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**AGGRESSIVE DISRUPTIVE STUDENTS IN RESTRICTED EDUCATIONAL
PLACEMENTS: MODERATED INFLUENCE OF PLACEMENT HISTORY ON
ADOLESCENT OUTCOMES**

A Dissertation in

Psychology

by

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Abstract

Students who enter school displaying aggressive-disruptive behavior frequently also have co-occurring learning difficulties that significantly interfere with their academic and social adjustment. In order to meet these children's needs and also prevent their disruptive behavior from detracting from other children's educational experiences, these children are frequently educated in restricted settings outside of mainstream classrooms. Previous studies of the effectiveness of this practice suggest that restricted placements have a limited to iatrogenic effect, but the validity of these results is questionable because prior studies have significant methodological short-comings. The present study uses a large sample size and casual inference methodology to address the most problematic methodological short-comings observed in previous studies. The purpose of this study was to examine the long-term impact of placing children with aggressive-disruptive behavior into restricted placements and to further examine the characteristics of students who experience different educational placement histories. The moderating effects of the severity of aggression and learning problems, as well as placement timing (elementary, secondary, and sustained placements) were examined. Students in restricted placements were found to have broad arrays of risk factors across multiple domains. Causal modeling using propensity scores indicated that secondary, but not elementary, restricted placements resulted in increased high-school dropout, depressive symptoms, and conduct problems. The iatrogenic impact of secondary placement was more pronounced for students with greater academic ability. Implications for educating behaviorally at-risk students and future directions for research are discussed.

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Introduction

Children who enter school exhibiting high rates of aggressive and disruptive behavior also frequently present with delayed language and reading development, poor social skills, and emotional dysregulation that interfere with academic and social adjustment to school (Bierman, Smoot, & Aumiller, 1993; Blair, 2002; Hinshaw, 1992a, 1992b). One way that schools frequently attempt to address the needs of these children is to educate them in separate special education or alternative settings, collectively known as restricted placements (Kavale & Forness, 2000; Koot & Verhulst, 1992), where the learning environment is structured to provide more individualized attention and support than the mainstream classroom (Padeliadu & Zigmond, 1996; Vaughn & Klingner, 1998). However, the efficacy of restricted placements for special needs children, and specifically for children exhibiting aggressive-disruptive behavior have been called into question, with some educational advocates calling for the inclusion of all children into mainstream classrooms (Fuchs & Fuchs, 1995; Kavale & Forness, 2000; Salend & Garrick Duhaney, 1999).

The purpose of this study was to examine the long-term impact of placing children with aggressive-disruptive behavior into restricted placements. This study employed a large, longitudinal data set and innovative statistical methodologies to examine the effect of different histories of placement in a restricted classroom setting (elementary only, secondary only, sustained placement, or no placement) on adolescent outcomes. The key question was whether restricted placement was beneficial or harmful in terms of student school success (e.g., high school completion vs. drop out) and mental health symptomatology (conduct problems and depressive symptomatology) for individuals who exhibited high rates of aggressive and disruptive behavior at school entry. Additionally, the possibility was explored that individual differences in the severity of student aggression and degree of learning challenges moderated the impact of restrictive placements.

Definition of Restricted Educational Placements

In an attempt to meet the diverse spectrum of student needs, many school districts use a “cascade of services” model to implement special education programs (Lowenbraun & Affleck, 1978). This model consists of a menu of special education options that range along dimensions of higher restriction (and support) to higher levels of mainstream inclusion (with corresponding lower levels of special education support). Within the context of this study, “restrictive placements” refer to educational placements that reduce the contact a child has with mainstream peers. At the least restrictive end of the spectrum, students may be fully included in the regular education classroom, with an Individualized Education Plan (IEP) that is implemented by the regular education instructor. At a mid-point on this spectrum, a student might receive support from an aide within the mainstream classroom and/or visit a “resource room” for small- group or individual instruction by a special education teacher or aide. At the most restrictive end of the spectrum, children may be assigned to a self-contained classroom for most or all of their day, or in some cases, the child may be placed in an alternative, specialized school to meet his/her educational needs. In the current study, children were considered to be in a restricted educational setting if they were educated outside of the mainstream classroom for an average of 2.5 or more hours each day (approximately three 50-minute class periods or 42% of the typical 6 hour school day).

The Educational Needs of Aggressive-Disruptive Children

Many children who enter school exhibiting high levels of disruptive and aggressive behavior also have co-occurring cognitive impairments including low IQ and attention deficits (Hinshaw, 1992a, 1992b). In addition to academic difficulties resulting from disruptive behavior and learning problems, aggressive behavior may also impair relationships with peers and teachers (Barth, Dunlap, Dane, Lochman, & Wells, 2004; Emmer & Stough, 2001). Due both to their frequent off-task behavior, and their hostile treatment of others, aggressive children often disrupt the mainstream classroom ecology,

increasing the pressure on school teachers and administrators to find an alternative placement, even if it is unclear whether or not it is in the best interest of the individual child. For these children, any single impairment, in the absence of the others, might not be considered severe enough to warrant a more restrictive placement; however, in combination, his or her impairments create significant barriers to learning at the same time that they impair peer relations and make the child particularly difficult for teachers to manage.

Early academic failure along with peer and teacher rejection may trigger a cascade of events which serve to maintain, exacerbate, and diversify the risk that accrues to children with high levels of aggressive-disruptive behavior problems at school entry. Education is cumulative, and early school failure-- in particular, difficulty learning to read--frequently leads to later school failure (Alexander, Entwisle, & Horsey, 1997). Academic and social failure disrupts school bonding, fueling a deviant set of attitudes and beliefs (Catalano & Hawkins, 1996). Upon entering adolescence, aggressive children who are ostracized by mainstream peers often begin to associate with other deviant peers who encourage and support antisocial attitudes and behaviors (Patterson, DeBaryshe, & Ramsey, 1989). By the time they enter high school, these individuals are at higher risk for participating in delinquent behavior (Fergusson & Horwood, 1996), and are more likely to drop out of school (Farmer et al., 2003). Furthermore, having experienced chronic failure in school, and coercive and low-quality interpersonal relationships, these individuals are also at greater risk for experiencing higher rates of depression (Fergusson, Wanner, Vitaro, Horwood, & Swain-Campbell, 2003).

The Controversy Surrounding Restrictive Educational Placements

In the past 35 years, special education policy has shifted toward greater and greater integration of students with special education needs into the mainstream classroom. This trend began with Public Law 94-142: The Education for All Handicapped Children Act (1975), now known as the Individual with Disabilities Education Act (IDEA, 2004) which mandated that, in order to receive federal fiscal support

for special education services, free and appropriate public education within the least-restrictive environment must be provided for all children, regardless of disability. As of the mid-1990's, 73% of students with disabilities received their instruction in a general education classroom and resource rooms, rather than a self-contained special education classroom or school setting (US Dept. of Education, 2006).

The major concern regarding the use of restrictive educational settings is that children who are removed from the regular education setting for significant periods of time typically spend large parts of their day in peer contexts that are comprised, solely or mostly, of other children with special needs, many of whom also have behavior problems and social skills deficits. As a result, children in restricted placements have less exposure to the regular education academic curriculum and few interactions with mainstream peers (Kavale & Forness, 2000). Further, when a child is absent from or repeatedly pulled out of the regular education classroom, the child is identified to his or her peers as being different, and may be subject to the resulting stigma (Christoplos & Renz, 1969). Research evidence suggests that being placed with a less academically or socially competent peer group reduces the pace of a child's academic and social skill acquisition (Foorman, York, Santi, & Francis, in press; Mashburn, Justice, Downer, & Pianta, 2009), and being placed with aggressive peers may exacerbate behavior problems via processes of peer modeling and selective reinforcement (Dishion & Tipsord, 2011).

At the same time that mainstreaming is becoming more common, the inclusion of all students, regardless of severity of disability, into regular education settings remains a controversial idea (Fuchs & Fuchs, 1995; Hornby, 1999; Kavale & Forness, 2000). It may be that the least restrictive environment that best meets some children's needs remains mostly segregated from mainstream peers (Jull, 2008; Snell, 1997). Such placements are typically staffed by specially trained instructors who are knowledgeable about the instructional methods best suited for teaching students with different disabilities (Fuchs & Fuchs, 1995). The teacher-student ratio is lower than in regular education

classrooms, providing more time for more intensive individual attention and careful formative evaluation of each student's progress (Richardson & Parker, 1993). It is also not uncommon for students in restricted settings to lack developmentally appropriate social knowledge (Gresham & Reschly, 1986), which places these children at increased risk of peer rejection and bullying in the less protected general education setting (Vaughn, 1991). Grouping with other, similarly low-skilled peers may produce a friendlier, more accepting environment, and reduce contact with hostile peers.

A motivating reason for this study is to provide information on whether or not, for youth who enter school with elevated behavior problems and learning difficulties, placement in restricted settings is beneficial or harmful to their prospects of completing high school and their psychosocial adjustment (specifically, delinquent and antisocial behavior, and depression) in late adolescence. Teachers, administrators, and parents tasked with determining which intensity of special education services best meets the needs of these children face a difficult task, without clear evidence to support their decisions. On the one hand, the more closely supervised restrictive placement may allow greater focus on behavioral interventions to increase positive behavior, more supervision to quickly interrupt coercive peer interactions, and a structured, more nurturing environment that allows the child to experience more success. Children tend to experience more academic success in restricted classrooms (although at the expense of lowered expectations; Wagner, et al., 2003), and instructors are more likely to be flexible when a child displays undesirable behavior which may help the child to experience classrooms as a less negative experience. For example, one study found that in a regular education classroom, students exhibiting high rates of antisocial behavior received more negative than positive comments from teachers at a ratio of 15:1 (Mayer, 2001). At the same time, pulling a child out of the regular education classroom creates social stigma and decreases the amount of time spent with mainstream peers, where naturalistic interaction and social sanctions against aggression are powerful socializing forces (Killen & Rutland, 2008). Further, in a segregated setting, a child may be grouped with other disruptive peers,

increasing the chances for modeling of deviant behavior and maladaptive interactional styles (Dishion, McCord, & Poulin, 1999; Lacourse, Nagin, Tremblay, Vitaro, & Claes, 2003; Snyder et al., 2005).

Limitations of Previous Studies Examining the Effect of Restricted Placements

Despite a significant body of research on the effect of restricted placements on both academic and social-emotional outcomes, there is not yet a consensus in the literature regarding the benefits vs. costs for students (Farrell, 1997; Hegarty, 1993; Hornby, 1999; Kavale & Forness, 2000; Madden & Slavin, 1983; Manset & Semmel, 1997; Salend & Garrick Duhaney, 1999). Meta-analyses (Baker, 1994; Carlberg & Kavale, 1980; Elbaum, 2002; Wang & Baker, 1985) indicate a slight preponderance of evidence that favors mainstream placements, but the overall effect of placement is frequently small and sometimes not significantly different than zero.

One possible reason for the equivocal results across reviews and meta-analyses is that methodologically stronger studies are mixed with those that have significant methodological flaws, undermining the confidence that one can have in the findings. In particular, two major methodological limitations characterize many of the studies that compare the impact of restricted and mainstream educational placement on student outcomes: small sample sizes and difficulty selecting an adequate comparison group.

Small sample size. Elbaum (2002) identified 36 studies in a review of all empirical studies published between 1975 and 1999 that compared the self-concept of students who were placed in more and less restrictive settings. The mean sample size of the studies was 26, with a standard deviation of 20.7 (range 4 to 120). Similarly, in a meta-analysis of 55 studies on academic interventions for children classified as emotionally and behaviorally disturbed (Mooney, Epstein, Reid, & Nelson, 2003), the mean sample size was 6.5, with a range of 1-42. Sample sizes in this range are generally inadequate to detect meaningful effects of classroom placement; they also make the reliability and generalization of findings uncertain.

Problems with determining a comparison condition. Decisions about special education placement are made by a panel of teachers, administrators, and psychologists who convene to make placement recommendation based on multiple pieces of information including grades, classroom performance, standardized test scores, social functioning, teacher recommendations, and parent preference. This process ensures that placement decisions are *not* random and that children placed in restricted placements have more severe problems, as well as more complex or multi-faceted skill deficits, than children served in less-restrictive placements. Even when studies compare the test scores and other characteristics of children in mainstreamed and restricted educational placements to establish their comparability, there is the risk that slight differences that do not reach statistical significance or differences on unmeasured variables introduce selection biases that will always favor the outcomes of children placed in less restricted placements. Furthermore, randomized controlled trials are not an option to evaluate the impact of restricted placements because the Education for All Handicapped Children Act in 1975 mandated that children be educated in the least restrictive environment.

Selected Review of Special Education Placement

In order to address the limitations of previous reviews and meta-analyses, the review that follows focuses selectively on methodologically stronger studies published within the last twenty years. To be considered for inclusion here, studies had to meet two criteria. First, a minimum sample size of fifty students (pooled across groups) was required. Second, studies had to examine the effect of the outcomes of children in restricted placements with a comparable group of children in more inclusive placements (for example, studies that compared mainstreamed children with disabilities to mainstream children without disabilities were excluded). Within the last twenty years, only six research projects (some with multiple studies) were identified that met these two review criteria. Among these six studies, two different strategies were used to address the methodological challenge of finding comparable groups of students placed in mainstream and restricted placements.

Natural experiments. Three studies leveraged policy differences across otherwise comparable schools in natural experiments: some schools have policies of greater inclusion, while others employ greater use of restricted placements. Across schools and districts with different policies, children with equivalent problem severity may receive two different placements. While this type of methodology addresses the selection effects at the individual level, it introduces bias at the school level. Even when equivalent on other variables, schools that are more interested in including all students may have different environments, philosophies, and efficacy than schools that are more interested in meeting student needs through restricted placements. Given the small number of schools included in each of the reviewed studies, school-level biases remain a serious concern.

Wiener and Tardif (2004) examined the social-emotional functioning of 117 children and adolescents with learning disabilities in grades 4-8 in two suburban school districts near Toronto, Canada. The two districts had differing philosophies on inclusive vs. restricted placements, and children received more or less restrictive placement depending on the district where they attended school. Students with milder learning disabilities (LD) in more restricted settings were less accepted by peers, had lower self-perceptions of academic competence and had more behavior problems. Students with more severe LD in more restricted settings had less satisfying relationships with a best friend, rated themselves as more lonely, and also had more behavior problems.

Waldron and McLesky (1998) examined the achievement differences in students with LD (N=71) from 3 schools which recently switched to an inclusive policy and compared them with students with LD (n=73) from 3 schools in same district, where the schools volunteered to implement inclusion programming, but had not yet done so. Students were in grades 2 through 6 and were comparable on IQ, and baseline math and reading achievement. Students who were moved to inclusive classrooms made greater gains in reading, but not math, compared with students in more restricted placements.

A third study examined all 8th grade students with learning disabilities in two different middle schools in a suburban district in the southeast (N = 36 and 22 respectively; Rea, McLaughlin, & Walther-Thomas, 2002). Students in one school received special education services through inclusive general education placements. Student in the other school received special education services through a resource “pullout” model. Children in the two conditions were examined for equivalence on a number of potentially confounding variables. Students receiving services through the more restricted “pullout” model had lower grades, achieved lower scores on standardized tests, and attended school less frequently than students in the less restrictive settings.

In summary, across these three studies that used a quasi-experimental design to compare the outcomes of children with similar learning problems who received mainstreamed or more restrictive special education service delivery, the mainstreamed service delivery appeared beneficial to students, promoting more positive peer relations and self-perceptions, better school attendance, higher academic achievement, and fewer behavior problems. However, these effects may have been due to school differences or unmeasured child characteristics – selection biases that cannot be ruled out with the quasi-experimental design that was utilized in these studies.

Covariate approach. The second group of studies handled the problem of non-equivalent groups by including a number of covariates in an attempt to statistically control for differences between mainstreamed students and those in restricted placements. When used to compare two nonequivalent groups, the validity of this method is based on two dubious assumptions: first, that the outcomes vary in a linear fashion with the covariates, and second, that the relationship between the covariates and the outcomes are the same for individuals in mainstreamed and restricted placements. In reality, this is rarely the case (Schafer & Kang, 2008), limiting the interpretation of the effects and perhaps biasing the outcome. Even if both assumptions hold, a second problem with this approach is that the meaning of the between group difference changes with each covariate entered. For example, the (unconditional)

overall effect, and the overall effect controlling for gender are two entirely different effects, with different meanings and interpretations. Especially when large numbers of covariates are used, both interpreting the results and replicating the findings can be a challenge.

Perhaps because of these greater methodological challenges, these studies reveal a more mixed pattern of findings than the natural experiments. The National Longitudinal Transition Study (Wagner, et al., 1993) and its follow up, the National Longitudinal Study-2 (Wagner, et al., 2003) were large-scale (N = 8,000 and 12,000 respectively) nationally-representative studies that examined the transition of students with disabilities as they left high-school and entered early adulthood. Outcomes for students who took more and fewer classes in regular education settings were examined after controlling for a set of youth, household, and school characteristics. Across these two studies, students in general education classes had levels of achievement closer to their normative peers, as assessed by standardized tests in reading and math. These results were qualified, however, by the fact that students who took more regular education classes had a lower GPA, and in the earlier study, were more likely to fail their courses and drop out.

One interpretation of these findings is that general education classrooms had higher standards, so students in those classes learned more, but were less successful meeting the more stringent criteria for success. Socially, the NLTS and NLTS-2 studies produced mixed results on several outcomes. The NLTS-2 results favored regular education placements, with students who took more classes in restricted settings being less likely to belong to groups and more likely to receive disciplinary action. The earlier NLTS study, however, found contradictory results; lower performing students were more likely to receive the greater teacher-rated behavior problems in general education classes than in more restricted placements.

A set of Norwegian studies by Myklebust (2002, 2006) examined 592, and 494 (respectively) upper secondary students with general learning problems and special education needs. In these studies,

students educated in regular education settings were compared to students who received small group instruction outside of the classroom. In both studies, students with special education needs who were educated in the general education classrooms had greater educational attainment than those who were educated in more restrictive settings. Thirteen problem indicators were used to create an additive index of “functional level,” and students in regular education placements outperformed students in restricted placements in each quartile of “functional level” except the lowest (where they were equivalent). However, these results are again qualified by the fact that student dropout of secondary education was higher among the group educated exclusively within the regular education system, replicating findings in the US from the National Longitudinal Transition Study (Wagner, et al., 1993).

Lastly, a large-scale longitudinal Dutch study followed 400 matched pairs of elementary school children for four years (Karsten, Peetsma, Roeleveld, & Vergeer, 2001; Peetsma, Vergeer, Roeleveld, & Karsten, 2001). Students in special education schools (which is the way that students with special education needs are educated in the Netherlands) were matched with students performing in the bottom 20% of the regular education classroom. Students were matched on gender, ethnicity, SES, and age. Students who were in more restricted special education classrooms made less academic progress than their matched peers in more inclusive settings.

