ABSTRACT

Title of Document: EARLY INTERNALIZING AND EXTERNALIZING PROBLEMS: AN EXPLORATION OF RISK FOR LATER PROBLEM BEHAVIOR COMORBIDITY

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The comorbidity of problem behaviors within individuals is prevalent and represents a public health concern. To date, extant literature remains inconclusive regarding which presents greater risk for the development of comorbidity: internalizing problems or externalizing problems. This study addressed the question of risk by first creating an outcome variable representative of comorbid elevations in internalizing and externalizing behaviors—a first step taken by few extant studies. Logistic regression was used on data from the Early Childhood Longitudinal Study (ECLS-K; National Center for Education Statistics, 2002) to answer which single problem behavior was more likely to precede comorbidity. Additionally, mediation by social and academic competence along with gender differences were examined. Results showed that, in general, externalizing problems in first grade were more likely to precede fifth grade comorbidity. Social competence and, to a lesser extent, academic competence in math mediated the problem behavior trajectories. Significant gender differences existed, however, such that, for girls, externalizing problems did not present risk for later comorbidity and, for boys, academic competence was not a significant mediator. Existing research findings and psychological theory

were utilized to provide potential explanations for the results and implications for future research and practice were discussed.

EARLY INTERNALIZING AND EXTERNALIZING PROBLEMS: AN EXPLORATION OF RISK FOR LATER PROBLEM BEHAVIOR COMORBIDITY

By

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Finally, to my father, Dr. Dennis McKearin, and my late mother, Mary Kuhn, I dedicate this dissertation to you. Let this dissertation stand as a testament to the values you so lovingly instilled in me—perseverance, clarity of thought, the value of education, and a ravenousness appetite for questioning the world around me. When asked about the meaning of life, the astrophysicist Neil deGrasse Tyson replied: "When I think of 'meaning' in life, I ask, 'Have I learned something today that I didn't know yesterday?' Bringing me a little closer to knowing all

that can be known in the universe. Just a little closer, however far away all the knowledge sits. If I live a day and I don't know a little more that day than the day before, I think I wasted that day."

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Chapter 1: Introduction

The Development and Comorbidity of Externalizing and Internalizing Behaviors

The term externalizing behaviors is used to represent a range of aggressive and delinquent behavior sometimes associated, but not synonymous, with clinical diagnoses of oppositional defiant disorder (ODD) and conduct disorder (CD) (Achenbach & Rescorla, 2000). Internalizing behaviors represent the range of withdrawn and overly inhibited behaviors sometimes characteristic of a clinical diagnosis of depression or anxiety.

A small degree of externalizing and internalizing behavior is typical in the development of youngsters. In general, externalizing behaviors (EB) peak during early adolescence and then decrease (Moffit, 1993), while internalizing behaviors (IB) arise a bit later and increase over time (Leve, Kim, & Pears, 2005). In some cases, developmental trajectories have been found to differ by gender, with boys exhibiting more EB than girls over time (Campbell, 1991) and girls exhibiting higher rates of IB (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Muris, Merckelbach, Gadet, & Moulaert, 2000). In other cases, gender differences have not arisen. Such was the case for Hay, Castle, and Davies (2000) and Broidy, Nagin, Tremblay, Bates, Brame, Dodge, et al. (2003) who found boys and girls did not differ in levels of instrumental aggression and defiance over time.

The comorbidity of elevated externalizing and internalizing problems present a unique dilemma for youngsters and their caretakers and clinicians. When youngsters exhibit comorbid internalizing and externalizing conditions, such as depression and conduct disorder, the symptoms of each tend to be more chronic and severe (Capaldi & Stoolmiller, 1999). Moreover, individuals with comorbid problem behaviors tend to have poorer overall adjustment in

adulthood compared to their counterparts who exhibit only one problem behavior (Capaldi & Stoolmiller, 1999). Regarding prevalence of comorbid pathology, a meta-analysis by Angold and Costello (1993) found that in community samples of youngsters diagnosed with depression, conduct problems co-occurred in 9 to 46% of cases. Additionally, in their 2000 study, Achenbach and Rescorla reported a correlation of .50 between externalizing and internalizing problems in populations as young as childhood.

Inconsistencies Within Comorbidity Research

Although comorbid problem behaviors pose a significant public health concern, inconsistent results surround the question of whether a specific behavior profile (i.e. primarily externalizing or internalizing) poses a greater risk for subsequent comorbidity. That is, some studies find early externalizing problems more likely to precede comorbid problem behavior, while other studies find internalizing problems pose a greater risk. Several factors could be contributing to inconsistent results in comorbidity research. First, most studies purporting to study predictors of comorbidity do not use comorbidity as an outcome variable. Second, studies tend to use clinical samples and make generalizations to the larger population (Burke, Loeber, Lahey, & Rathouz, 2005; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002), while a smaller number of studies extend their reach more broadly to community populations exhibiting significant externalizing and internalizing behaviors but not requiring a diagnosis (Kiesner, 2002; van Lier, Vitaro, Barker, Brendgen, Tremblay, & Boivin, 2012).

Third, until recently, the effects of variables mediating the trajectory from single to comorbid problem behaviors has only occasionally been formally studied (Rohde, Lewinsohn, & Seeley, 1991; Van der Giessen, Branje, Overbeek, Frijns, van Lier, Koot, & Meeus, 2013). Being that the relationships between early problem behavior and later comorbidity are complex,

formally examining mediation effects facilitates a deeper understanding of the longitudinal pathways.

Research Questions

This study included children and adolescents with significant externalizing and internalizing behaviors, not clinical diagnoses, and sought to overcome the latter limitations of previous investigations listed above. Specifically, this study sought to better understand the behavioral risk factors of problem behavior comorbidity and considered the potential mediation effects of social and academic variables on problem behavior development. Specific research questions included:

Research Question 1. What subsequent patterns of behavior are characteristic of first graders exhibiting elevated problem behaviors?

Research Question 2. To what degree do early internalizing problems and externalizing problems contribute to later internalizing/externalizing behavior comorbidity? Specifically:

2a. To what degree are internalizing problems in the first grade associated with problem behavior comorbidity in fifth grade?

2b. To what degree are externalizing problems in the first grade associated with problem behavior comorbidity in fifth grade?

Research Question 3. To what degree do social competence and academic competence influence the relationship between:

3a. Early internalizing behavior and later comorbidity?

3b. Early externalizing behavior and later comorbidity?

Supplementary Research Question. To what degree do gender differences exist amongst the aforementioned phenomena?

Chapter 2: A Review of the Literature

Search Methods

Electronic databases were the primary sources for the review of literature. Three electronic databases, EBSCO, ERIC, and Social Sciences Citations Index, were searched. Search terms included but were not limited to 'externalizing,' 'internalizing,' 'comorbidity,' 'problem behavior,' 'co-occurrence.'

Overview of Literature Review

In line with a prevention approach to mental health, this study sought to understand the risk factors that contribute to problem behavior comorbidity. One such risk factor is the presence of a separate, but equally detrimental, set of problem behaviors; that is, early externalizing behavior being a risk factor for subsequent externalizing-internalizing comorbidity, and early internalizing symptoms increasing risk of subsequent comorbidity. A noticeable question that arises, however, is which set of behaviors, externalizing or internalizing, presents more of a risk? Put another way, which set of behaviors is more likely to precede comorbidity?

This study relied on psychological theory and extant studies to explore this complex issue. In all, 35 studies are included in this literature review. In their review of extant literature, Oland and Shaw (2005) expressed concern about the dearth of theory and studies directly addressing the issue of behavioral predictors of comorbidity in a way that accounts for complex relationships. Rather, they pointed out, theories linking one class of problem behaviors directly to the subsequent development of another class of behaviors (e.g. early externalizing problems predicting the emergence of later internalizing problems), known as *pathogenic comorbidity,* have been used to explain the phenomenon of comorbidity. Although not ideal, studies of

pathogenic comorbidity are still a good starting point for understanding the relationship between externalizing and internalizing behaviors over time. Thus, the review of literature at present will begin by discussing studies of pathogenic comorbidity and their implications for a greater understanding of the development of comorbid problem behaviors. The author's evaluation of the literature is that evidence exists for both externalizing and internalizing problems being the better predictor of subsequent maladaptive behavior, suggesting studies of pathogenic comorbidity may not sufficiently capture the complexities of problem behavior relationships over time.

Perhaps additional variables influence the relationship between early and subsequent problem behaviors. As such, the chapter concludes by reviewing studies that have included the effects of mediating variables in their exploration of problem behavior trajectories, with a spotlight on social and academic variables. In the end, the author aims to shed light on the inconsistency amongst studies implicating externalizing or internalizing problems as predictive of later maladaptive behavior and to begin a conversation about whether the inclusion of mediating variables is key in clarifying our understanding of how behaviors relate over time. Notably, much of the research on behavioral predictors of comorbidity has, in fact, been conducted without the use of comorbidity as an outcome variable. This is a significant hole in the literature, and one that this study begins to fill.

Which Problem Behavior Profile Poses Greater Risk for Later Comorbidity?

In her seminal review of comorbidity research, Lilienfield (2003) proposed *pathogenetic comorbidity* as one possible source of comorbid externalizing/internalizing problems. Pathogenetic comorbidity proposes one condition predicts or contributes to another. Indeed, Drabick, Ollendick, and Bubier (2010) support this approach to researching comorbidity in their

discussion of directional theories; that is, theories that posit one class of behaviors exerts causal influence on the development of a subsequent class of behaviors. This study relies on two types of directional theories: First, those that implicate externalizing problems as posing a primary risk for future internalizing-externalizing comorbidity and, second, those implicating internalizing problems as posing a greater risk.

Risk Posed by Early Externalizing Problems

The theory behind early externalizing problems underlying later comorbidity is as follows: externalizing behaviors contribute to poor social interactions (e.g. peer rejection, conflicts with teachers) and academic experiences. If the youngster does not possess adequate coping mechanisms to deal with the failure experiences, they begin to view themselves and others in a negative light and are at increased vulnerability for developing internalizing problems. This theory is commonly referred to as the failure model (Capaldi, 1991) and it has received a good deal of support.

In her seminal two-part study, Capaldi (1992) classified 203 at-risk 6th grade boys as having no problem behavior, internalizing problems, externalizing problems, or comorbid internalizing-externalizing problems. Problem behaviors for group classification were based on self-report (internalizing problems) and parent, teacher, and self-report (externalizing problems). Behaviors were significantly elevated if they fell 0.5 standard deviations above the sample mean. Follow-up data on behavior, academic achievement, and peer and parent acceptance/rejection were collected from the boys in 8th grade in order to examine adjustment characteristics of male youngsters with early behavior problems. Using MANOVA analysis, Capaldi (1992) found that conduct problems in grade 6 were correlated with significant peer and parent rejection and a failure to develop academic skills in 8th grade. Additionally, the data showed that a higher

percentage of 6th grade externalizing boys were classified as having comorbid problem behaviors in 8th grade than early internalizing boys (22% vs. 3%, respectively). From these data, Capaldi developed the failure model, suggesting the early externalizing problems pose a more significant risk for later comorbidity, likely through social and academic failures. In addition to issues researchers could take with setting a low cutoff threshold (e.g. 0.5 SD above the mean) to denote "significant" behavior problems and a research design not ideal for examining complex relationships, a glaring problem exists with these data: the gender homogeneity of the sample (i.e. only boys). Indeed, a number of studies looking at the development of problem behavior over time seem to include gender homogeneous samples (Burke, Loeber, Lahey, & Rathouz, 2005; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002), which limits the generalizability of the failure model.

Other studies have included boys and girls in their sample, but the failure model was supported only for boys. A prime example is Boylan, Georgiades, and Szatmari's (2010) study of nearly 900 children with data on mother-reported depressive and oppositional behaviors over three waves of data collection (aged 6, 8, and 10 years old). Using structural equation modeling, the authors found that oppositional behaviors at age 6 posed significant risk for later depressive problems in only boys, but not in girls.

Given Capaldi's findings and the subsequent support of Boylan and colleagues (2010), one wonders: Do externalizing problems pose as significant a risk in girls' development of subsequent problem behavior? A study by Hipwell, Stepp, Feng, Burke, Battista, Loeber, and Keenan (2011) suggested the answer is yes. The authors explored the temporal ordering of externalizing and internalizing problems in a sample of 1,215 girls aged 8 years old at study entry. Behavioral data were then collected once a year for the next nine years. Specifically,

parent-ratings of externalizing behaviors consistent with DSM-IV conduct disorder and internalizing behaviors consistent with DSM-IV depression were obtained to measure the severity of problem behaviors. Results from path analyses showed significant externalizing problems tended to precede and, the authors believed, predict significant internalizing problems. Although the effect size was small (ranging .06 to .14 at the $p \leq .05$ level), Hipwell and colleagues contributed to evidence supporting the failure model for girls.

Support for externalizing problems preceding further maladaptive behavior has also been found in the international context. Kiesner (2002) recruited 215 boys and girls from a region in Italy (mean age of 13) and collected data on problem behaviors and peer rejection over a two-year period of time. Results related to peer rejection are discussed later in this review. Externalizing behavior was measured by an adapted version of the Teacher Report Questionnaire, students rated depressive symptomatology using the Children's Depression Inventory, and peer rejection was determined by peer nominations of whom they liked most and least in class. Multiple regression models were constructed and run hierarchically to test the relationship between externalizing behavior at age 13 (Time 1) and depressive symptoms at age 15 (Time 2), as well as possible mediation by peer rejection. Results showed that Time 1 externalizing behavior contributed to Time 2 depressive symptoms, supporting the temporal relationship between problem behaviors posited by the failure model.

Using a larger sample of adolescents, different analyses and source of behavioral data, Van der Giessen, Branje, Overbeek, Frijns, van Lier, Koot, and Meeus (2013) found similar results in the Netherlands. The authors collected annual data for nearly 500 boys and girls on self-reported depressive symptoms and parent-reported aggressive behavior over a three-year period beginning at age 12. Path analyses showed that, consistent with the failure model,

significant aggressive behaviors at age 12 predicted subsequently elevated depressive symptoms. Early depressive symptoms did not predict later aggression.

Evidence presented above supports Capaldi's failure model. Notably, while the failure model was developed to explain how early externalizing behaviors beget subsequent externalizing-internalizing comorbidity, the majority of studies following Capaldi's study have used just internalizing behavior as an outcome rather than comorbidity. The results of these studies, many discussed above, should not be overlooked, however, for their contribution to the failure model. Indeed, it seems logical that a child with early externalizing problems would continue to act out alongside the development of new internalizing problems and many authors have used the failure model in their studies of comorbidity (Boylan, Georgiades, & Szatmari, 2010; Burke, Loeber, Lahey, & Rathouz, 2005; Kiesner, 2002; Lahey, Loeber, Burke, Rathouz, & McBurnett, 2002; Van der Giessen, Branje, Overbeek, Frijns, van Lier, Koot, & Meeus, 2013).

Empirically speaking, results from at least one study, in addition to Capaldi (1992), support externalizing problems posing significant risk for later comorbidity, with comorbidity included as the outcome variable. Rohde, Lewinsohn, and Seeley (1991) explored clinical comorbidity in a community sample and the temporal relationships between disorders. Their study included a sample of 1,710 adolescents and 2,060 adults who completed a questionnaire and diagnostic interview in order to identify the presence of depressive disorders, disruptive behavior disorders, and other disorders. Prevalence odds ratios were calculated and results showed that, in both adolescents and adults with comorbid depression and disruptive behavior disorder, the disruptive behavior disorder was more likely to precede depression than vice-versa.

Risk Posed by Early Internalizing Problems

A second possibility exists—that early internalizing problems are greater predictors of later comorbidity than are externalizing problems. This temporal relationship aligns with a theory known as the *acting out model.* It may be that the withdrawn youngsters miss out on opportunities to interact positively with others, fail to build adequate social competencies, and, consequently, are more likely to engage in antisocial, externalizing behaviors later in life. Indeed, Rudolph, Hammen, and Burge (1994) reported that, in a conflict simulation task, depressed youth experienced symptoms aligned more with hostile problem-solving and conflictual peer exchanges than passive problem-solving and disengagement. It is also possible that feelings of hopelessness characteristic of some internalizing problems contribute to increased risky behaviors (e.g. fights, theft) characteristic of externalizing disorders (Oland & Shaw, 2005). Similar to aforementioned studies of externalizing problems, extant literature on the predictive role of internalizing problems has focused on how they lead to subsequent externalizing problems—neither overtly discussing or discounting comorbidity as the outcome. Also similar to the aforementioned section, however, it is plausible that early internalizing behaviors would not disappear, rather would persist, upon development of later externalizing problems.

