall of kinder-garten year	Parent	Composite variable created by NCES, so no specific question is associated with it. It seeks to measure whether the child's mother is black.	Black: 14.98%

Reading_level; *Math_level*: Child's reading and math achievement levels by the eighth grade

- These variables are simply downloaded directly from the ECLS-K survey responses, and they serve as a very simple measure of academic achievement. Both are ordinal variables, and each level reflects an increasing state of proficiency in reading and math, respectively. Specific levels can be seen in Table 16. The "distances" between each level

are not necessarily uniform; rather, the variable seeks to capture overall educational achievement of a child as opposed to what exactly influences a child's placement on the range of proficiency.

LOC: Child's level of locus of control

- The coding for this variable is explained in Appendix B.

Mom_edu: Highest level of education that the child's mother achieved

- The original ECLS-K variable that serves as a baseline for *mom_edu* codes the levels of maternal education as ranging from 1 to 9 (this original breakdown can be seen in Table 16). That original coding means that the ECLS-K variable is purely ordinal; shifting from level 3 to level 4 might not be equivalent to shifting from level 7 to 8 because no weighting is put on the spacing between levels.
- *Mom_edu* is therefore recoded in a way that attempts to weight the levels of education more appropriately. The index was created by assigning a number to each "grade" level and defining "grade" level as number of years in school. This means that 8^{th} grade = 8; 12^{th} grade = 12; college graduate = 16; doctorate/professional degree = 22; etc. With this recoding, the estimate of the coefficient on *mom_edu* can actually be interpreted in terms of years of education achieved rather than a more arbitrary "level."

Fam_income: Total household income, including salaries, interest, retirement, etc.

- This variable is downloaded directly from the ECLS-K results, but it is scaled to thousands of dollars (as opposed to single dollars) so that the results are more easily interpretable.

Single_par: Dummy for whether the household is headed by a single parent

- To create this dummy variable, the original ECLS-K variable is recoded so that responses with values of 3 and 4 (single parent with siblings and single parent with no siblings) are both set to equal 1.

Read_child: Frequency with which a parent used to read to his/her child

- This variable appears exactly as it is presented in the ECLS-K dataset. Beyond the standard cleaning applied to all variables, nothing is changed.

Num_sibs: Number of siblings that the child has by kindergarten

- This variable appears exactly as it is presented in the ECLS-K dataset. Beyond the standard cleaning applied to all variables, nothing is changed.

Edu_expect: Dummy for whether a parent expects his/her child to finish a 4- or 5-year college degree or better (Master's or Ph.D.)

- This variable is a dummy that explains whether, over the course of the survey, a parent ever expects his/her child to achieve a 4- or 5-year college degree (or better). As explained in Table 16, the ECLS-K dataset asks what the parents expect of their child 6 different times throughout the course of the survey. This dummy is coded as 1 if, in at least 3 out of the 6 waves of the survey, the parent indicated that he/she expects his/her child to finish a 4- or 5-year college degree or better (Master's or Ph.D.).

Mom_white; *Mom_black*: Dummies for whether the child's mother is white; black

- These variables appear exactly as they are presented in the ECLS-K dataset. Beyond the standard cleaning applied to all variables, nothing is changed.

11. Bibliography

American Psychoanalytic Association. (2013). Position statement on physical/corporal punishment. Retrieved from https://www.apsa.org/About_APsaA/Position_Statements/Physical_Punishment.aspx. Accessed on 4/18/14.

Aucoin, K.J., Frick, P.J., & Bodin, S.D. (2006). Corporal punishment and child adjustment. *Journal of Applied Developmental Psychology, 27,* 527-541.

Barón, J.D., & Cobb-Clark, D. (2010). Are young people's educational outcomes linked to their sense of control? *IZA Discussion Papers,* No. 4907.

Baumrind, D. (1996). The discipline controversy revisited. *Family Relations, 45,* 405-414.

Becker, G. (1962). Investment in human capital: A theoretical analysis. *The Journal of Political Economy, 70,* 9-49.