Limitations of previous studies. Educational policy and advocacy strongly support mainstreamed services for special education students, but schools continue to use restrictive placements. Although the impact of restrictive placement on student academic and behavioral outcomes has been examined by numerous studies, most of the studies have used non-equivalent comparison samples -- simply comparing the progress of students in special education classrooms with the progress of students in mainstreamed classrooms without controlling for selection biases. The few studies that have utilized more equivalent comparison groups and attempted to control for selection biases in student characteristics suggest that students who remain in mainstream settings generally

outperform those students in restricted settings, with some caveats. At the same time, these studies are still flawed methodologically, and fail to provide adequate control for the selection biases associated with special education placement. That is, while each of the studies mentioned attempted to find a comparable control group, for the reasons mentioned above the methodologies used fall short, and sometimes far short, of the level of evidence of a randomized trial. Relatively recent advances in methodological techniques for reducing bias in quasi-experimental studies, namely propensity scoring, are now available. These methods have been shown to reduce the effect of selection bias (Rosenbaum & Rubin, 1983) and are being widely used in fields where experimental studies are often difficult or impossible to conduct, like economics and epidemiology.

In addition, the reviewed studies are based on a population of all children in restricted placements, which includes students with learning disabilities, students with mental retardation, students with emotional and behavioral disturbances, and other categories of disability. No study to date has specifically examined the group of students who present primarily with aggressive and disruptive behavior, and whether they have better outcomes in mainstream placements or in restricted settings. There are several issues that may be particularly relevant for these students, which may be less relevant for students with other categories of disability. For students with aggressive and disruptive behavior, the timing of placement in a restricted setting may be important. It may be that restricted placements may be particularly iatrogenic in secondary school, when deviant peer influences are thought to be most powerful, whereas in elementary school restricted placements may be more benign or helpful. Additionally, considerable heterogeneity exists in the behavioral and cognitive deficits displayed by children who enter school exhibiting high rates of aggressive and disruptive behavior which may moderate the impact of restricted educational placements. In particular, the severity of a child's aggressive-disruptive behavior and level of co-occurring cognitive deficits may be important predictors of the need for and success of restricted placements for aggressive-disruptive individuals.

Impact of Timing of Restricted Placements

The original hope for restricted placements was that they would occur early on in a child's educational career and serve a remedial function, alleviating the need for later placements in secondary school (Lerner, 1977). Unfortunately, current knowledge suggests this idea is mostly unrealistic given that the number of children in restricted settings increases rather than decreases in the secondary grades (U.S. Department of Education, 2006). Children placed in restricted placements during the elementary school years rarely return to mainstream classrooms. In addition, a number of new students are placed in restricted placements for the first time during secondary school after an unsuccessful transition into middle school or high school. It may be that while some adolescents first enter restricted placements in secondary school because they can no longer succeed in the increasingly rigorous academic environment of the secondary schools, other children enter restricted placements in large part due to antisocial behavior. As such, both the classroom composition of restrictive placements and the educational priorities and instructional strategies used in these placements may be different in the elementary and secondary grades. It may be that the timing of restricted placements is an important factor that influences their impact on adolescent outcomes.

Secondary school placement. Developmental models of aggression and delinquent conduct indicate that association with deviant peers during adolescence is a particularly strong predictor of delinquent and antisocial behavior (Patterson et al., 1989). Both the density of peers with behavior problems (Haynie, 2001) and the deviancy of peers the adolescent considers to be friends (Vitaro, Brendgen, & Tremblay, 2000) impact an individual's antisocial behavior. During the secondary school years, placing adolescents in restricted settings may increase their contact with deviant peers at the same time that stigma associated with non-mainstream placements contributes to problematic relationships with mainstream peers, who may be particularly sensitive to differences in others at that

age. Deviant peer processes at this age are powerful enough that even grouping deviant adolescents in the context of interventions designed to prevent delinquency is contraindicated (Dishion et al., 1999).

Additionally, in the secondary grades adolescents become particularly sensitive to social comparison (Gibbons, Gerrard, & Lane, 2003), and pressure to conform to group norms is intense (Brown, Clasen, & Eicher, 1986). Being removed from the mainstream classroom may be perceived as a clear message of failure, which may decrease motivation and increase apathy and school disengagement (D. Simpson & Joe, 1993; Vallerand, Fortier, & Guay, 1997), fueling the elevated rates of depression and dropout experienced by aggressive-disruptive adolescents (Garber, Quiggle, Panak, & Dodge, 1991). Focusing on students who entered school displaying aggressive-disruptive behavior, the first hypothesis tested by this study was that restricted placements in secondary school would predict increased high-school dropout, increased antisocial and delinquent behavior, and higher rates of depression relative to placements in mainstreamed classrooms.

Elementary school placement. Almost nothing is known about the impact of restricted placement in elementary school on distal outcomes at the end of high school. This is in large part because longitudinal datasets designed to assess special education participation rarely exist for such a long span of time. A second major obstacle to examining the impact of elementary placements on outcomes in high school is that early placement in restricted settings is usually confounded by later placement. When placement is continuous, then even if early placement predicted harmful outcomes at later times, causal interpretation of the temporal etiology of iatrogenic effect is unclear. By using a longitudinal design and deconstructing the placement history into early and later placements, the present study sought to determine the causal effect of both early and later restricted placements on adolescent outcomes at the transition out of secondary education.

Studies of restricted placements which measure outcomes prior to entry into secondary school suggest that mainstream placements outperform restricted placements on both psychosocial and

academic outcomes. For example, in one of these studies, students placed in restricted settings in elementary school were less accepted by peers and had more behavior problems than comparable peers in a mainstream setting (Wiener & Tardif, 2004). Similarly, students tended to lose, rather than gain ground academically, when placed in restricted placements (Rafferty, Piscitelli, & Boettcher, 2003). Thus, for children who enter school exhibiting aggressive and disruptive behavior, restricted placements may exacerbate their behavior problems and academic deficits, contributing to more severe problems in secondary school, than if they had remained in a mainstream setting. As such, the second hypothesis tested in this study was that restricted placements in elementary school will predict high-school dropout, antisocial and delinquent behavior, and depression, above and beyond that of secondary education.

Moderating Impact of Aggressive-Disruptive Behavior.

Aggressive-disruptive behaviors present a different kind of challenge in school settings than do cognitive difficulties. Whereas students with more severe cognitive impairments are likely to elicit greater amounts of instructional support from teachers, students with increasingly severe aggressive and oppositional behavior are more likely to evoke frustration and anger, and to elicit punitive sanctions from teachers (Reinke & Herman, 2002). Aggressive, oppositional behavior is the primary reason for exclusion from school (in the form of suspensions and expulsion) and leads to less positive and more conflictual relationships with teachers (Jull, 2008). The high rates of school failure and dropout experienced by aggressive students, compared with other students with disabilities underscores this problem (Wagner & Cameto, 2004).

A meta-analysis of students classified as Emotionally and Behaviorally Disordered (EBD), many of whom exhibit elevated rates of aggressive-disruptive behavior, documented a mean level of academic functioning at the 25th percentile, a gap that does not close as students age (Reid, Gonzalez, Nordness, Trout, & Epstein, 2004). Theoretically, restricted environments allow greater focus on

behavioral support (Evans, Harden, & Thomas, 2004), management by teachers and paraprofessional staff with special training who are more knowledgeable about effective, non-exclusionary behavioral management strategies (Safran & Safran, 1984), and modified curricula (Fuchs & Fuchs, 1995), which are all designed to benefit students with high levels of behavior problems. A meta-analysis of 50 empirical studies provides some limited data that suggests that these supports are helpful, finding that for students with behavioral disorders, special education classes were more effective than mainstream classrooms (Carlberg & Kavale, 1980). However, more recent studies comparing self-contained classrooms to more restrictive self-contained schools found that students with EBD performed better in the less restrictive self-contained classrooms (Lane, Wehby, Little, & Cooley, 2005a, 2005b)—though it is not known whether this finding would generalize to a mainstream placement. The third hypothesis tested in this study was that the effect of restricted placements would be moderated by aggressive-disruptive behavior, such that children with more severe behavior problems benefit more from restricted placement. Confirmation of this hypothesis would indicate that the increased teacher-to-student ratio, modified curriculum, and greater behavioral supports are more helpful to children when their behavior problems are more severe.

Moderating Impact of Academic Aptitude.

Many children who enter school exhibiting aggressive and disruptive behavior also exhibit low IQ (particularly verbal IQ) and poor attentional control that contribute to academic difficulties (Hinshaw, 1992a, 1992b). Conceptually, the increased resources and attention that children could receive in restrictive special education classrooms would be beneficial for students who may feel overwhelmed by the academic pace of regular education classrooms (Fuchs & Fuchs, 1995). With reduced numbers of children in the class, there are fewer distractions. Additionally, restricted classrooms typically have additional paraprofessional support and specially trained teachers to help students stay on task, and to provide more individualized instruction. The final hypothesis tested in this study was that the effect of

restricted placements would be moderated by academic aptitude such that children with less academic ability would benefit more from restricted placement, indicating that the decreased pace and greater instructional supports are more helpful when learning problems are more severe.

Confounding Influences on Educational Placement and Adolescent Outcomes

There are many variables that would increase the chance of a child being placed in a restrictive setting and that would also predict poor academic and mental health outcomes. Children in special education placements have significant presenting problems that affect decisions about their placement in restrictive settings (Donovan & Cross, 2002; Mann, McCartney, & Park, 2007; Wagner, Blackorby, & Hebbler, 1993; Wagner, et al. 2003; Zigmond & Sansone, 1986). The sample of children selected for restrictive placement is heterogeneous, but as a group these children have more serious academic difficulties, lower IQ, and higher levels of disruptive and oppositional behavior than children in mainstreamed settings. Most children in special education placements have academic difficulties, and are identified as either learning disabled [LD] (46%), mentally retarded [MR] (9%) or emotionally and behaviorally disturbed [EBD], (8%).

In addition, there are a number of other child characteristics that are associated with academic difficulties and behavior problems that characterized many of the children placed in restrictive settings. For example, children diagnosed with Attention Deficit-Hyperactivity Disorder (ADHD) are more likely to be identified for special education (Wagner, et al., 2003). These children typically have difficulty regulating behavior (ex. staying in their seat) and maintaining attention long enough to learn material and complete assignments, which both contribute to their poor academic performance (Barkley, Anastopoulos, Guevermont, & Fletcher, 1991). Additionally, while deficits in social skills are not, in and of themselves, a categorizable disability, classifications of LD and EBD often involve a degree of judgment in addition to more objective criteria (Harry & Anderson, 1994), and students who violate

social norms or who are rejected by their peers are more likely to be identified for special education (Kavale & Forness, 1996).

In addition to these child characteristics, the early developmental experiences and social, family, and neighborhood contexts experienced by students selected for restrictive educational settings may vary from those of students who are served in mainstreamed settings. Factors that are outside of the school setting influence (positively or negatively) learning and achievement. Parental qualities such as involvement in school and warm and sensitive disciplinary practices (or the opposite-- harsh, neglectful parenting) influence a child's early academic and behavioral readiness for school (N. Hill & Taylor, 2004; Spera, 2005). Environmental factors in the home such as a stimulating and child friendly home or unsafe or disorganized neighborhoods (Davis-Kean, 2005; Dubow & Ippolito, 1994) are associated with greater achievement. The family stresses like parental depression or substance use also impact child development and the amount of adult attention and monitoring provided to that child (Astone & McLanahan, 1991; Cummings & Davies, 1994; Johnston, 1995). While a more distal influence of educational placement than child characteristics, family and neighborhood influences exert their influence over multiple years, often creating chronic stresses and liabilities that can interfere with school success and increase the chances that a child qualifies for special education.

Lastly, certain groups of individuals are frequently found to be overrepresented in special education placements. While these demographic characteristics are not in and of themselves explanatory, they serve as important predictors of who is identified for special education. Students from low socio-economic backgrounds (Dunn, 1968), racial minorities (particularly African American; Donovan & Cross, 2002; Oswald, Coutinho, Best, & Singh, 1999), and males (U. S. Department of Education, 2007) are more likely to be identified for special education and self-contained classrooms.

Studies that do not carefully control for the myriad factors confounding the effects of special education placement on the outcomes that are examined will, in almost all cases, bias results against

more restrictive settings (where children with more severe problems are preferentially placed). It is possible that all prior studies are affected by this bias. The present study was the first to employ a propensity score methodology, which is better suited to addressing this problem.

The Present Study

Students who enter school exhibiting high rates of aggressive-disruptive behavior frequently trigger a cascade of negative consequences that contributes to higher rates of high-school non-completion, increased levels of antisocial and delinquent behavior, and greater incidences of depression. The primary aim of this study was to assess the impact of histories of restricted educational placements in elementary and secondary school on these outcomes in later adolescence. This study introduces several new innovations to the literature. It is the first study to use propensity scoring methodology to address the methodological limitations of previous studies that have examined the impact of mainstream vs. restricted educational placements. By using propensity scores to weight the mainstream sample, a comparison group was generated that was equivalent to the group who experienced restricted settings on a large number of variables, reducing or eliminating selection bias. Specifically, in order to account for differences between children in restricted placement and those in general education settings, five categories of confounders were included in the propensity model: child cognitive and achievement characteristics, child behavioral characteristics, child-and-family demographics, family-and-neighborhood characteristics and family-school relationship characteristics. From across these domains, 33 confounders (24 confounders measured prior to elementary placements and 7 time-varying confounders measured again prior to secondary placement) were selected based on empirical and theoretical relationship to both restricted classroom placement and psychosocial and achievement outcomes (Donovan & Cross, 2002; Mann et al., 2007; Wagner, Blackorby, & Hebbler, 1993; Wagner, et al. 2003; Zigmond & Sansone, 1986).

Additionally, this is the first study to examine the impact of the timing of restricted placements on adolescent outcomes. Because of important differences between the elementary and secondary school contexts, the timing of exposure to restricted placements may play an important role in affecting the impact of such placement on children entering school with aggressive and disruptive behavior problems. Lastly, this study examines several variables that may moderate the impact of restricted placements on aggressive-disruptive youth, namely: severity of behavior problems, and low academic aptitude.

To better understand how histories of restricted placements for aggressive-disruptive individuals affect academic and psychosocial outcomes at the end of secondary school, the following hypotheses were tested:

Hypothesis 1: Based on prior studies examining the effect of restricted placement on academic and social outcomes, it was hypothesized that restricted placements in secondary school would predict increased high-school dropout, increased antisocial and delinquent behavior, and higher rates of depression.

Hypothesis 2: Sustained restricted placements (placement in both elementary and secondary school) will predict higher levels of high-school dropout, antisocial and delinquent behavior, and depression, than placement in secondary school only.

Hypothesis 3: The effect of restricted placements will be moderated by aggressive-disruptive behavior, such that children with more disruptive behavior will be less negatively impacted by restricted placements, indicating that the increased behavior supports are more helpful when behavioral problems are more severe.

Hypothesis 4: The effect of restricted placements will be moderated by academic aptitude, such that children with less academic ability benefit more from restricted

placement, indicating that the decreased pace and greater instructional supports are more helpful when learning problems are more severe.

Methods

Participants

Data analyzed in the present study were collected as part of a larger longitudinal investigation of the development and prevention of conduct disorders (Fast Track Program, see CPPRG, 1992, 1999). The data are from three consecutive-year cohorts totaling 1199 children from 4 sites across the United States. The sample for this study consisted of the “high-risk” sample participating in the Fast Track study. The high-risk sample included 445 participants in the preventive intervention group, and 446 children in the high-risk control group. Of these 891 participants, 117 were identified as being in a restricted placement in elementary school and 272 were identified as being in restricted placements in secondary school. All participants were drawn from four demographically and geographically diverse locations in the United States -- Durham, North Carolina, Nashville, Tennessee, Seattle, Washington, and several towns in rural central Pennsylvania—that were selected for the study based on their high crime and poverty statistics. Durham is a small city with a mostly African-American population. Nashville and Seattle are moderately-sized cities with a mixed ethnicity population consisting of mostly African- and European-Americans. Central Pennsylvania is a rural location with a predominantly European-American population. The sample was ethnically diverse (48% White, 49% Black, 3% other) and contained more males than females (63% male). The mean age of the students at the time they were identified was 6.5 years ($SD = .48$).

Screening and Sample Recruitment

High-risk participants were selected using a multi-gate screening process during their kindergarten year. All kindergarten teachers in the original 55 schools selected to participate in the Fast Track project assessed the aggressive-disruptive behavior of all the students in their classroom using the Authority Acceptance subscale of the Teacher Observation of Classroom Adaption- Revised (TOCA-R; Werthamer-Larsson, Kellam, & Wheeler, 1991). This scale included 10 items describing aggressive-

disruptive behavior (e.g., fights, argues, disobedient). Follow-up parent assessments were conducted for the 40% of the children who were rated by teachers as most elevated in aggressive-disruptive behavior at each site. Parents were contacted in person or on the phone and were asked to rate their children's behavior on a 24-item scale that consisted of the Aggression scales of the Child Behavior Checklist (CBCL; Achenbach, 1991) and the revised Problem Behavior Checklist (Quay & Peterson, 1987). The sum score of the parent and teacher measures were averaged to create a severity-of-risk screen score, and children were invited to participate in the study moving from the highest score downward until desired sample sizes were reached within sites, cohorts, and conditions. The average child t-scores on the externalizing scales of the kindergarten teachers Child Behavior Checklist -Teacher Report Form and Parent Report Form (Achenbach, 1991) were 66.3 and 61.3, respectively. Participating children were assigned to the intervention or control condition at the start of first grade (after initial assessments), based upon the school they attended in the fall of first grade.

Study Procedures

During the course of the study, parent- and child-reported measures were collected during home visits conducted during the summer. During home visits, one research assistant interviewed the primary caregiver (usually the mother). Children were interviewed separately, in another room, by a second research assistant. The research assistants read the questionnaires to both parents and children and noted their response. Additionally, during the home visits in the summer after kindergarten through 3rd grade, each mother and child participated in the Parent-Child Interaction Task (PCIT; Crnic & Greenberg, 1990), a semi-structured series of four dyadic activities including a child-led activity (5 minutes), a parent-led activity (5 minutes), a challenge task (where children were asked to build a developmentally challenging Lego structure, and parents were asked to only give verbal aid, 5 minutes) and clean-up (3 minutes).

In the spring of each year, high-risk and normative participants' teachers were asked to complete a series of measures that assessed behavior problems and social competence. The measures that a teacher was asked to complete changed depending on the child's grade. Teachers were compensated \$10 per child for completing the measures. School records of the presence and type of special education classification children may have received were collected each year, including the number of minutes per week that a child spent in resource- and self-contained-placements. All study procedures were reviewed and approved by the Institutional Review Boards of each of the participating universities.

