CO-OCCURRING ACADEMIC AND MENTAL HEALTH PROBLEMS IN HIGH SCHOOL: A LONGITUDINAL STUDY

Lin Wang

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Approved by,
Peggy Thoits
Glen Elder
Mike Shanahan
Kenneth Bollen
Philip Costanzo

ABSTRACT

LIN WANG: Co-occurring Academic and Mental Health Problems in High School: a Longitudinal Study
(Under the direction of Peggy Thoits and Glen H. Elder)

This study takes an interdisciplinary approach to co-occurring academic and mental health problems, with special attention to "the interdependent, individual-level processes that underlie academic success, difficulty, or disability" (Roeser and Eccles, 1997). The objective of the substantive chapters is to provide a greater understanding of developmental processes, linking mechanisms, and consequences of such joint occurrences using Add Health data and a variety of methods.

This study finds that academic difficulties persistently lead to internalizing and externalizing problems during high school. However, the effect of academic problems on depression decreases while its effect on delinquency grows over time. On the other hand, mental health problems also increase the size of academic problems throughout high school, although their effects remain relatively low over time. This study also demonstrates that gendered risks of internalizing and externalizing problems found in previous studies are p resent in academic settings.

In addition, this study shows that higher self-esteem and an internal locus of control generally protect the adolescents from both internalizing and externalizing problems. Their protective effect is even stronger against depression when adolescents face academic difficulties. This study also provides very clear evidence that self-esteem and locus of control are related to the types of mental health problems adolescents tend to experience, e.g., boys and girls with high esteem tend to have externalizing problems

more than internalizing problems and girls with high mastery are more likely to have internalizing problems than externalizing problems. However, self-esteem and mastery is not found to affect the tendency of depressed effect versus delinquent behavior in situations of academic stress. Instead, these coping resources contribute directly to the gendered risks of different types of mental health problems.

Finally, this study illustrates that an increasing academic performance trajectory is associated with a greater likelihood of entering a 2-year or 4-year college and the effects of SES and parenting are partially mediated by mental health. Furthermore, gender differences in college attendance are found to be partly explained by gender differences in the risk of internalizing and externalizing problems.

DEDICATION

To my beloved wife Catherine, for all her sacrifice in supporting me to complete this long and challenging journey…

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To professor Peggy Thoits, for her tremendous dedication to mentoring me and her unparalleled hard work and patience in guiding me through the distress, frustration, and exhaustion to finally reach the end of the tunnel. To professor Glen H. Elder, for his long standing support. And to professors Mike Shanahan, Kenneth Bollen, and Philip Costanzo, for their helpful comments and feedback.

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CHAPTER ONE

Introduction

Introduction

School holds a central place in the “developmental agenda” for children and adolescents throughout the world (Rogoff, 1990; Sameroff, 1987). However, many adolescents attending schools in the United States today have significant academic difficulties, emotional/behavioral difficulties, or most likely both (Dryfoos, 1994; Knitzer, Steinberg, & Fleisch, 1991; Weist, 1997). The co-occurrence of academic and mental health problems makes it important to study them simultaneously (Roeser and Eccles, 1997)

The reciprocal nature of the relationship between academic and mental health problems, as suggested by Eccles, Wigfield, & Schiefele (1998), may explain why many children with academic difficulties also show emotional difficulties, and vice versa. However, most studies that examine both academic and mental health problems are cross-sectional, which lack the capability to provide strong empirical evidence on the existence and strength of their causal relationships. Previous studies have also shown that across the adolescent years girls seem to be at increasing risk for internalizing problems (such as depressive symptoms; Angold & Rutter, 1992) and boys for externalizing problems (such as behavioral misconduct; Lewinsohn, Hops, Roberts, Seeley, & Andrews,

1993; Zahn-Waxler, 1993). However, such gender differences in mental health problems[1] have not been thoroughly examined in relation to academic performance. In addition, not all adolescent boys and girls experience increases in developmental problems throughout adolescence. Although studies have shown that social influences such as parental involvement and positive parenting practices protect against the development of both academic and mental health problems (Cicchetti & Toth, 1998; Ge, Best, Conger, & Simons, 1996; Loeber & Stouthamer-Loeber, 1998; Patterson, Reid, & Dishion, 1992), it is not clear whether parental factors operate differently for boys and girls.

In studying the causal relationships between academic performance and mental health problems, researchers found academic difficulties can lead to mental health problems by functioning as stressors (Dweck & Wortman, 1982; Connell & Wellborn, 1991; Weiner, 1994). However, adolescents often respond to academic stressors with different types of mental health problems. These emotional/behavioral difficulties can be generally categorized as either internalizing problems (such as depressive symptoms) or externalizing problems (such as behavioral misconduct; Achenbach, 1991). Despite the numerous studies linking academic problems with mental health problems, few have provided explanations of differential risks of internalizing versus externalizing mental health problems as the consequences of academic stressors.

High school is an important stage of schooling. After high school, adolescents transform from a rather homogenous group to diverse social members occupying various social roles, with college education being the normative and most desirable path to success. Studies find socioeconomic status (SES) is associated with college attendance

[1] The terms “mental health” and “well being” will be used throughout this proposal to encompass both psychological and behavioral problems.

(see review by Baker and Vélez, 1996), though the causes of this association have not been fully understood. Poor academic performance and mental health problems have also been found to reduce the likelihood of students going on to college. However, these studies tend to examine the effects of academic and mental health issues in isolation and fail to take into account the inter-relations between these problems. In addition, previous studies explored only the effect of overall performance of high school students (e.g., Hearn 1991) and failed to examine the possible impact of the trajectories of students' academic performance.

The current study attempts to bridge these gaps in the literature using data from the National Longitudinal Study of Adolescent Health (Add Health). The advantages of using this dataset include: it is nationally representative of all American high schools, full transcript data for high school are available, quality measures of psychological/behavioral/social characteristics during high school were included, as well as detailed information on post high school placement. This proposed study addresses three interrelated questions:

1. <u>What is the relationship between the academic performance and mental health over the high school years?</u> The first paper employs latent curve models to a) examine the relationship between academic performance and students' mental health problems over time, b) determine the extent to which these developmental trajectories of maladjustment vary by gender and test whether the internalizing and externalizing problems in relation to gender found in previous studies also hold in reaction to distress from academic difficulties, and c) investigate the protective influence of positive parenting against academic and mental health problems.

2. Do mastery and self-esteem moderate the relations between academic difficulties and mental health problems? The second paper employs structural equation models to examine mastery and self-esteem's stress-moderating effects on internalizing versus externalizing problems as the outcome of academic stressors. Gender differences in these moderating effects will also be examined.
3. How do high school academic performance and mental health together affect college attendance? The third paper uses logistic regression to address this question. First, factor scores will be created using latent curve models to capture the changes in students' academic performance. Then the effect of academic performance trajectory, mental health problems, and the interaction of the two on college attendance will be examined. Finally whether the effect of socioeconomic status on college attendance is mediated through the respondents' academic performance and well being will be investigated.

Theoretical Approach/Literature Review

Generally, this study attempts to investigate how academic and mental health problems are related over time, how academic problems might lead to one type of mental health problem versus another, and how these two interrelated problems cause differential outcomes of high school education. In order to understand those distinct but interrelated questions, it is important to extend beyond the scope of one research field and draw upon different theories and perspectives for a holistic view.

This study first relies on the theory of "stress process" (Pearlin, Menaghan, Lieberman, and Mullan 1981) to provide a framework to explain disparities in mental

health (see Pearlin et al. 1981; Thoits 1991; Turner, Lloyd, and Roszell 1999). According to the “stress process” theory, stressors such as poor academic performance erode positive concepts of self. Lower self-concepts place students at higher risk for mental health problems. However, coping resources such as mastery and self-esteem can buffer the impact of stress and minimize the elevation of psychological or behavioral symptoms (Turner and Roszell 1994). While the “stress process” theory has been instrumental in the establishment of a causal relationship from academic difficulties to mental health problems, it does not provide strong theoretical elucidation on how mental health problems in turn affect academic performance. In addition, the longitudinal relations between academic stressors and their mental health consequences have not been the center of attention in the applications of “stress process” framework in academic settings.

To overcome the limitations of the “stress process” theory, this study also employs a developmental perspective. From a developmental psychopathology point of view, investigations of life paths require a focus on patterns of functioning across multiple interrelated domains (e.g., academic, mental health, family), and on continuity and change in patterns of adjustment over time (Cicchetti, 1984; Sroufe & Rutter, 1984). Studies guided by this perspective have made more attempts to study both academic and mental health problems and their possible reciprocal relations. Numerous studies have contributed to understanding the linking mechanism of the two co-occurring problems (see review by Roeser & Eccles, 2000). Beyond that, the developmental perspective emphasizes the dynamics of adolescent life. To achieve a better understanding of the nature and course of academic and mental health problems, the interrelations between the two problems must be examined over time.

Finally, the idea of stratification as the outcome of different life paths is also explored in this study. Instead of viewing academic performance and well being as static outcomes measured at one point in time, schooling as a whole can be viewed as a stratification process through which individuals are channeled into different roles in society. The final outcome of schooling (such as college attendance) is not determined by one factor (such as GPA) at one time point (such as the 12th grade), but rather by multiple factors (academic performance, internalizing and externalizing difficulties) that influence each other throughout the course of high school education. It is the entire process that gradually moves individuals along pathways towards success or failure. To further understand this idea and provide empirical evidence for its validity, this study examines all key dimensions of high school life such as academic performance, psychological/behavioral characteristics, as well as certain social experiences. Special attention is directed to the deleterious effect of the accumulation of two problems that reinforce each other. In this study, a developmental perspective is also particularly helpful in examining the mechanisms through which SES affects adolescents' educational attainment.

Major Concepts and Definitions

Major concepts used in various chapters throughout this dissertation are listed and defined in this section for clarity. These concepts will be further discussed in the theoretical background and measurement sections of each of the three main chapters.

Mental Health. As defined by Mechanic (1999), "Mental illness is a form of deviant behavior. It arises when the individual's thought processes, feelings, or behaviors deviate

from usual expectations or experience and the person affected or others in the community define it as a problem that requires intervention." The term mental health is typically used to indicate the absence of mental illness. Given the gendered risks in mental health problems, it has become increasingly common for studies of mental health to include both internalizing and externalizing problems to better assess stress reactions for both males and females (Aneshensel, Ruitter, And Lachenbruch 1991). The terms “mental health” and “well being” will be used throughout this proposal to encompass the absence of both psychological and behavioral problems.

Internalizing and externalizing problems. There has not been a clear definition for internalizing versus externalizing although they are widely used concepts in sociology and epidemiology. These phrases are used (without definition) by sociologists of mental health very loosely to refer to distress turned inward vs. outward, or manifested with internal symptoms or outward, external behaviors. For example Achenbach in his child behavior checklist study (1991) examination of two broad groupings of syndromes: internalizing problems, which combines the social withdrawal, somatic complaints, and anxiety/depression scales; and externalizing problems, which combines the delinquent behavior and aggressive behavior scales. But in general, the terms arose as characterizations of disorders more prevalent in women (anxiety, depression, phobias, etc.) and in men (aggressive behavior, alcohol and drug abuse, antisocial personality). There are various types of disorders in both internalizing and externalizing categories, although they can have different predictors. For example, anxiety and depression, both being internalizing problems, are influenced by different factors. This study chose the most common and important problems (depression and delinquency) in each category to

represent each of the two paths adolescents may take in reaction to stressors. Throughout the text of this dissertation, internalizing and externalizing problems refer to depression and delinquency (respectively) only.