Evidence of internalizing problems as a risk factor can be seen in Beyers and Loeber's (2003) study examining the developmental trajectories of depressive and delinquency behavior. The authors drew from a randomly selected community-based sample of 13-year-old males and tracked them for 5 years. The boys self-reported their depressive symptoms and delinquency behaviors on rating scales. Using growth curve modeling, the authors found that, for adolescent boys, trajectories of depressed mood and delinquent behaviors share a dynamic relationship, but

that, ultimately, depressed mood exerts stronger influence on subsequent delinquency than the other way around. Specifically, high levels of depressed mood and high numbers of delinquent acts mutually influenced each other, but depressed mood had a more robust effect on the slope of delinquency. While these results do not speak to comorbid externalizing problems arising alongside pre-existing internalizing problems, they set the stage for comorbidity by suggesting early internalizing problems influence the developmental trajectories of externalizing problems.

The generalization of Beyers and Loeber's (2003) results to the general population of adolescents is limited by their inclusion of only a male sample. Several years later, however, Measelle, Stice, and Hogansen (2006) found similar results with a sample of only females, suggesting internalizing problems may, indeed, exert influence on the presence of externalizing problems over time regardless of gender. Measelle and colleagues (2006) followed a group of 485 adolescent girls (aged 13 Time 1) for four data collection waves over a five-year time period. Depressive symptoms (internalizing behaviors) were measured using a structured clinical interview and antisocial behaviors were measured using the externalizing behavior scale of the CBCL self-report. Using growth curve modeling, the authors found that, for girls, initially high depressive symptoms predicted slower rates of antisocial behavior deceleration. Similar results, of internalizing problems influencing changes in externalizing behaviors, have been found across international contexts, for Italian (Vieno, Kiesner, Pastore, & Santinello, 2008) and Finnish (Ritakallio, Koivisto, von der Pahlen, Pelkonen, Marttunen, & Kaltiala-Heino, 2008) adolescents.

Other authors have found support for the acting out model. Ritakallio, Koivisto, von der Pahlen, Pelkonen, Marttunen, and Kaltiala-Heino (2008), for one, surveyed approximately 2,000 adolescent boys and girls in Finland over a two-year period. The authors collected self-report

data on depressive symptoms and antisocial behavior, and used logistic regression analyses to examine the longitudinal relationship between problem behaviors. Results showed that girls with significant depressive symptoms at age 15 were twice as likely than their non-depressed counterparts to exhibit significant antisocial behavior at age 17. The study did not find support for antisocial behavior predicting later depression for either gender.

Mesman, Bongers, and Koot (2001) also found support for the internalizing preceding externalizing developmental pathway, although, in their young sample, this was true only for a subset of boys and the relationship was mediated by social problems. Mesman and colleagues obtained a random sample of 420 children residing in Holland and collected data on their problem behavior as well as social problems at three time points over an eight-year period. At Time 1, the mean age was 3 years old. At each time point, parents and teachers completed the Child Behavior Checklist (CBCL) to obtain information on key variables. Path analyses were used to model the relationships between Time 1, 2, and 3 variables. Results varied significantly for boys and girls depending on who rated behaviors, parents or teachers, suggesting rater bias can have a significant impact on research into problem behavior development. Related to internalizing problems, an indirect path existed for the teacher-rated boys' group whereby depressive symptoms at Time 1 predicted externalizing problems at Time 3 via social problems at Time 2. No such effect existed for parent ratings or for girls, regardless of rater. The mediating effects of social problems will be discussed in further detail later in this review.

Although Ritakallio et al. (2008) and Mesman et al. (2001) both found support for internalizing problems posing risk for later behavioral maladjustment, their results highligh gender differences, similar to aforementioned studies of the failure model. Specifically, Ritakallio and colleagues found internalizing behavior to be a risk factor in girls while Mesman

and colleagues identified the risk in boys. Such discrepancy may be due to the age difference in the samples. That is, perhaps an interaction between age and gender puts girls at greater risk for the negative effects of internalizing problems later in adolescence and boys at risk earlier in childhood. Gender discrepancy could also have been influenced by Mesman and colleagues' inclusion of the mediating influence of social problems. Ritakallio and colleagues did not include mediating variables, thus we cannot say whether a different outcome would have emerged had additional variables been taken into account. A strength of the study at present is that it explored potential mediating relationships in an attempt to bring additional clarity to our understanding of how problem behaviors relate over time.

Summary

In sum, literature on the extent to which a class of problem behaviors (i.e. internalizing, externalizing) accounts for eventual comorbid problem behaviors is surprisingly scarce. Rather, this literature review relies heavily on studies of pathogenetic comorbidity (i.e. externalizing→internalizing; internalizing→externalizing). Although this line of research does not specifically address comorbidity, it also does not discount its existence as an outcome and that the same theoretical principles underlie comorbidity. Indeed, in her review of comorbidity literature, Lilienfield (2003) acknowledges this line of research, which explores the temporal relationship of problem behaviors, as a promising approach in attempting to understand the developmental trajectory of comorbid psychopathology.

To complicate matters, however, literature on the temporal relationship of problem behaviors is inconsistent, with some studies supporting the failure model (Boylan, Georgiades, & Szatmari's, 2010; Capaldi, 1991; 1992; Hipwell, Stepp, Feng, Burke, Battista, Loeber, & Keenan, 2011; Kiesner, 2002; Rohde, Lewinsohn, & Seeley, 1991; Van der Giessen, Branje,

Overbeek, Frijns, van Lier, Koot, & Meeus, 2013) and others supporting the acting out model (Beyers & Loeber's, 2003; Measelle, Stice, & Hogansen, 2006; Mesman, Bongers, & Koot, 2001; Ritakallio, Koivisto, von der Pahlen, Pelkonen, Marttunen, & Kaltiala-Heino, 2008). Indeed, such inconsistency is a concern expressed by others in the research community (Hipwell, Stepp, Feng, Burke, Battista, Loeber, & Keenan, 2011; Loeber et al., 2000; Ritakallio et al., 2008). It is possible that differences in sample demographics (e.g. age, gender) and methodology (e.g. regression, path analysis, structural equation modeling) account for some inconsistencies among studies.

Research design could also be a factor. Specifically, some studies claim to explore precursors to internalizing/externalizing comorbidity, but do not design studies to match such intentions. For example, Ritakallio et al. (2008) used only antisocial behavior and depression, separately, as outcomes, but generalized results to explain risk factors of comorbidity. Although unidirectional theories, such as the failure model and acting out model, make logical sense applied to how one set of problem behaviors evolves into comorbidity, their application should be tested with a study design that includes comorbidity as an outcome. This study overcame such a limitation.

The Role of Mediating Variables

Recent studies have begun to shine light on the significant impact of secondary variables influencing the relationships between early problem behavior and subsequent maladjustment—the aforementioned Mesman, Bongers, and Koot (2001), for one. Additionally, negative emotionality (Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003), peer relations (Kiesner, 2002), self-concept (Lee & Stone, 2012), and academic achievement (Masten, Roisman, Long, Burt, Obradovic, Riley, & Tellegen, 2005) have all been found to influence problem behavior

development in youngsters. Thus, it was important for this study to consider intermediary variables in its exploration of how individual problem behaviors evolve into comorbid problem behaviors.

Two variables, social competence and academic competence, were of particular interest in youngsters as they relate to behavior development. Social competence is a multidimensional construct composed of emotional, cognitive, and behavioral skills needed to function adaptively in social environments. Academic competence is also a multidimensional construct; one that is composed of the skills, attitudes, and behaviors needed for a student to succeed in the classroom. The importance of early acquisition of competencies that facilitate adaptive interactions between the individual and their environment can be seen in Cicchetti and Schneider-Rosen's (1986) model of development that suggests successful development in the childhood and adolescence results from achieving a series of social, emotional, and cognitive competencies.

Social Competence

Social competence has been singled out as one of the most salient predictors of developmental outcomes in adolescence and adulthood, including juvenile delinquency, adult crime, psychopathy, and mental illness (Parker, Rubin, Price, & DeRosier, 1995). Youngsters exhibiting significant externalizing problems have been found to possess deficient social skills and social problem solving skills (Lochman & Dodge, 1994). Likewise, internalizing problems in youngsters have been associated with deficits in interpersonal functioning and poor social problem solving skills (Sacco & Graves, 1984).

Because it is a broad psychological construct, studies have not been consistent with the variables used to measure social competence. Variables have ranged from social skills, peer rejection, to victimization—all of which are arguably proxies for social competence with their

own strengths and weaknesses. The following section will review research on the relationship shared between problem behaviors and social competence, keeping in mind studies have utilized different variables as a proxy for social competence. Initially the basic links between problem behavior and social competence are discussed, followed by a more in depth presentation of studies on the dynamic relationship between these variables whereby social competence exerts influence on problem behaviors over time.

Basic links between the presence of problem behaviors and low social competence are, not surprisingly, present in the extant literature. Indeed, externalizing problem behavior (Kiesner, 2002) has been found to precede problems with social competence. In line with the aforementioned failure model, youngsters who act out are at risk of being rejected by their peers and missing out on positive social interactions crucial in building social competence, which puts them further at risk for failing to develop the emotional, cognitive, and behavioral skills characteristic of social competence. For example, in a study detailed earlier in this review, Kiesner (2002) found, using multiple regression techniques, that externalizing behavior in sixth graders contributed to peer rejection two years later.

Similarly, the link of low social competence leading to or exacerbating externalizing problems (Haselager, Cillessen, Van Lieshout, Riksen-Walraven, Hartup, & Bukowski, 2002) and internalizing problems (Kiesner, 2002) also exists. Consistent with the failure and acting out models, when youngsters aren't engaged in activities and experiences that help to develop their emotional, cognitive, and behavioral skills, they are more likely to conduct themselves in ways that violate social norms (e.g. aggressive behaviors, isolating self). Going back to Kiesner (2002), the author found that boys and girls rejected by peers in sixth grade exhibited more depressive symptoms two years later. With regard to externalizing outcomes, Haselager et al.

(2002), found that, for boys in elementary school, changes in peer rejection preceded and were associated with fluctuations in aggression.

With the accelerated use of multi-wave longitudinal study designs, studies have recently begun investigating the dynamic role social competence plays in the development of problem behaviors. In a seminal work by Ladd (2006), social-emotional data was collected for 399 children from their kindergarten year to 6th grade. Using these data, a variety of problem behavior prediction models were developed and structural equation modeling was utilized to evaluate the fit of the models to the data. Ladd found additive effects of social competence, whereby peer rejection exerted unique influence on later internalizing and externalizing behavior; these effects of peer rejection were above and beyond the effects of early problem behavior. In other words, Ladd's (2006) results suggest that, partially independent from the contribution of a child's behavior, their social experiences increase or decrease the probability of later maladjustment.

Indeed, the relationship between social competence and problem behavior is a complex one. Two studies--Sturaro, van Lier, Cuijpers, and Koot (2011) and Van Lier and Koot (2010)—underscored how complex this relationship can be through their use of mediation analysis. Specifically, these studies, together, suggested externalizing behavior shares a particularly strong relationship with social competence. Both studies used samples of children living in the Netherlands and evaluated the mediating role that peer relationships, as a proxy for social competence, play in the evolution of problem behavior over time.

Sturaro, van Lier, Cuijpers, and Koot (2011) followed 740 children from kindergarten to third grade, measuring the externalizing behavior and levels of peer rejection annually. Results of regression analyses showed that early externalizing behavior contributed to high levels of peer

rejection, which subsequently predicted exacerbation of externalizing behavior. Van Lier and Koot (2010) used a slightly smaller sample (N=653) but included internalizing behavior as a predictor and outcome. Structural equation modeling was used to analyze data and the authors found that social competence, as measured by peer rejection, mediated the relationship between early externalizing behavior and development of later internalizing behavior. Notably, early internalizing behavior did not serve as a risk factor for low social competence or later problem behavior. Taken together, these studies suggest early externalizing behavior is a risk factor for low social competence, which subsequently exacerbates externalizing problems and comorbid internalizing problems. These results align with the aforementioned failure model.

It should be noted, however, that evidence also exists in support of low social competence influencing the progression from early internalizing to later externalizing problems, in line with the acting out model. One need only turn to the study by Mesman, Bongers, and Koot (2001) that was discussed in an earlier section of this review. To refresh, Mesman and colleagues collected parent and teacher data on the problem behavior and social problems of children in Holland over three waves beginning at age 3 until the children were 11 years old. Path analysis showed that an indirect path existed for the teacher-rated boys' group whereby depressive symptoms at Time 1 predicted externalizing problems at Time 3 via social problems at Time 2. No such effect existed for girls, regardless of rater. While Mesman and colleagues found support for the acting out model via social problems for only a subset of the sample—boys whose social problems were rated by their teacher—the presence of inconsistency in the literature on this topic suggests the need for additional clarification on how social functioning influences the development of problem behavior.

In sum, social competence appears to share a complex relationship with problem behaviors. Evidence ranges from problem behaviors contributing to low levels of social competence to the reverse—low social competence being associated with later behavioral maladjustment. With the increased use of longitudinal research designs, social competence has arisen as a variable that exerts significant influence on the development of problem behavior over time. Additionally, recent studies suggest externalizing problems may share a particularly strong relationship with social competence. This study questioned whether similarly influential effects would arise when the outcome of problem behavior trajectories is comorbidity—a question not directly addressed in the extant literature.

Academic Competence

Though not as extensively studied as social competence, evidence exists implicating low academic competence in the development of problem behavior. As was done for research on social competence, this section will begin by presenting studies on the basic relationships between academic competence and problem behaviors and then will move to studies of the complex, intermediary effects of academic competence on the problem behavior trajectories over time.

To begin, externalizing problems (Capaldi, 1991) have been identified as risk factors for low academic competence. In the case of externalizing problems, it could be that disruptive student behavior leads to conflictual relationships with teachers and to the student frequently being sent out of the room, decreasing exposure to instruction, and, cumulatively, less developed academic competencies than peers who are not acting out. As was discussed earlier in this review, Capaldi (1991) found that, for boys, conduct problems in grade 6 were correlated with failure to develop academic skills in eighth grade.

Likewise, low academic competence has been found to precede externalizing problems (Ansary & Luthar, 2009; Miles and Stipek, 2006; Morgan, Farkas, Tufis, & Sperling, 2008) and internalizing problems (McCarty, Mason, Kosterman, Hawkins, Lengua, & McCauley, 2008; Morgan, Farkas, Tufis, & Sperling, 2008). Low academic competence tends to be characterized by low academic achievement and grades in class. Students struggling in school may be teased by or rejected by peers for their low performance in school. These negative social interactions, then, may contribute to patterns of conflict characteristic of externalizing behaviors (Williams & McGee, 1994) and/or negative self-perceptions characteristic of internalizing problems (Chen, Rubin, & Li, 1997). Miles and Stipek (2006) found reading problems in third grade were associated with externalizing problems in fifth grade. In an older sample, Ansary and Luthar (2009) found that boys and girls with low academic achievement in tenth grade were at risk for engaging in delinquent acts throughout the remainder of their high school career. For other students, consistent academic struggles and failures may lead to frustration, low self-esteem, and an external locus of control, eventually developing into significant problem behavior. For example, Morgan, Farkas, Tufis, and Sperling (2008) found that first grade boys and girls who struggled with reading were more likely to exhibit internalizing as well as externalizing problems in third grade than their peers without reading problems.

As with social competence, the relationship between academic competence and problem behaviors is not as clear-cut as one causing the other. Indeed, trajectories of problem behavior development unfold over time—in most cases, years—with fluctuations in the intensity of problem behavior. Additionally, a plethora of variables exist that contribute to their development (negative emotionality, Keiley, Lofthouse, Bates, Dodge, & Pettit, 2003; peer relations, Kiesner, 2002; self-concept, Lee & Stone, 2012, to name a few), with certain variables being more

influential in some than in others. As such, research on the mediating effects of variables, such as academic competence, seems more appropriate than direct singular relationships in the exploration of how comorbid problem behaviors develop, as this study did.