Measures.

Outcomes. Adolescent mental-health outcomes of conduct-disorder and major depressive symptomatology were assessed when youth were in 12th grade via combined parent- and child-report on the Diagnostic Interview Schedule for Children (DISC; Schafer & Fischer, 1997). The DISC was designed to be given by lay interviewers to assess DSM-IV psychiatric symptoms and diagnoses in epidemiological research. During the interview process, items were organized by diagnosis. Adolescents and parents were interviewed separately and were asked if the adolescent experienced specific symptoms of a given diagnosis; follow-up questions were asked if a given symptom was endorsed. Responses include "No," "Yes", "Not applicable," or "Don't know." Because adolescents and parents have complementary strengths and limitations (i. e., adolescents may censor their responses because of social desirability, and parents may be less able to report on covert antisocial behavior or less overt depressive symptoms), a given symptom was considered endorsed if either the parent or child (or both) endorsed the symptom.

Because empirical evidence indicates that clinical and subclinical levels of symptomatology appear to be on a continuum in terms of their relationship to functional impairments and prognostic information (Maser et al., 2009), symptom counts of the two mental health outcomes were used to

retain the maximum amount of information, rather than just distinguishing between diagnosis/no diagnosis. There are a total of fifteen possible symptoms for Conduct Disorder, and nine possible symptoms for Major Depressive Disorder.

Failure to complete high school was assessed from school records in years 12 through 15 of the Fast Track Study (up to two years after a student who had never been retained or dropped out of school would have received a diploma). The School Records measure is a modified version of the School Archival Records Search (SARS; Walker, et al., 1991). The purpose of the School Records measure was to quantify school record data, which were reviewed after the end of the academic year. If school records indicated that a student had completed twelfth grade, they were considered to have completed high school. If information from school records was missing, information from participant interviews were used. In study years 13-15, participants were interviewed and asked “what is the highest degree you have received or grade you have completed?” Students who indicated that they were a high school graduate, or had attended some or graduated from college were considered high-school completers. Students who indicated they had received a GED by year 15 were also considered to be high-school completers.

Placement. Children’s placement was assessed in a review of school records, focusing on the two time points of the elementary grades (1-4) and secondary grades (7-10). Children were considered to be in a restrictive placement if they met any one of three criteria: 1) spending more than 750 minutes per week (averaging 2.5 hours a day, or roughly three 50- minute class periods) outside of the regular classroom (including learning support and resource rooms); 2) being placed in a self-contained classroom (regardless of number of minutes); and 3) being placed in an alternative school environment (excluding home schooling), a residential restricted placement facility, or an alternative school. Children’s class placements were determined each year, but combined across years to designate participation in a restricted placement during the elementary or secondary years. Placement indicators

are scored as 1 (child was in a restricted placement for one or more years) or 0 (child was never in a restricted placement) for both the elementary grade (1-4) and secondary grade (7-10) intervals. This coding scheme was used because there were insufficient numbers of students entering restricted placements each year to reliably estimate the impact of one or several years of placement. Grades 5 and 6 were excluded from these analyses because students in different schools transitioned to secondary school at different times. Different transition times created a lack of comparability across schools in terms of whether 5th and 6th grade placements were considered “elementary” or “secondary.”

Moderators. Academic aptitude and aggressive-disruptive behavior at school entry were examined as moderators. Aggressive-oppositional behavior was assessed using the Authority Acceptance Subscale of the Teacher Observation of Classroom Adaptation—Revised (TOCA-R; Werthamer-Larsson et al., 1991). As noted earlier, this scale includes 10 items describing aggressive and oppositional behavior, including “fights,” “breaks rules,” “takes others’ property,” and “harms others.” Items are rated on a scale from 0 (*almost never*) to 5 (*almost always*). The TOCA-R has an adequate test-retest reliability (Pearson’s correlation coefficient ranging from .75 to .94 two weeks later) and the authority acceptance scale has adequate internal reliability ($\alpha = .95$; Werthamer-Larsson et al., 1991) and predictive validity (Hill, Coie, Lochman, Greenberg, & CPPRG, 2004; Lochman & Conduct Problems Prevention Research, 1995).

Academic aptitude was calculated as a composite score of measures of IQ and attention problems. Verbal and non-verbal IQ was assessed in kindergarten with the WISC-R Vocabulary and Block Design subtests respectively. Standard scores were calculated for each subtest. Attention problems were assessed in kindergarten by teacher report using the Attention Problems Syndrome Scale of the Child Behavior Checklist- Teacher Report Form (Achenbach, 1991). The Attention Problems scale has adequate internal reliability ($\alpha = .95$) and has good criterion and predictive validity (Achenbach, 1991). To create the composite IQ/attention problem score as a measure of academic aptitude,

children's IQ and attention problem subscale scores were standardized ($M = 0$, $SD = 1$) to ensure equal weighting and averaged together. The standardized IQ score was reversed prior to averaging such that a higher score on both the measure of IQ and attention problems would indicate worse cognitive performance.

Confounding variables. In order to increase the internal validity of the causal inferences, 33 variables that were either empirically or theoretically related to both educational placement and outcomes were included in the propensity score models. Five categories of confounders were selected: child demographics, child behavioral characteristics, child academic characteristics, family-and-home-environment characteristics, and family-relationship-with-school characteristics. Unless otherwise noted, confounders included in propensity models for elementary self-contained placement were measured in kindergarten, prior to the initiation of any self-contained placement and prior to the initiation of the Fast Track intervention. Propensity models for secondary self-contained placement included all of the confounders in the first model and additional confounders measured in fifth grade prior to secondary school placements.

The following child demographics were included as confounders: age, ethnicity, and gender. Based on their birthday, child age was assessed in months at the beginning of their 1st grade year. Ethnicity, reported by the primary caregiver, was dichotomized (Black = 1; Caucasian and non-Black minority = 0).

The following child cognitive characteristics were included as confounders: academic achievement and learning problems. Low Academic Aptitude was included as a confounder when not being examined as a moderator. Early academic achievement was assessed in kindergarten with the Spache Diagnostic Reading scales (cohorts 2 and 3, only; Spache, 1963) or the Woodcock-Johnson Letter-Word Identification subtest (cohort 1; Woodcock, 1989), and the Woodcock-Johnson Calculation

subtest (cohort 1; Woodcock, 1989). Academic achievement was assessed again in 5th grade with the Woodcock Johnson-Revised Calculation, Letter-word, and Passage Comprehension subtests.

Child behavioral characteristics that were included as confounders included: broad-band externalizing and internalizing problems, attention problems, and peer acceptance. Aggressive-disruptive behavior was included as a confounder when not being examined as a moderator. Broad-band externalizing and internalizing problems were assessed in kindergarten and 5th grade with the Child Behavior Checklist- Teacher Report Form ($\alpha = .97$ and $.85$, respectively; Achenbach, 1991). Attention problems was assessed with the Attention Problems subscale of the Child Behavior Checklist- Teacher Report Form ($\alpha = .82$). Peer acceptance was assessed in 1st grade by sociometric ratings. Peers were asked to rate how much they liked to play with each child in their classroom, using a 3-point scale. Each child's average rating was used. Sociometric ratings were not available in kindergarten or 5th grade.

The following family and home environment characteristics were included as confounders: parent discipline practices and warmth, maternal depression, stimulating home environment, neighborhood safety, family socioeconomic status, and maternal substance problems. Observer ratings of parenting behavior were assessed in kindergarten and 5th grade using a 60-item post-visit reaction inventory completed by parent and child interviewers within 24-hours of a home visit that was part of the procedures of the Fast Track program. The Harsh/physical discipline and Parent Warmth toward Child subscales were used (both $\alpha = .79$; www.fasttrackproject.org). Different subscales from the same inventory were used to assess the stimulation in the home environment. The Child-friendly interior and Home Environment Subscales were combined to create an 11-item scale that assesses the child's physical home environment, including ratings on topics such as whether the child has adequate play areas, age-appropriate toys for the child, space for their things, and cleanliness of the home. The neighborhood safety (e.g., frequency of mugging/burglary) subscale of the Neighborhood Questionnaire, a 16-item measure completed by parents that assesses characteristics of the

neighborhood, was used as a measure of neighborhood safety. Maternal depression was assessed with the 20-item Center for Epidemiological Studies Depression Scale (CES-D scale; Radloff, 1977). Maternal substance problems were assessed when the child was in 2nd grade using self-reports of alcohol or drug problems during interviews with parents. Family socioeconomic status was assessed in kindergarten and again in 7th grade using the Hollingshead (1975) scoring system.

The following family-school relationship variables were included as confounders: maternal education, whether or not the child attended preschool and parental school involvement. Preschool attendance (1 = ever attended, 0 = never attended) was assessed via parent report on a questionnaire. Parents were asked whether their child attended Head Start or any other preschool program during the preschool years, and their answers were coded as 1 (attended preschool) or 0 (did not attend preschool). Highest level of parental education was assessed via parent report in kindergarten and 5th grade. Education was assessed on a 7 point scale (0 = no high-school experience, 3 = high school diploma or GED to 6 = some graduate education). Parent and teacher involvement was assessed by teachers in kindergarten and 5th grade using the 21-item Parent & Teacher Involvement Questionnaire developed for the Fast Track Project (www.fasttrackproject.org).

In addition, the Fast Track location (Durham, Pennsylvania, Seattle, Nashville) were dummy coded and included as variables in the propensity model. Also, because both the intervention and control groups of the Fast Track Study were included in the sample, intervention condition was also included in the propensity model (intervention = 1, control = 0).

Results

Preliminary Analyses

Prior to all analyses, data was examined for outliers. Outliers due to coding errors were set to missing. Outliers that represented plausible values were set to the value of the highest non-outlying data value. Next, missing data were imputed using SAS Proc MI (SAS/STAT software, Version 9.2 of the SAS System for Windows, 2002). All outcomes, moderators, confounders, and interactions used in the analyses were included in the imputation models. Additionally, restricted educational placement, and assessments of the confounding variables from 1st and 6th grade (where available) were included as auxiliary variables to improve the precision of the imputation. The EM algorithm of Proc MI converged normally after 53 iterations. Fifty datasets were imputed in order to increase the precision of the estimate of between-imputation variance, given a concern that the use of imputed data to create weights may increase the between-imputation variance (Schafer & Olsen, 1998). Weights and analyses were calculated for each imputed dataset. Results were combined across imputations using Rubin's Rules (Rubin, 1987).

Characteristics of Students with Different Educational Histories

First, descriptive analyses were undertaken to compare three groups of high-risk youth with different histories of restricted placement: 1) students who entered restricted placements in elementary school and remained in restricted placements in secondary school ($N = 85$), labeled "elementary entry," 2) students who were educated in mainstream placements during the elementary school years, but then entered restricted placements in secondary school ($N = 187$), labeled "secondary entry," and 3) students who screened into the "high risk" sample of the Fast Track study due to elevated aggression at school entry, but were educated in mainstream placements throughout elementary and secondary school, labeled "high-risk mainstream" ($N = 585$). Table 1 displays the means and standard deviations of early (Kindergarten) and later (5th grade) behavioral and academic child characteristics, and child

Table 1. *Descriptive Statistics: Child Characteristics*

	Elementary Entry Mean (SD)	Secondary Entry Mean (SD)	High-Risk Mainstream Mean (SD)
<i>Child Demographics</i>			
Female	0.15 (0.36) ^a	0.24 (0.42) ^a	0.35 (0.48) ^b
Age	7.44 (0.55) ^a	7.36 (0.51) ^{ab}	7.36 (0.48) ^b
Black	.74 (.44) ^a	.66 (.47) ^a	.42 (.49) ^b
<i>Kindergarten Behaviors</i>			
TRF Internalizing Scale	58.42 (10.96) ^a	57.24 (11.17) ^{ab}	55.22 (10.53) ^b
TRF Externalizing Scale	69.77 (10.62) ^a	67.7 (10.17) ^a	65.14 (10.58) ^b
TRF Attention-problems	66.28 (8.17) ^a	63.27 (8.81) ^b	59.98 (8.83) ^c
Authority Acceptance	2.45 (1.11) ^a	2.3 (0.93) ^a	2.15 (0.93) ^b
Child Intrusiveness	4.13 (1.96) ^a	4.66 (2.23) ^b	5.43 (2.05) ^c
Peer Social Preference (1 st grade)	-0.94 (0.98) ^a	-0.68 (0.95) ^b	-0.46 (0.95) ^c
<i>Kindergarten Academics</i>			
WISC IQ	75.34 (15.58) ^a	83.05 (15.69) ^b	91.73 (16.9) ^c
Academic Aptitude	-0.75 (0.72) ^a	-0.37 (0.72) ^b	0.05 (0.77) ^c
W-J Calculation	-0.51 (0.69) ^a	-0.23 (0.90) ^b	0.09 (1.03) ^c
W-J Letter-word	-0.77 (0.75) ^a	-0.3 (0.87) ^b	0.11 (1.00) ^c
<i>5th Grade Behaviors</i>			
TRF Internalizing Scale	57.74 (11.14) ^a	57.66 (10.55) ^a	53.46 (10.48) ^b
TRF Externalizing Scale	66.23 (10.64) ^a	65.37 (10.14) ^a	60.27 (10.46) ^b
TRF Attention-problems	60.34 (8.19) ^a	61.92 (7.7) ^a	58.61 (7.78) ^b
Authority Acceptance	1.86 (0.99) ^a	1.82 (0.94) ^a	1.42 (0.90) ^b
<i>5th Grade Academics</i>			
W- J Calculation	-1.15 (1.05) ^a	-0.49 (1.02) ^b	-0.46 (1.49) ^b
W- J Letter-word	-1.35 (1.00) ^a	-0.5 (1.01) ^b	-0.36 (1.5) ^{bc}
W- J Passage Comp.	-1.33 (1.08) ^a	-0.54 (0.99) ^b	-0.38 (1.5) ^b

Note: Means with different superscripts are different at $p < .05$. W-J = Woodcock-Johnson, TRF = Teacher Report Form, WISC = Wechsler Intelligence Scale for Children.

demographics of the youth in the different groups. Means and standard deviations for the family and home environment characteristics of the different groups are displayed in Table 2. There were a few students ($N = 32$) who were educated in restricted placements for one or more years in the elementary grades and then re-entered a mainstream classroom for all of the secondary school years, but this pattern of placement was so rare that these children were not included in these analyses. ANOVAs were used to compare means, and Tukey-adjusted post-hoc comparisons were used to explore any significant effects.

Table 2. *Descriptive Statistics: Family and Home Characteristics*

	Elementary Entry Mean (SD)	Secondary Entry Mean (SD)	High-risk Mainstream Mean (SD)
<i>Family Environment</i>			
Family SES (K)	18.61 (10.33) ^a	22.64 (12.2) ^b	26.10 (12.75) ^c
Family SES (7 th)	25.48 (11.25) ^a	29.67 (11.09) ^b	31.13 (11.46) ^c
Maternal Depression (K)	19.76 (11.2) ^a	15.93 (10.29) ^b	15.84 (9.81) ^b
Neighborhood Quality (K)	27.91 (13.78) ^a	29.02 (12.16) ^a	33.54 (10.96) ^b
Child-friendly Home (K)	8.29 (2.32) ^a	9.08 (1.91) ^b	9.55 (1.73) ^c
Harsh discipline (K)	0.41 (0.49) ^a	0.27 (0.44) ^b	0.24 (0.43) ^b
Parental Warmth (K)	7.14 (1.53) ^a	7.33 (1.53) ^a	7.83 (1.36) ^b
Neighborhood Safety (K)	10.19 (2.3) ^a	9.75 (2.19) ^a	8.67 (2.21) ^b
Maternal Subst. Use (2 nd)	0.13 (0.35) <i>ns</i>	0.17 (0.37) <i>ns</i>	0.13 (0.34) <i>ns</i>
Maternal Education	3.68 (0.8) ^a	3.81 (1.04) ^a	3.98 (1.08) ^b
Preschool attendance	0.69 (0.46) ^a	0.61 (0.49) ^{ab}	0.59 (0.49) ^b
Parent-Teacher Rel. (K)	1.37 (0.5) ^a	1.47 (0.6) ^{ab}	1.53 (0.57) ^b
Parent-Teacher Rel. (5 th)	1.34 (0.62) <i>ns</i>	1.4 (0.63) <i>ns</i>	1.4 (0.6) <i>ns</i>

Note: Means with different superscripts are different at $p < .05$. K = Kindergarten, SES = Socioeconomic Status

Elementary entry restricted placement. Students in the elementary entry restricted placement group showed a broad spectrum of early risk across demographic, individual and family/home environment constructs measured in kindergarten. Compared with the mainstreamed group, children in the elementary entry group were significantly different ($p < .05$) on almost every variable across each of the domains examined: they had greater early externalizing and internalizing problems, lower peer acceptance, more attention problems, lower IQ, and lower early achievement. These children came from poorer, less educated families who practiced less effective parenting strategies, and lived in riskier neighborhoods. These results suggest that elementary placement in restrictive special education settings was associated with multiple risks across multiple domains, in addition to the problems in academic and behavioral functioning that represented the proximal cause for such placements. Further, these risks persisted through at least the elementary years; examined again in 5th grade, these students continued to show significantly more risk on behavioral measures and measures of academic aptitude and performance than children in mainstreamed placements. The only variables on which these children were not significantly different from children in the high-risk sample who remained in mainstream education were: maternal substance use, preschool attendance, and 5th grade parent-teacher communication. These findings suggest that academic aptitude and behavior problems, as well as family characteristics and poor parenting practices, are all important characteristics that are associated with early and continued placement in restricted educational placements, from elementary through the secondary school years.

Secondary-entry restricted placement. Students in the secondary entry restricted placement group were significantly different from the group of mainstreamed students on a variety of risk variables at both the kindergarten and fifth-grade assessments. Similar to students in the elementary entry group, students in the secondary entry group entered school with significantly greater externalizing behavior problems, more attention problems, and poorer peer relations than students in the

mainstreamed group. The only early behavioral indicator assessed here on which the secondary entry group did not differ from mainstreamed peers was early internalizing symptoms. Like their peers in the elementary entry group, these children who entered restricted placements in the secondary school years began school with significantly lower school readiness, displaying lower IQ, and lower pre-academic skills than children in mainstreamed placements.

Although children in the secondary entry group exhibited significantly greater behavioral, social, and academic risk than their peers in the mainstreamed group, they did not reach the levels of risk that characterized children in the elementary entry group. In Kindergarten, children in the secondary entry group had significantly less risky scores ($p < .05$) than children in the elementary entry group on many early social and behavioral characteristics (e.g., attention problems, peer social preference, and child intrusive behavior). Although levels of aggressive-disruptive behavior, externalizing and internalizing symptoms did not differ significantly for the elementary vs. secondary entry groups, the means of the former group were consistently higher in level. Conversely, children in the secondary entry group had significantly higher ($p < .05$) scores than children in the elementary entry group on all measures of early academic readiness (including measures of IQ, and early achievement).