Depression. Depression is commonly understood as frequent or persistent feelings of sadness and lack of interest and pleasure in life. Broadly, the term depression covers a spectrum of mood disorders that can range from being mild and transitory to a persistent state of incapacitation. One end of the spectrum can be difficult to distinguish from normal reactions and at the other end there is an overlap with severe psychotic disorders such as bipolar disorder. Based on different levels of severity, three approaches to the assessment and classification of adolescent psychopathology have been reflected in the literature on adolescent depression: (a) depressed mood, (b) depressive syndromes, and (c) clinical depression (Peterson et al. 1993). This study focuses on depressed mood, a less intense but relatively common phenomenon among adolescents. Research on depressed mood has been concerned with symptoms of sadness, unhappiness, or blue feelings for an unspecified period of time (Petersen et al. 1993). In the paper, unless otherwise specified, depression refers to depressed mood.

Delinquency. Delinquency is commonly understood as deviant or rule-breaking behaviors performed by individuals who have not reached adulthood, typically individuals 18 or younger. Delinquent behaviors are externalized manifestations of emotional distress. In the existing literature, delinquent behaviors are often categorized into serious delinquency and violent delinquency (such as Guo et al. 2008). These two categories of deviant behaviors differ in their severity, which is assumed to reflect the intensity of the underlying emotions.

Stress. Stress refers to the condition that results when person-environment transactions lead the individual to perceive a discrepancy between the demands of a situation and the resources of the person's biological, psychological or social systems (Lazarus, 1993). In other words, the discrepancy is the *stressor,* while stress or distress, an unpleasant subjective state (Mirowsky and Ross, 2003), is the emotional reaction to such discrepancy. Stress from stressors such as academic difficulties may take the form of anxiety, depression, or behavioral problems when not resolved through coping or adaptation.

Academic performance/academic problems. Academic performance is a student's achievement following specific academic programs. An objective evaluation is usually indicated by yearly GPA; low academic performance is a stressor.

Parental involvement. Parental involvement is on component of a positive parenting style which includes parental involvement, warmth, low hostility, and positive child management practices (such as good communication and encouragement). In this study, parental involvement is defined as the parents' participation in adolescents' life beyond providing basic survival needs. Participation is intentional, reflected in attentions the parents give to adolescents, in addition to the basic food, clothes, shelter, and transportation provided.

Coping resources. The concept of coping resources was summarized by Thoits (1995) as "social and personal characteristics upon which people may draw when dealing with stressors (Pearlin and Schooler, 1978)." Available personal coping resources such as self-esteem and mastery can greatly alter the outcome of stress exposure.

Self-esteem. Self-esteem reflects a person's overall appraisal of his/her own worth. In terms of the definition of self-esteem, there are debates about self-esteem having one or

two dimensions. In the mid 1960s Morris Rosenberg and social-learning theorists defined self-esteem in terms of a stable sense of personal worth or worthiness, (see Rosenberg self esteem scale 1965). This became the most frequently used definition in research, but involves problems of boundary-definition, making self-esteem indistinguishable from such things as narcissism or simple bragging. Branden (1969) later defined self-esteem as "...the experience of being competent to cope with the basic challenges of life and being worthy of happiness". This two-factor approach, as some have also called it, provides a more balanced definition that goes beyond defining self-esteem primarily in terms of competence or worth alone.

Mastery. "Mastery, as defined by Pearlin and Schooler (1978, p.5), concerns the extent to which one regards one's life chances as being under one's own control. The opposite of mastery is fatalism (Wheaton, 1983), which is a tendency to believe in the efficacy of environmental rather than personal forces as the causes of life outcomes. Mastery can also be referred to as internal locus of control (Rotter, 1966; Lefcourt, 1976)."

College aspirations. Generally, aspiration is a strong desire to achieve something high or great. College aspirations can also reflect the respondents' own expectations for future education.

Conclusion

This chapter introduces the three related objectives of this dissertation: (1) exploration of the relation between academic performance and mental health over the high school years; (2) examination of whether mastery and self-esteem moderate the relation between academic difficulties and mental health problems; and (3) investigation of how academic

performance and mental health in high school together affect college attendance. This chapter also discusses the theoretical perspectives, major concepts and definitions that are used throughout dissertation. Each of the following chapters will tackle one of the objectives described above. Different methodological approaches will be adapted for the particular needs of each chapter. The last chapter provides a summary of the dissertation's findings and limitations.

CHAPTER TWO

Academic Difficulties and Mental Health Problems over Time: Reciprocal Causation, Gender Differences, and Parenting

Introduction

Many adolescents attending schools in the United States today have significant academic difficulties, emotional/behavioral difficulties, or most likely both (Dryfoos, 1994; Knitzer, Steinberg, & Reisch, 1991; Weist, 1997). A reciprocal relationship between academic and mental health problems has been attributed by previous literature to the co-occurrence of the two (Eccles, Wigfield, & Schiefele, 1998; Kendall & Dobson, 1993; Weiner, 1986). However, with a few exceptions, most of these studies are cross-sectional. Without a developmental view, these studies are missing a very important part of the story, especially considering adolescence is a stage of constant change. Furthermore, based on the empirical evidence to be discussed below, across the adolescent years girls seem to be at increasing risk for internalizing problems (such as depressive symptoms; Angold & Rutter, 1992) and boys for externalizing problems (such as behavioral misconduct; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Zahn-Waxler, 1993). However, such gender differences in mental health problems have

not been thoroughly examined in relation to academic performance. Finally, not all adolescent boys and girls experience increases in developmental problems during adolescence. Although studies have shown that social influences such as good parenting practices (such as warmth, low hostility, and positive child management) protect against the development of both academic and mental health problems (Cicchetti & Toth, 1998; Ge, Best, Conger, & Simons, 1996; Loeber & Stouthamer-Loeber, 1998; Patterson, Reid, & Dishion, 1992), it is not clear how these operate differently for boys and girls. Gender differences in the prevalence of internalizing and externalizing problems suggest that unique predictors of each may also be important (Allen, Leadbeater, & Aber, 1994).

In this study, I use latent curve models (LCM) and the high school sample of the Add Health data to bridge the gaps. High school is an important stage of schooling given its diverse outcomes; some students drop out while many others go on to college and a path to greater success. Not surprisingly, the highest levels of mental health problems during adolescence have been found in the high school years (age 16-18) (Meadows, Brown, and Elder 2006). To further understand this key stage of education, my first goal is to expand our knowledge on the relationship between academic performance and mental health problems from cross-sectional to longitudinal effects.

Trajectories of academic performance will be created with longitudinal mental health measures as time varying predictors. This will allow me to capture the dynamics of the relationships between academic performance and mental health status over time and illustrate how the two problems fuel each other and evolve together. The second goal of

this study is to determine the extent to which these developmental trajectories of maladjustment vary by gender and test whether the gender differences in internalizing and externalizing problems found in previous studies also hold in reaction to distress from academic difficulties. Finally, the protective influence of positive parenting practices is examined separately by gender to determine whether parenting behaviors affect boys and girls differently in inhibiting growth rates of academic performance and mental health problems.

Background

Academic Problems Lead to Distress

Academic difficulties and emotional problems are likely reciprocally related. In one direction, academic difficulties are a source of stress and can lead to mental health problems. Stress refers to the condition that results when person-environment transactions lead the individual to perceive a discrepancy between the demands of a situation and the resources of the person's biological, psychological or social systems (Lazarus, 1993). In other words, the discrepancy is the stressor, while stress or distress is the emotional reaction to such discrepancy. Stress from stressors such as academic difficulties may include anxiety or depression when not resolved through coping or adaptation. Scholars theorize that certain cognitive processes translate academic problems into subsequent emotional distress. For example, as children cognitively appraise their academic difficulties, specific kinds of attributions for difficulty can lead directly to

either internalizing emotions or externalizing behaviors (Ames & Archer, 1988; Weiner, 1994). Children who attribute poor academic performance to personal incompetence generate feelings of shame, self-doubt, and low esteem (e.g., internalizing distress, see Dweck & Wortman, 1982). Achievement-related behavioral characteristics of such children include avoidance of academic challenges, failure to persist on difficult tasks, and withdrawal from classroom activities.

Alternatively, children who attribute academic problems to the influence of a hostile environment or unsupportive teachers and peers generate feelings of anger, academic alienation, and hostility toward others (see Connell & Wellborn, 1991; Roeser, Eccles, & Strobel, 1998; Weiner, 1994). Such children show a great deal of time "off-task" in learning settings, have poor peer relations, and are disruptive in the classroom (Dishion, French, and Patterson, 1995; Hinshaw, 1992). However, these studies only focus on either internalizing or externalizing problems. They failed to account for the shared underlying psychological process that they are both reactions to stressors and to examine their differences in psychopathology. Existing studies also tend to concentrate on childhood and early adolescence when mental health problems only start to development. Given the significance of high school as a stage of education, our knowledge of adolescent academic performance and mental health problems for high school students is rather limited. In addition, it remains unclear whether the relationship between academic and mental health problems changes over this period. It is possible as academic difficulties persist over the years of schooling, adolescents will accept a

lowered self-image and therefore experience reduced the distress from poor academic performance.

Given the evidence provided by previous studies on both children and adolescents, I hypothesize that academic difficulties continuously affect the mental wellbeing of students throughout high school. However, some negative effects of academic difficulties such as psychological symptoms will decrease over time, while other effects such as behavioral problems will continue to increase as alienation deepens.

Distress Leads to Academic Problems

Emotion not only is an outcome of cognitive processes, but also shapes them (Lazarus, 1991). In a second direction, emotional distress influences cognitive processes, which in turn can lead to subsequent academic problems. Thus, children who experience predominantly negative emotions sometimes show mood-congruent biases of memory and attention (e.g., Gotlib & MacLeod, 1997) that can affect academic functioning. Negative, mood-induced biases can divert the investment of psychological resources into self-protective goals and coping efforts rather than into academic mastery goals and learning strategies (Boekaerts, 1993), therefore precipitating subsequent academic problems. Negative mood can also influence academic functioning through the biasing effect of mood on attention. Children experiencing high levels of either internalized or externalized distress in academic settings may discount positive experiences (e.g., moments of academic success or support by others), and focus instead on

mood-consistent experiences (e.g., difficulties with learning and unsupportive others), thereby maintaining the original negative emotional state (Segal & Cloitre, 1993).

Children who report frequent feelings of internalized distress show diminished academic functioning in terms of achievement-related behaviors. Symptoms of depression and test anxiety are believed to lead to lower teacher-rated grades and standardized test scores, challenge avoidance and lack of persistence in the face of academic difficulties, and a lack of classroom participation among both children and adolescents (Blechman, McEnroe, Carella, & Audette, 1986; Dweck & Wortman, 1982; Kellam, Rebok, Mayer, lalongo, and Kalodner, 1994; Kovacs, 1992; Nolen-Hoeksema, Girgus, & Seligman, 1986; Hill & Wigfield, 1984; Wigfield & Eccles, 1989).

Children with externalized distress in the form of conduct problems also show poorer academic functioning in school. Externalizing difficulties in children are associated with poorer teacher-rated grades and standardized test scores, more time off-task in the classroom, and more behavioral problems within and outside class at school (Astor, 1998; Barkley, 1998; Dishion, French, & Patterson, 1995; Hinshaw, 1992; Ol1endick, Weist, Borden, and Greene, 1992; Parker and Asher, 1987; Roeser, Eccles, and Strobel, 1998).