In a study of the influence of academic competence on subsequent problem behaviors, McCarty, Mason, Kosterman, Hawkins, Lengua, and McCauley (2008) followed a sample of approximately 800 boys and girls from age 10 to age 21 collecting data on their problem behavior and academic problems. Specifically, the authors were interested in adolescent predictors of adult depression, as measured by a diagnostic interview at age 21. McCarty and colleagues used structural equation modeling to fit several models predicting adult depression and t-tests to explore gender differences. Results showed that high rates of academic problems (measured by a combination of self and parent report) were both predictors and outcomes of depressive symptoms in girls. Specifically, girls with higher levels of teacher-rated depression at age 10 were more likely to experience academic problems later in adolescence. Subsequently, girls experiencing academic problems in mid-adolescence were more likely to experience a major depressive episode at age 21. None of these relationships were true for boys. In fact, the experiences of boys were quite the opposite, with academic problems being predictors and outcomes of externalizing problems rather than internalizing. McCarty et al.'s results, thus, suggest academic competence has a stronger relationship with internalizing problems in girls and externalizing in boys.

A study by Moilanen, Shaw, and Maxwell (2010), however, contradicts McCarty et al.'s assertion, showing that early academic problems contribute to internalizing problems in boys via mediation processes. The authors tracked approximately 290 boys over five waves of data collections—age 6, 8, 10, 11, and 12. Data were collected on mother- and child-reported

externalizing and internalizing behaviors and teacher-rated academic competence using the Child Behavior Checklist (CBCL), Child Depression Inventory (CDI), and Social Skills Rating Scale (SSRS), respectively. Results of path analyses showed that externalizing problems at age 6 and 8 were associated with low academic competence age 8 and 10, which was subsequently associated with the emergence of internalizing problems and exacerbation of externalizing at age 11. The authors proposed that their results reflect externalizing behaviors having a negative effect on the teacher-student relationship, subsequently leading to a decrease in student academic engagement. As student grades decreased, students experienced feelings of failure at school and begin to direct frustration inward, leading to internalizing problems.

The results of McCarty (2008) and Moilanen, Shaw, and Maxwell (2010) point to inconsistencies in the literature of the relationship shared between academic competence and problem behaviors—namely, gender differences. What they do have in common, however, is that academic competence had a significant impact on the trajectory from early to later problem behavior. Indeed, further evidence exists in support of academic competence as an intermediary variable. Masten, Roisman, Long, Burt, Obradovic, Riley, and Tellegen (2005), for example, recruited a sample of boys and girls between the ages of 8 to 12 and followed up with them 7, 10, and 20 years later—an extraordinary longitudinal study. Their results were similar to Moilan, Shaw, and Maxwell (2010) in that Time 1 externalizing problems undermined academic achievement during adolescence, which was subsequently associated with internalizing problems in young adulthood. Unlike Moilan and colleagues, Masten et al.'s results held true for both boys and girls.

Influential Study: van Lier, Vitaro, Barker, Brendgen, Tremblay, and Boivin (2012)

Perhaps the most informative for this study wass the work of van Lier, Vitaro, Barker, Brendgen, Tremblay, and Boivin (2012). The authors tracked the externalizing problems, internalizing problems, peer victimization, and academic achievement of 1,558 children in Canada when they were 6, 7, and 8 years old. The study used teacher ratings of problem behavior and academic competence (achievement) and self-reported social competence (peer victimization). Data were modeled using autoregressive techniques. Van Lier and colleagues (2012) claimed to find support for the failure model via direct influence of social and academic competence, combined, and found no support for the acting out model (i.e. internalizing→externalizing). Specifically, related to the failure model, results showed externalizing problems at age 6 indirectly predicted internalizing problems at age 8 through the combined influence of low academic achievement and high peer victimization. This relationship, however, was significant at the $p=.06$ level—meaning, by some researchers' standards, the mediation path linking externalizing problems to internalizing problems through low academic and social competence was not supported.

Given the inconsistent extant research on the development of problem behavior coupled with the results of van Lier and colleagues (2012), it appears clear that additional work is needed to better understand the risk posed by early problem behaviors to later comorbidity. This study differed from van Lier and colleagues (2012) first and foremost in its use of comorbid externalizing-internalizing problems as the primary outcome variable. Additionally, this study spanned a greater number of years and was conducted with a cohort of students from the United States. That said, the results of van Lier et al. (2012) have informed the hypotheses of this study.

Summary of Review of Literature

This chapter began by reviewing literature on the influence of early externalizing problems and, separately, early internalizing problems on subsequent maladaptive behavior. The implications for comorbidity as an outcome were also discussed. The chapter concluded by presenting studies of how social competences and, separately, academic competences influence the relationship between early and subsequent problem behaviors.

To date, inconsistencies remain in regards to the temporal relationship between externalizing and internalizing problems throughout development in youngsters. This is especially true in studies questioning which class of behavior presents higher risk for later comorbid problem behaviors, as comorbidity is rarely used as an outcome variable. Studies that consider mediating variables represent a step forward in our understanding of the complex relationships involved in the development of comorbid problem behaviors. This study considered two potential mediating variables, social and academic competence, that literature has shown are associated with the development of problem behaviors over time.

Chapter 3: Method

Design

This study used longitudinal, non-experimental, archival data from The Early Childhood Longitudinal Study: Kindergarten Cohort (ECLS-K; National Center for Education Statistics, 2001). Data from children's first (Time 1), third (Time 2), and fifth (Time 3) grade years were used. Specifically, the outcome (i.e. presence of problem behavior comorbidity) was based on elevated internalizing and externalizing problems in fifth grade. First, third, and fifth grade problem behaviors were utilized in tracking the stability of problem behaviors over time (Research Question 1). First grade internalizing and externalizing behavior data were used in addressing Research Question 2—to what extent early problem behaviors contribute to fifth grade comorbidity—and third grade social and academic competence were added as mediators to address Research Question 3. The use of longitudinal data is a strength of this study being that it facilitated the tracking of within-student changes over time.

Participants

The ECLS-K study followed a nationally representative sample of U.S. children enrolled in 1,000 kindergarten schools during the 1998-1999 school year through to the 2003-2004 school year. The sampling plan was three-fold. First, counties were selected based on census areas and demographic characteristics. Second, schools within selected counties were chosen to represent the stratification of public or private school status, school size, and proportion of Asian-Pacific Islander students. Lastly, 24 students were selected from each school. Students were enrolled in both public and private kindergartens with full- and half-day programs and were evenly distributed across all regions of the U.S. regions.

Participants in the present study were a subset of the original sample. The original kindergarten sample included 21,396 students (10,950 male and 10,446 female). Specifically, this study's sample were students with completed problem behavior data on the Social Rating Scale in fifth grade (Time 3), being that these data were the sole contributor to the outcome variable. Only students with complete data were included, resulting in a final sample of 10,028 children. Basic demographics of this study's sample are presented in Table 1; more detailed descriptives, including problem behavior and covariates, are presented in Appendix B.

Table 1

Demographics

Variable	N	Percent
Gender		
Male	5,224	52.1
Female	4,804	47.9
Ethnicity		
Caucasian	5,743	57.3
Af Amer	1,523	15.2
Hispanic	1,977	19.7
Asian	293	2.9
Pacific Isl	64	0.6
Am Indian	175	1.7
More than 1	221	2.2
Not Ascertained	32	0.3
SES (5th grade)		
1st Quintile	1,771	19.2
2nd Quintile	1,805	19.6
3rd Quintile	1,838	20.0
4th Quintile	1,853	20.1
5th Quintile	1,935	21.0

Note. Demographic data are weighted.

The final sample was relatively evenly split between males (52%) and females (48%). The majority of students had been identified by their parents as Caucasian (appx. 57%), followed

by Hispanic (appx. 20%) and African American (appx. 15%). Socioeconomic data were evenly distributed with approximately 20% of children falling into one of the five quintiles in fifth grade. Related to problem behavior, consistently across Time 1, 2, and 3, a higher percentage of the 10,028 children exhibited externalizing problems (approx. 6-8%) than internalizing (approx. 4-5%). Also across time, the comorbidity rate remained around 1-2% of the final sample. Regarding covariates, the sample fell around an unstandardized mean of 3 for social competence (on a 1-4 scale, with a score of 3 or 4 indicating good social competencies across Time 1, 2, and 3) and of 50 for academic competence in reading and math and. Note that reading and math competence scores were standardized as T-scores within each respective wave of data collection.

Not surprisingly, overall characteristics of the final sample were similar to the distributions of gender, ethnicity, SES, academic achievement, and social competence found in the original nationally representative ECLS-K sample, including the relatively small sample of children exhibiting significantly elevated problem behavior.

Measures

Table 2 presents a summary of the measures used in this study.

Demographics. Demographic information, including gender, race, and socioeconomic status (SES) during fifth grade was collected via parent report.

Table 2

Summary of Measures

Variable	Time	Respondent	Measure	# of Items	Response Range
Gender	T1	Parent	Parent Demographic Questionnaire	1	Male, Female
Race/Ethnicity	T1	Parent	Parent Demographic Questionnaire	1	Caucasian, Af American, Hispanic, Asian, Pacific Isl, Am Indian, More than 1 race
SES	T1	Parent	Parent Demographic Questionnaire	1	---
Internalizing	T1, T2, T3	Teacher	Social Rating Scale (SRS): Internalizing subscale Content: (a) anxiety, (b) loneliness, (c) low self-esteem, (d) sadness.	4	(1) never (2) sometimes (3) often (4) very often [higher scores indicate more IB]
Externalizing	T1, T2, T3	Teacher	Social Rating Scale (SRS): Externalizing subscale Content: (a) argues, (b) fights, (c) gets angry, (d) acts impulsively, (e) disturbs ongoing activities [added at T3 (f) talks during quiet study time]	5-6	Same as above [higher scores indicate more EB]
Social Competence	T2	Teacher	Social Rating Scale (SRS): Peer Relations subscale Content: (a) respecting the property rights of others, (b) controlling temper, (c) accepting peer ideas for group activities, and (d) responding appropriately to pressure	9	Same as above

			from peers. The remaining items ask the teacher to rate the child's skills in: (e) forming and maintaining friendships, (f) getting along with people who are different, (g) comforting and helping other children, (h) expressing feelings, ideas, and opinions in positive ways, (i) showing sensitivity to the feelings of others		[higher scores indicate better social competence]
Academic Competence (Reading & Math)	T2	Direct Child Assessment	ECLS-K Achievement Assessment <u>Reading Content</u>: phonemic awareness, single word decoding, vocabulary (reading), and passage comprehension <u>Math Content</u>: number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and pattern, algebra, and functions	Varied by student	-- [student performance was reflected in a T-score with a mean of 50]

Internalizing and Externalizing Behavior. Problem behaviors in students' first grade year (*T4INTERN; T4EXTERN*) were used as independent variables and in their fifth grade year (*T6INTERN; T6EXTERN*) were used to calculate the dependent variable—*comorbid problem behavior*. Problem behavior was assessed using teacher ratings on the Social Rating Scale (SRS). The SRS was used during data-collection for the ECLS-K study, and is an adaptation of the larger Social Skills Rating Scale (SSRS; Gresham & Elliot, 1990). The SRS includes Internalizing and Externalizing Problem Behavior subscales.

The Internalizing subscale of the SRS includes four self-administered questionnaire items asking about the apparent presence of (a) anxiety, (b) loneliness, (c) low self-esteem, and (d) sadness. During the wave of first grade data collection, the Externalizing subscale of the SRS included five items asking how often the child (a) argues, (b) fights, (c) gets angry, (d) acts impulsively, and (e) disturbs ongoing activities. During the children's fifth grade year, an additional item was included to the Externalizing subscale asking about the frequency with which the child (f) talks during quiet study time. For both waves, teachers responded to SRS items on a 4-point, Likert-type scale addressing the frequency of these behaviors as "never," "sometimes," "often," or "very often." To obtain scale scores, item scores were summed and averaged, with higher scores indicating the presence of more problem behavior.

The split-half reliability coefficient, a measure of internal consistency, for the Externalizing subscale of the SRS was .86 in first grade and .90 in fifth grade. The split-half reliability coefficient for the Internalizing subscale was .77 in first grade and .78 in fifth grade (Pollack, Atkins-Burnett, Najaraian, & Rock, 2005).

For those familiar with the SSRS, it is important to note specifically how the SRS, which was created for the ECLS-K study, differs from the SSRS, which is used more broadly in clinical practice. The following description is taken from the ECLS-K Users Manual (Tourangeau, Nord, Lê, Pollack, & Atkins-Burnett, 2006):

> *The order of presentation of items was different on the SRS. Unlike the SSRS, the SRS did not separate the problem behavior items from the social skill items. On the SRS, the problem behavior items were interspersed throughout the SRS questionnaire to break any response sets.*
>
> *The SSRS uses a three-point response scale while the SRS used a four point scale (never, sometimes, often, very often) and allowed respondents to indicate "no opportunity to observe." Only three of the SSRS social skills items are the same on the SRS. The remainder of the social skills items were adapted (N=6) or new (N=7). Some items were adapted completely to tap a wider representation of the skill (e.g., "keeps belonging organized," "forms and maintains friendships," "easily adapts to changes in routine," "pays attention well," "follows classroom rules"). One item was abbreviated to cover a wider range of situations ("controls temper"). Seven of the social skills items were new items developed for ECLS-K (i.e., "is sensitive to the feelings of others," "respects the property rights of others," "shows eagerness to learn new things," "persists in completing tasks," "works independently," "expresses own feelings, opinions, and ideas without putting down those of others," "comforts or helps other children"). The SRS problem behavior scales were much shorter than the SSRS (ten items on the SRS*

compared with eighteen on the SSRS). Seven of the items on the SRS problem scales are identical to SSRS problem behavior items. The remaining three items are new (i.e., "worries about things," "talks during quiet study time") or adapted from the SSRS ("shows low self- esteem"). (p. 2-23)

Social Competence. Social competence, a mediating variable, was assessed using teacher ratings on the Social Rating Scale (SRS) in the third grade (*T5SCINT*).

Social Rating Scale (SRS). General details of the SRS are described above. Specifically, the SRS subscale called Peer Relations was used for the measurement of social competence. The Peer Relations subscale is comprised of nine items representing the self-control and interpersonal skills that are important in establishing and maintaining peer relationships. Specifically, the items ask about the child's ability to control behavior by: (a) respecting the property rights of others, (b) controlling temper, (c) accepting peer ideas for group activities, and (d) responding appropriately to pressure from peers. The remaining items ask the teacher to rate the child's skills in: (e) forming and maintaining friendships, (f) getting along with people who are different, (g) comforting and helping other children, (h) expressing feelings, ideas, and opinions in positive ways, and (i) showing sensitivity to the feelings of others. Although the exact wording of the items are not available for public review, several items were taken directly from the SSRS (Gresham & Elliot, 1990); thus, examples of items include how often the child "appropriately questions rules that may be unfair," "appropriately tells you when he or she thinks you have treated him or her unfairly," "gets along with people who are different," and "makes friends easily."

Teachers responded to SRS items on a 4-point, Likert-type scale addressing the frequency of these behaviors as "never", "sometimes", "often", or "very often". To obtain scale scores, item scores were summed and averaged, with higher scores indicating better functioning. The split-half reliability coefficient for the Peer Relations subscale was 0.92 in third grade (Pollack, Atkins-Burnett, Rock, & Weiss 2005).

Academic Competence. Academic competence, a mediating variable, was assessed using a performance-based measure of achievement—that is, a direct cognitive assessments of students' reading and math skills in the third grade (*C5R4RTSC; C5R4MTSC*).

Direct Cognitive Assessments. The direct cognitive assessments of reading and math skills were administered to students by trained evaluators during a one-on-one session. Items were created under the supervision of specialists in the area of elementary education, child development, and the subject areas, so that the content and format of the assessment was grade-appropriate. The number of items administered to each student varied based on their performance; each assessment lasted 80 minutes. Validity of the items was established by comparing scores on the ECLS-K reading and math direct assessments with scores on the Woodcock-McGrew-Werder Mini-Battery of Achievement (MBA) during two field tests. The MBA x ECLS-K direct cognitive assessment correlation for reading was .73 and for math was .80. These correlations were close to the square root of the reliability calculated for the MBA alone (.85 MBA reading, .78 MBA math), suggesting the MBA and ECLS-K assessments measure closely related skills.

Items related to reading competence measured phonemic awareness, single word decoding, vocabulary (reading), and passage comprehension. Youngsters also read biographical and expository texts and were required to identify the tone of a remark, the author's purpose for a

selection, and evidence for and against theories discussed in the text. Items related to math competence measured number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and pattern, algebra, and functions.

For both the reading and math competence assessments, the difficulty of the items given to each child was based on their responses to initial routing items. Each child's performance on the math and reading components resulted in an estimate of ability (theta) based on their pattern of right and wrong responses. These estimates, based on Item Response Theory, were then transformed into standardized T-scores for reading and math so as to compare their performance to same-age peers. The reliability for each component of the direct cognitive assessment was very high in third grade: 0.94 for reading and 0.95 for math (Pollack, Atkins-Burnett, Rock, & Weiss, 2005).