Across all variables used to assess the quality of the child's home environment (e.g., family SES, maternal depression, neighborhood safety, child-friendly home environment, parenting quality) children in the secondary entry group had scores that reflected equal or lower risk ($p < .05$) than children in the elementary entry group, but equal to or greater risk ($p < .05$) than children in the high-risk sample who remained in mainstream placements.

In 5th grade, children in the secondary entry group had achievement scores comparable to their peers in the mainstreamed group. At the same time, the students in the secondary entry group displayed significantly more behavioral problems than high-risk students who continued in mainstream placements ($p < .05$), including more aggressive disruptive behavior, more externalizing problems,

greater attention problems and more internalizing symptomatology. Further, students in the secondary entry group were not significantly different from students in the elementary entry group on measures of risky behavioral characteristics measured in 5th grade (all Tukey-adjusted t-tests $p > .05$, n.s.). These results suggest that the placement into a restricted educational setting in secondary school was related to poor behavior, but not necessarily related to declining academic performance. It may be that disruptive behavior was the primary motivator for placing these students in a restricted setting.

Model Testing with Propensity Scoring

The next steps in the analyses involved the application of propensity scoring to create groups that were equivalent on the factors confounded with restricted educational placement, in order to test hypotheses regarding the impact of those placements on youth outcomes. Due to the lack of ability to randomly assign children to more and less restricted placements, and the fact that children in restrictive vs. mainstream placements were not equivalent on a number of factors that might affect their outcomes (and thereby confound the interpretation of the impact of placement on those outcomes), propensity scoring was utilized to address the complex set of selection effects for children placed in restrictive placements. Propensity scoring, a relatively recently developed statistical technique (Rosenbaum & Rubin, 1983), provides an improved method for creating a compelling comparison group, increasing the internal validity of inferences about the causal effect of restricted placements (Hong & Raudenbush, 2005; Morgan & Hibel, 2010).

Balancing the mainstream and restricted samples. The first step in building a propensity model is to calculate the propensity of each child to be placed in a self-contained setting in both elementary school (grades 1-4) and secondary school (grades 7-10). The propensity scores are used to calculate inverse propensity of treatment weights (IPTW; Cole & Hernán, 2008; Hirano & Imbens, 2001; Robins, 1994) which are used to weight and balance the sample. The equation used to calculate weights is shown in equation 1.

$$\text{IPTW}_{ti} = P(A | a_{(t-1)}, S_i) / (P(A | a_{(t-1)}, S_i, X_i)) \quad \text{eq. 1}$$

Where:

IPTW_{ti} = the inverse propensity for treatment weight for a given time point for a given individual

A = 1 if in a restricted placement, 0 if in the mainstream group

$a_{(t-1)}$ = treatment history [vector]

S_i = moderators, if any [vector]

X_i = confounders [vector]

Logit models were used to predicting the probability of elementary placements and secondary placements. Separate logit models were used for each moderating variable or variable set. Weights for the elementary and secondary times were multiplied to generate a single weight. In order to ensure that no single individual had an overly large influence on the outcomes, any combined weight greater than 4 was set to 4 (i.e., no student “counted” more than four times the average student).

Weighting by the propensity scores does not guarantee that the samples will be balanced. It is important to check for balance because some students who experienced restricted placements may have had extreme scores on enough of the confounding variables that they had no comparable peers in mainstream placement (Haviland, Nagin, & Rosenbaum, 2007). If that is the case, propensity scoring alone will not be sufficient to create a balanced sample.

The propensity score weighting procedure was implemented using the confounders listed on pages 28-30 of the methods, and its success in eliminating the imbalances that existed across child and family characteristics of children in the four groups was evaluated. Propensity models for elementary-placement were calculated using 24 confounding variables measured prior to the elementary placement. Another set of propensity models for secondary placement were calculated that included the 24 early confounders and 9 additional confounders measured in 5th grade, prior to secondary school.

Four of 24 in the elementary-placement propensity model and 9 of 33 variables in the secondary-placement propensity model had a standardized mean difference greater than .25, and often much greater, indicating that the propensity-weighted samples were not equivalent after the initial procedure. Thus, weighting alone was not sufficient to create equivalent samples, indicating that additional procedures were necessary before propensity score analyses could be conducted with unconfounded samples.

Histograms of the propensity scores for the different placement groups were created to examine group differences in the weighted number of participants at each level of propensity score (in increments of .05). Examinations of the histograms suggested that there was not a sufficient degree of overlap across the weighted samples at the very low and very high end of propensity for restricted placement. At the low end, there was an overrepresentation of students in the mainstream condition who had a very low probability of being in a restricted placement in elementary school. Examination of the unweighted sample revealed that among students who had less than a 3% conditional probability of being in restricted placements, students in mainstream placements outnumbered students in restricted placements by 50-to-1. At the high end, there was an overrepresentation of students in the restricted condition who had a very high probability of being in a restricted placement in secondary school. Of the youth who experienced restricted placement in both elementary and secondary school, 23% had an overall level of problem severity that the propensity models predicted a 90% or greater probability of being in restricted placement in secondary school. There were no comparable students in the mainstream condition.

Because of such a large difference in representation across some of the groups at the high and low end of the range of propensity scores, students with less than a 3% probability to be in a restricted placement in elementary school (316 students) and students with greater than a 90% probability to be in restricted placement in secondary school (17 students) were excluded from further analyses, leaving

an N of 558. To include those students would be to compare non-equivalent groups. With the reduced sample, examination of histograms of propensity scores of the unweighted and weighted samples (Figures 1 and 2) indicated that the distributions of propensities are similar between the restricted and mainstream placements.

The weighted means of the reduced samples were again compared to assess confounding on any of the risk variables. With the reduced samples, the weighted means for all variables differed by less than .25 of a standard deviation between elementary mainstream versus restricted placement and between secondary mainstream versus restricted placement groups. Thus the reduced samples were appropriately balanced with weighting, suggesting that with the correct application of propensity scoring, causal inferences can be made regarding the outcomes experienced by students who received different levels of restricted placement (Rubin, 2001). The means and standard deviations of the unweighted and weighted samples are shown in Tables 3 through 6. For each comparison, the first table displays the unweighted means and the second table displays the weighted means.

Figure 1A. Histogram Illustrating the Distribution of Estimated Propensity Scores for Restricted Placement in Elementary School, by Educational Placement.

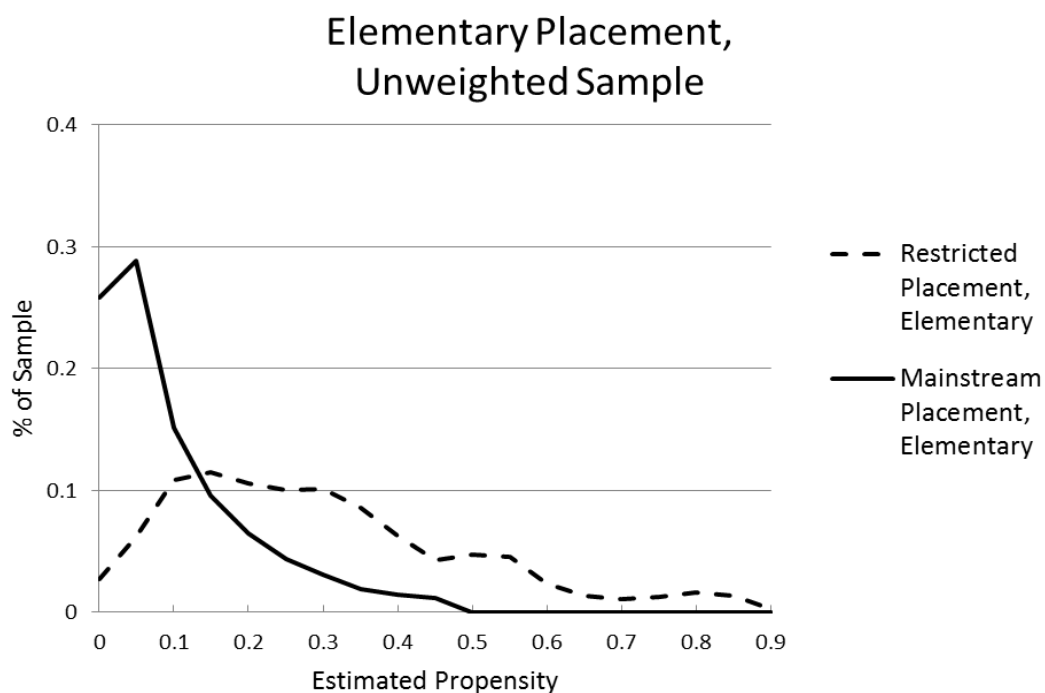


Figure 1B. Histogram Illustrating the Pseudo-distribution of Estimated Propensity Scores for Restricted Placement in Elementary School for the Weighted Sample, by Educational Placement.

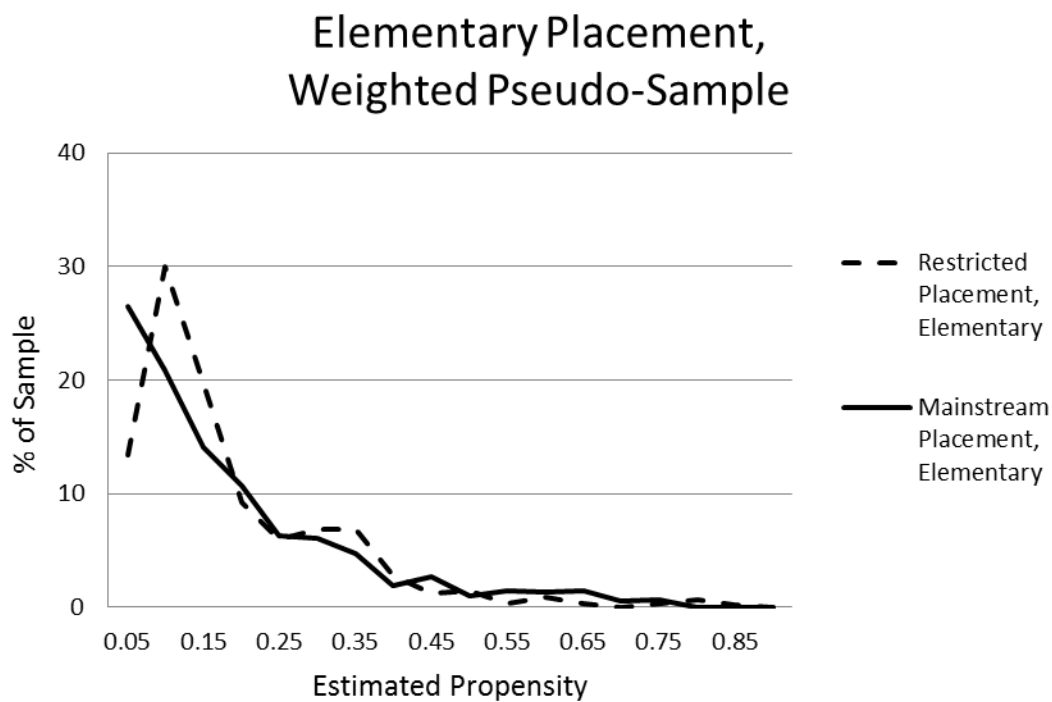


Figure 2A. Histogram Illustrating the Distribution of Estimated Propensity Scores for Restricted Placement in Secondary School, by Educational Placement.

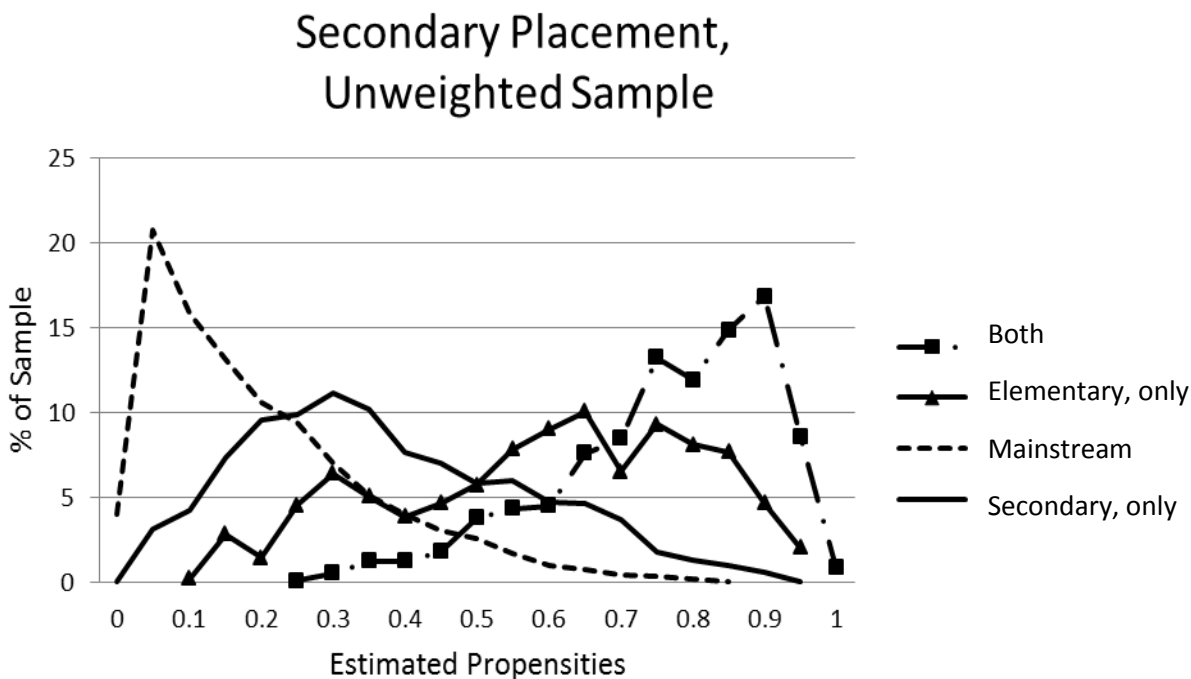


Figure 2B. Histogram Illustrating the Pseudo-distribution of Estimated Propensity Scores for Restricted Placement in Secondary School for the Weighted Sample, by Educational Placement.

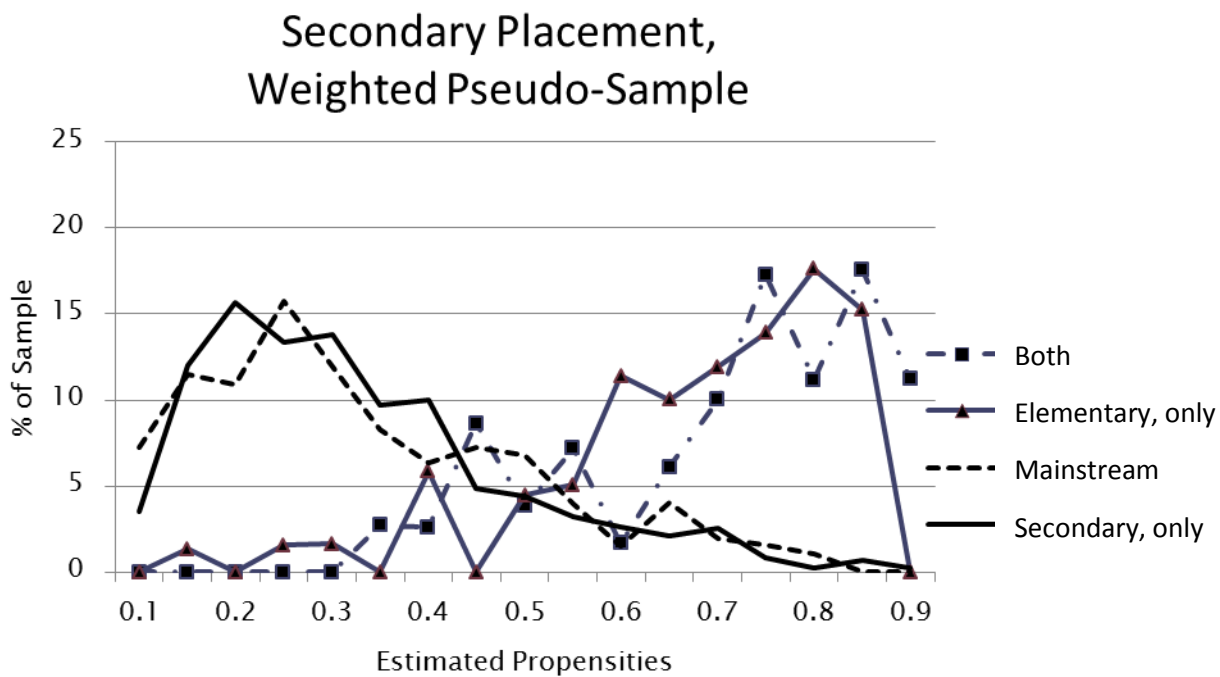


Table 3A. *Unweighted Descriptive Statistics: Characteristics of Children in Mainstreamed versus Restricted Placements in Elementary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Child Demographics</i>			
Female	0.25 (0.44)	0.21 (0.41)	-0.11
Age	7.40 (0.49)	7.51 (0.56)	0.20
Black	0.61 (0.49)	0.68 (0.47)	0.14
<i>Kindergarten Behaviors</i>			
TRF Internalizing Scale	57.45 (10.99)	58.58 (10.31)	0.11
TRF Externalizing Scale	67.72 (10.26)	68.75 (10.61)	0.10
TRF Attention-problems	63.05 (9.03)	64.86 (8.39)	0.22
Authority Acceptance	2.31 (0.94)	2.41 (1.07)	0.09
Child Intrusiveness	4.80 (2.15)	4.43 (2.03)	-0.18
Social Preference (1 st grade)	-0.68 (0.97)	-0.96 (0.96)	-0.29
<i>Kindergarten Academics</i>			
WISC IQ	83.27 (14.24)	79.57 (14.95)	-0.25
Academic Aptitude	0.36 (0.68)	0.56 (0.70)	0.29
W-J Calculation	-0.29 (0.81)	-0.45 (0.78)	-0.20
W-J Letter-word	-0.33 (0.73)	-0.62 (0.80)	-0.36

Table 3B. *Weighted Descriptive Statistics: Characteristics of Children in Mainstreamed versus Restricted Placements in Elementary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Child Demographics</i>			
Female	0.25 (0.45)	0.22 (0.35)	-0.09
Age	7.41 (0.50)	7.41 (0.49)	0.01
Black	0.62 (0.50)	0.67 (0.39)	0.13
<i>Kindergarten Behaviors</i>			
TRF Internalizing Scale	57.84 (11.27)	58.79 (8.23)	0.12
TRF Externalizing Scale	67.83 (10.41)	68.17 (8.26)	0.04
TRF Attention-problems	63.57 (9.41)	63.67 (6.32)	0.02
Authority Acceptance	2.32 (0.95)	2.41 (0.86)	0.10
Child Intrusiveness	4.77 (2.17)	4.55 (1.66)	-0.13
Social Preference (1 st grade)	-0.71 (0.99)	-0.87 (0.81)	-0.20
<i>Kindergarten Academics</i>			
WISC IQ	82.21 (14.60)	82.54 (12.23)	0.03
Academic Aptitude	0.41 (0.71)	0.41 (0.55)	-0.01
W-J Calculation	-0.32 (0.81)	-0.34 (0.74)	-0.03
W-J Letter-word	-0.40 (0.79)	-0.42 (0.60)	-0.04