Behncke, S. (2009). How do shocks to non-cognitive skills affect test scores? *IZA Discussion Papers, No. 4222*.

Borghans, L., Meijers, H., & Ter Weel, B. (2008). The role of noncognitive skills in explaining cognitive test scores. *Economic Inquiry, 46,* 2-12.

Carton, J.S., & Nowicki, S. (1994). Antecedents of individual differences in locus of control of reinforcement: A critical review. *Genetic, Social, and General Psychology Monographs, 120,* 31-81.

The Center for Effective Discipline. (2010). *Discipline at school (NCACPS)*. Retrieved from: http://www.stophitting.com/index.php?page=statesbanning. Accessed on 4/18/14.

Coleman, M., & DeLeire, T. (2000). An economic model of locus of control and the human capital investment decision. *Journal of Human Resources, 38,* 701-721.

Crocker, J., & Major, B. (1989). Social stigma and self-esteem: The self-protective properties of stigma. *Psychological Review, 96,* 608-630.

Davis-Kean, P.E. (2005). The influence of parent education and family income on child achievement: The indirect role of parental expectations and the home environment. *Journal of Family Psychology, 19,* 294-304.

De Neis, Y. (2012). Should your child be spanked in school? In 19 states, it's legal. Retrieved from ABC News. Retrieved from: http://abcnews.go.com/US/spanking-school-19-states-corporal-punishment-legal/story?id=15932135. Accessed on 4/18/14.

Dodge Reyome, N. (1994). Teacher ratings of the achievement-related classroom behaviors of maltreated and non-maltreated children. *Psychology in the Schools, 31,* 253-260.

Dougherty, C. (2011). *Introduction to Econometrics, 4th Edition.* New York, NY: Oxford University Press, Inc.

Eckenrode, J., Laird, M., & Doris, J. (1993). School performance and disciplinary problems among abused and neglected children. *Developmental Psychology, 29,* 53-62.

Gershoff, E.T. (2002). Corporal punishment by parents and associated child behaviors and experiences: A meta-analytic and theoretical review. *Psychological Bulletin, 128,* 539-579.

Glasgow, K.L., Dornbusch, S.M., Troyer, L., Steinberg, L., & Ritter, P.L. (1997). Parenting styles, adolescents' attributions, and educational outcomes in nine heterogeneous high schools. *Child Development, 68,* 507-529.

Global Initiative to End All Corporal Punishment of Children. (2014). States with full abolition. Retrieved from: http://www.endcorporalpunishment.org/pages/progress/prohib_states.html. Accessed on 4/18/14.

Grusec, J.E., Goodnow, J.J., & Kuczynski, L. (2000). New directions in analyses of parenting contributions to children's acquisition of values. *Child Development, 71,* 205-211.

Hart, C.H., DeWolf, D.M., Wozniak, P., & Burts, D.C. (1992). Maternal and paternal disciplinary styles: Relations with preschoolers'' playground behavioral orientations and peer status. *Child Development, 63,* 879-892.

Hart, C.H., Ladd, G.W., & Burleson, B.R. (1990). Children's expectations of the outcomes of social strategies: Relations with sociometric status and maternal disciplinary styles. *Child Development, 61,* 127-137.

Heckman, J.J. (2008). Schools, skills, and synapses. *Economic Inquiry, 46,* 289-324.

Heckman, J.J., & Kautz, T. (2013). Fostering and measuring skills: Interventions that improve character and cognition. *National Bureau of Economic Research, No. w19656*.

Heckman, J.J., & Rubinstein, Y. (2001). The importance of noncognitive skill: Lessons from the GED testing program. *The American Economic Review*, *91*, 145-149.

Janssens, J. (1994). Authoritarian child rearing, parental locus of control, and the child's behaviour style. *International Journal of Behavioral Development, 17,* 485-501.

Jewell, J.D., Krohn, E.J., Scott, V.G., Carlton, M., & Meinz, E. (2008). The differential impact of mothers' and fathers' discipline on preschool children's home and classroom behavior. *North American Journal of Psychology, 10,* 173-188.