Data Preparation

Weights

Prior to beginning analyses, the data were weighted to adjust for disproportionality in the sample due to subjects dropping out and non-random sampling. The weight entitled *C456CWO* was used, which is appropriate for child direct assessment data from three rounds of data collection involving the full sample of children (Spring-first grade, Spring-third grade, and Spring- fifth grade), alone or in conjunction with any of the school, teacher, or classroom data, or a limited set of child characteristics (e.g., age, sex, and race/ethnicity) (Tourangeau et al., 2006). Because this weight generalized results to the population of the original ECLS-K kindergarten sample, this weight was used for all descriptive analyses, correlations, cross tabulations, and chi square analyses.

The weight was subsequently normalized to account for design effects and thus controlled for otherwise inflated standard errors (Hahs-Vaughn, McWayne, Bulotsky-Shearer, Wen, & Faria, 2011). The normalized weight was calculated via linear transformation by dividing the aforementioned weight by the DEFF (design effects) of the dependent variable found in Table 9.4 of the ECLS-K User Manual (Tourangeau et al., 2006). The DEFF-adjusted normalized weight was used for regression analyses.

Standardization of Variables

All problem behavior and competence variables were standardized to ease interpretability (i.e. change is discussed in terms of units of standard deviation change). To standardize to z-scores, the mean and standard deviation of each variable was calculated. The mean was then subtracted from the total value and the difference was subsequently divided by the standard deviation.

Creation of Outcome Variable: Comorbid Problem Behavior

The outcome variable, termed *comorbid problem behavior,* was a dichotomous variable based on teacher-rated fifth grade internalizing and externalizing problems. The two levels of this variable were (0) no significant comorbid problem behavior and (1) significant comorbid problem behavior (internalizing + externalizing). Significant comorbid problem behaviors were those standardized SRS item scores that fell two or more standard deviations above the mean on *both* the Internalizing and Externalizing Scales in fifth grade. The cutoff of 2 SD is a common cutoff used by prominent measures of pathology (e.g. Behavior Assessment System for Children-Second Edition, Reynolds & Kamphaus, 2004; Reynolds Adolescent Depression Scale-Second Edition, Reynolds, 2002; Conners Comprehensive Behavior Rating Scales, Burkes & Burkes,

2011) to denote clinical significance. Because weighted data from the ECLS-K longitudinal study are representative of the population at large, the use of normative cutoff points such as 2 SD was justified.

Missing Data Analysis

Because the ECLS-K dataset is longitudinal, there were significant missing data resulting from problems with attrition over waves of data collection. Being that data were likely missing at random (i.e. missingness likely depends on values that are observed, but not the values that are missing), the Multiple Imputation procedure was determined to provide the most accurate estimates of values (Schlomer, Bauman, & Card, 2010). Multiple Imputation (MI) analyzes the patterns of missing data and uses these patterns to compute multiple (e.g., five) versions of the dataset, each containing its own set of imputed values (Schafer & Olsen, 1998). According to Schlomer et al. (2010) three to five imputations provide sufficient information for the standard errors of parameter estimates, ultimately reducing bias. When statistical analyses were performed for this study (i.e. crosstabulations, regression) the parameter estimates for all imputed datasets were pooled, providing estimates generally more accurate than they would be with just one imputation.

Mediation

A mediator (M) is a variable that exerts causal effects on the relationship between a predictor (X) and outcome (Y) (Robins & Greenland, 1992). In other words, in its simplest form: X→M→Y. The decision to conduct mediation analyses over moderation analyses, whereby the moderator is not a part of the causal sequence, was based on criteria proposed by Kraemer, Kiernan, Essex, and Kupfer (2008). Kraemer and colleagues considered both the temporal order

and association between the predictor variable and the intermediary variable in their criteria to define moderators and mediators (see Table 3). According to Kraemer and colleagues, the intermediary variables (i.e. social and academic competence) would be moderators if: (a) competence preceded first grade problem behavior (predictor) and (b) competence and first grade problem behavior were independent from one another. Conversely, the intermediary variables (i.e. social and academic competence) would be mediators if: (a) first grade problem behavior (predictor) preceded competence and (b) competence and first grade problem behavior are associated with one another. Being that, for this study, T3 social and academic competencies occurred after the onset of T1 problem behaviors and, as will be seen in Chapter 4, they are correlated, mediation analyses were utilized to address Research Question 3.

Table 3

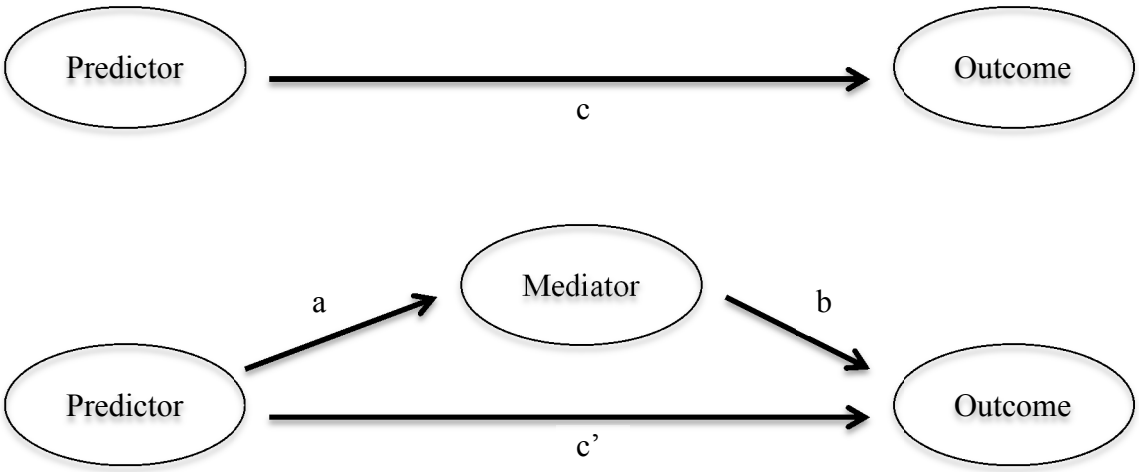
Moderation vs. Mediation based on Kraemer, Kiernan, Essex, and Kupfer (2008)

Eligibility Criteria	Moderation	Mediation
Temporal precedence	Competence before 1st grade problem behavior	1st grade problem behavior before competence
Association between intermediary variable and predictor variable	Competence and 1st grade problem behavior NOT significantly associated	Competence and 1st grade problem behavior significantly associated

Mediation analyses were conducted for the present study using logistic regression. Regression equations were run, first, without the mediator and, second, with the mediator, resulting in a series of path coefficients. The resulting path coefficients represented the relationships between the predictor and outcome before mediation (c) and the predictor, mediator, and outcome after mediation (a, b, c'). The reader is referred to Figure 1 for visual clarification of relationships represented by each path coefficient.

Figure 1

Framework for Mediation Analyses



Mediation is said to occur when:

- The predictor affects the outcome in the absence of the mediator (path c)
- The predictor affects the mediator (path a)
- The mediator affects the outcome (path b)
- The effect of the predictor on the outcome shrinks upon introduction of the mediator (path c'). Full mediation is said to have occurred when c' loses significance.

To determine the indirect effects of the mediator on the predictor-outcome relationship, the Sobel test is used. The Sobel test considers the unstandardized coefficients and standard errors for path coefficients a and b to produce a t-statistic and determine whether mediation effects have occurred. In other words, a statistically significant Sobel test would suggest the relationship between the predictor and outcome was significantly influenced by the introduction of the mediator to the model.

It should be noted that when dichotomous outcome variables are included in mediation analyses, as was the case for this study, a correction formula must be applied to path coefficients

to ensure paths a, b, c, and c' are on the same scale and, thus, comparable. The correction formula, described in detail by MacKinnon and Dwyer (1993), involves each path coefficient being multiplied by the standard deviation of the predictor and then divided by the standard deviation of the outcome variable. This correction formula was applied to the coefficients in each mediation analysis so that results could be discussed in terms of changes between regression equations without the mediator (c) and with the mediator (c') as well as the indirect effects of the mediator (a and b).

Chapter 4: Results

Results are organized as follows. Initially, correlations, crosstabulations, and chi square analyses are discussed to address Research Question 1. Next, results of logistic regression analyses are presented to address Research Questions 2 and 3. Finally, analyses of gender differences are presented to address the supplementary research question. Note that a general threshold of at least $p < .05$ was used in determining statistical significance of results.

Research Question 1

What subsequent patterns of behavior are characteristic of first graders exhibiting elevated problem behaviors?

Research Question 1 was an essential starting point in order to broadly look at the stability of problem behavior. Based on frequency counts presented in Table 4, incidence of elevated IB and EB increased over time. Specifically, internalizing problems saw a larger increase from first to third grade (1^{st} = 439 children; 3^{rd} = 506; 5^{th} = 523) and externalizing problems increased more from third to fifth grade (1^{st} = 625 children; 3^{rd} = 634; 5^{th} = 785). The prevalence of comorbidity remained relatively stable, with a slight dip during third grade (1^{st} = 136 children; 3^{rd} = 110; 5^{th} = 147).

Table 4

Frequency Counts of Problem Behaviors Across T1, T2, and T3

	Not Elevated	Elevated
Internalizing Behavior (IB)		
T1 (1st)	9588 (95.6%)	439 (4.4%)
T2 (3rd)	9522 (95.0%)	505 (5.0%)
T3 (5th)	9505 (94.5%)	523 (5.5%)
Externalizing Behavior (EB)		
T1 (1st)	9403 (93.8%)	625 (6.2%)
T2 (3rd)	9393 (93.7%)	634 (6.3%)
T3 (5th)	9242 (92.2%)	785 (7.8%)
Comorbid (IB+EB)		
T1 (1st)	9891 (98.6%)	136 (1.4%)
T2 (3rd)	9918 (98.9%)	110 (1.1%)
T3 (5th)	9880 (98.5%)	147 (1.5%)

Chi-square analyses for all groups were significant (see Table 5), suggesting problem behavior shared a significant relationship with time. Cross tabulations were run to examine the proportion of first graders (T1) with elevated IB, EB, and comorbidity who went on to exhibit those same elevated behaviors at T2 and T3. The standardized residuals for all elevated problem behaviors (T1 to T2; T1 to T3) fell above the 2.0 mark, indicating that significantly ($p < .01$) more children continued to exhibit internalizing, externalizing, and comorbid problems from first to third and from first to fifth grade than would be expected by chance.

Table 5

Chi Square and Cross-tabulations for Internalizing, Externalizing, and Comorbid Problem Behavior

INTERNALIZING									
		3rd IB		**X^{2a}**	**P**	**5th IB**		**X^{2a}**	**P**
		Typical	**Elevated**			**Typical**	**Elevated**		
1st grade IB	**Typical**	9154 (95.5%)	434 (4.5%)	22.7 - 45.4	.000	9126 (95.2%)	462 (4.8%)	14.0 – 31.5	.000
	Std. Resid	*0.4 – 0.6*	*-1.8 – -2.5*			*0.3 – 0.5*	*-1.4 – -2.1*		
	Elevated	368 (83.8%)	71 (16.2%)			379 (86.3%)	60 (13.7%)		
	Std. Resid	*-1.9 – -2.7*	*8.2 – 11.6*			*-1.5 – -2.3*	*6.5 – 9.5*		
EXTERNALIZING									
		3rd EB		**X^{2a}**	**P**	**5th EB**		**X^{2a}**	**P**
		Typical	**Elevated**			**Typical**	**Elevated**		
1st grade EB	**Typical**	9000 (95.7%)	403 (4.3%)	239.3 – 403.9	.000	8804 (93.6%)	599 (6.4%)	113.6 – 157.3	.000
	Std. Resid	*1.8 – 2.3*	*-7.0 – -8.6*			*1.3 – 1.6*	*-4.5 – -5.6*		
	Elevated	393 (62.9%)	232 (37.1%)			439 (70.2%)	186 (29.8%)		
	Std. Resid	*-6.7 – -8.6*	*25.9 – 33.5*			*-5.2 – -6.0*	*17.8 – 20.7*		
COMORBID									
		3rd Com		**X^{2a}**	**P**	**5th Com**		**X^{2a}**	**P**
		Typical	**Elevated**			**Typical**	**Elevated**		
1st grade Com	**Typical**	9806 (99.1%)	85 (0.9%)	54.5 – 217.5	.000	9767 (98.7%)	124 (1.3%)	47.1 – 108.8	.000
	Std. Resid	*0.2 – 0.3*	*-1.5 – -3.1*			*0.2 – 0.3*	*-1.6 – -2.2*		
	Elevated	111 (81.6%)	25 (18.4%)			114 (83.2%)	23 (16.8%)		
	Std. Resid	*-1.4 – -2.8*	*13.7 – 25.8*			*-1.6 – -2.3*	*13.3 – 18.4*		

Note. Because the Multiple Imputation procedure used to account for missing data does not produce pooled X^2 values and standardized residuals, the range of X^2 and standardized residuals values from the five imputations are reported. [a]df = 1. The X^2 dfs have been adjusted by use of a normalized weight.

More specifically, of the 439 first graders with elevated internalizing problems, 16% (N = 71) remained internalizers in third grade and 14% (N = 60) in fifth. Of the 625 children with externalizing problems in first grade, 37% (N = 232) remained elevated in third grade and 30% (N = 186) in fifth. Regarding comorbid problem behaviors, percentages fell similar to those of internalizing problems. That is, of the 136 first graders exhibiting comorbidity, 18% (N = 25) remained comorbid in third grade and 17% (N = 23) in fifth. Indeed, Pearson correlations (see Table 6) exhibited a similar pattern, with first grade internalizing behaviors (IB) sharing a small but significant relationship with subsequent IB ($1^{st}/3^{rd}$, $r = .11$; $1^{st}/5^{th}$, $r = .09$) and first grade externalizing behaviors (EB) sharing a small to moderate relationship with subsequent EB ($1^{st}/3^{rd}$, $r = .35$; $1^{st}/5^{th}$, $r = .21$). A more extensive correlation matrix including mediating variables is available in Appendix C.

Table 6

Intercorrelations of IB, EB, and Comorbidity Across T1, T2, and T3

		T1			T2			T3		
		IB	**EB**	**Com**	**IB**	**EB**	**Com**	**IB**	**EB**	**Com**
T1	**IB**	1.00								
	EB	.23	1.00							
	Com	.56	.47	1.00						
T2	**IB**	.11	.08	.09	1.00					
	EB	.15	.35	.25	.13	1.00				
	Com	.13	.19	.20	.47	.43	1.00			
T3	**IB**	.09	.06	.09	.05	.06	(NS)	1.00		
	EB	.07	.21	.13	.10	.29	.14	.18	1.00	
	Com	.12	.14	.17	(NS)	.17	.05	.53	.43	1.00

Note. Most correlations were significant at least at the $p < .01$ level (**). Those that were not significant are denoted by (NS).

These data suggest externalizing problems will remain stable for about one-third of externalizing first graders. Internalizing and comorbid problems remain stable for a smaller proportion (about one-sixth) of first graders with problem behavior. Of typically developing children in first grade, between 93% to 99% continued to exhibit typical behavior in third and fifth grade.

Research Question 2

To what degree are early (2a) internalizing problems and (2b) externalizing problems associated with later comorbidity?

To address Research Question 2, binary logistic regression procedures were conducted. Binary logistic regression was selected based on the dichotomous nature of the dependent variable—fifth grade (T3) comorbidity—whereby 0 = no comorbidity and 1 = elevated internalizing and externalizing. During analysis, T3 comorbidity was regressed onto T1 internalizing behavior and T1 externalizing behavior to ascertain their unique contribution to the likelihood of developing comorbid problem behaviors in fifth grade. Note that, as a result of the multiple imputation procedure used to account for missing data, pooled values are presented when available. Some regression procedures, however, did not produce pooled values; in these situations, relevant values for the five imputations are reported and results are discussed in terms of range of values.

To begin, the omnibus test of model coefficients resulted in a range of chi-square values falling at the $p < .001$ level (see Table 7). These data suggested the two predictors, first grade internalizing and externalizing behaviors, taken together, had a significant effect on the outcome variable, fifth grade comorbidity.