Table 4A. *Unweighted Descriptive Statistics: Family and Neighborhood Characteristics of Children in Mainstreamed versus Restricted Placements in Elementary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Family Environment</i>			
Family SES (K)	22.03 (11.79)	19.35 (10.58)	-0.25
Maternal Depression (K)	17.10 (9.96)	20.00 (11.22)	0.26
Neighborhood Quality (K)	30.16 (11.92)	29.51 (12.18)	-0.05
Child-friendly Home (K)	9.11 (1.86)	8.72 (2.18)	-0.18
Harsh discipline (K)	0.28 (0.45)	0.34 (0.48)	0.11
Parental Warmth (K)	7.49 (1.49)	7.43 (1.37)	-0.05
Neighborhood Safety (K)	9.37 (2.21)	9.64 (2.20)	0.12
Maternal Subst. Use (2 nd)	0.15 (0.35)	0.15 (0.38)	0.02
Maternal Education	3.80 (1.06)	3.71 (0.86)	-0.11
Preschool attendance	0.62 (0.49)	0.66 (0.48)	0.09
Parent-Teacher Rel. (K)	1.48 (0.59)	1.40 (0.54)	-0.16

Table 4B. *Weighted Descriptive Statistics: Family and Neighborhood Characteristics of Children in Mainstreamed versus Restricted placements in Elementary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Family Environment</i>			
Family SES (K)	21.77 (12.14)	21.07 (9.39)	-0.07
Maternal Depression (K)	17.31 (10.16)	17.99 (8.59)	0.08
Neighborhood Quality (K)	29.87 (12.47)	29.03 (10.62)	-0.08
Child-friendly Home (K)	9.06 (1.95)	9.22 (1.68)	0.09
Harsh discipline (K)	0.28 (0.46)	0.34 (0.40)	0.16
Parental Warmth (K)	7.50 (1.53)	7.68 (1.10)	0.16
Neighborhood Safety (K)	9.34 (2.28)	9.46 (1.86)	0.07
Maternal Subst. Use (2 nd)	0.15 (0.36)	0.16 (0.31)	0.05
Maternal Education	3.79 (1.08)	3.77 (0.70)	-0.04
Preschool attendance	0.63 (0.50)	0.62 (0.41)	-0.02
Parent-Teacher Rel. (K)	1.47 (0.61)	1.46 (0.48)	-0.04

Table 5A. *Unweighted Descriptive Statistics: Characteristics of Children in Mainstreamed versus Restricted Placements in Secondary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Child Demographics</i>			
Female	0.27 (0.45)	0.21 (0.41)	-0.15
Age	7.42 (0.48)	7.42 (0.53)	0.00
Black	0.58 (0.49)	0.69 (0.46)	0.24
<i>Kindergarten Behaviors</i>			
TRF Internalizing Scale	57.50 (10.50)	57.85 (11.44)	0.03
TRF Externalizing Scale	67.48 (10.49)	68.53 (10.05)	0.10
TRF Attention-problems	62.75 (9.29)	64.26 (8.34)	0.18
Authority Acceptance	2.31 (0.94)	2.37 (0.99)	0.06
Child Intrusiveness	4.93 (2.10)	4.45 (2.15)	-0.22
Social Preference (1 st grade)	-0.64 (0.97)	-0.85 (0.96)	-0.22
<i>Kindergarten Academics</i>			
WISC IQ	84.57 (14.11)	79.73 (14.41)	-0.34
Academic Aptitude	0.30 (0.68)	0.52 (0.66)	0.33
W-J Calculation	-0.25 (0.81)	-0.42 (0.78)	-0.21
W-J Letter-word	-0.28 (0.73)	-0.52 (0.74)	-0.32
<i>5th Grade Behaviors</i>			
TRF Internalizing Scale	54.92 (10.38)	57.60 (10.65)	0.25
TRF Externalizing Scale	62.49 (10.30)	65.73 (10.48)	0.31
TRF Attention-problems	60.40 (8.09)	61.43 (7.95)	0.13
Authority Acceptance	1.56 (0.92)	1.83 (0.97)	0.27
<i>5th Grade Academics</i>			
W- J Calculation	-0.57 (1.39)	-0.73 (1.04)	-0.16
W- J Letter-word	-0.52 (1.36)	-0.78 (1.02)	-0.25
W- J Passage Comp.	-0.52 (1.37)	-0.85 (1.00)	-0.33

Table 5B. *Weighted Descriptive Statistics: Characteristics of Children in Mainstreamed versus Restricted Placements in Secondary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Child Demographics</i>			
Female	0.25 (0.47)	0.26 (0.38)	0.03
Age	7.40 (0.51)	7.43 (0.49)	0.07
Black	0.63 (0.52)	0.63 (0.42)	0.00
<i>Kindergarten Behaviors</i>			
TRF Internalizing Scale	57.98 (11.59)	57.87 (9.56)	-0.01
TRF Externalizing Scale	67.75 (11.14)	68.16 (8.23)	0.05
TRF Attention-problems	63.51 (10.05)	63.76 (7.04)	0.04
Authority Acceptance	2.34 (1.00)	2.31 (0.84)	-0.04
Child Intrusiveness	4.74 (2.25)	4.76 (1.83)	0.01
Social Preference (1 st grade)	-0.69 (1.05)	-0.81 (0.81)	-0.15
<i>Kindergarten Academics</i>			
WISC IQ	82.66 (15.39)	81.25 (12.23)	-0.12
Academic Aptitude	0.40 (0.75)	0.45 (0.56)	0.09
W-J Calculation	-0.32 (0.84)	-0.34 (0.73)	-0.03
W-J Letter-word	-0.39 (0.83)	-0.43 (0.62)	-0.07
<i>5th Grade Behaviors</i>			
TRF Internalizing Scale	56.08 (11.78)	56.38 (8.85)	0.03
TRF Externalizing Scale	63.66 (11.75)	64.22 (8.94)	0.06
TRF Attention-problems	61.15 (8.89)	60.97 (6.52)	-0.03
Authority Acceptance	1.65 (1.05)	1.73 (0.83)	0.09
<i>5th Grade Academics</i>			
W- J Calculation	-0.60 (1.47)	-0.69 (0.93)	-0.10
W- J Letter-word	-0.61 (1.45)	-0.69 (0.84)	-0.10
W- J Passage Comp.	-0.60 (1.47)	-0.75 (0.85)	-0.18

Table 6A. *Unweighted Descriptive Statistics: Family and Neighborhood Characteristics of Children in Mainstreamed versus Restricted Placements in Secondary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Family Environment</i>			
Family SES (K)	22.26 (11.83)	20.56 (11.28)	-0.15
Family SES (7 th)	29.12 (11.76)	27.70 (10.92)	-0.13
Maternal Depression (K)	17.49 (9.63)	17.74 (11.09)	0.02
Neighborhood Quality (K)	30.72 (11.75)	29.03 (12.21)	-0.14
Child-friendly Home (K)	9.20 (1.83)	8.81 (2.02)	-0.20
Harsh discipline (K)	0.26 (0.44)	0.34 (0.47)	0.17
Parental Warmth (K)	7.61 (1.44)	7.29 (1.50)	-0.21
Neighborhood Safety (K)	9.12 (2.18)	9.86 (2.19)	0.34
Maternal Subst. Use (2 nd)	0.15 (0.36)	0.14 (0.35)	-0.05
Maternal Education	3.81 (1.06)	3.75 (0.98)	-0.06
Preschool attendance	0.62 (0.49)	0.64 (0.48)	0.06
Parent-Teacher Rel. (K)	1.49 (0.59)	1.44 (0.57)	-0.09
Parent-Teacher Rel. (5th)	1.37 (0.61)	1.38 (0.64)	0.02

Table 6B. *Weighted Descriptive Statistics: Family and Neighborhood Characteristics of Children in Mainstreamed versus Restricted Placements in Secondary School.*

	Mainstreamed Mean (SD)	Restricted Placement Mean (SD)	Standard Difference
<i>Family Environment</i>			
Family SES (K)	21.67 (12.84)	21.73 (9.81)	0.01
Family SES (7 th)	28.59 (12.53)	28.83 (9.46)	0.03
Maternal Depression (K)	17.36 (10.21)	17.45 (9.46)	0.01
Neighborhood Quality (K)	29.54 (13.09)	30.34 (10.66)	0.08
Child-friendly Home (K)	9.07 (2.09)	9.10 (1.61)	0.02
Harsh discipline (K)	0.27 (0.48)	0.31 (0.40)	0.09
Parental Warmth (K)	7.52 (1.61)	7.53 (1.23)	0.01
Neighborhood Safety (K)	9.27 (2.39)	9.55 (1.90)	0.15
Maternal Subst. Use (2 nd)	0.16 (0.40)	0.12 (0.28)	-0.15
Maternal Education	3.78 (1.14)	3.81 (0.83)	0.04
Preschool attendance	0.63 (0.52)	0.63 (0.42)	0.01
Parent-Teacher Rel. (K)	1.47 (0.64)	1.48 (0.51)	0.02
Parent-Teacher Rel. (5th)	1.36 (0.67)	1.37 (0.53)	0.02

Testing the main effects of restricted placement. Hypotheses 1 and 2, that restricted placement in secondary school and in elementary school would have iatrogenic impacts on mental health and high school dropout, were tested using Marginal Structural Models (MSM; Robins, Hernan, & Brumback, 2000). MSMs use the weights calculated by the propensity scores to statistically mimic a sequentially randomized experiment, where students would have been randomized to elementary restricted vs mainstream placement and again to secondary restricted or mainstream placement (Bray, Almirall, Zimmerman, Lynam, & Murphy, 2006; Robins et al., 2000).

Within the MSM framework, weighted Poisson regressions were used to model the symptom counts for major depressive symptoms and conduct disordered symptoms. Weighted logistic regression was used to model high school completion. All three models were estimated using the `svyglm` procedure in R (R software, Version 2.12.1, The R Foundation for Statistical Computing, 2010). `Svyglm` was used because this procedure provides standard errors appropriate for weighting. The form of the regression models is as follows:

$$E [Y_i | A_{1i}, A_{2i}] = \beta_0 + \beta_1 A_{1i} + \beta_2 A_{2i} + \beta_3 A_{1i} A_{2i} \quad \text{eq. 2}$$

Where:

A_{1i} = restricted placement in grades 1-4 (1 = yes, 0 = no)

A_{2i} = restricted placement in grades 7-10 (1 = yes, 0 = no)

β_1 is the causal effect of being in a restricted placement in elementary-school only versus mainstream in both elementary and secondary school. β_2 is the causal effect of being in a restricted placement for the first time in secondary-school versus mainstream in both elementary and secondary school. $\beta_1 + \beta_2 + \beta_3$ is causal effect of a sustained restricted placement versus mainstream in both elementary and secondary school. Results are shown in Table 7. For major depressive symptoms, there

was no significant overall effect of restricted placement during either the elementary years , $\beta_1 = -.29, p > .10$ or the secondary school years $\beta_2 = .35, p > .10$. Furthermore, there was no synergistic effect of sustained placement; remaining in a restricted placement for both the elementary and secondary years was not different than the additive effect of elementary and secondary placement (interaction effect of $\beta_3 = .42, p > .10$).

Table 7. *Marginal Structural Model Results*

Predictor	Coefficients (Standard Error)
<i>Major Depressive Symptoms</i>	
Intercept	-0.39 (0.14)**
Restricted Placement, Elementary	-0.29 (0.53)
Restricted Placement, Secondary	0.35 (0.22)
Restricted Placement, Elementary X Secondary	0.42 (0.62)
<i>Conduct Disordered Symptoms</i>	
Intercept	-0.38 (0.11)**
Restricted Placement, Elementary	-0.44 (0.50)
Restricted Placement, Secondary	0.36 (0.16)*
Restricted Placement, Elementary X Secondary	0.18 (0.57)
<i>High-school Non-completion</i>	
Intercept	-0.07 (0.13)
Restricted Placement, Elementary	-0.04 (0.51)
Restricted Placement, Secondary	0.54 (0.22)*
Restricted Placement, Elementary X Secondary	0.06 (.64)

* $p < .05$. ** $p < .01$.

For conduct disordered symptoms and high-school non-completion, there was an iatrogenic impact of experiencing a restrictive placement during the secondary school years, $\beta_2 = .36$, $p < .05$ for conduct disorder symptoms, and $\beta_2 = .54$, $p < .05$ for the failure to graduate from high school. A youth who experienced secondary placement was more likely to have conduct disorder symptoms and to drop out of high school than a comparable youth in a mainstream placement. However, there was no significant effect on either outcome for experiencing restrictive placement during the elementary school years, $\beta_1 = -.44$, $p > .10$ for conduct disorder symptoms and $\beta_1 = -.04$, $p > .10$, for the failure to graduate from high school. Nor was there an interactive effect between elementary and secondary placement (interaction terms of $\beta_3 = .18$ for conduct disorder symptoms and $\beta_3 = .06$ for high school non-completion, both $ps > .10$), indicating that the effect of sustained restricted placement for the

elementary and secondary years was not significantly different than the additive effect of elementary and secondary placement. Hence, a youth who received restrictive placements in elementary school (but did not continue in restrictive placement in secondary school) would be just as likely to graduate from high school and no more likely to develop conduct disorder symptoms than a comparable child who experienced no restrictive placements.

The Poisson and logistic models displayed in Table 7 indicate that placing a student into a restricted placement in secondary school increases conduct disorder symptoms by 42%, and increases the chance of not completing high school by 28%. Overall, the models predicted that for students who have severe enough problems to warrant a restricted placement, but who did not have problems so severe as to virtually guarantee a non-mainstream placement, a restricted placement in secondary school would result in .96 conduct disordered symptoms on average compared with .68 symptoms on average had they remained in a mainstream placement. Similarly, the models predicted that, for these students, restricted placements in secondary school would result in an expected non-completion rate of 62%, compared with an expected non-completion rate of 48% had they remained in a mainstream placement.

For all models, it is important to note that the standard error was significantly larger for elementary placement (and the interaction involving elementary placement) than it was for secondary placement. As a result, although the magnitude of the effect of elementary placement on conduct disordered symptoms ($\beta = -.44$) is actually larger than the effect for secondary placement ($\beta = .36$), the former effect is not significantly different from zero, whereas the latter is statistically significant. A large standard error likely indicates that the effect of elementary restricted placement has greater overall variability across children. A large standard error may also arise from poor model identification due to the fact that most children who were placed in restricted placement in elementary school were also in restricted placement in secondary school, making the main effect of restricted placement and the

interactive effect of elementary and secondary placement difficult to estimate precisely. To determine whether poor model identification was affecting the outcome, a second set of models (for these and later MSMs) were estimated excluding the subjects with elementary-only placement, comparing the impact of “sustained placement” (in elementary and secondary years) with a secondary-only or no placement. The standard errors remained large, suggesting that the “true” effect of elementary restricted placement (alone or in conjunction with secondary placement) is highly variable.

These results partially confirm the hypothesis that restricted placement in secondary school has iatrogenic impacts on adolescent mental health and graduation rates. Specifically, restricted placements in secondary school led to increased drop out and greater numbers of conduct problems compared to mainstream placement. There was not, however, any statistically significant impact on depressive symptoms. The hypothesis that restricted placements in elementary school would have similar negative consequences on adolescent outcomes compared with mainstream placement was not confirmed. There were no effects for elementary restricted placement only on any adolescent outcome compared to mainstream placement in both elementary and secondary school..

Testing the moderating effect of aggression. The third hypothesis tested using MSMs was that aggressive-disruptive behavior at school entry would moderate the impact of restricted placements on adolescent mental health and behavioral outcomes. Specifically, it was anticipated that the increased level of behavioral support available in restricted placements would be more beneficial for students who had more behavioral problems. MSM methods were used, adding kindergarten aggressive-disruptive behavior as a moderator (Hirano & Imbens, 2001; Li, Liu, & Ren, 2010; Robins et al., 2000). In order to do this, weights were re-calculated using eq. 1, and kindergarten aggressive-disruptive behavior was added to the model as a main effect, and as an interaction term with each of the placement history indicators (i.e., A1i and A2i; Robins et al., 2000). The general form of the moderated models is:

$$E [Y_i | A_{1i}, A_{2i}, Z] = \beta_0 + \beta_1 A_{1i} + \beta_2 A_{2i} + \beta_3 A_{1i} A_{2i} + \beta_4 Z + \beta_5 Z A_{1i} + \beta_6 Z A_{1i} + \beta_7 Z A_{1i} A_{2i} \quad \text{eq. 3}$$

Where:

A_{1i} = restricted placement in grades 1-4 (1 = yes, 0 = no)

A_{2i} = restricted placement in grades 7-10 (1 = yes, 0 = no)

Z = moderator

As before, all models were estimated using the svyglm procedure in R, and weighted Poisson regressions were used to model the symptom counts for major depressive symptoms and conduct disordered symptoms, and weighted logistic regression was used to model high school completion.

This hypothesis was not supported with this sample. Aggressive-disruptive behavior at school entry did not moderate the impact of restricted placement for any of the three outcomes, at any time point (Table 8). In other words, the impact of restricted placement was the same for students regardless of their initial levels of aggressive-disruptive behavior, and it was not “protective” for students with high rates of aggressive-disruptive behavior.