Despite the abundance of research concerning mental health problems associated with academic difficulties, longitudinal studies on this subject are scarce. There are exceptions such as work by Kellam and colleagues (1991, 1998), in which they investigated the causal effects of improving achievement on aggressive behavior and

depressive symptoms and of improving aggressive behavior and depressive symptoms on achievement through preventive interventions during the first grade. They found aggressive behavior and depressive symptoms led to poor achievement in both girls and boys, whereas poor achievement led to depressive symptoms in girls but not boys and lead to aggressive behaviors among boys. Overall, however, it is unclear how or whether the relationship between academic and mental health problems persists over time, especially during mid-adolescence. The literature has not provided evidence on whether or not the deleterious effect of mental health problems on academic functioning is likely to increase or decrease over time.

Therefore, the second hypothesis I will be testing is that both internalizing and externalizing problems can lead to a steady increase in academic difficulties over the years. When testing this hypothesis, it is of particular interest of this study to identify possible changes in this relationship through the high school years.

Gendered Patterns

However, studies have shown that males and females do not respond to stressors in the same ways (Aneshensel et al. 1991; Hagan and Foster 2003). Not only do women react to stressors more strongly than men (e.g.: Aneshensel, Rutter, and Lachenbruch 1991; Thoits, 1994), it has been widely accepted that the influence of stress experiences on the type of mental health problems is largely gender specific. As shown in the literature above, adolescent mental health problems have been frequently dichotomized

into two empirically established syndromes reflecting internalizing disturbances (including depression, anxiety, withdrawal, and eating disorders) and externalizing disturbances (including aggression, oppositional disorders, delinquency, and school problems; Achenbach, 1991). Empirical evidence indicates that during adolescence, a stressful stage of the life course (Angold & Costello,1995; Nottelmann & Jensen, 1995), internalizing problems such as depression and anxiety increase for girls but not for boys (Ge, Conger, Lorenz, Shanahan, & Elder, 1995; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Lewinsohn, Roberts, Seeley, Rohde, Gotlib, Hops, 1994). Boys, on the other hand, seem especially vulnerable to developing externalizing problems like delinquency and drug use (Gottfredson & Hirschi, 1990; Patterson, Reid, & Dishion, 1992). Findings such as these indicate that research on adolescent developmental problems needs to consider both the gender of the adolescent and the specific type of maladjustment. However, academic difficulties have not been particularly investigated as the primary sources of mental health problems where these gender differences were found.

Given the above, I hypothesize that internalizing and externalizing problems in relation to gender found in previous studies also hold in reaction to distress from academic difficulties.

Protective Factors

Finally, although emotional distress and academic problems often co-occur among

what is likely a small group (e.g., 12% of school-aged children), there is evidence that they are a socially significant minority of school-age children (see review by Roeser and Eccles, 2000). It is of particular interest to scholars and educators that certain social influences in their lives protect against such maladjustment. Studies find that parental involvement, warmth, low hostility, and positive child management practices (such as good communication and encouragement) as exhibited by parents are related to lower rates of internalizing and externalizing problems during adolescence (Barnes, Farrell, & Cairns, 1986; Chassin, Pillow, Curran, Molina, & Barrera, 1993; Conger, Rueter, & Conger, 1994; Coombs & Landsverk, 1988). Children with continuous exposure to unsupportive, coercive, and hostile parenting in childhood are expected to adopt this aggressive and uncaring style of interacting with others (Patterson, Reid, et al., 1992; Scaramelia, Conger, Spoth, & Simons, 1998; Snyder, Dishion, & Patterson, 1986; Patterson, Crosby, & Vuchinich, 1992; Simons, Wu, Conger, & Lorenz, 1994) and are likely to experience feelings of anxiety and distress (Burbach & Borduin, 1986; Downey & Coyne, 1990; DuBois, Felner, Brand, Adan, & Evans, 1992; Ge, Best, Conger, & Simons, 1996; Robertson & Simons, 1989).

Given the above, I hypothesize that positive parenting styles will reduce distress and mental health problems both in the presence and absence of academic difficulties, while unsupportive parenting can exacerbate the impact of stressors on mental health.

Data and Methods

Data

Data from the National Longitudinal Study of Adolescent Health (Add Health) will be used. Add Health is a nationally representative, school-based sample of 20,745 adolescents in grades 7-12 surveyed during the 1994–1995 academic year. The sampling frame consisted of all high schools in the United States. A total of 80 high schools were selected with probabilities proportional to size and a sample of 52 feeder middle schools was attached to the sample of high schools. The response rate for the 132 participating schools was 78.9%. Of the over 90,000 students who completed the in-school survey in 1994 a baseline sample of 20,745 adolescents was selected for further data collection. The adolescents were interviewed three times during a 7-year period in 1994–1995, 1995–1996, and 2001–2002. The overall sample is representative of United States schools with respect to region of the country, urbanicity, school type (e.g., public, parochial, private non-religious, military, etc.), and school size. Further details regarding the sample are available at http://www.cpc.unc.edu/projects/adhealth/. Respondents who were not enrolled in high school during wave I or II interviews are excluded from this study. In addition, due to the small sample size of Asians and Native Americans and the relatively heterogeneous backgrounds of Hispanic students, only non-Hispanic Whites and non-Hispanic Blacks are included in the sample for this study. The total sample size for this paper is 9249.

For the purpose of data analysis in this chapter, only the measures of academic

performance come from wave III, all other variables come from waves I and II. The second wave of data collection in Add Health suffered large amount of attrition (about 28.7%) due to change of the sample and non-response. In order to detect possible patterns of attrition, dummy variables for attrition from wave I to wave II (0, 1) and wave III (0, 1) were created and regressed on variables from wave I such as gender, grade, race, parental involvement, and mental health problems using logistic regression. Attrition patterns for wave II and III are the same: respondents with more violent delinquency are more likely to drop out of the survey in either wave II or III, so do Black and male respondents. However, these attrition patterns will only make my findings more conservative. In addition, it is important to note that the bulk of the wave I and II interviews were conducted in early summer, right around the end of the school year. Therefore, the psychological/behavioral measures reflected the well being of the respondents right before or after their final exam times.

Measures

Academic Performance. The transcript data newly available in Add Health wave III will be used to measure students' academic performance in high school. Four GPA variables were constructed corresponding to means for each of the four high school years in courses across all subjects taken, including electives. These variables capture students' academic performance for each year of high school experience. The majority of students in this sample took courses on a semester basis, such that schools recorded two separate

entries for a year-long course on the transcript, each designated with a grade. The GPA variables are calculated as the average grade across semester-length courses in a given year (for the yearly indicators)[2]. Fs are coded as 0, Ds are coded as 1, Cs are coded as 2, Bs are coded as 3, and As are coded as 4. Grades with +/- signs (such as B+ or B-) were treated the same as without (such as B). When students received a P for pass, a NG for not graded, a W for withdrew, a WF for withdrew failing, a WP for withdrew passing, or an I for incomplete, these courses were not included in the calculation of GPA. Students who did not take a course assigned a grade of A to F in a given year, but who were in school that year, have a missing value on the corresponding GPA variable.

These measures provide yearly indicators of students' academic performance in the core curricular subjects of all subjects taken. In contrast to self-reported data, these are official indicators of performance as recorded on the students' high school transcripts. This detailed and accurate information on respondents' academic record during high school gives me the opportunity to model the trajectories of academic performance by school grade (9^{th}-12^{th}).

Psychological/Behavioral Problems. Externalizing problems, or delinquency[3], is

[2] Less than 1% of all courses taken by the entire sample of students occurred on a trimester basis. For the purposes of the construction of academic indicators, trimesters are considered equivalent to semesters. Students who took courses designated as year long (and with only one grade recorded) are treated as having received the same grade for two semester-length courses.

[3] Broadly, substance abuses such as alcohol consumption and drug use are also considered externalizing problems. However, many substance abuses are initiated by social reasons such as peer pressure. For the purpose of this study, I will focus on delinquency and violence only as those are the more likely to be responses to academic stressors for adolescents.

measured by a series of problem behaviors the respondents conducted during the past year. In this study, the self-reported items of the delinquency measure are considered various ways to express the common underlying emotion of distress. Therefore, these items are treated as effect indictors. In the existing literature, delinquent behaviors are often categorized into serious delinquency and violent delinquency (such as Guo et al. 2008). Serious delinquency and violent delinquency are measured separately, each by a summed score of a series of items. Serious delinquency (Appendix A) is measured by a summed score of items that describe various mildly delinquent behaviors during the past year. The response categories of these items are never, once or twice, 3 or 4 times, and 5 or more times and are coded as 0, 1, 2, and 3, respectively. Violent delinquency (Appendix B) is measured by a summed scale capturing the respondent's violently aggressive behaviors towards others during the past year. The response categories of these items are never, once, and more than once and coded as 0, 1, and 2, respectively. These two categories of deviant behaviors differ in their severity, which is assumed to reflect the intensity of the underlying emotions.

However, there are no existing theories suggesting multiple dimensions in the measurement of delinquency. Reflected in data analysis, exploratory factor analysis showed very weak patterns with low factor loadings, indicating low correlations among the items. This is expected given that the items create an index of various delinquent behaviors rather than a scale of equivalent items. Also, these "factors" do not correspond to serious and violent delinquency. As shown in the current results, serious and violent

delinquency showed very similar effects in the data analysis when examined separately. The serious delinquency scale and violent delinquency scale are thun standardized and summed to form the measurement of delinquency finally used for the analysis.

Internalizing problems, or depression, is typically measured through adolescents' self-reported emotions, either through measures specifically concerned with mood or though items included in checklists of depressive symptoms. The Center for Epidemiological Studies Depression Scale (CES-D) is one of these key measurement instruments. Developed in 1976 for use in the general adult population (aged 18 or older), the standard CES-D is a 20-item self-report scale that measures depression (Radloff 1977, 1991). In this chapter, the measurement of depression consists of a 5-item scale, all of which are effect indicators representing a single dimension (Perreir et al. 2005). One of the 5 items is "life is not worth living," which was added to the original CES-D to suit adolescents. These 5 items are listed in Appendix C. Compared to a full 20-item scale, a 5-item scale has the advantage of being less contaminated by indicators of other concepts and also being more comparable across racial/ethnic groups (Perreir et al. 2005). Individual items are coded on a four-point scale, from never or rarely (0) to most or all of the time (3) and refer to feelings the respondent had in the past week. One positively worded item is reverse coded. Theoretically, a confirmatory factor analysis, which is unbiased and free of measurement error, would be the best to measure depression. However, considering the analytical model is already very complex, it would be very difficult to measure depression using a CFA in this chapter. As the 5-item measure is

single-dimensional and all the indicators are effects, its internal reliability can be measured by Cronbach's alpha. The alphas are listed by gender and wave in Appendix H and show very good internal reliability. Therefore, this paper uses a summed-score[4] to measure depression. Given that depression is a dependent variable in the model, a summed-score is more acceptable (Perreir et al. 2005).