Table 7

Omnibus Tests of Model Coefficients

Imputation Number	Chi-square	df	Sig.
1	46.7	2	.000
2	33.2	2	.000
3	32.0	2	.000
4	32.7	2	.000
5	34.6	2	.000

Unlike OLS regression, logistic regression does not have an R^2 statistic to determine the percentage of outcome variance accounted for by the predictors. A statistic called Nagelkereke R^2, however, is often reported in logistic regression as a rough estimate of variance accounted for. For these data, Nagelkereke's R^2 ranged across imputations from .07 to .10 (see Table 8), suggesting the predictors, taken together, accounted for 7% to 10% of the variance in fifth grade comorbidity. Again, the reader should interpret Nagelkereke R^2 with caution as it is only a partial R^2 statistic.

Table 8

Model Summary

Imputation Number	-2 Log Likelihood	Nagelkereke R Square
1	444.606	.102
2	438.472	.075
3	458.066	.070
4	438.724	.074
5	440.538	.078

Note. Because the Multiple Imputation procedure used to account for missing data does not produce pooled values for the Model Summary, the range of values from the five imputations are reported.

To specifically address Research Question 2, odds ratios were generated. Results presented in Table 9 suggested first graders with significant problem behaviors were more likely

than their no-problem-behaviors counterparts to develop comorbid problem behaviors in fifth grade. Specifically, children with elevated **internalizing** problems at T1 were 3.86 times more likely to develop comorbid problem behaviors at T3 than those without elevated internalizing problems at T1 (*Exp(B)* = 3.86, $p \leq .01$), controlling for externalizing problems at T1. Similarly, those with elevated **externalizing** problems at T1 were 4.91 times more likely to develop comorbid problem behaviors at T3 than those without elevated externalizing problems at T1 (*Exp(B)* = 4.91, $p \leq .001$), controlling for internalizing problems at T1.

Table 9

Variables in the Equation – Two Predictors

						95% C.I. for Exp(B)	
		B	S.E.	Sig	Exp(B)	Lower	Upper
Pooled	T1 IB	1.35	.43	.002	3.86	1.65	9.03
	T1 EB	1.59	.37	.000	4.91	2.38	10.10
	Constant	-4.60	.19	.000	.01	.007	.015

The prediction models were re-run with only one predictor at a time to evaluate the effects of individual problem behaviors on later comorbidity without having to control for the other problem behavior (see Table 10). Logistic regression results showed that when the outcome was regressed on T1 internalizing and T1 externalizing behaviors separately, T1 **externalizing** problem behaviors were still slightly more predictive of T3 comorbidity than T1 **internalizing** problems [*Exp(B)* = 7.04, $p \leq .000$; 6.80, $p \leq .000$, respectively].

Table 10

Variables in the Equation – Individual Predictors

						95% C.I. for Exp(B)	
		B	S.E.	Sig	Exp(B)	Lower	Upper
Internalizing							
Pooled	T1 IB	1.92	.39	.000	6.80	3.13	14.80
	Constant	-4.42	.17	.000	.01	.009	.017
Externalizing							
Pooled	T1 EB	1.95	.34	.000	7.04	3.61	13.71
	Constant	-4.51	.18	.000	.01	.008	.016

Research Question 3

To what degree do social competence and academic competence mediate the relationship between fifth grade comorbidity and first grade (3a) internalizing behavior, (3b) externalizing behavior?

To begin, as discussed in Chapter 3, an assumption of Kraemer, Kiernan, Essex, and Kupfer's (2008) approach to mediation is that the mediator be correlated with the predictors. Pearson correlations showed that, indeed, the mediators (third grade social and academic competence) shared a small but significant negative relationship with the predictors, first grade IB (social competence, r = -.11; reading competence, r = -.11; math competence, r = -.09) and first grade EB (social competence, r = -.29; reading competence, r = -.12; math competence, r = -.12).

The mediating effects of T2 (third grade) social competence and competence in reading and math were tested one-by-one on the relationships between T3 comorbidity and T1 (a) internalizing and (b) externalizing behavior. Mediation analysis within logistic regression presents a particularly unique challenge because the dichotomous outcome variable is not on a comparable scale to the mediators. To remedy this situation, prior to logistic regression, each

mediator was multiplied by the standard deviation of the predictor and then divided by the standard deviation of the outcome variable (MacKinnon & Dwyer, 1993), the result of which was standardized coefficients, making the scale equivalent across equations. The logistic regression output was then used to fill in the mediation path coefficients discussed within the context of the conceptual framework introduced in Chapter 3. Mediation has occurred if path coefficient *b* is significant and there is a reduction from coefficients *c* to *c'*. The indirect effect of the mediator on the predictor-outcome relationship was determined by multiplying coefficients *a* and *b*. Table 11 presents the path coefficients (a, b, c, c') for each mediation analysis. Additionally, path coefficients are presented visually within the conceptual framework in Appendix D1 and D2.

Table 11

Mediation Path Coefficients and Indirect Effects of Mediators

	a	b	c	c'	Indirect effect (a*b)
1st Internalizing					
Mediator					
3rd Social	-.52	-1.28	1.92	1.44	.67
3rd Reading	-.50	*-.23*	1.92	1.81	*1.55*
3rd Math	-.44	-.39	1.92	1.76	.17
1st Externalizing					
Mediator					
3rd Social	-1.25	-1.22	1.95	.77	1.53
3rd Reading	-.07	*-.20*	1.95	1.85	*1.36*
3rd Math	-.48	-.36	1.95	1.79	.17

**Note.* Path coefficients reflect unstandardized coefficients. Coefficients were significant at the $p \leq .05$ unless they are in gray and *italicized*. The significance of the indirect effects was determined using the Sobel test.

Results showed that partial mediation occurred for two of the three variables: social and math competence. Specifically, the unstandardized coefficients from T1 **internalizing behavior** to T2 social competence ($B = -.52$, $p \leq .001$) and math competence ($B = -.44$, $p \leq .001$) were

statistically significant, as were the unstandardized coefficient for these mediators and the T3 outcome variable (social, B = -1.28, $p \leq .001$; math, B = -.39, $p \leq .001$). Similarly, the unstandardized coefficients from T1 **externalizing behavior** to T2 social competence (B = -1.25, $p \leq .001$) and math competence (B = -.48, $p \leq .001$) were statistically significant, as were the unstandardized coefficient for these mediators and the T3 outcome variable (social, B = -1.22, $p \leq .001$; math, B = -.36, $p \leq .05$). The path coefficient representing the predictor-outcome relationship (c') remained significant even after mediators were added to the model, suggesting that full mediation did not take place for any mediation variables. In other words, third grade social competence and, to a lesser extent, competence in math partially mediated the relationships between the first grade IB and EB and fifth grade comorbidity. Competence in reading achievement did not have mediating effects on either of the predictors' relationship with the outcome.

The specific indirect effects of social and math competence on the predictor-outcome relationship were calculated by multiplying path coefficients *a* and *b* then using the Sobel test to determine whether the indirect effects significantly influenced the predictor-outcome relationship. Calculations of indirect effects suggested that third grade social competence was a stronger mediator of the relationship between both predictors and fifth grade comorbidity. Specifically, the indirect effect of social competence on the internalizing predictor path fell around 0.67 while indirect effects of math competence fell around 0.17, both with more than 95% confidence. Related to the externalizing predictor path, indirect effects of social competence fell around 1.53 and math competence fell around .17, again, with more than 95% confidence. In sum, social competence appeared to be a stronger mediator than math competence.

To further explore the magnitude of the effects of social and academic mediators on behavior change over time, odds ratios for T1 predictors and T3 comorbidity were examined before and after the inclusion of each mediator (Table 12). For both predictors, T2 social competence appeared to be the mediator with the strongest effect on the predictor-outcome relationship. This was especially true for the relationship between T1 EB, where the odds of developing comorbid problem behaviors in fifth grade compared to typically developing peers decreased from 7.04 to 2.15 with the inclusion of social competence. In other words, social competence was a significant protective factor against developing comorbid behavior problems, more so for children exhibiting externalizing problems in first grade than those exhibiting internalizing problems.

Table 12

Odds Ratios Before and After Mediation is Accounted For

	Odds Ratio **without** Mediator			Odds Ratio **with** Mediator	
	Exp(B)	Sig		Exp(B)	Sig
1st Internalizing	6.80**	.000	Mediator		
			3rd Social	4.22*	.002
			3rd Reading	6.11**	.000
			3rd Math	5.83**	.000
1st Externalizing	7.04**	.000	Mediator		
			3rd Social	2.15*	.05
			3rd Reading	6.37**	.000
			3rd Math	6.00**	.000

Supplementary Research Question

To what extent do gender differences exist amongst the aforementioned phenomena?

To address the final, supplementary, research question of to what extent gender differences exist in the relationship between each problem behaviors and subsequent comorbidity, analyses from Research Questions 1 through 3 were re-run by gender. Related to Research Question 1, frequency counts (see Table 13) and chi-square analyses showed that problem behaviors remained relatively stable over time for both boys and girls. For boys, externalizing behaviors were the more prevalent problem behavior at T1, T2, and T3, with percentages ranging from 4.8 percent to 5.9 percent of males in the sample exhibiting elevated EB between first and fifth grade. For females, internalizing problems were slightly more prevalent than externalizing over time, with prevalence rates ranging from 1.8 percent to 2.4 percent. Comorbid elevations in IB + EB were more prevalent in boys than girls.

Table 13

Frequency Counts of Problem Behaviors Across T1, T2, and T3 by Gender

	Not Elevated		Elevated	
	Male	Female	Male	Female
Internalizing Behavior (IB)				
T1 (1st)	4962 (49.5%)	4627 (46.1%)	262 (2.6%)	177 (1.8%)
T2 (3rd)	4959 (49.5%)	4563 (45.5%)	265 (2.6%)	241 (2.4%)
T3 (5th)	4932 (49.2%)	4573 (45.6%)	291 (2.9%)	231 (2.3%)
Externalizing Behavior (EB)				
T1 (1st)	4738 (47.2%)	4665 (46.5%)	485 (4.8%)	140 (1.4%)
T2 (3rd)	4746 (47.3%)	4647 (46.3%)	477 (4.8%)	158 (1.6%)
T3 (5th)	4631 (46.2%)	4612 (46.0%)	593 (5.9%)	193 (1.9%)
Comorbid (IB+EB)				
T1 (1st)	5119 (51.0%)	4773 (47.6%)	105 (1.0%)	31 (0.3%)
T2 (3rd)	5131 (51.2%)	4787 (47.7%)	92 (0.9%)	17 (0.2%)
T3 (5th)	5121 (51.1%)	4760 (47.5%)	103 (1.0%)	44 (0.4%)

Chi-square analyses (see Tables 14a, 14b, 14c) were significant for problem behaviors over time, with the exception of comorbidity in females. In other words, for girls, problem behavior comorbidity did not share a significant relationship with time. For both genders, the

standardized residuals for elevated internalizing and externalizing behaviors (T1 to T2; T1 to T3) fell above the 2.0 mark. For comorbidity, the standardized residuals fell below 2.0 for girls. These results suggested, regardless of gender, more children exhibited internalizing and externalizing problems from first to third and from first to fifth grade than would be expected by chance, indicating stability of these problem behaviors. Comorbid problem behaviors, however, were stable over time for boys but not for girls.

Table 14a

Chi Square and Cross-tabulations for Internalizing Problem Behavior by Gender

			3rd IB		X2a	P	5th IB		X2a	P
			Typical	**Elevated**			**Typical**	**Elevated**		
1st grade IB	**Male**	**Typical**	4746 (95.7%)	215 (4.3%)	78.4 –	.000	4710 (94.9%)	251 (5.1%)	28.4 – 87.7	.000
		Std. Resid	*0.4 – 0.6*	*-1.9 – -2.6*	142.7		*0.3 – 0.5*	*-1.2 – -2.0*		
		Elevated	213 (81.3%)	49 (18.7%)			222 (48.7%)	234 (51.3%)		
		Std. Resid	*-1.9 – -2.7*	*8.4 – 11.3*			*-1.2 – -2.2*	*5.0 – 8.9*		
	Female	**Typical**	4408 (95.3%)	219 (4.7%)	7.1 – 42.0	.000	4416 (95.4%)	211 (4.6%)	14.5 – 18.5	.000
		Std. Resid	*0.4 – 0.6*	*-0.5 – -1.3*			*0.2 – 0.2*	*-0.7 – -0.8*		
		Elevated	155 (87.6%)	22 (12.4%)			157 (88.7%)	20 (11.3%)		
		Std. Resid	*-0.6 – -1.4*	*2.5 – 11.3*			*-0.8 – -0.9*	*3.6 – 4.1*		

Table 14b

Chi Square and Cross-tabulations for Externalizing Problem Behavior by Gender

			3rd EB		X2a	P	5th EB		X2a	P
			Typical	**Elevated**			**Typical**	**Elevated**		
1st grade EB	**Male**	**Typical**	4451 (93.9%)	287 (6.1%)	400.1 –	.000	4301 (90.1%)	437 (9.2%)	202.5 –	.000
		Std. Resid	*1.9 – 2.6*	*-6.0 – -8.2*	791.1		*1.4 – 1.7*	*-4.0 – -4.6*	260.2	
		Elevated	295 (60.8%)	190 (39.2%)			330 (68.0%)	155 (32.0%)		
		Std. Resid	*-5.7 – -8.2*	*18.1 – 25.5*			*-4.6 – -5.2*	*12.8 – 14.5*		
	Female	**Typical**	4549 (97.5%)	115 (2.5%)	214.5 –	.000	4503 (96.5%)	162 (3.5%)	50.7 –	.000
		Std. Resid	*0.4 – 0.6*	*-2.4 – -3.4*	423.0		*0.2 – 06*	*-1.1 – -3.0*	266.8	
		Elevated	98 (70.0%)	42 (30.0%)			109 (77.9%)	31 (22.1%)		
		Std. Resid	*-2.6 – -3.7*	*14.2 – 20.0*			*-1.4 – -3.2*	*6.9 – 15.7*		

Table 14c

Chi Square and Cross-tabulations for Comorbid Problem Behavior by Gender

			3rd Com		X^{2a}	P	5th Com		X^{2a}	P
			Typical	**Elevated**			**Typical**	**Elevated**		
1st grade Com	**Male**	**Typical**	5049 (98.6%)	70 (1.4%)	145.9 – 335.6	.000	5038 (98.4%)	81 (1.6%)	158.5 – 310.0	.000
		Std. Resid	*0.2 – 0.3*	*-1.6 – -2.6*			*0.3 – 0.4*	*-1.8 – -2.5*		
		Elevated	82 (78.1%)	23 (21.9%)			83 (79.0%)	22 (21.0%)		
		Std. Resid	*-1.6 – -2.4*	*11.9 – 18.0*			*-1.7 – -2.5*	*12.3 – 17.2*		
	Female	**Typical**	4758 (99.7%)	15 (0.3%)	0.1 – 492.3	NS	4729 (99.1%)	44 (0.9%)	0.3 – 0.4	NS
		Std. Resid	*0.0 – 0.1*	*0.0 – -2.0*			*0.0 – 0.0*	*0.0 – 0.1*		
		Elevated	29 (93.5%)	2 (6.5%)			31 (100.0%)	0 (0.0%)		
		Std. Resid	*0.0 – -1.6*	*-0.3 – 22.0*			*0.0 – 0.1*	*-0.5 – -0.6*		

Related to Research Question 2, binary logistic regressions were conducted separately for males and females. The omnibus test of model coefficients (see Table 15) resulted in chi-square values falling in the significant range for males but not for females. These data suggested the two predictors, taken together, had a significant effect on fifth grade comorbidity for males only. More specifically, according to Nagelkereke R^2 (see Table 16), the predictors, taken together, accounted for 9% to 14% of the variance in fifth grade comorbidity in males.

Table 15

Omnibus Tests of Model Coefficients by Gender

Imputation Number	Gender	Chi-square	df	Sig.
1	Male	42.35	2	.000
	Female	*3.15*	*2*	*NS*
2	Male	28.28	2	.000
	Female	*3.62*	*2*	*NS*
3	Male	26.72	2	.000
	Female	*3.09*	*2*	*NS*
4	Male	27.47	2	.000
	Female	*3.59*	*2*	*NS*
5	Male	30.49	2	.000
	Female	*3.04*	*2*	*NS*

Note. Because the Multiple Imputation procedure used to account for missing data does not produce pooled values for the Model Summary, the range of values from the five imputations are reported.