Jordan, N.C., Hanich, L.B., & Kaplan, D. (2003). A longitudinal study of mathematical

competencies in children with specific mathematics versus children with comorbid mathematics and reading difficulties. *Child Development, 74,* 834-850.

Katkovsky, W., Crandall, V.C., & Good, S. (1967). Parental antecedents of children's beliefs in internal-external control of reinforcements in intellectual achievement situations. *Child Development, 38,* 765-776.

Knafo, A., & Plomin, R. (2006). Parental discipline and affection and children's proscocial behavior: Genetic and environmental links. *Journal of Personality and Social Psychology, 90,* 147-164.

Kreig, C.S. (2003). *The link between parental discipline and social behavior among abused and comparison children: Monitoring influences of nurturing parenting style and child gender* (Doctoral dissertation). Available from North Carolina State University Institutional Repository. Retrieved from: http://repository.lib.ncsu.edu/ir/handle/1840.16/4194. Accessed on 4/18/14.

Krevans, J. & Gibbs, J.C. (1996). Parents' use of inductive discipline: Relations to children's empathy and prosocial behavior. *Child Development, 67,* 3263-3277.

Larzelere, R.E. (1996). A review of the outcomes of parental use of nonabusive or customary physical punishment. *Pediatrics, 98,* 824-282.

Larzelere, R.E. (2000). Child outcomes of nonabusive and customary physical punishment by parents: An updated literature review. *Clinical Child and Family Psychology Review, 3,* 199-221.

Larzelere, R.E. & Kuhn, B.R. (2005). Comparing child outcomes of physical punishment and alternative disciplinary tactics: A meta-analysis. *Clinical Child and Family Psychology Review, 8,* 1-37.

Lundberg, S. (2013). The college type: Personality and educational inequality. *Journal of Labor Economics, 31*, 421-441.

MacDonald, A.P. (1971). Internal-external locus of control: Parental antecedents. *Journal of Consulting and Clinical Psychology, 37,* 141-147.

Milner, J.S., & Chilamkurti, C. (1991). Physical child abuse perpetrator characteristics: A review of the literature. *Journal of Interpersonal Violence, 6,* 345-366.

Paolucci, E.O., & Violato, C. (2004). A meta-analysis of the published research on the affective, cognitive, and behavioral effects of corporal punishment. *The Journal of Psychology: Interdisciplinary and Applied, 138,* 197-222.

Pettit, G.S., Bates, J.E., & Dodge, K.A. (1997). Supportive parenting, ecological context, and children's adjustment: A seven-year longitudinal study. *Child Development, 68,* 908-923.

Roberts Gray, M., and Steinberg, L. (1999). Unpacking authoritative parenting: Reassessing a multidimensional construct. *Journal of Marriage and Family, 61,* 574-587.

Ross, C.E., & Broh, B.A. (2000). The roles of self-esteem and the sense of personal control in the academic achievement process. *Sociology of Education, 73,* 270-284.

Rotter, J.B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80*, 1-28.

Steinberg, L., Elmen, J.D., & Mounts, N.S. (1989). Authoritative parenting, psychosocial maturity, and academic success among adolescents. *Child Development, 60,* 1424-1436.

Steinberg, L., Lamborn, S.D., Dornbusch, S.M., & Darling, N. (1992). Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Development, 63,* 1266-1281.

Studenmund, A.H. (2006). *Using econometrics: A practical guide, 5th Edition.* Upper Saddle River, NJ: Pearson Education, Inc.

Tourangeau, K., Nord, C., Lê, T., Sorongon, A. G., & Najarian, M. (2009). Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K): Combined user's manual for the ECLS-K eighth-grade and K-8 full sample data files and electronic codebooks. *National Center for Education Statistics, 2009-004.*

Wang, L., Kick, E., Fraser, J., & Burns, T.J. (1999). Status attainment in America: The roles of locus of control and self-esteem in educational and occupational outcomes. *Sociological Spectrum, 19,* 281-298.

Zussman, J.U. (1978). Relationship of demographic factors to parental discipline techniques. *Developmental Psychology, 14,* 685-686.