Parenting. Parenting is measured by a summed scale of items reported by the respondents regarding parental involvement (Appendix D). The information regarding the parental involvement scale is collected based on a yes/no checklist. Parenting was measured in both wave I and II. However, considering that parenting of adolescents is a relatively stable behavior of mature adults as well as the complexity of the models in the current study, the average of parental involvement across waves I and II is taken to represent the overall measure and used as a time invariant covariate in the models. Respondents who have only one wave of measurement are treated as having reported the same value for waves I and II. Given the items listed reflect choice or conscious intentions, I consider these as effect indicators of parents' voluntary involvement in their children's development. The internal reliabilities of the scales described above are estimated by alpha (Cronbach, 1951). The results for boys and girls by wave are shown in Appendix F. Exploratory factor analysis showed no evidence for multiple factors in the parent

[4] Several respondents did not answer all 5 questions in this scale. Their summed scores are divided by the number of questions they answered and then multiplied by 5 to make them more comparable to those who answered all questions.

involvement scale used in this study.

Due to the complex relationships examined in this study, as shown in Figures 2.1 and 2.2 below, and the difficulties for complex models to converge, no other variables will be included in the data analysis other than the variables described above plus gender and race (Black and White only). Overall, this study includes the most important sociodemographic and parenting variables related to adolescent mental health and academic problems. However, it is impossible to include all variables associated with these problems. Certain intervening variables such as peer influence, when left out, could potentially bias the estimates. This will be further discussed in the discussion section.

Methods

This study employs latent trajectory modeling (LCM) to estimate the trajectory of academic performance and capture the relationships between academic performance and mental health problems over time, examine gender differences, and examine the effects of parenting as a buffer or exacerbater of mental health. I will discuss the general models and estimation method, followed by a description of the analytical strategy.

LCM is a flexible approach to modeling developmental trajectories, in which the observed repeated measures are considered indicators of an unobserved growth trajectory (Willet and Sayer 1994; Curran 2000). As a type of two-level growth model, the level-1 model captures the within-person trajectories over time and the level-2 model captures the between-person variations. Time-varying and time-invariant covariates can be added

to the model to test how other variables are related to the developmental trajectories of interest. In the preliminary analysis, I found the respondents' academic performance exhibited a U-shaped trajectory, which can be modeled as a quadratic function of time. The following equations describe the general form of a quadratic LCM with both time-varying and time-invariant covariates:

Level 1 model: $y_{ig} = \alpha_i + \beta_{1i}\lambda_g + \beta_{2i}\lambda_g^2 + \gamma_{1g}x_{1ig} + \varepsilon_{ig}$

Level 2 model: $\alpha_i = \mu_\alpha + \gamma_{2\alpha i}x_{2i} + \zeta_{\alpha i}$

$\beta_{1i} = \mu_{\beta 1} + \gamma_{2\beta 1i}x_{2i} + \zeta_{\beta 1i}$

$\beta_{2i} = \mu_{\beta 2} + \gamma_{2\beta 2i}x_{2i} + \zeta_{\beta 2i}$

Combined model: $y_{ig} = (\mu_\alpha + \gamma_{\alpha i}x_{2i} + \lambda_g\mu_{\beta 1} + \lambda_g\gamma_{2\beta 1i}x_{2i} + \lambda_g^2\mu_{\beta 2} + \lambda_g^2\gamma_{2\beta 2i}x_{2i} + \gamma_{1g}x_{1ig}) + (\zeta_{\alpha i} + \lambda_g\zeta_{\beta 1i} + \lambda_g^2\zeta_{\beta 2i} + \varepsilon_{ig})$

Overall, subscript i represents each person and subscript g represents grade. In the level 1 model, y_{ig} represents the GPA measure for person i at grade g; α_i, β_{1i}, and β_{2i} represents the intercept, the linear component of the slope, and the quadratic component of the slope of the growth trajectory respectively; λ_g andλ_g^2 represent the value of loading and squared value of loading at grade g, and ε_{ig} is the residual; x_{1ig} represents the measure of covariate x_1 for person i at grade g, and γ_{1g} is the fixed regression parameter relating y to x_1 at grade g. In the level two model, μ_α, $\mu_{\beta 1}$, and $\mu_{\beta 2}$ represent the mean (or fixed) intercept, the mean linear component of the slope, and the mean quadratic component of the slope of the trajectory; $\zeta_{\alpha i}$, $\zeta_{\beta 1i}$, and $\zeta_{\beta 2i}$ represent the residual (or random component) of the intercept term, the linear component of the slope term, and the quadratic component of

the slope term; the three γ_2s represent the fixed effect prediction of the random intercepts and slopes as a function of the time-invariant predictor x_2. The combined model clarifies that the observed repeated measures of y can be expressed as an additive combination of a fixed component of growth ($\mu_\alpha + \gamma_{\alpha i}x_{2i} + \lambda_g\mu_{\beta 1} + \lambda_g\gamma_{2\beta 1i}x_{2i} + \lambda_g^2\mu_{\beta 2} + \lambda_g^2\gamma_{2\beta 2i}x_{2i} + \gamma_{1g}x_{1ig}$) and a random component of growth ($\zeta_{\alpha i} + \lambda_g\zeta_{\beta 1i} + \lambda_g^2\zeta_{\beta 2i} + \varepsilon_{ig}$).

As there is a large amount of missing data due to rearranging the data from wave based to grade based order (explained below), the estimation of such a complex LCM becomes challenging. To cope with the missing data, the LCMs will be estimated with Direct Maximum Likelihood (DML). In this approach, the likelihood function is computed for each case using only those variables that are available for that case. The total likelihood is the sum of the values of the likelihood for each case. Therefore the DML method makes use of all available information in the data with no need to impute values. One of the most important properties of DML is it can maintain the asymptotic properties of ML estimators under the more relaxed assumption of missing at random (Bollen and Curran, 2006).

Aggression, delinquency, and depression are measured at both wave I and II of Add Health. However, Add Health employs a multi-cohort design that spans from 7^{th}-12^{th} grade at wave I. In the analysis, these three variables will be rearranged so they will correspond to school grade (9^{th}-12th)[5] as shown in Equation 2.2, instead of wave (I and II) as shown in Equation 2.1. The change of the temporal order of these three variables

[5] Those who were not interviewed in wave I and II during high school are excluded from this study.

will make them correspond exactly to the time metric used for the trajectories of high school GPA, which is 9th-12th grade. In the following equations, the first subscript is the respondent number, the second represents the wave (Equation 2.1) or the grade level (Equation 2.2).

$$\begin{pmatrix} dep_{1,1} & dep_{1,2} \\ dep_{2,1} & dep_{2,2} \\ dep_{3,1} & dep_{3,2} \\ \dots & \dots \\ dep_{N,1} & dep_{N,2} \end{pmatrix} \tag{2.1}$$

$$\begin{pmatrix} dep_{1,9} & dep_{1,10} & & \\ & dep_{2,10} & dep_{2,11} & \\ & & dep_{3,11} & dep_{3,12} \\ \dots & \dots & \dots & \dots \\ & & dep_{N,11} & dep_{N,12} \end{pmatrix} \tag{2.2}$$

Analytical Strategy. I will begin by modeling an unconditional LCM in which there are no predictors in order to identify the optimal functional form of the trajectory for academic performance. As part of the exploratory data analysis, a simple autoregressive model and an autoregressive LCM will also be tested to investigate the nature of the association among the repeated measures of academic performance to identify the best approach for modeling GPA. After developing an accurate model of the unconditional trajectory, I will extend the unconditional LCM to include time-invariant variables such

as parental involvement, gender, and race to predict the intercept, slope, and quadratic of the individual trajectories. Interactions among these predictors will be tested.

Next I will examine the relationship between adolescents' mental health and academic performance. These analyses will be carried out separately for internalizing and externalizing problems. Generally, two possible modeling approaches will be tested, each representing a different theoretical proposition. In the first approach, mental health repeated measures are added to the model as time-varying covariates. However, these two mental health problems will likely require different approaches as time-varying covariates due to reasons described in detail in the following paragraph. Therefore, in the first step, I will incorporate the repeated mental health measures as time-varying covariates into the unconditional LCM and identify the best fitting models to relate repeated mental health measures and GPA, for internalizing problems and then for externalizing problems.

According to the literature, academic performance can affect or be affected by the respondent's mental health (Eccles, Wigfield, & Schiefele, 1998). Academic performance, measured by yearly GPA, is the outcome of respondents' learning effectiveness over the course of a school year. Given the nature of internalizing and externalizing problems and their measurement (depression is week-based and assessed near the end of the school year and delinquency assesses the number of problem behaviors over the past year), it is likely that internalizing problems are connected to academic performance differently from externalizing problems as illustrated in Figures 2.1 and 2.2. In one direction, poor

GPA is more likely to affect the respondent's mood around the end of the school year, leading to internalizing problems. GPA is also more likely to influence the respondents' behavior in the following year, resulting in externalizing problems. In the other direction, the respondent's depressed mood around the end of the school year is unlikely to affect their academic performance in that year[6]. But how they feel about their grades may well change their learning behavior (e.g., more or less motivated) and therefore GPA in the following school year. On the other hand, delinquent behaviors, which occurred throughout the school year, are very likely to affect the respondents' learning and therefore their GPA for that year. The diagrams of the modeling approaches for internalizing and externalizing problems are shown in Figures 2.1 and 2.2 respectively. Given that the respondents' mental health problems may partially contribute to their mental health in the following year, autoregressive links between adjacent mental health measures will be tested. A longitudinal study of academic performance and mental health like this provides an opportunity to better our understanding of the reciprocal relationship between academic and mental health problems.

The second approach is multivariate LCM, in which mental health variables will also be modeled using LCM and the intercepts and slopes of the mental health trajectories and GPA trajectories will influence each other as illustrated in Figure 2.3. However, I have only one or two mental health measures for each respondent during high school,

[6] About a third of the respondents were interviewed prior to their final exams before the summer. It's possible that the respondents' depressive symptoms can affect their test performance. However, given the main stress during that time comes from the tests themselves, the depressive symptoms are more likely coming from the anticipated poor grades. I therefore argue that the most significant relationship between GPA and depression at that time is in the direction of GPA causing depressed mood, not the other way around.

making it very difficult to estimate trajectories. Analyses show that a linear trajectory for delinquency is acceptable. But for depression, there is a known curvilinear trajectory. Another problem is that, for respondents with two repeated measures, they were measured in two adjacent years. For non-adjacent grades, the mental health measure covariance coverage is zero. It was not possible to fit a curvilinear LTM to depression under the current configuration of the data[7]. Therefore, this study will only be able to test this approach with delinquency, which is known to generally decline during late adolescence.

Overall, the first approach (mental health as time-varying covariates) focuses on micro level processes on a yearly basis, which is in line with the back and forth reciprocal relationship suggested by the literature. While the second approach (Multivariate LCM) emphasizes a parallel process such that academic performance and mental health influence each other simultaneously. Theoretically, the first approach maybe more appropriate for events such as exams and test scores during the school year influencing depressed mood (measured "in the past week" at the end of the school year). However, the second approach maybe more appropriate for long lasting, persistent influences, such as delinquent behavior (measured for past 12 months) on academic performance. Nonetheless, these two approaches will both be discussed and tested if possible to better understand the relationship between academic and mental health problems.

[7] Adding depression measures from wave III could potentially help to estimate a curvilinear trajectory. However, wave III only have three of the five indictors of CES-D.