Table 16

Model Summary by Gender

Imputation Number	Gender	-2 Log Likelihood	Nagelkereke R Square
1	Male	285.16	.141
	Female	*153.53*	*.021*
2	Male	281.06	.099
	Female	*153.07*	*.024*
3	Male	298.49	.090
	Female	*155.03*	*.021*
4	Male	281.60	.097
	Female	*153.09*	*.024*
5	Male	282.02	.106
	Female	*153.64*	*.020*

Note. Because the Multiple Imputation procedure used to account for missing data does not produce pooled values for the Model Summary, the range of values from the five imputations are reported.

When the predictors were considered individually (see Table 17), it was revealed that, while externalizing behavior in first grade was not a significant risk factor for later comorbidity in girls (*Exp(B)* = 1.09, *NS*), internalizing behavior in first grade was a significant risk factor (*Exp(B)* = 5.00, $p \leq .05$). For boys, both internalizing (*Exp(B)* = 3.62, $p \leq .01$) and externalizing (*Exp(B)* = 5.38, $p \leq .01$) problems in first grade were risk factors for later comorbid problem behaviors. Put another way, compared to typically developing same-aged peers, girls with elevated internalizing problems in first grade were 5 times more likely and boys 3.86 times more likely to develop comorbid problem behaviors in fifth grade. Girls with elevated externalizing problems in first grade were no more likely than their typically developing counterparts to develop comorbid problem behaviors in fifth grade. Boys, however, with elevated externalizing problems in first grade were 5.38 times more likely than their typically developing peers to develop later comorbid problem behaviors.

Table 17

Variables in the Equation by Gender

						95% C.I. for Exp(B)	
		B	S.E.	Sig	Exp(B)	Lower	Upper
Male	T1 IB	1.29	.50	.011	3.62	1.35	9.71
	T1 EB	1.68	.42	.000	5.38	2.38	12.15
	Constant	-4.82	.25	.000	0.01	0.01	0.02
Female	T1 IB	1.61	.79	.041	5.00	1.07	23.40
	T1 EB	0.09	1.30	NS	1.09	0.09	13.90
	Constant	-4.82	.30	.000	0.01	0.01	0.01

Related to Research Question 3, boys and girls exhibited different mediation profiles (see Table 18). For boys, T2 social competence was the only significant partial mediator of the relationship between IB (B = -1.16, $p \leq .001$) and EB (B = -1.06, $p \leq .001$) and comorbidity. In other words, for boys, reading and math competence did not have a mediating influence on the relationships of interest.

As previously discussed, for girls, internalizing behavior was the only problem behavior that served as a risk factor for later comorbidity. Mediation analysis resulted in this relationship (c) losing significance with the introduction of each mediator (c'), suggesting full mediation. Tests of indirect effects using the Sobel test revealed T2 reading competence did not exert significant mediation effects. In other words, for girls, third grade social competence (B = -1.46, $p \leq .001$) and math competence (B = -0.80, $p \leq .001$), in their own right, fully mediated the relationship between first grade IB and fifth grade comorbidity.

Table 18

Mediation Path Coefficients and Indirect Effects of Mediators by Gender

		a	b	c	c'	Indirect effect (a*b)
1st Internalizing						
Mediator						
3rd Social	Male	-.56	-1.16	1.96	1.50	2.79
	Female	-.39	-1.46	1.62	*1.24*	2.05
3rd Reading	Male	-.49	*-.05*	1.96	1.93	*.29*
	Female	-.49	-.54	1.62	*1.40*	*1.81*
3rd Math	Male	-.48	*-.25*	1.96	1.84	*1.35*
	Female	-.42	-.80	1.62	*1.37*	2.00
1st Externalizing						
Mediator						
3rd Social	Male	-1.18	-1.06	2.01	1.04	4.22
	Female	-1.13	-1.53	*.60*	*-.87*	3.74
3rd Reading	Male	-.43	*-.02*	2.01	2.00	*.12*
	Female	-.67	-.57	*.60*	*.21*	1.99
3rd Math	Male	-.54	*-.19*	2.01	1.91	*1.03*
	Female	-.59	-.82	*.60*	*.19*	2.83

**Note.* Path coefficients reflect unstandardized coefficients. Coefficients were significant at the $p \leq .05$ unless they are in gray and *italicized*. The significance of the indirect effects was determined using the Sobel test.

Chapter 5: Discussion

This study's primary exploration was that of predictive effects of early internalizing and externalizing problems on later comorbid problem behavior. Setting it apart from extant research, this study created an outcome variable that reflected comorbid elevations in internalizing and externalizing problems, thus closely aligning with the research question in a way that few studies have done. Not surprisingly, due to the multifaceted nature of problem behavior development, variation exists in the literature regarding the predictive power of internalizing versus externalizing problems on eventual comorbid problem behaviors. As such, the present study took care to evaluate the prevalence and stability of each problem behavior, gender differences, and the role social and academic competence plays in the developmental trajectory towards comorbidity. In the discussion that follows the reader should view the interpretation of results as a starting place, acknowledging that, while the interpretations are legitimate, alternative explanations may also exist.

Findings: Prevalence and Stability of Problem Behaviors

Frequency calculations resulted in prevalence rates of 4 to 5% for internalizing problems, 6 to 7% for externalizing problems, and approximately 1% for comorbid internalizing-externalizing problems. These prevalence rates were consistent with previous studies of community samples (Cohen, Cohen, Kasen, Velez, Hartmark, Johnson, et al., 1993). In general, girls tended to exhibit more elevated IB than EB and boys more elevated EB than IB. Much of the extant literature (Campbell, 1991; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Muris, Merckelbach, Gadet, & Moulaert, 2000) supports such a gender distinction, hypothesizing that, at least during the later waves of data collection, girls grapple more with self-esteem and body-image issues and boys with irritability and peer conflict as they become exposed to

different social groups and develop pre-puberty hormones (Hoffman, Powlishta, & White, 2004). Another possible explanation involves gender stereotypes. That is, boys tend to be perceived as more likely to "misbehave," perhaps due to higher activity levels as youngsters, and girls more likely to internalize their feelings. Being that problem behavior in this study was teacher rated, it is possible that the teacher's recollection of each student's behavior was influenced by gender stereotypes.

In general, externalizing problems appeared to have the highest rate of stability from first to fifth grade. Specifically, Pearson correlations, cross tabulations, and chi-square analyses coalesced to show that about one-third of externalizing first graders continued to exhibit elevated externalizing behaviors in third and fifth grade. Internalizing and comorbid problems remained stable for a smaller proportion (about one-sixth) of first graders with respective problem behaviors. Elevated EB stability in the population could have been due, in part, to measurement, in that overt acting out behaviors were easier for teachers to consistently report on than subtle indicators of potential internalizing problems. Another possible explanation is that, by nature, individuals with externalizing problems experience reciprocally negative interactions with the environment around them (e.g. getting into arguments and fights, receiving punishments), decreasing the likelihood that others want to help or intervene in productive ways, thereby increasing the chances that maladaptive behavior will continue over time. When these data were analyzed by gender, one exception existed in that, for girls, elevated comorbidity did not appear to be a stable phenomenon in the population. It is likely, however, that this was due to the low number of girls with elevated comorbidity from T1 to T2 to T3 (N = 31,17, 44, respectively), thus, the increase in comorbidity amongst girls in the population was so small that it did not rise above what would be expected by chance.

Findings: The Risk Posed by Early Internalizing and Externalizing Problems

Using logistic regression, both internalizing and externalizing problems in first grade were found to be risk factors for comorbidity in fifth grade. That said, elevated externalizing behaviors emerged as more likely to precede comorbidity than internalizing problems. More specifically, compared to typically developing peers, youngsters exhibiting elevated EB were 4.91 times more likely to develop comorbid problem behaviors compared to those with elevated IB, who were 3.86 times more likely than typically developing peers. These data suggest the failure model and, to a lesser extent, the acting out model, underlie the development of comorbid problem behaviors. Perhaps early elevations in EB pose a higher risk due to their overt impact on the ways youngsters interact with their environment. In other words, a youngster who frequently argues, fights, and is defiant will be more likely to have negative interactions with their environment than the youngster who is withdrawn, thereby increasing his/her chances of developing additional dimensions of psychopathology. It should be noted that although the odds of becoming co-morbid are substantially increased by the presence of elevated IB or EB in 1st grade, the odds are still rather small.

A closer look at these data uncovered significant gender differences. For boys, both internalizing and externalizing problems posed risk for later comorbidity, though elevated EB was a more powerful risk factor. For girls, however, only elevated IB in first grade predicted fifth grade comorbidity. Why would the acting out model hold true regardless of gender but the failure model apply only to boys? Indeed, that the failure model would hold true for boys but not girls is consistent with Boylan, Georgiades, and Szatmari (2010) who found similar results in a sample that included both genders. One possible explanation for gender differences in the failure

model involves how American society perceives and responds to problem behaviors in boys versus girls. It could be that girls who act out are more likely to receive supports and additional opportunities to work towards success (e.g. early behavior intervention, "second-chances") as well as less severe consequences than their male counterparts, thus buffering against further problem behaviors in girls. Hill and Lynch (1983) alluded to this phenomenon in their gender intensification theory, whereby they hypothesized that with age comes an increased societal pressure to conform to gender stereotypes. That is, because the gender stereotype suggests boys are more likely to act out than girls, when girls do so it becomes more noticeable to those around her and adults intervene more quickly to prevent additional problem behaviors. The additional opportunities provided to girls to experience success or decreased severity of consequences may subsequently contribute to girls being significantly less likely to internalize automatic negative thoughts (e.g. "I am a failure," "No one likes or cares about me," "I will never achieve my aspirations").

Findings: Mediation by Social and Academic Competence

Mediation analyses within logistic regression resulted in strikingly different mediation effects for boys and girls. Before separating data by gender, social competence and, to a lesser degree, competence in math achievement appeared to exert partial mediation effects on the trajectories from both internalizing and externalizing problems to comorbidity. These results are consistent with Ladd's (2006) and McCarty, Mason, Kosterman, Hawkins, Lengua, and McCauley (2008) who found, respectively, that, partially independent from the contribution of a child's behavior, social and academic experiences increase or decrease the probability of later maladjustment. In fact, a newly published study by Ettekal and Ladd (2015) demonstrated how nuanced the mediating effects of social experiences can be on problem behavior escalation. The

researchers found that aggressive-disruptive behaviors in childhood led to adolescent rule-breaking behaviors via two different pathways: peer rejection and deviant friendships. That is, a variety of negative social experiences can influence problem behavior trajectories, especially, in this case, related to externalizing problems. Of note, it is possible that the degree to which social competence mediated behavior change may have been influenced by *method bias* (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). That is, because social competence and problem behaviors were measured by similar scales and by the same rater, the strength of their relationship may have been reflective of the measurement method rather than the constructs. Academic competence, however, was not subject to such bias since it was based on a performance-based measure of achievement.

After accounting for gender, for boys, social competence was the only mediator of both problem behavior trajectories, with effects appearing stronger on the externalizing problems trajectory than on the internalizing trajectory. In other words, how socially competent a boy is in third grade appears to influence whether elevations in IB or EB will develop into comorbid problem behavior. It seems plausible, then, that first grade boys who act out may subsequently experience negative social interactions (e.g. peer rejection, arguments with parents), which lead to less opportunities to build adaptive social competencies (e.g. skills for initiating and maintaining friendships) and contributes to the development of internalized negative feelings that appear comorbid with continuing to act out in fifth grade. This aligns with the failure model (Capaldi, 1991). Related to internalizing problems and the acting out model, it appears boys who are withdrawn during first grade may miss out on opportunities to build social competencies and amplifies risk of negative interactions, which, in part, contributes to the comorbid development

of acting out behaviors by fifth grade, perhaps due to misunderstandings of social cues and norms.

Interestingly, academic competence in reading and math did not mediate why a single problem behavior would evolve into comorbid problems in boys. These results contradict studies claiming academic problems link early externalizing (Masten, Roisman, Long, Burt, Obradovic, Riley, & Tellegen, 2005; Moilanen, Shaw, & Maxwell, 2010) and internalizing (McCarty, Mason, Kosterman, Hawkins, Lengua, & McCauley, 2008) problems to later comorbidity in boys via mediation processes. Path coefficients within the mediation analyses showed that, for boys, early internalizing and externalizing problems had a slight effect on academic competence, suggesting boys who act out or are withdrawn early in their schooling may experience more academic struggles, due, perhaps, to spending time out of instruction for poor behavior choices or not being able to attend to instruction due to mood dysregulation, subsequently missing assignments or new skill development. The effects of underdeveloped academic competencies, however, did not appear to influence the development of additional problem behaviors later. These data seem to point to minimal impact of academics on behavior in boys. Indeed, in his review of literature, D'Souza (2011) discussed findings that boys report feeling less invested in school and have fewer worries about college than girls.

For girls, mediators connecting internalizing problems to later comorbidity were of primary concern being that externalizing problems did not significantly predict later comorbidity. Social competence and, to less of an extent, competence in math in third grade fully mediated the effects of first grade internalizing problems on fifth grade comorbidity. That is, girls who are withdrawn during first grade may miss out on opportunities to build social competences and math skills, eventually leading to acting out behaviors. Being that academic competence did not

mediate the development of comorbidity in boys, these results pose the possibility that academics have more of an impact on the future behaviors of girls than boys. This could be due to social pressure put on girls to succeed academically. D'Souza (2011) described girls as reporting more school-related stress than boys—believing they have to be perfect in every area of their life, school being just one. Such intense stress could lead girls to further feelings of hopelessness and failure and contribute to risk-taking, externalizing behaviors.

Interestingly, competence in math, but not reading, was a significant mediator for girls with early internalizing problems. This result is especially surprising as one would expect both reading and math or just reading to influence problem behavior development. A possible explanation relates to the stereotype that girls are not as good at math as boys. Galdi, Cadinu, and Tomasetto (2014) found that girls internalize this stereotype at a young age (i.e. by six years of age) and that it negatively affects their performance on math tasks. It could be, then, that the internalization of the stereotype "girls aren't good at math" interacts with the missed opportunities to build competencies in math such that by fifth grade comorbid externalizing behaviors have arisen.

Protective Factors

This study has focused its discussion around the risk posed by individual problem behaviors on the development of exacerbated, comorbid problem behaviors. Taking an alternate perspective, however, there are implications for protective factors against developing comorbid problems within these data. First, gender arose as a protective factor in some respects. Namely, being a girl appeared to buffer against the negative effects of externalizing problems on later comorbidity. Next, social competence arose as a protective factor for boys and girls. That is, how socially competent a boy or girl was in third grade appeared to influence whether a single

problem behavior developed into comorbid problem behaviors. This appeared especially true for early externalizing problems, where the odds of developing comorbid problem behaviors in fifth grade compared to typically developing peers decreased from 7.04 to 2.15 with the inclusion of social competence. Finally, for girls experiencing internalizing problems, academic successes, specifically in math, may buffer against the later development of comorbidity.

Limitations

Despite the strengths of this study, including a large and representative sample, longitudinal measurement, testing of gender differences, and creation of a dependent variable to match the research question, there were several limitations. First, problem behavior and social competence were measured by a short teacher questionnaire, subjecting the independent and dependent variable to issues of content validity (i.e. Are the questions representative of the whole construct of externalizing behavior?) and reporter bias, since only the teacher's perception of student behavior was measured. There is evidence to suggest, however, that teachers may be the best reporters of overt EB and social competence being that they have access to a greater range of comparison peers (Stanger & Lewis, 1993). Second, and related to content validity, the direct measure of academic competence did not reflect learning behaviors, such as student motivation and study skills, that are included in the construct of academic competence.

Third, different teachers rated each student's behavior at each time point (i.e. first, third, and fifth grade teachers), introducing possible instrumentation threat to internal validity. Fourth, bias may have been introduced with the use of multiple imputation for missing data. According to Sterne, White, Carlin, Spratt, Royston, Kenward, Wood, and Carpenter (2009), only when enough variables predictive of missing values are included in the imputation model will it avoid bias. Because the ECLS-K is a large, nationally-representative longitudinal dataset that includes

hundreds of variables, to include all predictors of missingness within ECLS-K was not within the scope of the present study. Finally, the designation of a 2 standard deviation cutoff to represent an "elevation" in problem behavior may have underestimated the impact of early behavior problems on the development of comorbidity. That is, the more stringent the cutoff, the less likely subthreshold problems are to be captured. However, this study sought to align itself with widely accepted research used by school psychologists designating 2 SD as a sufficient cutoff for labeling problem behaviors.