Moderating effect of academic aptitude. The final hypothesis was that academic aptitude at school entry would moderate the effectiveness of restricted placements. Specifically, it was anticipated that restricted placements would be more beneficial for students who had difficulty keeping pace with their peers because of lower academic aptitude at school entry. The same procedures used to test the moderating effect of early aggression were used to test the moderating effect of early academic aptitude on placement history (Hirano & Imbens, 2001; Li et al., 2010; Robins et al., 2000). Results are shown in Table 9. This hypothesis was confirmed across all three outcomes for secondary-entry restricted placements: academic aptitude moderated the iatrogenic effect of restricted placement in secondary school only such that students with lower levels of academic aptitude were less negatively impacted by the restricted placement, $\beta_6 = .67, p < .05$ for major depressive symptoms, $\beta_6 = .63, p < .01$ for conduct disorder symptoms, and $\beta_6 = .75, p < .05$ for high school non-completion. Unfortunately, the

Table 8. *Marginal Structural Models: Interactions with Kindergarten Aggression.*

Predictor	Coefficients (Standard Error)
<i>Major Depressive Symptoms</i>	
Intercept	-0.03 (0.37)
Restricted Placement, Elementary	-0.68 (0.71)
Restricted Placement, Secondary	0.26 (0.25)
Restricted Placement, Elementary X Secondary	0.88 (0.78)
Aggression, kindergarten	-0.16 (0.14)
Elementary Restricted Placement X Aggression	0.58 (0.52)
Secondary Restricted Placement X Aggression	0.20 (0.23)
Elementary X Secondary Restricted Placement X Aggression	-0.72 (0.61)
<i>Conduct Disordered Symptoms</i>	
Intercept	-0.65 (0.27)**
Restricted Placement, Elementary	-0.76 (0.67)
Restricted Placement, Secondary	0.36 (0.19)
Restricted Placement, Elementary X Secondary	0.36 (0.77)
Aggression, kindergarten	0.11 (0.10)
Elementary Restricted Placement X Aggression	0.35 (0.51)
Secondary Restricted Placement X Aggression	0.02 (0.16)
Elementary X Secondary Restricted Placement X Aggression	-0.23 (0.60)
<i>High-school Non-completion</i>	
Intercept	-0.39 (0.35)
Restricted Placement, Elementary	0.08 (0.64)
Restricted Placement, Secondary	0.48 (0.26)
Restricted Placement, Elementary X Secondary	-0.20 (0.78)
Aggression, kindergarten	0.14 (0.14)
Elementary Restricted Placement X Aggression	-0.20 (0.56)
Secondary Restricted Placement X Aggression	0.19 (0.25)
Elementary X Secondary Restricted Placement X Aggression	0.37 (0.73)

* $p < .05$. ** $p < .01$.

Table 9. *Marginal Structural Models: Interactions with Academic Aptitude*

Predictor	Coefficients (Standard Error)
<i>Major Depressive Symptoms</i>	
Intercept	-0.50 (0.15)**
Restricted Placement, Elementary	-0.35 (0.65)
Restricted Placement, Secondary	0.63 (0.24)**
Restricted Placement, Elementary X Secondary	0.35 (0.78)
Academic Aptitude, kindergarten	-0.27 (0.22)
Elementary Restricted Placement X Academic Aptitude	-0.22 (0.71)
Secondary Restricted Placement X Academic Aptitude	0.67 (0.33)*
Elementary X Secondary Restricted Placement X Academic Aptitude	-0.33 (0.82)
<i>Conduct Disordered Symptoms</i>	
Intercept	-0.36 (0.11)**
Restricted Placement, Elementary	-0.48 (0.51)
Restricted Placement, Secondary	0.53 (0.17)**
Restricted Placement, Elementary X Secondary	0.01 (0.65)
Academic Aptitude, kindergarten	0.09 (0.13)
Elementary Restricted Placement X Academic Aptitude	-0.02 (0.64)
Secondary Restricted Placement X Academic Aptitude	0.63 (0.24)**
Elementary X Secondary Restricted Placement X Academic Aptitude	-0.64 (0.80)
<i>High-school Non-completion</i>	
Intercept	-0.15 (0.13)
Restricted Placement, Elementary	0.15 (0.57)
Restricted Placement, Secondary	0.83 (0.27)**
Restricted Placement, Elementary X Secondary	-0.14 (0.83)
Academic Aptitude, kindergarten	-0.40 (0.20)*
Elementary Restricted Placement X Academic Aptitude	0.69 (0.76)
Secondary Restricted Placement X Academic Aptitude	0.75 (0.36)*
Elementary X Secondary Restricted Placement X Academic Aptitude	-0.64 (0.96)

* $p < .05$. ** $p < .01$.

converse is also true—secondary-entry restricted placements were particularly iatrogenic for students who entered school with greater academic aptitude, compared to an equivalent sample of peers with similar academic aptitude who did not experience restricted placements.

In contrast, academic aptitude did not moderate the impact of restricted educational placement in elementary school on any of the adolescent outcomes, $\beta_5 = -.22, p > .10$ for major depressive disorders, $\beta_5 = -.02, p > .10$ for conduct disorder symptoms, and $\beta_5 = .69, p > .10$ for high school non-completion. Nor did academic aptitude significantly moderate the interaction between elementary and secondary placement, $\beta_7 = -.33, p > .10$ for major depressive disorder, $\beta_7 = -.64, p > .10$ for conduct disorder symptoms, and $\beta_7 = -.64, p > .10$ for high school non-completers.

Graphs of the interactions are shown in Figures 3, 4, and 5. In all figures, because coefficients from logistic and Poisson models can be difficult to interpret, the moderation of restricted placement by academic aptitude is illustrated by the more easily interpreted metrics of expected symptom counts and probability of high school non-completion. Standardized academic aptitude is displayed on the x-axis. A score of 0 on this scale is the mean academic aptitude for the at risk sample, which is approximately a standard deviation lower than the mean of the normative sample.

For major depressive and conduct disordered symptoms, shown in Figures 3 and 4, a similar pattern emerges. For students in elementary-only, and sustained restricted placement, depressive and conduct-disordered symptoms (non-significantly) decline or remain stable on average and are not significantly different from the pattern associated with increases in academic aptitude shown by students who remained in mainstream placement. This indicates that the impact of restricted placement was not moderated by academic aptitude and did not have a significant main effect on major depressive or conduct disordered symptomatology. However, for students who first experienced

Figure 3. *Interaction of the effect of placement history with academic aptitude on major depressive symptoms.*

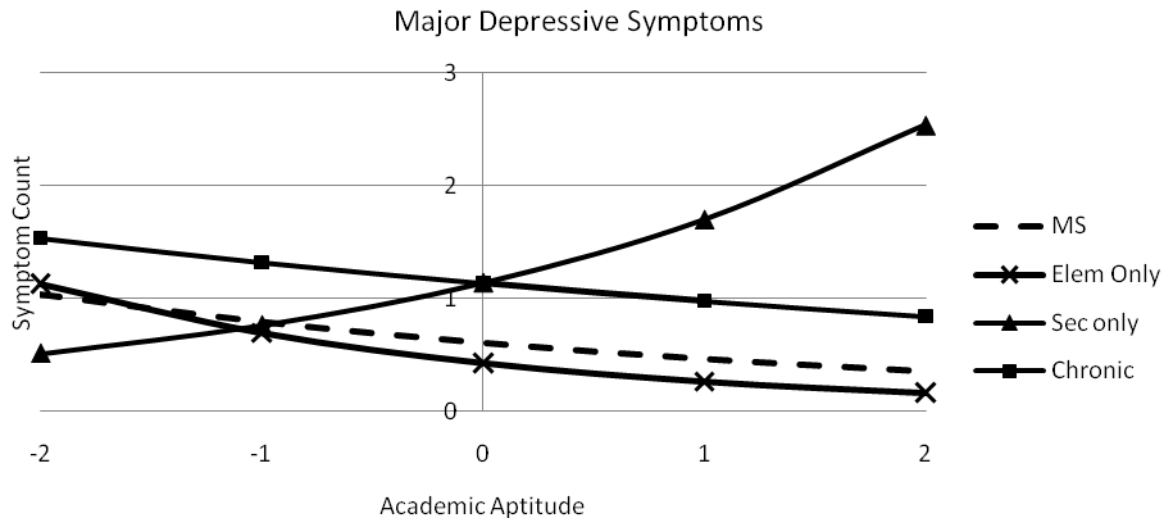


Figure 4. *Interaction of the effect of placement history with academic aptitude on conduct problems.*

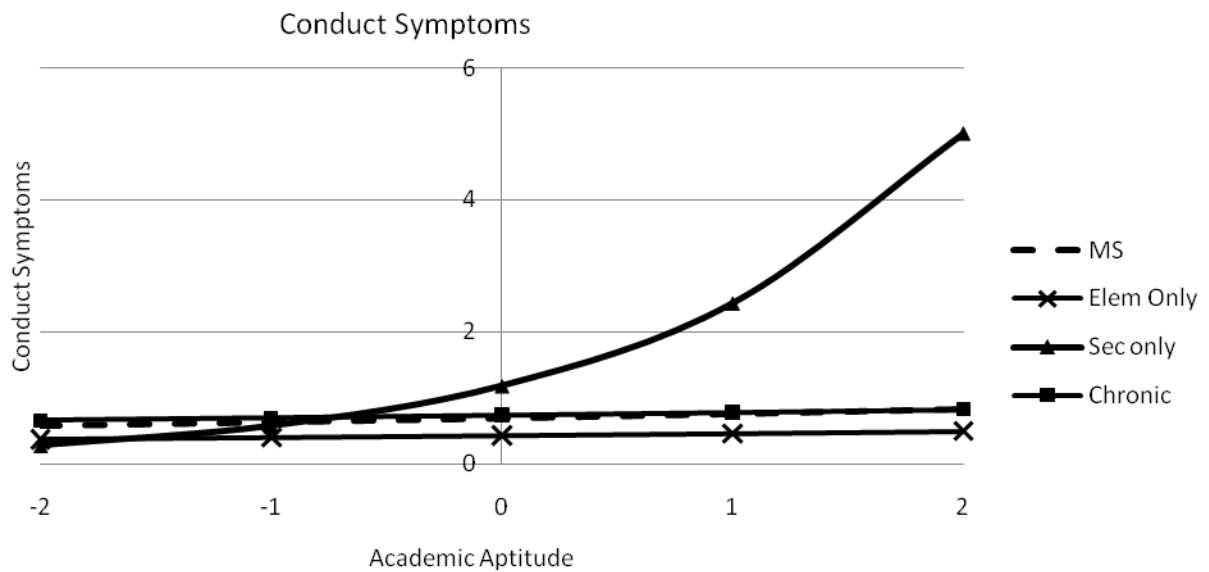
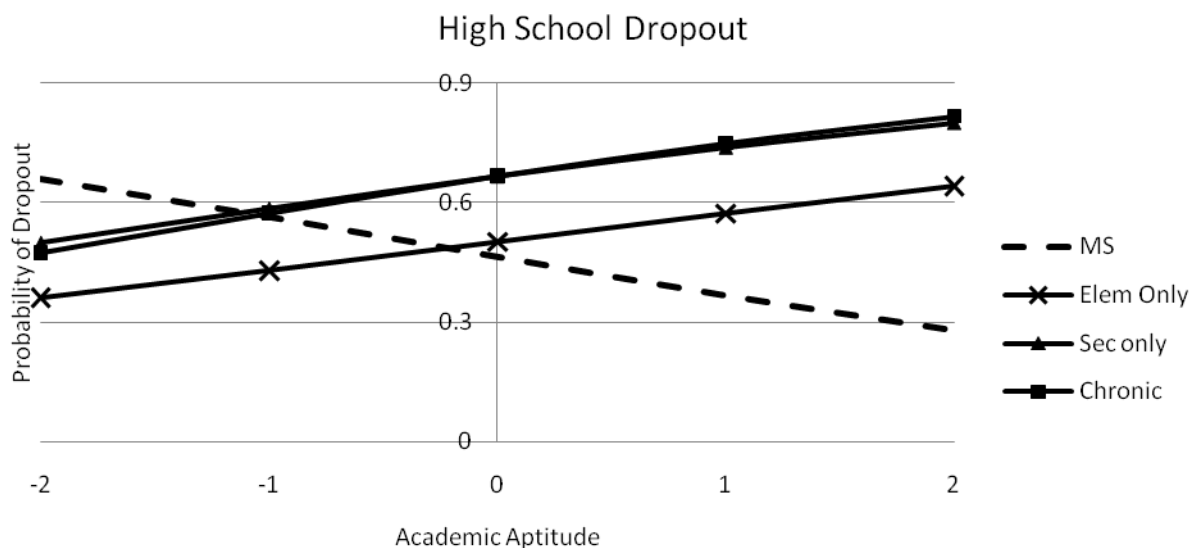


Figure 5. *Interaction of the effect of placement history with academic aptitude on high school dropout.*



restricted placements in secondary school, the effect was the opposite: as academic aptitude increased, students endorsed significantly more depressive and conduct symptoms. This pattern suggests that, among students first placed in restricted placements during the secondary school years who do not have problems learning or attending to instruction, restricted placements are associated with increased depressive and conduct symptoms.

For high-school non-completion, shown in Figure 5, the data show that for students in mainstream education, dropout rates increased as academic aptitude declined, as one would expect. However, the trends for all restricted placement histories are the opposite, suggest that placing children with higher levels of academic aptitude in restricted placements led to increased dropout. It is important to note that, although the coefficients are similar across placement histories, the standard errors are larger for the elementary-only and sustained-placements than for students with secondary entry into restricted placements, leading to those coefficients being not significantly different from mainstream placements. These data also suggest that there may be a protective effect for restricted placement compared with mainstream placement for children with lower academic aptitude. At lower

levels of academic aptitude, students in restricted placements tended to have (non-significantly) lower rates of dropout.

Discussion

Children who enter school displaying elevated rates of aggressive-disruptive behavior problems often have co-occurring learning challenges. Both disruptive behavior and learning challenges put these children at increased odds of being educated in settings outside of the mainstream education classroom. Despite a relatively clear policy direction of including as many children as possible in a mainstream setting, the empirical data on mainstream versus restricted educational placements, as a whole, remains largely inconclusive (Farrell, 1997; Hegarty, 1993; Hornby, 1999; Kavale & Forness, 2000; Madden & Slavin, 1983; Manset & Semmel, 1997; Salend & Garrick Duhaney, 1999). In many studies, students placed in restricted placements have poorer academic and behavioral outcomes than students in mainstreamed classrooms, raising serious concerns about the on-going use of restricted placements. However, small sample sizes and designs that fail to correct for selection biases into restrictive placements make the results of many of these studies questionable. Some of the more well-controlled studies suggest that restrictive placement can be beneficial to some students in some ways. Additional research on this topic is critically needed, given the important policy and program implications for the nation's most vulnerable students.

This study focused on the impact of restrictive educational placements on a particularly hard-to-serve and problematic group of students – children who enter school with high rates of aggressive-disruptive behavior. In addition to their behavior problems which are a problem for teachers and other students, these children often have serious learning difficulties that impair their capacity to progress academically at a normative pace in mainstreamed settings. Hence, aggressive-disruptive students are often placed in restricted educational placements in the elementary or secondary school years, despite several reasons to think that these children are different from children with learning disabilities without

behavior problems and without clear evidence of the effectiveness or impact of those placements. Research in existence since the 1980s on a similar population-- children classified with EBD-- suggests that educational outcomes for these students are poor, with little evidence that effectiveness of the educational approach has improved in the past 30 years (Bradley, Doolittle & Bartolotta, 2008).

This study adds to the understanding of restrictive educational placements for aggressive-disruptive students in four unique ways. First, this study compared the characteristics of aggressive-disruptive students who were placed in restricted placements during the elementary or secondary years with aggressive-disruptive students who remained in mainstreamed placements, documenting a wide range of family, demographic, and neighborhood risk factors as well as student characteristics associated with the likelihood and timing of restricted placement. Second, this study examined the impact of the timing of restricted education placement, comparing the outcomes of aggressive-disruptive students who entered restrictive placements in elementary school with students who entered in secondary school. Important differences emerged, with iatrogenic effects for restrictive placement most likely for students who entered in secondary school. Third, this study examined student characteristics (including the severity of learning problems and the severity of behavior problems) as potential moderators of the impact of restrictive placements. Lastly, this study was also the first to examine the impact of restricted placements using a robust sample size and casual inference methodology. Almost all prior studies on this topic were limited either by a small sample size, or difficulties determining a comparable control group. Each of these study contributions is discussed further in the following sections.

Characteristics of Students Placed in Restricted Placements

One of the factors that makes it challenging to assess the impact of restricted placement on student outcomes is that students are not equally likely to experience different placement histories. In other words, one cannot treat the comparison of children placed in restrictive placements at different

points in time (elementary vs. secondary) and children who remain in mainstreamed placement as a randomized experiment. Indeed, in this study, an examination of the characteristics of students who experienced the different patterns of restricted placement (elementary entry, secondary entry, and no restricted placement) varied considerably.

Elementary entry. Students who entered restricted placements in elementary school and who remained in restricted placement through secondary school were characterized by a broad array of risks across multiple domains. They had significantly higher levels of aggressive-disruptive behavior problems and internalizing symptoms, and significantly lower cognitive abilities and poorer academic readiness at school entry than their peers who remained in mainstreamed placement in elementary school. In addition to these child risks, these children came from less enriching homes and neighborhoods, and were exposed to more risks factors for later behavior and academic problems such as unsafe neighborhood, maternal depression, and poorer parent-teacher relationships.

These results demonstrate the difficulty faced by schools in determining how to meet the challenging, complex, and multi-faceted needs of these children: by the time of their entry to school, these students are already exhibiting a broad array of deficits across multiple domains which are likely maintained and exacerbated by their environments outside of school. Prior studies have demonstrated that children identified by the schools primarily for behavior problems have poorer academic outcomes (Lane, Barton-Arwood, Nelson, & Wehby, 2008). In addition, they are at risk for a wide variety of negative outcomes when they leave the school setting. They have low rates of employment, high rates of substance abuse and high rates of mental health utilization (Bullis & Yovanoff, 2006; Walker, Ramsey, & Gresham, 2004). This study demonstrates that the risks these children face for an adverse school- as well as life- trajectory are already apparent at an early age and span multiple domains beyond simply aggressive-disruptive behavior.

Secondary entry. Students who entered restricted placements in secondary school also had early-starting deficits on a similarly broad array of variables. They were at significantly greater risk than their mainstream peers, but did not reach the level of risk for students identified for restricted placements in elementary school. Essentially, they were students with low levels of academic performance and marginal behavioral adjustment who fell shy of the threshold that would have identified them for a restricted educational placement in elementary school. Interestingly, by the end of elementary school, these students had levels of academic achievement that were not significantly different than their high-risk peers who remained in mainstream placements (though still lower than their normative peers). However, behaviorally, they exhibited aggressive-disruptive behaviors in 5th grade that were equivalent to the problems exhibited by their high-risk peers who entered restricted placements in elementary school. Unfortunately, the data from the present study suggest a troubling picture: students who enter restricted placements in secondary school are generally students with adequate levels of achievement, but problematic behavior—precisely the characteristics of the student for whom restricted placements in secondary school are contraindicated.

It is not surprising that behavioral, rather than academic, concerns place these children at the greatest risk for being removed from the mainstream classroom. In elementary school, aversive behaviors that fall shy of overt aggression, such as poor cooperation with peers, impatience/impulsivity, and inattention are generally tolerated as nuisances (Safran & Safran, 1984). Thus, children may exhibit high rates of behavior problems, but if they are not hitting other children, their behavior is unlikely to trigger more intensive services. However, in secondary school, the same behaviors that were largely tolerated in elementary school become less acceptable (Johnson & Fullwood, 2006). In addition, students in secondary school may also start displaying delinquent behaviors not usually exhibited by younger children, such as truancy and substance use. These behaviors are also viewed as disturbing by classroom teachers and may contribute to secondary placements (Johnson & Fullwood, 2006). Thus, in

secondary school there are more behaviors and more classes of behavior that are likely to be deemed unacceptable. The present study suggests that there are a number of children who were displaying problematic, but tolerable, behaviors in elementary school who are unable to meet the more stringent behavioral requirements of a secondary school classroom.