For the first approach, once the LCM with time-varying covariates are finalized, parental involvement, gender, race, and interactions of parenting with gender and with race are then introduced to the model. This will allow me to examine the effects of parental involvement and identify gender and racial differences in the prevalence of mental health problems in relation to academic performance. Examination of gender and race is particularly important given females' higher risk in internalizing problems and Blacks' higher prevalence of externalizing behaviors as indicated in the exploratory analysis. All covariates are centered[8] when they are introduced to the models so that the estimates of the GPA trajectories will remain the same as the unconditional LCM. The important gender differences that this paper is concerned with are all tested with interactions. Given that multiple group analysis (MGA) requires more pages of added results, I opt for interactions, which has a shorter presentation. Also, gender differences are a major focus in Chapter 3, where they are discussed in much greater detail.

After the analyses for the first approach are completed, analyses of delinquency and GPA trajectories with the second approach will be conducted. Multivariate latent curve analysis will be used. The results will be compared with the first approach.

Results

Descriptive Statistics

[8] Gender and race are dummy variables. Their effects are calculated based on the distance between two possible values (0, 1) being 1. Centering does not change that. Therefore the estimation of their effects remains the same mathematically.

Table 1 presents descriptive statistics for all variables involved in the data analysis. GPA, depression, delinquency (listed as the original measures of serious delinquency and violent delinquency) are time-varying variables and descriptive statistics of these repeated measures are presented for each of the 9th through 12th grade. According to Table 2.1, GPA is shown to decrease in the first two years of high school and increase in the last two years. As a mental health measure, depression is at the highest in the middle years and lower in the first and last years, while delinquency generally declines throughout the high school years. Also, because the mental health measures were rearranged from wave I and II data by grade, their sample sizes by grade are drastically reduced.

Latent curve models with time-invariant covariates

To investigate different possibilities, I conducted analysis using a latent curve model, a simple autoregressive model, and an autoregressive LCM to examine the repeated measures of GPA. The results of the latent curve model (not shown) indicate that a quadratic unconditional LCM of high school GPA best fits the data (CFI=0.996; TLI=0.976; RMSEA=0.077)[9] and represents a superior balance of accuracy and parsimony. This quadratic model fits the data well with highly significant growth factor means. Overall, the respondents' GPA follows a U-shaped trajectory (Intercept mean=2.606; Slope mean=-0.121; and Quadratic mean=0.048), decreasing in the first two years and increasing in the rest of high school. The results from LCM indicate that

[9] A free loading LCM for GPA was also tested but did not converge.

respondents' high school GPA is largely determined by an underlying growth process.

The results of the simple autoregressive (simplex) model, on the other hand, showed a very poor fit. Different from LCM, the autoregressive model assumes the yearly measures of GPA are the outcome of the respondents' GPA from the previous year, emphasizing strong inter-grade transmission among GPA measures. The poor fit of the simplex model and a relatively weak inter-grade correlation among yearly GPAs are likely caused by the structure of course-taking in high school, which involves diverse subjects and lacks a high level of continuity.

Fitting an autoregressive LCM, which combines autoregressive models and the quadratic LCM (identified as superior in the previous steps), to the data is not possible because the model is not identified due to the complexity of the model. However, the autoregressive links in the simple autoregressive models are very similar and constraining them to be equal did not significantly reduce model fit of the simple autoregressive model. Given this, I constrained the autoregressive links to be equal in the autoregressive LCM. The results are shown in Model 1 of Table 2.2. The model fit (CFI=1.000; TLI=1.000; RMSEA=0.000) is significantly improved over the LCM, indicating that the repeated measures of high school GPA are not only determined by an underlying growth process, but to some extent, also by GPA from the previous year (coef.=0.053).

Time-invariant covariates including parental involvement, gender, and race are introduced in Model 2 to evaluate the protective influences of parental behaviors and examine gender and racial differences. They are introduced to affect the random

intercepts and slopes governing the repeated measures of academic performance as well as the repeated measures of mental health outcomes themselves. As expected, parental involvement is positively associated with the intercept of the LCM. There is no significant correlation between parental involvement and the slope factors. Female respondents have higher starting points in the GPA trajectories than males. The results also show that Black students have lower overall GPA than Whites.

Model 3 of Table 2.2 examines the effects of interactions among time-invariant covariates on GPA trajectories and establishes a baseline model for examining the effects of these interactions on mental health problems in the following analyses. Exploratory analyses showed no significant interaction effects between gender and race. Therefore, only interactions between gender and parental involvement as well as interactions between race and parental involvement are included in model 3. The results show a significant interaction between parental involvement and race for the intercept, indicating that for black students, parental involvement does not improve respondents' GPA as much as for whites.

Latent curve models with time-varying covariates

Mental health was introduced to the LCM by adding repeated measures of internalizing or externalizing problems as time-varying covariates to the three models shown in Table 2.2. The results of LCM with depression are shown in Table 2.3 and the results for delinquency in Table 2.4.

Model 1 of Table 2.3 shows the results of LCM with depression scores in each grade as time-varying covariates. All parameter estimates are significant, except using depression to predict next year GPA. As expected, for each of the four repeated measures, poor GPA leads to a higher level of depressive symptoms. This effect is net of the respondents' depressive symptoms in the previous year (as controlled by the autoregressive links among depression), suggesting a strong relationship between GPA and end-of-year depression. However, this association seems to become smaller across grades, although this cannot be confirmed through statistical tests due to the limitations of the estimation methods; chi-square estimates cannot be used for model comparison. On the other hand, the respondents' depression does not significantly affect their GPA in the following year. This is most likely caused by the greater predictive power of the latent growth factors and GPA from the previous year. Sensitivity analysis of the same model without the autoregressive links for GPA (results not shown) show that the respondents' depression does significantly affect their GPA in the following year, suggesting a reciprocal relationship between depression and academic achievement over time. The effect of depression on GPA is relatively consistent across grades as the coefficients barely fluctuate.

In model 2, time-invariant covariates such as parental involvement, gender, and race were introduced. The results indicate that parental involvement protects respondents against depressive symptoms in all but the 12^{th} grade. The reason for this inconsistency is unclear. Female respondents have significantly higher levels of depressive symptoms

especially in the earlier years of high school than males, net of GPA of the corresponding year and depression in the previous year. However, this difference diminishes in the later years. The results showed no significant difference in depression between Blacks and Whites.

Model 3 tests the interactions between the time-invariant covariates to detect any variation in the way protective factors operate across gender and race. The results show some significant interactions. Specifically, females benefit slightly more from the protective influences of parental involvement against depression compared to males and Blacks benefit slightly less from the protective influences of parental involvement against depression compared to Whites. However, these differences are only significant for the 9^{th} grade.

Similar to internalizing problems, the relationship between externalizing problems and academic performance is examined in Table 2.4. Model 1 of Table 2.4 shows the results of LCM with delinquency as time-varying covariates. Different from models with depression, however, GPAs are specified as the outcome of delinquency in the corresponding year, while delinquency is affected by GPA and delinquency in the previous year. According to the results, delinquent behaviors over the course of a school year have significant negative effects on respondents' academic performance in that year. In the opposite direction, a low GPA is associated with higher levels of delinquency after controlling for the respondents' delinquency in the previous year. There is a modest increase in the coefficients for both directions across grades, suggesting a somewhat

intensifying relationship between academic performance and delinquency. In addition, sensitivity tests, in which delinquency was substituted by either serious delinquency or violent delinquency, were conducted to determine whether or not they are related to GPA in the same way. These two types of delinquent behaviors produced similar results, supporting the validity of combining the two types into one measure.

Model 2 shows the influences of parental involvement, gender, and race on GPA and mental health problems. The results show that parental involvement is protective of delinquency, but only for the 9th grade. The results also indicate that there are significant gender differences. Consistent with previous findings from cross-sectional studies, in all four years of high school, female respondents are much less likely to experience externalizing problems compared to males. There is no difference between Blacks and Whites in terms of delinquent behaviors, after controlling for GPA and delinquency in the previous year. The interactions between parenting and gender, as well as parenting and race are examined in Model 3. The most significant finding in this model is that females benefit more from the protective influences of involved parents than do males, but only in the 9th and 11th grade. Black respondents seem to benefit less from greater parental involvement in the 9th grade.

The results of multivariate LCM for delinquency are shown in Table 2.5. Overall, the model fits the data really well, possibly better than the LCM approach with delinquency scores as timing-varying covariates. The growth factors of the GPA trajectories correlate significantly with the growth factors of the delinquency trajectories,

indicating a strong relationship between the development of the two variables. However, possibly due to the complexity of the model and the large amount of missing values in the delinquency measure, attempting to fit additional models (such as multiple group analysis by gender to detect gender difference in the relations between GPA trajectories and delinquency trajectories, as well as specifying causal linkages between the growth factors) has resulted in non-positive definite variances/co-variances, a sign of an over-stressed model. Therefore, the analyses using my second approach are incomplete and the validity of my second approach is not fully evaluated in the current study.

Discussion

There is a growing concern in recent years about a co-occurrence of academic and mental health problems among adolescents. This co-occurrence is signified by a presumed reciprocal relationship between the two health problems that are reinforcing (Eccles, Wigfield, & Schiefele, 1998; Kendall & Dobson, 1993; Weiner, 1986). As a results, these adolescents are academically unprepared to enter the labor market when their education ends, and are also psychologically and behaviorally challenged to pursue a successful career.

This study used latent curve models (LCM) and the high school sample of the Add Health data to examine the development of academic performance and mental health problems longitudinally. Trajectories of academic performance were created with longitudinal mental health measures as time-varying predictors. Different ways of

connecting academic performance and mental health problems were explored to capture the complex relationships between these two problems over time. Specific LCMs were developed to account for time differences in the measurement of internalizing and externalizing problems. Time-invariant covariates were added to the model to examine how these developmental trajectories of academic and mental health problems vary by gender and race, as well as the protective influence of parental involvement in relations to these maladjustments.

Overall, the results from the data analysis support the majority of my hypotheses derived from the literature based primarily on cross-sectional studies. Significant correlations between repeated measures of academic performance and mental health time-varying covariates suggest a continuous effect of academic difficulties on mental well-being over time and vice versa. There is clear evidence that academic performance continuously contributes to internalizing and externalizing problems of students throughout high school, even after their prior mental health problems were controlled. Decrease in coefficients from the 9^{th} to 12^{th} grade suggests that the influence of academic performance on end-of-year depressive symptoms weakened over time. However, during the same period, academic problems seem to be leading to more delinquent behaviors in junior and senior years of high school, indicating the effect of academic performance on externalizing behaviors is somewhat cumulative. The increasing correlation between delinquency and academic problems suggest that an externalizing reaction to academic distress is a slippery slope. It is especially hazardous for adolescent development during

high school.

My second hypothesis is that both internalizing and externalizing problems can increasingly cause academic difficulties during high school. The results showed some support for this hypothesis; the effects of delinquency on GPA slightly increased but depression's impact on GPA was relatively constant over the high school years.

In line with gender differences in mental health problems found in previous research (Angold & Rutter, 1992; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Zahn-Waxler, 1993), this study found greater depressive symptoms among females and greater delinquency among males, supporting my hypothesis that gendered risks in internalizing and externalizing problems found in previous studies are present in academic settings. Contrary to some of the previous research, this study did not find significant Black and White differences in terms of mental health problems once their academic performance and previous mental health risks were controlled. In the case of delinquency, the reason for a lack of racial difference might be although Blacks have a higher rate of physical fighting, Whites are more likely to have serious delinquency. Additional sensitivity analyses were conducted to test gender differences in the relationships between GPA and depression and GPA and delinquency by re-running Model 1 of Tables 2.3 and 2.4 separately for boys and girls (results not shown). The results indicate a stronger correlation between academic difficulties and internalizing problems among female adolescents and a stronger association between academic difficulties with externalizing behaviors among males.