Implications and Future Directions

A variety of implications for future research and practice exist as a result of this study. Of primary importance, this study successfully explored the predictive power of the failure model and acting out model using an outcome variable of comorbidity rather than a single problem behavior. Being that the development of comorbid problem behaviors is a significant public health concern and have inconsistent results in the extant literature, future studies should model this study's development of a *comorbidity* outcome variable to align with the research question. Indeed, the extant literature would greatly benefit from descriptive research facilitating a deeper understanding of the *comorbid* group. Future studies should explore what common characteristics exist amongst youngsters exhibiting comorbid problem behaviors (e.g. family structure, SES) and trends in outcomes beyond adolescence exist for this group (e.g. incarceration rates, stable employment).

Perhaps future studies could designate lower cutoff points for problem behavior (i.e. 1.5 or 1.0 standard deviations from the mean) so as to increase the number of subjects in the comorbid group and further explore relationships between the phenomena, with the understanding that symptomatology is less intense/clinical. In their consideration of different

cutoff points, future studies may consider conducting sensitivity analyses to determine the ideal cutoff. Future research should also continue this study's pursuit of a deeper understanding of the longitudinal pathways towards problem behavior development by investigating the mediating effects of additional variables, such as self-concept, and/or including additional measures of social and academic competence. Future research would be especially meaningful in its utilization of a variety of measurement methods for key constructs, which would eliminate the current study's limitation of method bias associated with behavior rating scales.

Gender differences arose across nearly every phenomena investigated by the present study, highlighting the importance for future problem behavior research to include analyses of gender differences. Indeed, an interesting future direction would be research that includes statistical models allowing for formal testing of interactions between gender and the phenomena to better understand the relationships discussed in this study. An unexpected finding that arose in the study was that math competence mediated the trajectory from internalizing problems to comorbidity in girls. Future research may seek to better understand this finding and provide additional explanation as to why reading competence was not a mediator and why the same mediating effects did not hold true for boys. One limitation of this study was its inclusion of mainly teacher ratings of problem behavior and social competence. Future research should replicate this study with the inclusion of additional rater measures (i.e. parent report, self report) and evaluate rater agreement to get a more nuanced picture of behavior changes over time. For example, perhaps internalizing problems would have been significant risk factors for later comorbidity in boys had self-report measures been included.

This study resulted in several implications for practice, especially within the educational setting. An important implication relates to school psychologists and their role in classifying

students as having an Emotional Disability (ED). This study demonstrated that of first graders with elevated externalizing behaviors, only one-third continued to meet this threshold in third and fifth grade. Even less stable, only one-sixth of students with internalizing problems in first grade exhibited the same problems in subsequent years. In other words, using the same cutoff point (i.e. 2 SD above the mean) as norm-referenced rating scales employed by practicing school psychologists, this study demonstrated many students who could potentially be classified as having an Emotional Disability in first grade may not meet the same criteria in subsequent years. Not only does this highlight the importance of frequent re-evaluation of students with ED, it also suggests the initial designation of an ED label should be assigned only when all other interventions have not been successful and a comprehensive evaluation, rather than solely rating scales, has been used to establish the presence and stability of an emotional condition.

Extant literature supports the idea that youngsters exhibiting comorbid problem behaviors have worse outcomes than those exhibiting a single problem behavior. This study provided evidence that single behaviors, however, pose a significant risk towards later comorbidity, often through social variables. Schools, then, may consider developing school-wide prevention programs that identify youngsters who are beginning to act out or, especially for girls, withdraw and implement targeted interventions with strong social components that emphasize community-building and forming healthy social relationships in order to buffer against the later development of comorbid behaviors. For those students who do begin exhibiting both internalizing and externalizing problems together, evidence-based treatments for comorbid behaviors do not appear readily accessible in schools. Indeed, most therapeutic approaches focus on the treatment of one problem behavior or the other. Being that schools are in a position to identify at-risk or comorbid youth and have access to natural environments to implement interventions, schools

may consider working with researchers to develop interventions tailored for comorbid students and evaluate their efficacy over time.

Appendix A

Literature Review Summary Table

Author Name (Year)	Details	Relevance to Study
Ansary, N., & Luthar, S. (2009)	Examine the relationship between problem behaviors and low academic achievement. Sample: Data from 256 boys and girls were obtained annually from 10^{th} to 12^{th} grade. Methodology: Information on delinquency and anxiety were obtained via teacher report and self report. Academic achievement was based on class grades obtained through the school record. General linear modeling was used.	Results showed that, for boys and girls, low academic achievement in tenth grade was a risk factor for engaging in delinquent acts throughout high school.
Beyers, J. M., & Loeber, R. (2003)	Examined the developmental trajectories of depressive and delinquent behavior. Sample: 506 boys recruited at age 13 and followed annually for five years. Methodology: Boys self-reported depressive symptomatology and delinquent behavior. Growth curve modeling was used.	Results set the stage for the acting out model: Specifically, depressed mood exerted stronger influence on subsequent delinquency than the other way around. Limitation: Used gender homogeneous sample, limiting generalizability
Boylan, K., Georgiades, K., & Szatmari, P. (2010)	Examined relationship between oppositional and depressive symptoms during childhood.	Results supported failure model for only boys: Oppositional behaviors at age 6 associated with later depressive symptoms

	Sample: 903 community-based boys and girls recruited at age 6 and followed-up at age 8 and age 10. Methodology: Mother-reported depressive and oppositional behaviors were measured. Structural equation modeling used.	in boys but not girls.
Burke, J., Loeber, R., Lahey, B., & Rathouz, P. (2005)	Examined longitudinal relationships between several clinically diagnosed psychopathologies. Sample: 177 clinic-referred boys recruited between ages of 7 to 12 and followed annually until they turned 18. Methodology: Symptoms of ADHD, CD, ODD, depression, and anxiety used as dependent and independent variables. Generalized estimating equation regression used.	Results supported failure model: ODD directly predicted later anxiety and depression Limitation: Used gender homogeneous sample, limiting generalizability

Capaldi, D. M. (1991; 1992)	Described social and academic characteristics of adolescent boys with elevated levels of internalizing, externalizing, and co-occurring problem behaviors. Additionally, examined 6th grade predictors of 8th grade maladjustment. Sample: Data were collected for 203 boys in the 6th grade and then the 8th grade. Methodology: Information about externalizing problems was obtained through parent and child interviews and parent, teacher, and child questionnaires. Information regarding internalizing problems was obtained through self-report. The reading section of the WRAT, given in the 6th grade, provided information about academic skills. Trained observations of interactions with a pre-selected peer provided information about peer acceptance/rejection. Trained observations of interactions with parents during a problem-solving task provided information about parent acceptance/rejection. **Capaldi (1991):** Used MANOVAs to examine group differences between boys with internalizing, externalizing, and co-occurring problem behaviors. **Capaldi (1992):** Used MANOVAs to examine group differences between 8th grade boys who had been classified in the 6th grade as having internalizing, externalizing, and co-occurring problem behaviors.	**Capaldi (1991):** Results showed that boys in grade 6 with significant externalizing, internalizing, and co-occurring problem behaviors exhibited deficits in reading skills and peer relations, with the co-occurring group demonstrating the most severe and the internalizing group the least severe deficits. **Capaldi (1992):** Results showed that boys with externalizing problems in the 6th grade continued to experience deficits described in Capaldi (1991) in the 8th grade, while the internalizing group's deficits were improved. Second, externalizing behavior showed more stability from 6th to 8th grade than internalizing behavior. Third, externalizing problems in the 6th grade were correlated with significant internalizing problems in the 8th grade. Fourth, and most relevant to this study, a higher percentage of 6th grade externalizers were classified as having co-occurring problem behaviors in 8th grade than early internalizers (22% vs. 3%, respectively). Limitation: Used gender homogeneous sample, limiting generalizability;

Cicchetti, D., & Schneider-Rosen, K. (1986)	Reviewed research on the development of depression from a developmental perspective.	Proposed a model of development suggesting successful development in the childhood and adolescence results from achieving a series of social, emotional, and cognitive competencies.
Drabick, D. A., Ollendick, T. H., & Bubier, J. L. (2010)	Review literature on the co-occurrence of oppositional defiance disorder (ODD) and anxiety disorders	The authors echo Lilienfeld's *pathogenetic* comorbidity in their discussion of using directional theories in comorbidity research. Directional theories posit one class of behaviors exerts causal influence on the development of a subsequent class of behaviors. This study relies on two types of directional theories. First, those that implicate externalizing problems as posing a primary risk for future internalizing-externalizing comorbidity and, second, those implicating internalizing problems as posing a greater risk.
Haselager, G. J., Cillessen, A. H., Van Lieshout, C. F., Riksen-Walraven, J. M., Hartup, W. W., & Bukowski, W. M. (2002)	Examined the relationship between peer rejection and problem behaviors. Sample: 274 boys residing in the Netherlands were recruited at approximately 6 years old and were followed-up one and four years later. Methodology: Aggressive and prosocial behavior was assessed through behavior observations, peer ratings, parent ratings, and teacher ratings. Peers rated the overall feelings of acceptance or rejection	Results showed that, for boys, changes in peer rejection preceded and were associated with fluctuations in aggression. Limitation: Used gender homogeneous sample, limiting generalizability

	for the sample.	
Hipwell, A. E., Stepp, S., Feng, X., Burke, J., Battista, D. R., Loeber, R., & Keenan, K. (2011)	Explored the temporal ordering of externalizing and internalizing problems Sample: 1,215 girls recruited at age 8 and followed annually for nine years. Methodology: Parent-reported severity of behavioral symptoms consistent with conduct disorder (CD) and depression was collected. Path analysis was used.	Results supported failure model: Symptoms of CD preceded symptoms of depression. Limitations: Used gender homogeneous sample, limiting generalizability; small effect size
Keiley, M. K., Lofthouse, N., Bates, J. E., Dodge, K. A., & Pettit, G.S. (2003)	Examined how externalizing and internalizing problems covary over time and whether latent variables influence covariation. Sample: 585 boys and girls were followed annually from kindergarten to 8th grade. Methodology: Mothers and teachers of youngsters reported, via rating scale, on a host of behavioral, emotional, social, and demographic characteristics of youngsters. Structural equation modeling was used.	Results showed that a higher ratings on the difficultness temperament variable influenced the covariation of internalizing and externalizing problems over time.
Kiesner, J. (2002)	Explored the temporal relationships between problem behavior and peer rejection. Sample: 215 boys and girls recruited from a community-sample in Italy. Mean age of recruits was 13 and follow-up occurred two years later. Methodology: Data included teacher-reported	Results supported failure model: Significant externalizing behavior at age 13 contributed to depressive symptoms at age 15. With regards to social competence, high peer rejection at 13 was associated with internalizing problems at 15. Additionally,

	externalizing behavior, child-reported internalizing behavior, and peer-reported peer rejection. Multiple regression was used.	externalizing behavior at age 13 contributed to peer rejection at age 15.
Ladd, G. W. (2006)	Examined the relationship between peer rejection and problem behaviors. Sample: Data for 399 boys and girls were obtained annually from kindergarten to 6th grade. Methodology: Externalizing and internalizing problems were rated by teachers. Peer rejection ratings were obtained by teachers and peers. Structural equation modeling was used.	Results showed that, after controlling for early problem behavior, peer rejection exerted unique influence on later internalizing and externalizing behavior.
Lahey, B.B., Loeber, R., Burke, J., Rathouz, P.J., & McBurnett, K. (2002)	Examined the longitudinal covariation of CD with other clinically diagnosed psychopathologies. Sample: 168 clinic-referred boys recruited between ages of 7 to 12 and followed annually until they turned 18. Methodology: Symptoms of ADHD, CD, ODD, depression, and anxiety used as dependent and independent variables. Generalized estimating equation and log-linear regression used.	Results supported failure model: Early CD symptoms were associated with later anxiety and depression, but not vice-versa. Limitation: Used gender homogeneous sample, limiting generalizability
Lee, E., & Stone, S. (2012)	Examined the relationship between internalizing and externalizing behavior and the influence of self-concept on that relationship. Sample: 2,844 boys and girls residing in Korea were included beginning in 4th grade and followed	Results showed that negative self-concept mediates the relationship between internalizing and externalizing problems, which are reciprocally reinforcing.

	annually for four years. Methodology: Data included self-reported problem behaviors and self-concept. Path analysis was used.	
Lilienfeld, S. O. (2003)	Reviewed literature on the temporal relationship between early internalizing and externalizing problems and later co-occurrence	She proposed the term *pathogenetic comorbidity,* meaning one condition directly causes or contributes to another. Specifically, she acknowledged evidence exists for both externalizing problems predicting internalizing and internalizing problems predicting externalizing. While evidence is still mixed as to which is more predictive of later comorbidity, internalizing or externalizing problems, she suggested studies applying a *pathogenetic comorbidity* approach may aid in clarifying the issue of predictors of comorbidity. Many studies in this study's literature review take a *pathogenetic comorbidity* approach to researching comorbidity.
Lochman, J. E., & Dodge, K. A. (1994)	Examined social-cognitive patterns in aggressive and non-aggressive boys. Subjects: 296 boys in the 4^{th} grade and 7^{th} grade were recruited. Methodology: Boys were designated as aggressive or non-aggressive based on teacher ratings and a subsequent evaluation by a multidisciplinary panel.	Results showed that youngsters exhibiting significant externalizing problems possess significantly more deficient social skills and social problem solving skills than non-externalizing youngsters. Limitation: Used gender homogeneous sample, limiting generalizability

	Patterns in social information processing and cognitive schemas were assessed using responses to a variety of vignettes, videos, and other tasks. Behavior observations were also used. Analyses were done using ANOVA.	
Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradovic, J., Riley, J. R., & Tellegen, A. (2005)	Examined the influence of academic competence on the development of problem behavior. Sample: 205 boys and girls recruited between 8 and 12 and were followed-up 7, 10, ad 20 years later. Methodology: Data on academic competence was obtained via parent rating scale, teacher rating scale, achievement test, and grade point average. Date on problem behaviors was obtained via parent rating scale and self-report. Structural equation modeling was used.	Results showed mediating effects of academic achievement. Specifically, Time 1 externalizing problems undermined academic achievement during adolescence, which was subsequently associated with internalizing problem in young adulthood.
McCarty, C., Mason, W., Kosterman, R., Hawkins, J., Lengua, L., & McCauley, E. (2008)	Examined the influence of academic competence on problem behavior development. Subjects were 808 boys and girls. Data was collected first in grade 5, again in grades 10, 11, and 12, and a final follow-up at age 21. Methodology: Externalizing behavior was measured by self-report and internalizing by teacher report. Academic achievement was measured by parent and self-report. A semi-structured diagnostic interview was conducted at age 21 to assess the presence of a past-year depressive episode. Structural equation modeling	Results showed that girls with higher levels of teacher-rated depression at age 10 were more likely to experience academic problems later in adolescence. Subsequently, girls experiencing academic problems in mid-adolescence were more likely to experience a major depressive episode at age 21. None of these relationships were true for boys. In fact, the experiences of boys were quite the opposite, with academic problems being predictors and outcomes of externalizing problems rather than internalizing.