The fact that students placed in restricted placements differ significantly from students in mainstreamed classrooms on such a large array of risk factors creates a substantial challenge for evaluations aimed at estimating the impact of those placements on student outcomes. To reduce the impact of confounding risk factors, the present study included a large, multisite sample and applied causal modeling using propensity score methodology.

Methodological Improvements

This study addresses many of the methodological short-comings that have plagued almost all prior studies that examined the topic of restricted placement. One significant short-coming of most prior studies was the use of too small of a sample size, reducing power and making generalization of findings difficult. This study employed a sample of 558 students, 248 of whom had an educational history that included placement in a restricted setting, addressing the problems of small sample size.

In addition to small sample sizes, given the strong selection effects across a wide array of constructs for restricted placements, perhaps the largest shortcoming of the body of prior work involved the selection of a valid control condition. It can be challenging to find a reasonable comparison group that is educated in mainstream placement yet has all of the characteristics of students who receive restricted placements. Any selection bias is likely to bias the results against restricted placements because students with a higher level of disability and concurrent family risk factors are more likely to receive restricted placements. This is the first study to employ propensity scoring methodology to address the problem of selection bias in restricted placements. The advantage of propensity scoring methodology is that it works by modeling the propensity of a child to be in a restricted placement based

on a large number of variables. When groups are balanced based on their propensity scores, the weighted quasi-experimental data approximate that of a randomized controlled trial (Dehejia & Wahba, 2002), reducing bias by 73-90% (Luellen, Shadish, & Clark, 2005).

In the present study, however, the use of propensity scores alone was not sufficient to create comparable groups of children who did and did not receive restricted placements. Examination of this metric revealed that there were a sizable number of children in restricted placements who had no comparable counterparts in the mainstream setting (23% of the sustained placement sample). These children were almost guaranteed to be placed in a restricted setting, with a modeled probability for a restricted placement of greater than 90%. Similarly, there are high-functioning children in the high-risk mainstream group (47%), who had no comparable children in a restricted setting. These children were simply very unlikely to be in a restricted placement (usually less than 1% probability). These results suggest that there are significant risks to using standard statistical controls to compare students in restricted placements to students in mainstream placements. In particular, there is a sizable group of the most at-risk kids, for whom there are no comparison children in a mainstream setting. These children are the least likely to do well in school. Any prior study that included these children at the extremes of the population and failed to control for all confounding variables in their regression models is going to produce biased results, with a bias that would indicate that restricted placements tend to not help children. Even if the proper covariates can be controlled for in a regression model, there are additional dangers of comparing non-overlapping groups. When groups do not overlap, the causal effect relies on extrapolation, which makes the estimate unstable and prone to bias (King & Zeng, 2006, 2007). Also, if the relationship between child "severity" (measured across all confounding variables) and the outcome of interest is not linear (i.e., the relationship differs at different levels of problem severity), as the results of this study partially support, then bias will remain even if all the necessary covariates are included (Schafer & Kang, 2008). By using propensity score methods and dropping extreme outliers, this

study provided a more complete control for confounding variables than prior studies, thereby producing less biased estimates of the impact of restricted placements on student outcomes.

Impact of Restricted Placement: Elementary vs. Secondary Entry

In the present study, propensity scoring methods were used to make causal inferences about the effects of different placement histories. Results from propensity scoring methods are interpreted similar to regression coefficients, but, importantly, because the samples were weighted to be equivalent, just like a randomized sample, the interpretation of effects is causal (Dehejia & Wahba, 2002). Also, because marginal structural models were used, the independent effects of elementary and secondary placement and their combination can each be estimated and tested, as shown in equation 2 (Robins et al., 2000). As such, the results presented in the following discussion are interpreted as the causal impact of being in a restricted setting at different time periods for any student who has a chance of being in either a restricted or mainstreamed classroom. These analyses should not be thought of as comparing the outcomes of the students who experience a particular placement history, similar to what was presented earlier when characteristics of those children were examined.

Elementary entry. Prior to this study, almost nothing was known about the effects of restricted placement in elementary school on distal outcomes at the end of high school. In part, this is because very few datasets follow a sufficient population of students in restricted placements from the elementary years to the end of high school. It is also, in part, because earlier restricted placement is frequently confounded with later restricted placement. In the present high-risk sample, 13% of the students were placed in a restricted placement in elementary school. Almost all of these children remained in a restricted placement in secondary school. Even after removing the students with the most severe problems by restricting the sample to students who had a greater than 10% chance of being in a mainstream placement, 70% of the sample who entered a restricted placement in elementary school remained in restricted placement in secondary school. This overlap created a methodological

challenge in evaluating the unique impact of restricted placements in elementary school, because to do so required accounting for the effect of secondary school placement.

Marginal structural models were used to disaggregate the effects of elementary and secondary placements (Robins et al., 2000). After accounting for the impact of secondary placement, the effects of elementary entry into restricted placements did not add significantly to the prediction of the outcomes of high-school completion, conduct problems, and depressive symptoms. Nor did restricted placement in elementary school change or moderate the impact of secondary placement on any of those outcomes. Hence, the hypothesis that a restricted placement in elementary school would have an iatrogenic effect on outcomes in late adolescence was not supported. Instead, these results indicate that there were no long-term effects of restricted placements on aggressive-disruptive students at the end of secondary school, after decoupling the effects of elementary and secondary placements.

It was noted, however, that the standard errors on the estimates of the effects of elementary restricted placement on later adolescent outcomes were also larger (generally more than 2.5 times larger) than the standard errors of the coefficients associated with the estimated effects of secondary restricted placements. It is possible that the large standard errors indicate that the effects of elementary placement were more poorly estimated than the effects of secondary, because so few students experienced elementary placement without also experiencing secondary placement. In order to test out this possibility, a simplified set of models were estimated, with the students who experienced elementary-only placement excluded (i.e., removing β_1 and β_5 from the model). These models, which compared the impact of sustained placement with a secondary-only or no placement, should have improved model identification. Yet, the standard errors associated with the estimate of elementary placement effects remained large. This finding suggests an alternative explanation, which is that there is a high level of variability in the impact of early placement on students. For some students, elementary

placement may reduce the negative adolescent outcomes studied here, whereas for other students, elementary placement may increase the likelihood of those negative outcomes.

The variability associated with elementary restricted placement observed in the present study is consistent with the prior research literature, in which some studies find positive effects of elementary restricted placements whereas others find negative effects (Kavale & Forness, 2000; Lindsey, 2007; Salend & Garrick Duhaney, 1999). In one study, students in restricted settings were less accepted by peers and had more behavior problems than comparable peers in a mainstream setting (Wiener & Tardif, 2004). However, another study suggests that while students may fall farther behind academically in a restricted placement, they do better behaviorally (Rafferty et al., 2003). Still other studies find no effects on either academic or social outcomes (Buysse, Goldman, & Skinner, 2002), or variable effects with some students doing better in more restricted settings and others doing better in mainstream settings (Karsten et al., 2001; Peetsma et al., 2001). Clearly, the effects of elementary school placement warrant further study.

Secondary entry. As hypothesized, there was an iatrogenic impact of restricted placement in secondary school, increasing late adolescent conduct problems and high-school non-completion (but not depressive symptomatology). Specifically, students who were placed in restricted placements in secondary school had a 42% increase in conduct disorder symptoms (.96 versus .68) and a 28% greater chance of not completing high school (62% dropout versus 48% dropout) compared with an equivalent sample of students who remained in mainstream placement during secondary school.

Few well-controlled studies have examined the impact of secondary restricted placements on later mental health and graduation rates, and, of those studies, no prior study has attempted to control for the influence of earlier restricted placements. Of the studies that have examined secondary placement, outcomes are mixed, with the majority favoring better outcomes for mainstream placements. For example, Myklebust (2002; 2006) found that students with special education needs

who were educated in mainstreamed classrooms had greater educational attainment than those who were educated in more restrictive settings, but found that students in more restrictive placements were less likely to drop out. Rea and colleagues (2002) found similar declines in academic performance for students educated in more restrictive settings, and also found declines in school attendance, suggesting lower student motivation. The National Longitudinal Transition Study (Wagner, et al., 1993) and its follow up, the National Longitudinal Study-2 (Wagner, et al., 2003) found higher achievement test scores for students in mainstreamed classes, but lower grades and increased dropout. The present study suggests that removing children with aggressive-disruptive behaviors from the mainstream classroom and grouping them with similar low-performing peers may exacerbate their academic and behavioral difficulties. In addition, this study explored the possibility that child characteristics might moderate the impact of restricted placement.

Moderation of the Impact of Restricted Placements by Student Characteristics

It was hypothesized that restricted placements would not be equally beneficial or harmful for every student. Student characteristics of aggression and academic aptitude were examined to determine if and how they influenced the effects of restricted placements.

Aggression. The hypothesis that aggression would moderate the effect of restricted placements was not confirmed in this study. No evidence for moderation of the impact of restricted placement in either elementary or secondary school by aggressive-disruptive behavior was observed for any outcome. Previous studies have found that students with more severe disruptive behavior experience worse outcomes than less disruptive peers (Bradley, Doolittle, & Bartolotta, 2008; Lane et al., 2005b). Additionally, the poor outcomes for these students suggest that mainstream placements are insufficient to meet the needs of these children (Bullock and Gable, 2006; Jull, 2008). In theory, restricted environments employ more effective, non-exclusionary behavioral management strategies (Safran & Safran, 1984), and offer greater behavioral support for students with disruptive behavior problems

(Evans et al., 2004). Conceptually, restricted placements offer the capacity for modified curricula and individualized instructional approaches (Fuchs & Fuchs, 1995), which should benefit students with severe disruptive behaviors. Despite conceptual support for this idea, few studies have examined the impact of aggressive behavior on the efficacy of placement. Only one study was identified that examined moderation by severity of behavior problems: contrary to the findings of this study, Peetsma (2001) found that students with more severe psychosocial problems developed somewhat better in more restricted settings. The present study suggests that restricted placements do not meet the needs of students with more severe disruptive behavior any better than mainstream placements, further highlighting the need to develop alternative ways to meet the educational, behavioral and social needs of these students.

Academic Problems. Consistent with hypotheses, students with higher levels of academic aptitude—who presumably are less likely to need the added educational support of a restricted setting—were most negatively impacted by restricted placements. The iatrogenic effects were noteworthy. For students with mean levels of academic aptitude in this sample, there were modest negative impacts on depressive and conduct symptoms, with an expected increase of approximately .53 depressive symptoms and .48 conduct symptoms. At the sample average of academic aptitude, the effect on high school non-completion was stronger: weighted estimates suggested a rate of 67% high school non-completion associated with restricted placement compared with 46% non-completion if students remained in mainstream placements. For students with higher academic aptitude, restrictive placements were even more iatrogenic. For example, consider students without academic difficulties (e.g., with an IQ of 100, and a TRF Attention Problems T-score of 50, both 50th percentile in a normative population). For these students, placement in a restricted placement versus a mainstream placement was associated with an increase in 1.40 conduct disordered symptoms (2.15 symptoms in a restricted placement versus .75 symptoms in a mainstream placement), 1.10 depressive symptoms (1.59

symptoms in a restricted placement versus .49 symptoms in a mainstream placement), and an increase in the rate of high school non-completions of 35% (73% in a restricted placement versus 38% in a mainstream placement). As levels of academic aptitude decline below the sample average, the difference in outcomes between students in mainstream and restricted placements also declines. Slightly below the sample average academic aptitude, differences on all outcomes were non-significant, and for students with academic aptitudes one standard deviation below the sample average (averaging an IQ of 80, and TRF Attention problems T-score of 72.5), students in restricted placements have scores that are higher than similar students in mainstream placements, although not significantly so.

Although it is recognized that students with behavior problems in restricted placements frequently have co-occurring learning difficulties (Lane et al., 2008), this is the first well-controlled study to examine the moderating effect of academic aptitude on the effect of restricted placements for this population. In principle, the greater teacher-to-student ratio, more individualized instruction, greater attention to the skill development, and a protective environment that facilitates greater success may be most beneficial to struggling learners. This idea is supported by these results. Similar to the findings of the present study, the NLTS study (1993) also found that lower performing (but not necessarily disruptive) students had higher grades and lower rates of dropout in more restricted settings. The same study also noted that students identified for more restrictive placements primarily for behavioral reasons had worse grades, poorer attendance and lower graduation rates despite having higher achievement as measured on standardized tests than their learning-disabled peers, suggesting that restricted placements were insufficient to aid this population. However, this is the first study to indicate that placing academically-capable, disruptive students out of the mainstream classroom has an iatrogenic impact.

Implications and Challenges for Educational Policy and Practice

Aggressive-disruptive students present unique challenges for schools because their problems affect not only their own school progress and outcomes, but also that of other students and teachers as well. The frequent use of restrictive placements for aggressive-disruptive students is understandable as an attempt to both provide these students with educational supports that meet their needs, and reduce the negative impact they have on other students in the school. However, as evident in the results of this study, restricted placements are not effectively meeting the needs of the aggressive-disruptive students. The fact that 68% of the students educated in a restricted placement in elementary school remained in restricted placements in secondary school, and the fact that students in sustained restricted placements continued to have the highest rates of behavioral and academic problems at the end of elementary school suggest that restricted-educational placements, as they were practiced by the schools in this study, failed to remediate students' behavioral and academic deficits. The overlap between elementary and secondary placement also suggests that, despite the hope that early restricted placements might provide struggling learners with the extra support needed to remediate their early deficits allowing them to move back into mainstream education, this positive outcome rarely occurs in reality.

Risks of secondary restricted placement. This study has important implications for policies and practices for educating aggressive-disruptive students. The clearest message is that, for disruptive students who do not have serious academic deficits (e.g., low IQ or extreme attention deficits), placement in a restricted educational setting in secondary school is contraindicated. If students do not have problems learning, then such placements are likely to be harmful: reducing graduation rates, increasing conduct problems and increasing depressive symptomology. Thus, for educators and parents who are faced with the decision of whether to remove a disruptive adolescent student from a mainstream classroom to a setting with greater behavioral supports, this study would suggest that significant caution should be used prior to making such a decision. If the student has a low cognitive

ability or significant attention problems in addition to behavior problems, a restricted placement may provide some help, and is unlikely to do significant harm. However, if the student is a capable learner, placing him or her in a restricted setting is likely to have an iatrogenic impact. Examination of the characteristics of students who first enter restricted educational placements in secondary school suggests that, currently, it is often problematic behavior, rather than inadequate academic performance, that triggers the restriction placement. The data in the present study suggest that these later occurring placements are, by and large, inappropriate, and these students are better educated in the mainstream placement, perhaps with increased levels of behavioral support. Some possible alternatives to better meet the needs of these students are discussed below.

Multiple, early-starting risk factors. A second finding of the present study with important implications for educational policy is that students who were placed in restricted placements entered school already displaying and being exposed to multiple risk factors beyond simply aggressive-disruptive behavior. Consistent with other studies that have examined the academic risks and outcomes of disruptive children, the children in the present study who were identified early also had levels of school readiness significantly below their peers who remained in mainstream education, which were apparent by the start of kindergarten (Lane et al., 2008). In addition, many of these students came from risky home- and family-environments, characterized by socioeconomic disadvantages and neighborhood violence. By and large, at school entry, these students are already exhibiting a broad array of deficits across multiple domains which are likely maintained and exacerbated by their environments outside of school.

While more attention has recently been placed on the academic needs of disruptive children, family and neighborhood risk factors are rarely discussed or addressed in the educational literature (Gardner & Frazier-Trotman, 2001; Lane et al., 2008). This may be an important oversight, as these risk factors are widely regarded as important influences on developmental models of aggressive-disruptive

behavior (Catalano & Hawkins, 1996; Dodge, Greenberg, Malone, & CPPRG, 2008; Patterson et al., 1989). It is understandable that teachers and administrators who are already overwhelmed with meeting a diverse array of academic and nonacademic needs of their student body may be reluctant to address these influences that occur beyond the school-walls. However, ignoring the multifactorial nature at the root of the problem may limit the effectiveness of interventions and increase the severity of the problems that need to be addressed later on. Recognizing the challenges in addressing the wide-array of risks with which these students present, the next section describes approaches that might either reduce the need for the restricted placement of aggressive-disruptive students, or improve the impact of restricted placement on those students.

Addressing the Needs of Aggressive Students

The prognosis for individuals entering school with aggressive-disruptive behavior is bleak. Among all children with a classified disability, children classified as EBD are regarded as the most difficult children to include in mainstream classrooms (Heflin & Bullock, 1999). Even years after the start of the inclusion movement, the majority of children with this classification continue to be educated in restricted settings (Bullock & Gable, 2006). As such, it remains important to identify ways to improve the quality of restricted placements so that they are more effective at meeting the needs of these students and are less likely to cause harm. Additionally, altering problematic behaviors once they become entrenched is generally more difficult than preventing those problems initially. Another way to meet the needs of behaviorally at-risk students may be to intervene early to prevent behavior problems from escalating to the point of requiring a restricted placement (Dodge et al., 2008; Patterson et al., 1989). Thus, both improving the quality of restricted placements and early intervention and prevention efforts are likely to lead to improved outcomes for students entering school with disruptive behavior.

Improving the quality and impact of restricted placements. At the time that these data were collected, most educators believed that a “curriculum of control” was necessary in order to educate

these youth, and the practices that occurred in restricted placements were often substandard (Knitzer, Steinberg, & Fleisch, 1990). At the same time, there are a number of evidence-based practices that have been shown to improve the outcomes of children placed in restricted settings (R. L. Simpson, Peterson, & Smith, 2011). Thus, one important and frequently called for method of improving outcomes for disruptive students in restricted placements is greater adherence to practices that are known to be effective, and to avoid practices that are known to be ineffective (R. L. Simpson et al., 2011). While the increased interest in evidence-based programs like PBS are signs that the research-practice gap is closing, critics have argued that there continues to be a significant discrepancy between what are known to be effective (or ineffective) practices and what occurs in the classroom (Walker, 2004; Wehby, Symons, Canale, & Go, 1998). Within a restricted setting, greater use of more effective teaching practices and thoughtfully shaping the classroom context are associated with better student outcomes (Sutherland, Lewis-Palmer, Stichter, & Morgan, 2008; Sutherland & Wehby, 2001). As such, the poor outcomes for disruptive students in restricted placements may not be a function of the placement per se, and also does not reflect a lack of knowledge about how to help these students so much as a failure to properly implement practices that are known to be effective.