My last hypothesis concerns the positive influence of parenting in inhibiting an increase of mental health problems. The results showed that greater parental involvement not only directly protected adolescents from mental health problems, it also indirectly reduced mental health problems by improving respondents' academic performance, which led to less mental health problems. However, this protective influence is limited to depressive symptoms. Parental involvement did not show any direct effect on delinquency. This may be because delinquent behaviors can distance adolescents from their parents, making them less likely to receive parental support. In addition, there is some evidence that parental involvement is more protective for females in relations to depression and delinquency but less protective for Blacks on delinquency. However, these differences are only marginally significant at certain grades. Overall, the hypothesis is only partially supported.

This study contributes to the literature primarily in three ways. First, it brings to bear a dynamic, developmental perspective. Using longitudinal analysis, I have examined the relationship between academic problems and mental health over time. Adolescence is a stage of constant change. A developmental approach offers various benefits over traditional cross-sectional studies often found in the literature. The analytic approach of this study enabled me to bring academic and mental health problems together by investigating the developmental course of both types of problems.

Second, complex statistical techniques allow for better modeling of the data and more correspondence to potential scenarios. For example, when modeling repeated

measures of GPA, comparing the approach of underlying growth processes with autoregressive links revealed that academic performance for each school grade is the outcome of an underlying process rather than a random grade-to-grade relay, improving the understanding of academic performance in high school. Also, paying attention to timing in the measurement of mental health problems helps to capture the unique elements of internalizing and externalizing problems and to design models that match their relations to academic performance. Additionally, the temporal ordering reflected in this longitudinal study allows me to make a stronger case regarding the directionality of the association between academic performance and mental health problems. For example, when a poor yearly GPA predicts depression at the end of that school year, after controlling for depressed feelings of the previous year, it is a more valid interpretation of this association that academic performance is affecting depression than the reverse. Furthermore, examining both internalizing and externalizing problems in this study provides an opportunity to directly compare the two types of mental health problems in relation to academic performance. (The reciprocal relations are tested mainly in unidirectional, cross-sectional studies where the models estimate the strength of the association between the two problems. This tends to over-estimate the strength of the influence and has limited inference on directionality. There is no study examining both directions simultaneously.)

Third, this study improves our understanding of gender differences and the protective influences of parental involvement. Gender and parenting effects on mental

health problems have both frequently appeared in the literature, but longitudinal studies in academic settings are still needed. Adding to the previous findings that females are at higher risk for internalizing problems and males for externalizing problems, this study allows an examination of these mental health differences that are specifically related to academic problems over time. Given the consequences of academic and mental health problems, this study was also able to show that good parenting practices protect against the development of academic problems and depressive symptoms over time and how they operate differently for different gender and race groups.

The current study also has limitations. First, there are only up to two waves[10] of data collection during high school, which creates lots of missing data points once the data are rearranged from wave based to school grade based. This also potentially limits the flexibility of modeling. For example, fitting an LCM to repeated measures of mental health is not doable. This created major barriers to examining the second analytical approach using multivariate-LCM. Second, the data suffer from attrition, primarily in two ways. One is from wave I to wave II and III. Exploratory analyses were conducted to investigate patterns of attrition. However, the fact that Black and male respondents, as well as respondents with more violent delinquency are more likely to drop out of the survey in either wave II or III only led to more conservative findings. Moreover, students who do poorly in school are more likely to drop out of the study (less than 5%), producing missing values in their GPA measures. The direct maximum likelihood

[10] Some respondents only have one wave of interview conducted during high school.

estimator used in the data analysis can still calculate the GPA trajectories based on the GPAs the students have completed. Third, the academic performance trajectory was limited to high school years only. It maybe helpful to have students' test scores and mental health measures from middle school or even elementary school years for more extensive coverage in the progression of academic and mental health problems. It is possible that some developments have already begun in the earlier years. Last, although this study has included the most important sociodemographic and parenting variables related to adolescent mental health and academic problems, it is impossible to include all variables associated with these problems. Certain intervening variables, when left out, could potentially bias the estimates. The most notable variable omitted is peer influence on delinquency. Not controlling for peer influence could potentially inflate the estimate of parental influence on delinquency. However, this study did not include peer influence due to the problems of selection vs. causation (i.e., do delinquent youth select delinquent friends, or do delinquent friends encourage delinquent behavior). As such, it is difficult to assess how much peer influence has contributed to delinquency.

Despite these limitations, this study shows that academic difficulties significantly increase the risk of internalizing and externalizing problems during high school. However, the effect of academic problems on depression decreases while its effect on delinquency grows over time. On the other hand, mental health problems also continuously increase the risk of academic problems throughout high school. The effects of depression remain relatively constant while the effects of delinquency increase slightly. In addition, this

study shows that the gendered risks of internalizing and externalizing problems are present in academic settings. Greater parental involvement reduces mental health problems among adolescents and protects against depressive symptoms, but has very little direct effects on delinquency.

Table2. 1 Means, Standard Deviations and Range for Model Predictors (N=9078)

Variable	Grade	N	Mean/%	SD	Min	Max
GPA	9	9057	2.60	0.89	0	4
	10	8884	2.57	0.90	0	4
	11	8550	2.59	0.89	0	4
	12	8093	2.78	0.85	0	4
Depression	9	2751	10.34	7.33	0	48
	10	2997	10.90	7.50	0	56
	11	2959	11.00	7.61	0	50
	12	2570	10.55	7.18	0	43
Serious Delinquency	9	2746	3.06	4.03	0	30
	10	2994	3.04	3.80	0	31
	11	2953	2.93	3.60	0	28
	12	2566	2.65	3.43	0	33
Violent Delinquency	9	2745	0.87	1.45	0	12
	10	2995	0.81	1.46	0	12
	11	2953	0.74	1.36	0	11
	12	2566	0.67	1.30	0	12
Parental Involvement		8961	3.69	1.66	0	10
Gender		9125	53.9%			
Black		9125	26.2%			

Table 2.2 Parameter Estimates of Latent Curve Models of High-School GPA (N=9125)

	Model 1		Model 2		Model 3	
	Estimate	Est/SE	Estimate	Est/SE	Estimate	Est/SE
Trajectory Analysis of GPA	Mean		Mean		Mean	
Intercept	2.601**	279.347	2.601**	293.703	2.676**	97.900
Slope	-0.270**	-14.829	-0.273**	-12.682	-0.288**	-9.458
Quadratic	0.084**	17.738	0.085**	15.521	0.092**	10.557
	Coef.		Coef.		Coef.	
GPA10 on GPA9	0.053**	9.149	0.054**	7.514	0.054**	7.505
GPA11 on GPA10	0.053**	9.149	0.054**	7.514	0.054**	7.505
GPA12 on GPA11	0.053**	9.149	0.054**	7.514	0.054**	7.505
Time invariant predictors						
Parental						
Involvement->Intercept			0.078**	14.224	0.100**	11.556
Parental Involvement->Linear			-0.007	-1.425	-0.011	-1.487
Parental						
Involvement->Quadratic			0.000	0.093	0.002	0.925
Female->Intercept			0.243**	13.712	0.268**	5.962
Female->Linear			0.028	1.918	0.007	0.188
Female->Quadratic			0.001	0.144	0.013	1.045
Black->Intercept			-0.490**	-23.994	-0.257**	-5.023
Black->Linear			0.030	1.692	0.015	0.334
Black->Quadratic			-0.004	-0.667	0.000	0.014
Interactions						
Parental*Female->Intercept					-0.007	-0.632
Parental*Female->Linear					0.006	0.601
Parental*Female->Quadratic					-0.003	-1.084
Parental*Black->Intercept					-0.063**	-5.083
Parental*Black->Linear					0.004	0.389
Parental*Black->Quadratic					-0.001	-0.302
Fit Indices						
Chi-squred	0.014		2.758		4.132	
DF	1		3		5	
P-value	0.906		0.431		0.531	
CFI	1.000		1.000		1.000	
TLI	1.000		1.000		1.000	
RMSEA	0.000		0.003		0.000	

Note:

1. Coef. Stands for regression coefficient.
2. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
3. * $p<0.05$, ** $p<0.01$

4. – indicates a negative parameter estimate (e.g., a mean or a regression coefficient).

Table 2.3 Parameter Estimates of Latent Curve Models of GPA: Depression as Time-varying Covariates (N=9125)

	Model 1		Model 2		Model 3	
	Estimate	Est/SE	Estimate	Est/SE	Estimate	Est/SE
Trajectory Analysis of GPA	Mean		Mean		Mean	
Intercept	2.597**	278.421	2.598**	295.604	2.677**	101.103
Slope	-0.270**	-12.354	-0.271**	-14.648	-0.289**	-9.629
Quadratic	0.084**	15.103	0.084**	17.547	0.092**	10.730
	Coef.		Coef.		Coef.	
GPA9 -> GPA10	0.053**	7.258	0.053**	9.015	0.054**	7.550
GPA10 -> GPA11	0.053**	7.258	0.053**	9.015	0.054**	7.550
GPA11 -> GPA12	0.053**	7.258	0.053**	9.015	0.054**	7.550
Time variant predictors						
GPA9->Depression9	-0.191**	-9.558	-0.205**	-9.708	-0.201**	-9.471
GPA10->Depression10	-0.112**	-5.646	-0.128**	-6.071	-0.127**	-6.026
GPA11->Depression11	-0.115**	-5.890	-0.114**	-5.448	-0.117**	-5.589
GPA12->Depression12	-0.087**	-3.776	0.027	0.022	0.106	0.083
Depression9->GPA10	-0.015	-1.545	-0.017	-1.823	-0.018	-1.819
Depression10->GPA11	-0.014	-1.482	-0.021*	-2.154	-0.021*	-2.102
Depression11->GPA12	-0.008	-0.735	-0.019	-1.587	-0.020	-1.683
Depression9->Depression10	0.472**	15.185	0.447**	14.052	0.444**	13.931
Depression10->Depression11	0.474**	16.684	0.460**	15.702	0.458**	15.593
Depression11->Depression12	0.475**	15.878	0.456**	12.324	0.457**	11.760
Time invariant predictors						
Parental Involvement->Intercept			0.097**	16.889	0.122**	13.346
Parental Involvement->Linear			-0.005	-1.008	-0.010	-1.271
Parental Involvement->Quadratic			0.000	-0.139	0.002	0.810
Parental Involvement->Depression9			-0.066**	-5.237	-0.056**	-3.254
Parental Involvement->Depression10			-0.026*	-2.222	-0.022	-1.336
Parental Involvement->Depression11			-0.036**	-3.249	-0.011	-0.646
Parental Involvement->Depression12			-0.050	-0.486	-0.044	-0.294
Female->Intercept			0.243**	13.749	0.259**	5.970
Female->Linear			0.037*	2.441	0.022	0.577
Female->Quadratic			-0.002	-0.434	0.008	0.689
Female->Depression9			0.447**	12.379	0.638**	6.575
Female->Depression10			0.204**	5.787	0.314**	3.509
Female->Depression11			0.109**	3.000	0.204*	2.346
Female->Depression12			0.126	0.297	0.202	0.370

Black->Intercept		-0.492**	-24.173	-0.230**	-4.612
Black->Linear		0.032	1.785	0.002	0.044
Black->Quadratic		-0.004	-0.755	0.004	0.254
Black->Depression9		0.026	0.576	-0.220	-1.918
Black->Depression10		-0.027	-0.667	-0.175	-1.706
Black->Depression11		0.023	0.577	0.144	1.592
Black->Depression12		0.149	0.266	0.137	0.483
Interactions					
Parental*Female->Intercept				-0.005	-0.459
Parental*Female->Linear				0.004	0.451
Parental*Female->Quadratic				-0.003	-0.963
Parental*Female->Depression9				-0.056*	-2.287
Parental*Female->Depression10				-0.032	-1.417
Parental*Female->Depression11				-0.028	-1.293
Parental*Female->Depression12				-0.032	-0.880
Parental*Black->Intercept				-0.077**	-5.877
Parental*Black->Linear				0.009	0.765
Parental*Black->Quadratic				-0.002	-0.610
Parental*Black->Depression9				0.071*	2.402
Parental*Black->Depression10				0.043	1.599
Parental*Black->Depression11				-0.035	-1.512
Parental*Black->Depression12				0.014	0.134
Fit Indices					
Chi-squred	3.671	10.363		12.479	
DF	9	10		11	
P-value	0.932	0.409		0.329	
CFI	1.000	1.000		1.000	
TLI	1.000	1.000		1.000	
RMSEA	0.002	0.002		0.004	

Note:

1. Coef. Stands for regression coefficient.
2. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
3. * $p<0.05$, ** $p<0.01$
4. – indicates a negative parameter estimate (e.g., a mean or a regression coefficient).