	was used.	
Measelle, J. R., Stice, E., & Hogansen, J. M. (2006)	Examined the developmental trajectories of depressive symptoms and antisocial behavior. Sample: 485 adolescent girls (aged 13 Time 1) were followed for four data collection waves over a five-year time period. Methodology: Girls self-reported antisocial behavior via rating scale and depressive symptoms via diagnostic interview. Growth curve modeling was used.	Results set the stage for the acting out model: Initially high depressive symptoms predicted slower rates of antisocial behavior deceleration. Limitation: Used gender homogeneous sample, limiting generalizability
Mesman, J., Bongers, I. L., & Koot, H. M. (2001)	Examined the temporal relationship between internalizing and externalizing problems. Sample: Recruited a random sample of 420 boys and girls in Holland. At Time 1, the mean age was 3 years old and data was collected twice more over an eight-year period. Methodology: Data included parent- and teacher-reported problem behavior and social competence. Path analysis was used and the mediating effects of social problems were examined.	Results supported the acting out model only for boys with teacher-rated problem behavior: An indirect path existed for the teacher-rated boys' group whereby depressive symptoms at Time 1 predicted externalizing problems at Time 3 via social problems at Time 2
Miles, S. B., & Stipek, D. (2006)	Examined the relationship between academic achievement in reading and externalizing behaviors. Sample: Subjects (approximately 500 boys and girls) were either in kindergarten or 1st grade at	Results showed that reading problems in third grade were associated with externalizing problems in fifth grade

	study entry and data was collected again in 3rd and 5th grade. Methodology: Externalizing problems were measured via teacher ratings. Reading achievement was measured by direct assessments of literacy. Path analysis was used.	
Moilanen, K. L., Shaw, D. S., & Maxwell, K. L. (2010)	Examined the influence of academic competence on problem behavior development. Subjects: The authors tracked approximately 290 boys over five waves of data collections—age 6, 8, 10, 11, and 12. Methodology: Data were collected on mother- and child-reported externalizing and internalizing behaviors and teacher-rated academic competence. Path analysis was used.	Results differ from those of McCarty and colleagues (2008). Specifically, for boys, externalizing problems at age 6 and 8 were associated with low academic competence age 8 and 10, which was subsequently associated with the emergence of internalizing problems and exacerbation of externalizing at age 11. Limitation: Used gender homogeneous sample, limiting generalizability
Morgan, P., Farkas, G., Tufis, P., & Sperling, R. (2008)	Examined the relationship between reading and behavior problems over time. Sample: Data was collected for 11, 515 boys and girls during the 1st and 3rd grade years. Methodology: Reading achievement was measured by a direct reading assessment. Teacher ratings were used to measure problem behaviors. Logistic regression was used.	Results showed that boys and girls who struggled with reading were more likely than their counterparts to exhibit internalizing as well as externalizing problems later.
Oland, A. J., & Shaw, D. S. (2005)	Reviewed literature on the temporal relationship between early internalizing and externalizing	The authors expressed concern at the dearth of theory and studies directly

	problems and later co-occurrence	addressing the issue of behavioral predictors of comorbidity in a way that accounts for complex relationships. Rather, they point out, theories linking one class of problem behaviors directly to the subsequent development of another class of behaviors (e.g. early externalizing problems predicting the emergence of later internalizing problems) have been used to explain the phenomenon of comorbidity.
Parker J. G., Rubin K. H., Price J., DeRosier M. E. (1995)	Reviewed literature on the development of peer relationships, in part, from a developmental psychopathology perspective.	Social competence has been singled out as one of the most salient predictors of developmental outcomes in adolescence and adulthood, including juvenile delinquency, adult crime, psychopathy, and mental illness
Ritakallio, M., Koivisto, A.-M., Pahlen, B., Pelkonen, M., Marttunen, M., & Kaltiala-Heino, R. (2008)	Examined the temporal relationship between depressive symptoms and antisocial behavior. Sample: Data for approximately 2,000 boys and girls residing in Finland were collected at age 15 and 17. Methodology: Data included self-reported depressive symptoms and antisocial behavior. Logistic regression was used.	Results supported the acting out model for girls only: Girls with significant depressive symptoms at age 15 were twice as likely than their non-depressed counterparts to exhibit significant antisocial behavior at age 17. The study did not find support for antisocial behavior predicting later depression for either gender.
Rohde, P., Lewinsohn, P. M., & Seeley, J. R. (1991)	Examined clinical comorbidity in adolescents and adults. Sample: 1,710 adolescent and 2,060 adult males	Results supported failure model: In both adolescents and adults with comorbid depression and disruptive behavior disorder, the disruptive behavior disorder

	and females recruited from the community. Methodology: Data on the lifetime presence of depression and disruptive behavior disorders were obtained through questionnaire and diagnostic interview. Prevalence odds ratios were calculated.	was more likely to precede depression than vice-versa.
Sacco, W. P., & Graves, D. J. (1984)	Examined whether differences in social problem solving abilities exist between depressed and non-depressed youngsters. Sample: 40 boys and girls aged 9 and 11 were recruited. Methodology: Youngsters were designated as depressed or not depressed based on a child rating scale. Social problem solving abilities were assessed via rating scales and responses to questions about pictures.	Results showed that some aspects of social problem solving abilities were more deficient in depressed youngsters; specifically, means-end thinking.
Sturaro, C., Van Lier, P. A., Cuijpers, P., & Koot, H. M. (2011)	Examined the mediating influence of peer rejection on externalizing behavior development. Sample: Data for 740 boys and girls were obtained annually from kindergarten to 3rd grade. Methodology: Externalizing behaviors were rated by teachers and peers. Peer rejection ratings were obtained by peers nomination. Autoregressive modeling techniques were used.	Results showed that early externalizing behavior contributed to high levels of peer rejection, which subsequently predicted exacerbation of externalizing behavior
Van der Giessen, D., Branje, S., Overbeek, G., Frijns, T., van	Examined temporal relationship between depressive symptoms and aggressive behavior.	Results supported failure model: Significant aggressive behaviors at age 12

Lier, P. A. C., Koot, H. M., & Meeus, W. (2013)	Sample: Approximately 500 boys and girls from the Netherlands. Sample was recruited when they were 12 years old and were followed annually for three years. Methodology: Data included parent-reported aggressive behavior and self-reported depressive symptoms. Path analysis was used.	predicted subsequently elevated depressive symptoms. The reverse relationship did not exist.
Van Lier, P. A. C., & Koot, H. M. (2010)	Examined the mediating influence of peer rejection on the relationship between internalizing and externalizing problems. Sample: Data from 653 boys and girls were obtained annually from kindergarten to 3rd grade. Methodology: Externalizing and internalizing behaviors were rated by teachers and peers. Peer rejection ratings were obtained by peers nomination. Structural equation modeling was used.	Results showed that peer rejection mediated the relationship between early externalizing behavior and development of later internalizing behavior. Notably, early internalizing behavior did not serve as a risk factor for low social competence or later problem behavior.
van Lier, P. A., Vitaro, F., Barker, E. D., Brendgen, M., Tremblay, R. E., & Boivin, M. (2012)	Examined the combined influence of academic and social competence on problem behavior development. Sample: Collected data on 1,558 boys and girls when they were 6, 7, and 8 years old Methodology: Data included teacher ratings of problem behavior and academic competence (achievement) and self-reported social competence (peer victimization). The data were modeled using	Results supported the failure model via mediation of social and academic competence, combined, and found no support for the acting out model (i.e. internalizing→externalizing). Specifically, related to the failure model, results showed externalizing problems at age 6 indirectly predicted internalizing problems at age 8 through the combined influence of low academic achievement and high peer victimization.

	autoregressive techniques.	Limitation: Mediation results significant at the *p=.06* level—meaning, by some researchers' standards, the mediation path linking externalizing problems to internalizing problems through low academic and social competence was not supported.
Vieno, A., Kiesner, J., Pastore, M., & Santinello, M. (2008)	Examined the developmental trajectories of depressive symptoms and antisocial behavior. Sample: 107 boys and girls residing in Italy. Mean age at recruitment was 12 years old and follow-up occurred 10 months later. Methodology: Adolescents self-reported depressive symptoms and antisocial behavior. Structural equation modeling was used.	Found results similar to Measelle, Stice, and Hogansen (2006) in Italian adolescents.

Appendix B

Descriptives and Frequencies

N = 10,028

Demographics

Variable	N	Percent
Gender		
Male	5,224	52.1
Female	4,804	47.9
Ethnicity		
Caucasian	5,743	57.5
Af Amer	1,523	15.2
Hispanic	1,977	19.8
Asian	293	2.9
Pacific Isl	64	0.6
Am Indian	175	1.8
More than 1	221	2.2
Not obtained	32	0.3
SES (5th grade)		
1st Quintile	1,771	19.2
2nd Quintile	1,805	19.6
3rd Quintile	1,838	20.0
4th Quintile	1,853	20.1
5th Quintile	1,935	21.0

Variables of Interest

Variable	Not Elevated	Elevated
Internalizing Behavior (IB)		
T1 (1st)	9588.2 (95.6%)	439.2 (4.4%)
T2 (3rd)	9521.8 (95.0%)	505.4 (5.0%)
T3 (5th)	9504.6 (94.5%)	522.6 (5.5%)
Externalizing Behavior (EB)		
T1 (1st)	9402.6 (93.8%)	624.6 (6.2%)
T2 (3rd)	9392.8 (93.7%)	634.4 (6.3%)
T3 (5th)	9242.4 (92.2%)	785 (7.8%)
Comorbid (IB+EB)		
T1 (1st)	9891.2 (98.6%)	136.2 (1.4%)
T2 (3rd)	9917.6 (98.9%)	109.8 (1.1%)
T3 (5th)	9880.4 (98.5%)	146.8 (1.5%)

Variable	Mean	Range of SD
Social Competence		
T1 (1st)	3.1	0.6-0.7
T2 (3rd)	3.1	0.6-0.6
T3 (5th)	3.1	0.6-0.6
Acad Competence (Reading)		
T1 (1st)	50.0	10.0-10.1
T2 (3rd)	49.7	10.0-10.3
T3 (5th)	49.9	10.0-10.2
Acad Competence (Math)		
T1 (1st)	50.1	9.7-9.7
T2 (3rd)	49.8	10.1-10.2
T3 (5th)	50.0	10.1-10.2

Note. Unstandardized scores were used for social and academic competence. The Multiple Imputation procedure used to account for missing data does not allow for reporting of SD of pooled means, thus the range of SD from the five imputations are reported.

Appendix C

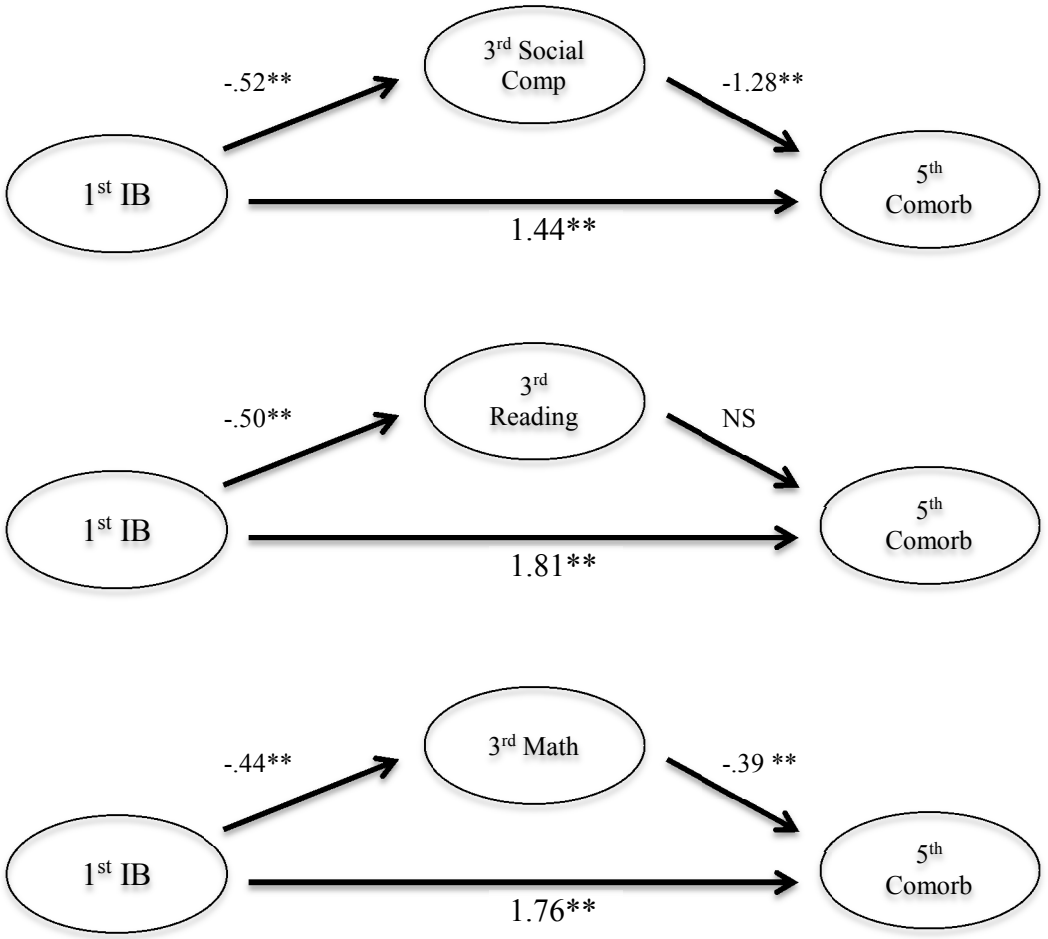
Intercorrelations of Variables of Interest Across T1, T2, and T3

		T1			T2						T3		
		IB	**EB**	**Com**	**IB**	**EB**	**Com**	**Social**	**Acad R**	**Acad M**	**IB**	**EB**	**Com**
T1	**IB**	1.00											
	EB	.23	1.00										
	Com	.56	.47	1.00									
T2	**IB**	.11	.08	.09	1.00								
	EB	.15	.35	.25	.13	1.00							
	Com	.13	.19	.20	.47	.43	1.00						
	Social	-.11	-.29	-.15	-.18	-.42	-.17	1.00					
	Acad R	-.11	-.12	-.05	-.15	-.16	-.10	.29	1.00				
	Acad M	-.09	-.12	-.06	-.16	-.15	-.09	.25	.74	1.00			
T3	**IB**	.09	.06	.09	.05	.06	(NS)	-.11	-.06	-.07	1.00		
	EB	.07	.21	.13	.10	.29	.14	-.30	-.14	-.10	.18	1.00	
	Com	.12	.14	.17	(NS)	.17	.05	-.17	-.04	-.06	.53	.43	1.00

Note. Most correlations were significant at least at the $p < .01$ level (**). Those that were not significant are denoted by (NS).

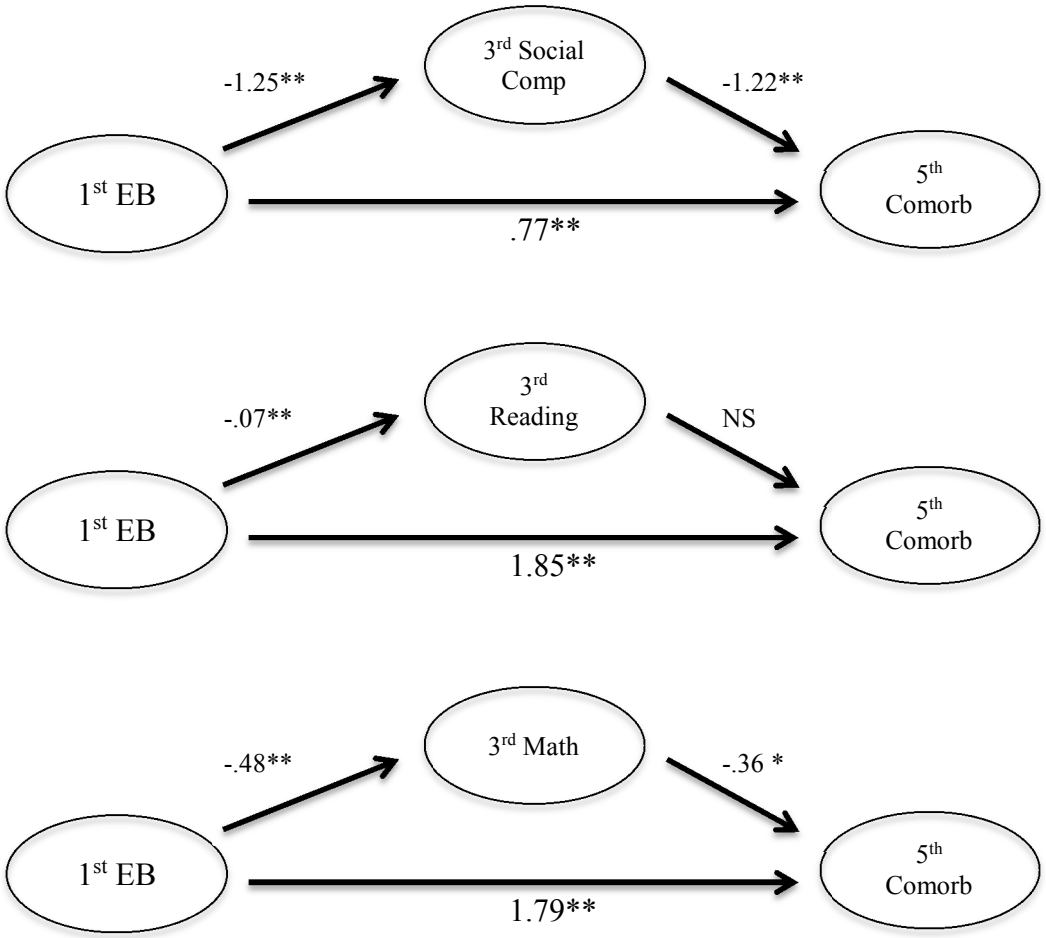
Appendix D1

Mediation Path Coefficients: **Internalizing Problems**



Appendix D2

Mediation Path Coefficients: **Externalizing Problems**



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