Critics of alternative and restricted educational settings have pointed out that, too often, these settings are akin to “dumping grounds” for students that are difficult for schools to teach and employ practices that are almost certain to be ineffective (Fitzsimons-Lovett, 2001; Kellmayer, 1995). The adherence to ineffective practices was more true during the 1990’s prior to reforms in education for EBD students that have focused on greater implementation of evidence based practices (Knitzer et al., 1990; R. L. Simpson et al., 2011). Many educators prescribed to the belief that a “curriculum of control” was necessary for managing classrooms with disruptive children (Brendtro & Brokenleg, 1993). Unfortunately, while practice overall is improving, many programs for disruptive students still attempt to manage students’ behavior with punitive, coercive approaches and limited student choice, which are

likely to lead to decreased engagement with school, resentment and worse, rather than better, behavior (Sutherland et al., 2008).

Additionally, teachers are frequently inadequately trained, stressed, and receive inadequate support (Fore, Martin, & Bender, 2002; Peetsma et al., 2001). Teaching children with disruptive behavior is undoubtedly challenging, and significant caution should be used before concluding that the continued use of ineffective practices are simply the result of inept or uncaring teachers and administrators. At the same time that teachers are attempting to shape a child's behavior by adjusting his or her environment, disruptive children also influence their teachers and school environment by punishing teacher's attempts at instructions with defiance, off-task behavior, and aversive behavior (Wehby et al., 1998). Unfortunately, students' low motivation, poor academic achievement, and disruptive behavior frequently evoke an environment that is harsh, coercive and less interactive. For this reason, special educators trained in the use of effective practices for disruptive children, who have access to additional supports as needed, are critical to better meeting the needs of these children (Sutherland et al., 2008; Wehby et al., 1998). Consistently applying effective practices like having a highly structured classroom, a primarily positive rather than punitive behavior management plan, a low ratio of students to teacher, high-quality academic instruction, and solicitation of greater parent involvement are likely to promote better outcomes and at the same time disrupt the formation of these mutually coercive patterns (R. L. Simpson et al., 2011; Tobin & Sprague, 2000). For example, a review by Sutherland and Wehby (2001) showed that by increasing opportunities to respond to academic requests improved both behavior and academic targets. Increasing the use of evidence-based practices requires training and careful assessment of implementation quality, frequently by setting up a model of regular consultation and monitoring (Wilkinson, 2006). While increased adherence to evidence-based practices is likely to improve the outcomes of students in restricted placements, there is growing evidence that early and on-

going, less-restrictive interventions may prevent the need for more restrictive placements for some students.

Early Intervention. There is growing evidence that the first five years of life are a critical period of child development, during which important neurobiological and behavioral systems and patterns are still developing (Bailey, Bruer, Symons, & Lichtman, 2001; Nelson, 2000). There is some promising evidence that suggests that earlier identification and preventive interventions during this period can alter children's developmental trajectories, generating benefits that remain apparent years later (e. g. Achenbach & Howell, 1993; Bradshaw, Zmuda, Kellam, & Ialongo, 2009; J. Hill, Brooks-Gunn, & Waldfogel, 2003). Targets of early intervention include improving the quality of parent-child interactions, creating more enriching home environments and early childhood experiences, and improving child health and safety (Guralnick, 2005).

A meta-analysis by Lewis and Vosburgh (1988) provides evidence that early academic interventions are effective, with a mean effect size of .43, equivalent to a mean increase of test scores from the 50th to the 67th percentile. Effects of early intervention programs are often evident years after exposure to the intervention has ceased, suggesting that it is, indeed, possible to positively alter developmental trajectories (Pungello et al., 2010). The results of early intervention programs are promising enough that a new provision in the Individual with Disabilities Education Act (IDEA) has been added that allows schools to use part of their IDEA money for early intervention services to prevent behavioral or academic problems (Bradley et al., 2008). After children age out of early intervention and start of school, tiered, multi-component preventive interventions are available to continue to support at-risk students in less-restrictive placements.

Tiered multi-component preventive interventions. Creating a school community that facilitates good behavior, having all staff well-trained in positive, non-exclusionary disciplinary practices, and

having a non-restrictive system of more intensive behavioral supports available on an as needed basis may meet the needs of behaviorally at-risk children without the risks of more intensive restricted placements. More and more educational researchers are calling for tiered interventions as effective and efficient ways to meet the needs of at-risk students, while also benefiting all children (Farmer, Farmer, Estell, & Hutchins, 2007; Gresham, 2004; Stewart, Benner, Martella, & Marchand-Martella, 2007). Tiered interventions have a universal component of evidence-based academic and/or social emotional instruction designed to prevent problems and improve outcomes for all students. It is estimated that universal interventions will be effective for 80-90% of the school population (Gresham, 2004). For students who do not respond to the universal intervention and begin to show or persist in showing behavior problems, a more intensive selected level of intervention is called for that focuses on reversing harm. Relatively simple selected interventions, including components that focus on the likely antecedents and consequences of the problematic behavior such as token systems and, behavioral contracts are likely to be effective for another 5-10% of students (Gresham, 2004; Stewart et al., 2007). Finally, for a few children with the most severe and difficult to remediate behavior problems, intensive, individualized and comprehensive targeted interventions are called for.

A recent review of three-tiered models of reading and behavioral interventions identified 17 three-tiered intervention models with research support (5 reading interventions, 7 behavioral interventions, and 5 integrated behavior and reading interventions), suggesting that there are a number of evidence-based options for schools to choose from (Stewart et al., 2007). Within recent years, interest in the use of tiered evidence-based programs by schools has grown tremendously, with Positive Behavioral Support (PBS) programs, in particular, being adopted by schools with particular enthusiasm (Walker et al., 2004). PBS systems have been successfully implemented on a large scale basis with high fidelity and positive results (Barrett, Bradshaw, & Lewis-Palmer, 2008). Similar to early intervention programs, at least one study has shown that tiered interventions in the early school years have

sustained positive impacts years later: Kellam, Ialongo and colleagues conducted an intervention in first grade that paired the behavioral intervention, Good Behavior Game, with an enhanced academic curriculum and found improvements on standardized achievement tests, improved rates of high school graduation, and decreased special education service use in high school (Bradshaw et al., 2009).

There is significant room for improvement in meeting the needs of students with disruptive behavior. Early intervention may set at-risk children on a more adaptive developmental trajectory and/or reduce the harm incurred by exposure to less-than-optimal home and neighborhood environments like those experienced by the children in the present study. Once children enter school, the application of tiered multi-component preventive interventions that target both behavioral and academic deficits may prevent problems from developing and/or address them more effectively with less restricted efforts. Finally, for those children who still exhibit severe enough behavior problems to warrant a restricted placement, careful and consistent use of evidence-based practices in a restricted setting are likely that result in better outcomes.

Limitations

Education policy and special education laws create major impediments to randomized designs that assign students with similar needs and abilities to more and less restricted placements. Since randomized trials are not possible, propensity scoring is, and is likely to continue to be, the best way to address the challenge of finding a valid control group when studying the impact of these placements, given the presence of strong and multifaceted selection effects. Propensity scoring methods are capable of reducing bias and they provide better ways to check the validity of the comparison group. However, the effectiveness of propensity scoring methods to create equivalent groups rests completely on the quality and comprehensiveness of the confounding variables that are included in the model. In theory, when all of the important confounding variables are measured well and included in the

propensity model, the groups will be fully comparable and results should be equivalent to a randomized design (Robins et al., 2000; Schafer & Kang, 2008).

In practice, identifying and including all confounders is likely to be impossible. Studies that have compared results from propensity scoring methods to randomized trials suggest that these methods are improvements over standard methods. At the same time, propensity scoring methods are not infallible, and are capable of both over- and under-estimating the “true” effect (Luellen et al., 2005). In the present study, thirty-three confounding variables from several domains were selected based on their theoretical and empirical association with restricted placements and negative outcomes in late adolescence. If there are unmeasured confounders that were not highly correlated with any of these thirty-three measured confounders but were highly related to the outcome variables, they could significantly affect the results and the corresponding interpretations regarding the impact of restricted placements (Rosenbaum, 2002). However, we believe that situation to be unlikely, given the number and range of confounders that were included in this study.

Additionally, the confounding measures were mostly assessed in Kindergarten and 5th grade (prior to elementary and secondary restricted placements). It is possible that more proximal events occurred after these time points that both affected the outcomes and served as a trigger for a restricted placement. If events like this occurred, it would bias the results in a way that cannot be detected using propensity scores.

An additional methodological issue is that because of the danger of extrapolation (King & Zeng, 2006), children in either restricted or mainstream placements without comparable peers in the opposite condition were excluded. Analyses with the remaining sample ask a more refined question: “Among students *who have a chance of being in either mainstream or restricted placement*, what is the impact of placement history?” This study should not be generalized to the effect of restricted placements on high-

performing children. More importantly, it also should not be generalized to the group of children with very severe problems, for whom no comparable children could be found in the mainstream setting. For these children, given that 100% of them are educated outside of the mainstream classroom, we can assume that a traditional classroom environment was not sufficient to meet their needs. However, this study does not address whether or not restricted placements are a better option.

Another limitation of the present study is that special education is dynamic, with policies and procedures undergoing revision over time. The data used in this study were collected from 1990-2002. Over the course of the preceding two decades, the inclusion movement has changed the special education delivery model in significant ways, with more students with more severe disabilities and learning and behavioral challenges being educated in a mainstream setting. At the same time, most students with severe behavior problems continue to be educated outside of the mainstream classroom for large parts of their day (Bullock & Gable, 2006), suggesting that these findings are likely to continue to be relevant for this student population. In addition, the challenging nature of educating aggressive-disruptive children and the poor outcomes for these students is widely understood. In response, there is an increasing focus on applying an array of evidence-based practices to prevent, intervene, and assess the effectiveness of interventions (Gresham, 2004). As such, the methods by which schools attempt to meet the needs of these students are also evolving over time, and the use of school-wide evidence-based programs like PBS has become much more widespread. As such, these data may not fully reflect the current state of practice.

Lastly, some caution should be used in interpreting the lack of positive impacts for restricted placements. On two of the outcomes examined, depression and conduct problems, the average symptom counts for students in mainstream placements were fairly low (.81 for depression and .78 for conduct problems). Thus, for those outcomes, reducing symptoms further may be difficult (since they are already so close to 0) and may not be very meaningful (i.e., does a person displaying 1 symptom of

depression function significantly better than a person with 0 symptoms?). Thus, on two of the three outcomes measured, this study is better suited for finding iatrogenic effects than positive outcomes. In this regard, finding no ill effects for many of the students in restricted placements can be viewed as a positive result. Prior to making any strong conclusions that there was no positive effect of restricted placement, other variables that measure positive outcomes, such as self-esteem, self-efficacy, academic motivation, and peer-relations should be examined.

Future Directions

This study demonstrates that restricted placements, in their current form, do not improve the high-school completion rates or reduce adolescent conduct problems or depression for students who begin school with elevated aggressive-disruptive behaviors. In fact, these placements exacerbate conduct problems, and high school dropout in general, and are particularly iatrogenic when students have average or better academic ability. As discussed earlier, there are some promising new ideas for how to better meet these children's needs including greater attention to prevention, different models of intervention, and greater use of evidence-based practices within traditional restricted settings. However, findings from this study suggest that much work still needs to be done in order to know how to better meet the needs of students entering with aggressive-disruptive behavior. Some additional directions for research highlighted by the findings in the present study are discussed below.

Why was secondary placement harmful? Additional studies are needed to answer the question of why restricted placements in secondary school are harmful, and why they are particularly iatrogenic for students who are more academically able. Placing these disruptive students into restricted placements in secondary school exposes them to a number of risk factors which may individually or in combination produce iatrogenic impacts.

One factor may be peer contagion, a process in which grouping delinquent children with other students displaying similar behavior problems facilitates the transfer and escalation of deviant ideas and behaviors (Dishion & Tipsord, 2011). Developmental models of antisocial behavior have demonstrated a robust relationship between associating with deviant peers and an adolescent's own increases in delinquent behavior (Haynie, 2001; Patterson et al., 1989; Vitaro et al., 2000). Being placed in a restricted setting is likely to increase the contact a student has with other students who have behavior problems. Even when closely supervised and monitored, greater affiliation with deviant peers can escalate and reinforce deviant behavior (Dishion et al., 1999).

A second factor may be that by the start of secondary school, aggressive-disruptive students may have remained in a mainstream setting long enough to develop a lasting negative reputation, and to be the focus of harsh treatment from mainstream peers and coercive discipline practices from teachers. Students with aggressive-disruptive behavior are frequently rejected and isolated by mainstream peers (de Monchy, Pijl, & Zandberg, 2004) and often subjected to harsh and punitive punishments by frustrated teachers (Jull, 2008). Thus, at the same time that they are being exposed to deviant models, they are rejected by mainstream peer groups, viewed with suspicion by teachers and administrators, and by the fact of their restricted placement, are de facto excluded from exposure to more positive peer norms and activities.

The timing of the onset of restricted placements may also play a role. The early adolescent years mark the beginning of a decline in a number of motivational constructs such as interest in school, intrinsic motivation, self-concepts and self-perceptions (Eccles et al., 1993). Removal from a mainstream classroom during this time, particularly for a student who is intellectually capable of success, may convey to the student a clear message of rejection by the school, leading to lowered self-efficacy and disaffiliation with mainstream norms and values (Garber et al., 1991; Lund, 1987). Placement in restricted classrooms may have a similar effect of lowering expectations of teachers

(Good, 1987) and parents (Heiman, 2002). These factors may, in turn, set them on a path of lower school engagement, and further engagement with delinquent lifestyles associated with conduct problems, dropout and depressive symptoms (Catalano & Hawkins, 1996).

Possible protective effects of elementary placement. Although elementary restricted placements did not seem to have an overall positive impact, the expected outcomes for experiencing sustained restricted placements were not significantly different from the expected outcomes for remaining in a mainstream placement, whereas the expected outcomes for experiencing a restricted placement in secondary school only was iatrogenic. This suggests that being in restricted placements in elementary school may reduce the negative impact of restricted placements in secondary school. It is important to note, however, that when tested directly, there was no statistically significant effect for the combined elementary and secondary placement, making this conclusion very tentative. However, in almost all cases, the effect for combined elementary and secondary placement was of similar magnitude, but in the opposite direction as secondary placement (though the latter was significant whereas the former was not because the effect had a larger standard error). It may be that education within a more protective restricted placement in elementary school may lead to improved social skills, better relationship with peers and teachers, and increased behavioral regulation. Alternatively, entering a restricted setting in elementary school and sustaining placement during secondary school may avoid the reductions in self-esteem and motivation, and protect a child from mainstream peer and teacher hostility that were earlier speculated to occur with the removal from a mainstream environment in secondary school. However, this effect needs to be replicated and better understood before it should be considered as evidence to influence policy.

Understanding variability in the effect of elementary restricted placements. Part of the answer for how to better educate students with behavior problems may lie in better understanding the widely variable results calculated in the present study for the effect of restricted placements in elementary

school. In this study, although approximately 70% of children who were identified for restricted placements in elementary school remained in restricted placements in secondary school, the remaining 30% was able to rejoin the mainstream setting and remain there for their entire secondary school career, suggesting that these placements appeared to be effective for some children. Additionally, whether or not students experienced sustained or elementary-only restricted placements, the wide standard error on the estimated impact suggests that some students benefited being educated in a restricted setting, while others did worse.

One explanation for this variability may be that earlier interventions can, indeed, be helpful, but only if those interventions are conducted in the right way (Sutherland & Wehby, 2001). If interventions are not implemented with fidelity by competent, well-trained educational professionals, then intervening by pulling these students out of the mainstream classroom may be worse than doing nothing. Given the documented shortage of qualified personnel serving the EBD population (U.S. Department of Education, 2008), it is likely that the quality of implementation varies widely among under-resourced schools. Further study of the relationship between effective versus ineffective teaching practices is likely to explain part of the variability in outcomes.

It may also be that the effect of restricted placements is determined in part by the classroom context of the mainstream classroom environment (Sutherland et al., 2008). In a well-run, high-achieving classroom, disruptive students may become targets and be singled out for harsh treatment by teachers and peers. In such settings, restricted placements may be protective and be viewed positively. In less well-run classrooms, with less well-run programs, disruptive students may, paradoxically be more protected in the mainstream setting than in other, better managed, mainstream classrooms. When the classroom culture is more disruptive in general, and aggressive behavior is more normative, aggressive-disruptive students are less likely to stand out in negative ways and may be less disliked by peers

(Powers, Bierman, & CPPRG, in press; Stormshak, Bierman, Bruschi, Dodge, & Coie, 1999) allowing them greater access to the benefits of the mainstream classroom.

Another possible explanation is school and program resources. There is some evidence that teacher practices differ in Title I versus non-title schools (Stichter et al., 2009). It may be that better funded schools have more resources that make restricted placements the enriching experiences they were designed to be and the ability to train and retain skilled teachers at higher rates (Fore et al., 2002).

Given that children exhibiting disruptive behavior problems have diverse needs that usually extend beyond the boundaries typically addressed in a school setting, it is likely that multiple factors account for more or less effective practice. These proposed research directions suggest that answers for creating more consistently effective programs for disruptive children are likely to exist at the individual-, classroom- and school-levels.

Effects on peers without behavior problems. This study examined the effect of restricted placements from a deontological perspective (i.e., what is in the best interest of the disruptive student?). An important alternative perspective is to assess the effect of removing or including disruptive students on other students in the classroom. Disruptive students can create significant challenges to classroom management and force teachers to devote considerable time and energy to non-educational aspects of the classroom. Although this study found no benefits for most of the students who received restricted placements and some harmful effects, serving the needs of these aggressive-disruptive students is only one of the goals of school districts. Schools have the goal of educating all students, and non-problem students may be affected in negative ways by the mainstream inclusion of aggressive-disruptive classmates. It may be that removing the most disruptive students from the mainstream classrooms may improve the overall academic achievement and behavior of the class. If this were the case, an argument could be made from a utilitarian perspective, that as long as students in

restricted placements were not negatively impacted by their placement, the needs of the student body as a whole are better met by removing some students. Rujis and colleagues (2009) reviewed the literature on the question of whether the inclusion of children with special education needs affected the social and academic performance of non-special needs peers. They found evidence of net neutral to positive effects on non-special needs peers, however, there was some evidence to suggest that the effect may vary based on the type of inclusion and the level of support provided. Additionally, there is some tentative evidence that the impact may be different for high versus low achieving peers. Clearly, this is a question that requires future research.

Summary

Educating students with aggressive-disruptive behavior is a difficult challenge. Some promising directions exist for improving practice, but no good solutions have yet been found. In their current form, utilization of restricted placements to meet the needs of these students has a limited impact and, in some situations, can produce more harm than good. More high-quality research is needed in order to know how to better meet the needs of this challenging student population.

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