Table2.4 Parameter Estimates of Latent Curve Models of GPA: Delinquency as Time-varying Covariates (N=9125)

	Model 1		Model 2		Model 3	
	Estimate	Est/SE	Estimate	Est/SE	Estimate	Est/SE
Trajectory Analysis of GPA	Mean		Mean		Mean	
Intercept	2.599**	275.215	2.599**	297.169	2.677**	102.069
Slope	-0.275**	-12.300	-0.289**	-12.678	-0.302**	-9.734
Quadratic	0.085**	14.922	0.088**	15.231	0.095**	10.710
	Coef.		Coef.		Coef.	
GPA9 -> GPA10	0.054**	7.324	0.059**	7.758	0.058**	7.738
GPA10 -> GPA11	0.054**	7.324	0.059**	7.758	0.058**	7.738
GPA11 -> GPA12	0.054**	7.324	0.059**	7.758	0.058**	7.738
Time variant predictors						
GPA9-> Delinquency10	-0.049**	-2.661	-0.084**	-4.336	-0.084**	-4.350
GPA10-> Delinquency11	-0.051*	-2.356	-0.063**	-2.838	-0.063**	-2.852
GPA11-> Delinquency12	-0.109**	-5.068	-0.093**	-4.328	-0.094**	-4.332
Delinquency9->GPA9	-0.039	-0.637	-0.066**	-4.623	-0.064**	-4.443
Delinquency10->GPA10	-0.048**	-2.706	-0.091**	-6.633	-0.089**	-6.511
Delinquency11->GPA11	-0.073**	-4.941	-0.106**	-7.722	-0.104**	-7.627
Delinquency12->GPA12	-0.086**	-5.239	-0.106**	-6.227	-0.105**	-6.212
Delinquency9->Delinquency10	0.611**	16.884	0.591**	16.063	0.591**	16.014
Delinquency10->Delinquency11	0.537**	10.210	0.529**	10.111	0.528**	10.080
Delinquency11->Delinquency12	0.498**	10.353	0.490**	10.140	0.490**	10.060
Time invariant predictors						
Parental Involvement->Intercept			0.095**	16.614	0.119**	13.182
Parental Involvement->Linear			-0.005	-0.932	-0.009	-1.146
Parental Involvement->Quadratic			0.000	-0.158	0.002	0.748
Parental Involvement->Delinquency9			-0.030**	-2.946	-0.031	-1.731
Parental Involvement->Delinquency10			-0.011	-1.199	-0.016	-0.959
Parental Involvement->Delinquency11			0.006	0.640	0.026	1.432
Parental Involvement->Delinquency12			-0.005	-0.495	-0.003	-0.171
Female->Intercept			0.225**	12.624	0.250**	5.787
Female->Linear			0.018	1.183	0.003	0.086
Female->Quadratic			0.001	0.275	0.012	0.956
Female->Delinquency9			-0.267**	-8.158	-0.116	-1.446
Female->Delinquency10			-0.087**	-3.091	-0.110	-1.447
Female->Delinquency11			-0.139**	-5.018	-0.005	-0.072
Female->Delinquency12			-0.154**	-4.661	-0.147	-1.846

Black->Intercept		-0.488**	-24.119	-0.246**	-4.965
Black->Linear		0.029	1.608	0.007	0.158
Black->Quadratic		-0.003	-0.562	0.003	0.224
Black->Delinquency9		0.049	1.346	-0.271**	-3.165
Black->Delinquency10		-0.022	-0.659	-0.016	-0.183
Black->Delinquency11		-0.056	-1.650	-0.084	-1.050
Black->Delinquency12		0.018	0.490	0.022	0.260
Interactions					
Parental*Female->Intercept				-0.007	-0.642
Parental*Female->Linear				0.004	0.445
Parental*Female->Quadratic				-0.003	-0.938
Parental*Female->Delinquency9				-0.043*	-2.083
Parental*Female->Delinquency10				0.006	0.320
Parental*Female->Delinquency11				-0.040*	-1.984
Parental*Female->Delinquency12				-0.003	-0.133
Parental*Black->Intercept				-0.071**	-5.437
Parental*Black->Linear				0.007	0.576
Parental*Black->Quadratic				-0.002	-0.498
Parental*Black->Delinquency9				0.091**	4.110
Parental*Black->Delinquency10				-0.001	-0.047
Parental*Black->Delinquency11				0.009	0.412
Parental*Black->Delinquency12				-0.001	-0.061
Fit Indices					
Chi-squred	12.149	156.079		156.317	
DF	6	12		14	
P-value	0.059	0.000		0.000	
CFI	1.000	0.992		0.993	
TLI	0.998	0.969		0.968	
RMSEA	0.011	0.036		0.033	

Note:

1. Coef. Stands for regression coefficient.
2. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
3. * $p<0.05$, ** $p<0.01$
4. – indicates a negative parameter estimate (e.g., a mean or a regression coefficient).

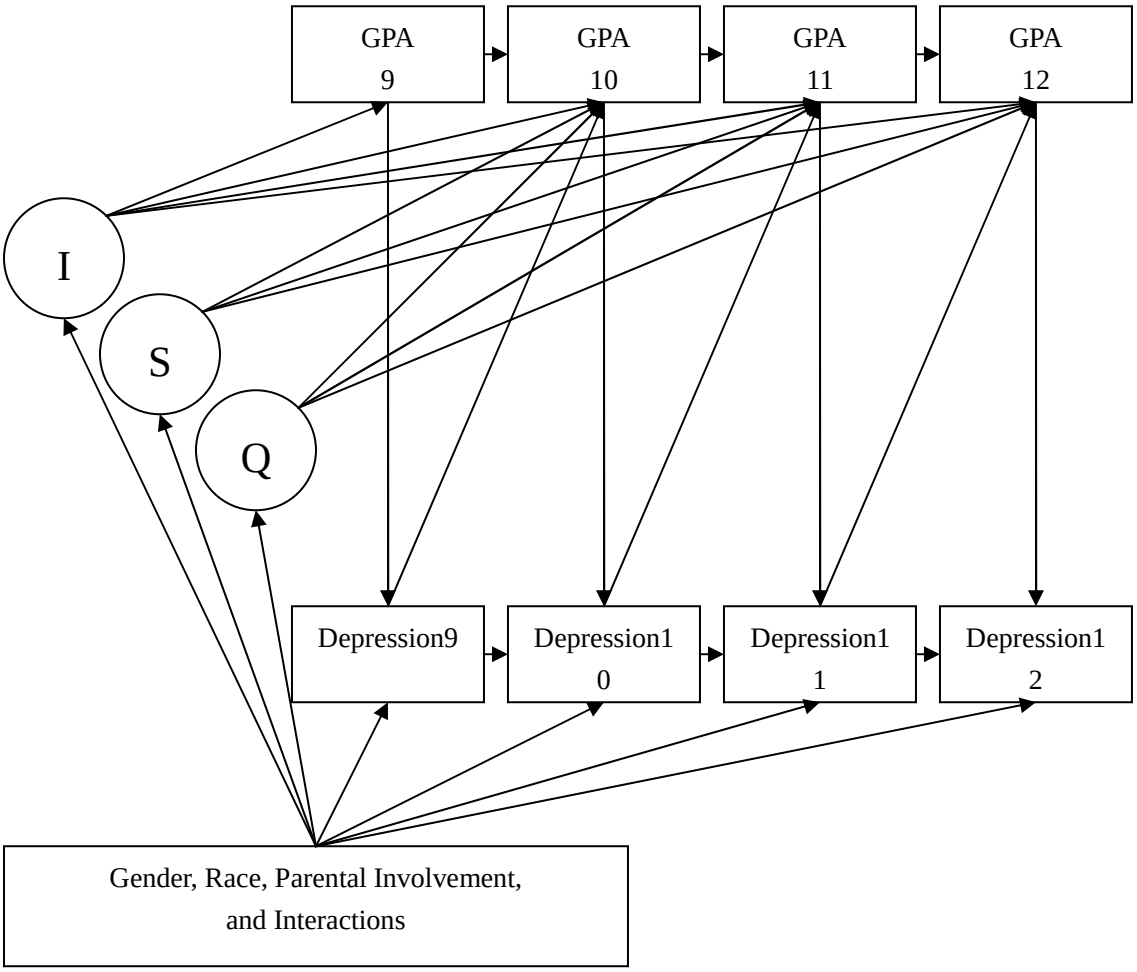
Table 2.5 Parameter Estimates of Multivariate Latent Curve Models of High-School GPA and Delinquency (N=9125)

Trajectory Analysis of Delinquency	Mean	Est/SE
Intercept (I1)	0.028	1.925
Slope (S1)	-0.015*	-2.046
Trajectory Analysis of GPA		
Intercept (I2)	2.597**	278.475
Slope (S2)	-0.268**	-12.424
Quadratic (Q)	0.083**	15.202
	Coef.	Est/SE
GPA9 -> GPA10	0.052**	7.268
GPA10 -> GPA11	0.052**	7.268
GPA11 -> GPA12	0.052**	7.268
Correlations	Correlation	Est/SE
I1 with S1	-0.060	-1.028
I1 with I2	-0.193**	-14.375
I1 with S2	-0.025*	-2.130
I1 with Q	0.010*	2.549
S1 with I2	0.030**	4.291
S1 with S2	-0.004	-0.734
S1 with Q	-0.001	-0.677
I2 with S2	0.012	0.559
I2 with Q	-0.014**	-2.611
S2 with Q	-0.020**	-3.297
Fit Indices		
Chi-squred	16.039	
DF	12	
P-value	0.190	
CFI	1.000	
TLI	0.999	
RMSEA	0.006	

Note:

1. Coef. Stands for regression coefficient.
2. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
3. * $p<0.05$, ** $p<0.01$
4. – indicates a negative parameter estimate (e.g., a mean or a regression coefficient).

Figure 2.1 Path Diagram of the Final LCM with Time-Varying and Time-invariant Covariates: Internalizing Problems



Note: I, S, and Q in the figure represent Intercept, Slope, and Quadratic terms of the academic performance trajectory.

Figure 2.2 Path Diagram of the Final LCM with Time-Varying and Time-invariant Covariates: Externalizing Problems

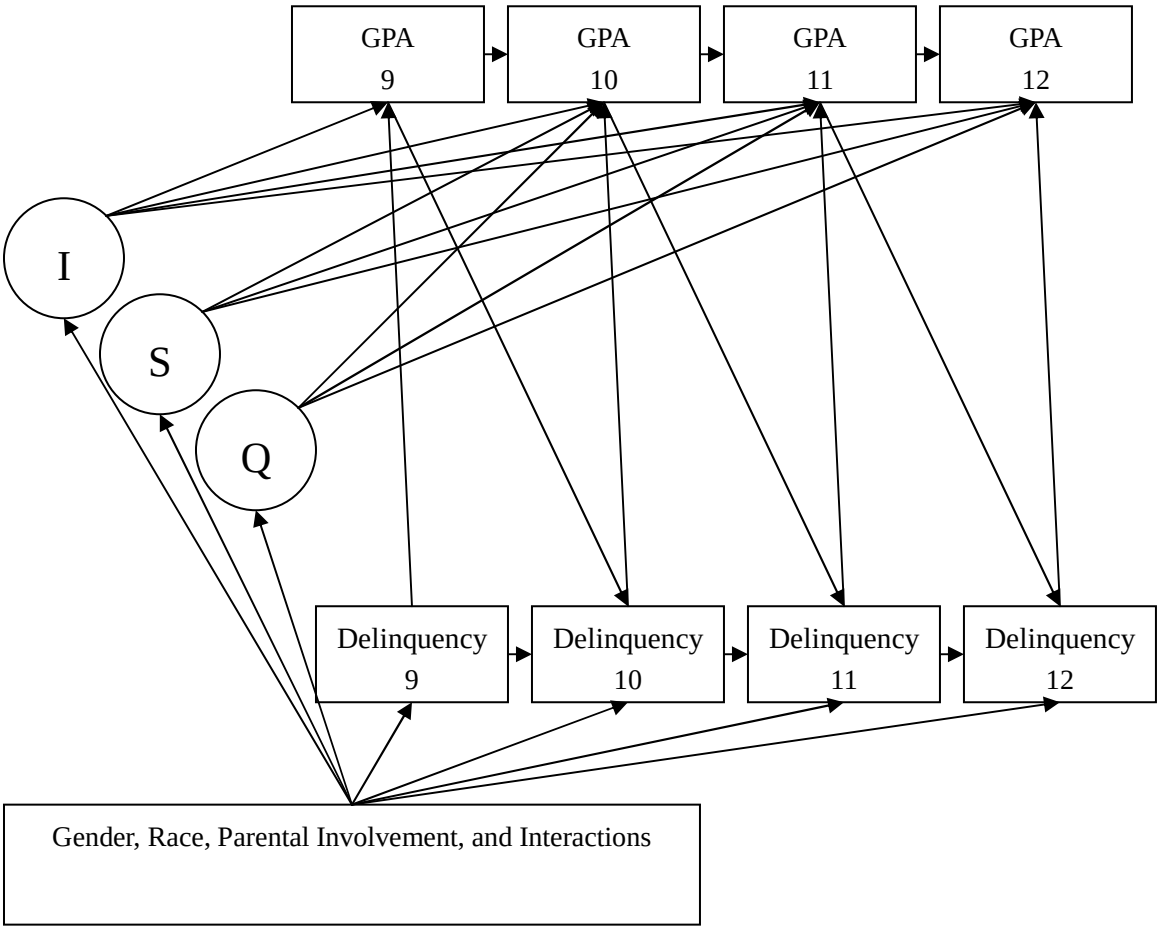
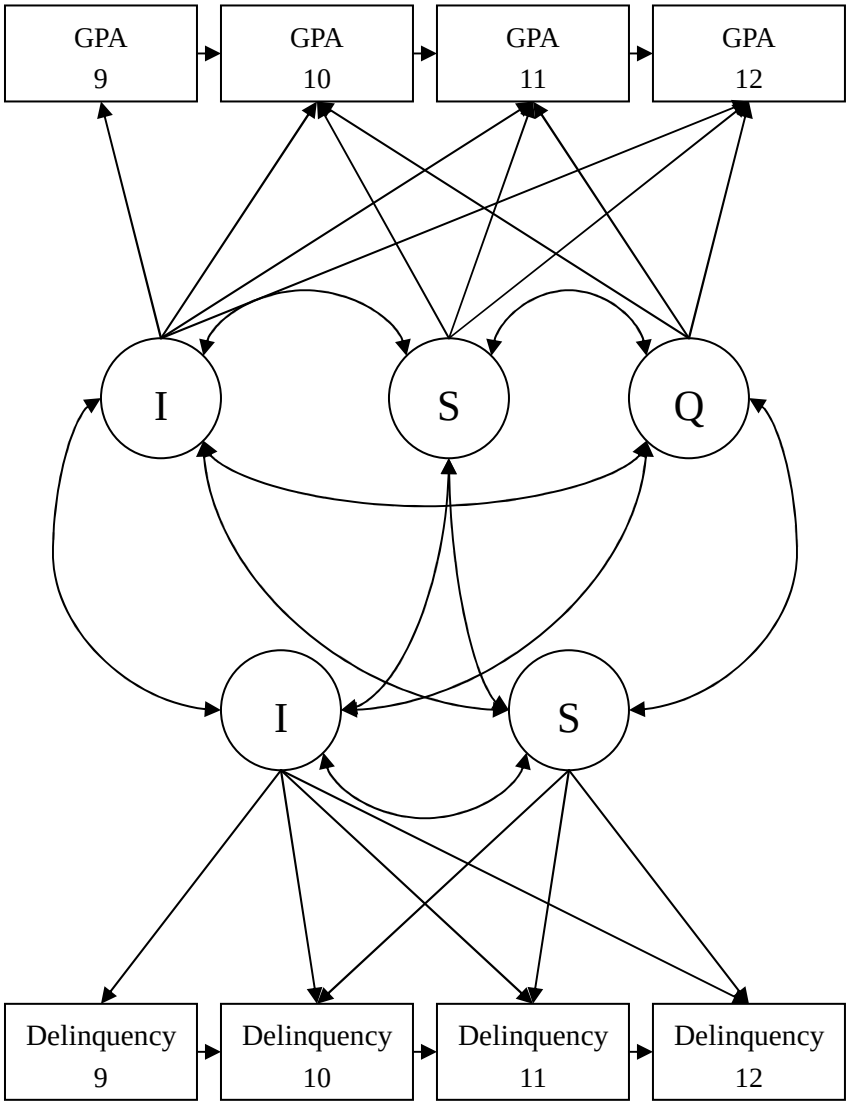


Figure 2.3 Path Diagram of the Multivariate LCM for GPA and Delinquency



CHAPTER THREE

Academic Difficulties and Internalizing Versus Externalizing Problems: Who Gets What and Why?

Introduction

There have been multiple studies suggesting that stress from academic difficulties can lead to emotional/behavioral problems among students (Weiner, 1994; Dweck & Wortman, 1982)[11]. Such emotional/behavioral difficulties can be generally categorized as either internalizing problems (such as depressive symptoms) or externalizing problems (such as behavioral misconduct). Despite the numerous studies linking academic problems with mental health problems, it is still unclear which type of mental health problem a student will develop when facing stress from academic difficulties. Few studies have examined why some students are at increased risk for internalizing problems while others develop externalizing problems.

In order to further our understanding of the impact of academic problems on mental health, this study will use the theories of stress process in social psychology as the overall theoretical framework, while drawing upon the recent advancements in

[11] Please note that the literature has suggested that mental health problems can also negatively affect academic performance. However, this reverse causal relationship is not the focus of this study.

developmental psychology through in-depth studies of internalizing and externalizing problems. Based on the literature, I argue that personal coping resources, including self-esteem and mastery, moderate the relationships between academic and mental health problems and channel adolescent towards different types of mental health problems (e.g., internalizing vs. externalizing). This study uses a nationally representative sample of high school students to address three analytical goals. The first goal is to examine the effects of high school academic performance on adolescent mental health and investigate the protective influences of self-esteem and mastery against mental health problems, especially those aroused from academic problems. The second goal is test whether or not self-esteem and mastery is related to adolescents' tendency towards internalizing or externalizing mental health problems when experiencing distress. The last goal is to explore gender differences in the moderating effects of self-esteem and mastery. In the following sections I will discuss in detail the role of self-esteem and mastery in moderating the relationship between academic performance and mental health.

Background

Stress Processes

When applied to academic settings, Pearlin's (1981) "stress process" theory provides a vital link between poor academic performance and mental health. According to stress theory, stress arises from poor academic performance, either as chronic strain from consistent academic difficulties or as negative events such as receiving poor test

results. These stressors erode positive concepts of self, such as self-esteem and a sense of mastery or control. More specifically, children's appraisals of academic difficulty can affect their developing self-perceptions of academic competence, which further affect their values about education and beliefs about the relative supportiveness of others in learning situations. Diminished self-concepts increase students' vulnerability to experiencing internalizing or externalizing symptoms, or sometimes both, when under stress.

The stress process theory sees coping strategies as a resource which can buffer the impact of stress and minimize the elevation of distress symptoms. However, later studies have shown that available personal coping resources such as self-esteem and mastery can greatly alter the outcome of stress exposure. Thoits (1995) summarized coping resources as "social and personal characteristics upon which people may draw when dealing with stressors (Pearlin and Schooler, 1978)." People with more coping resources also have been found to be less prone to mental health problems (Turner and Roszell, 1994). Yet we have not developed theoretically detailed explications of how these personality characteristics (such as self-esteem and mastery) actually work to reduce physical and emotional vulnerability to stress, as Thoits (1995) pointed out in her review of the stress process literature. Based on the literature described above, my *first hypothesis* is that self-esteem and mastery protect adolescents from mental health problems (internalizing and externalizing), including those caused by academic problems.

While social psychologists have established a clear association between coping

resources and depression (see review by Thoits, 1994), few studies have examined internalizing and externalizing problems at the same time. Developmental psychologists, on the other hand, have made more attempts to study both internalizing and externalizing problems. However, nearly all previous studies focused on the level, or *magnitude*, of these mental health problems. Little is known regarding the *directionality*, or the tendency toward internalizing versus externalizing problems, of the adolescents' response to stress. In other words, scholars have paid little attention to which type of mental health problems one is likely to have in reaction to stress, or when one experiences both internalizing and externalizing problems, which type one will experience more. Below I will discuss perspectives on the mechanisms that channel distress to internalizing or externalizing problems based on findings from the developmental literature in conjunction with stress process theory. Appendix H provides an overview of the theorized associations between coping resources and mental health problems described below.

Mastery

Mastery, as defined by Pearlin and Schooler (1978, p.5), concerns the extent to which one regards one's life chances as being under one's own control. The opposite of mastery is fatalism (Wheaton, 1983), which is a tendency to believe in the efficacy of environmental rather than personal forces as the causes of life outcomes. Mastery can also be referred to as internal locus of control (Rotter, 1966; Lefcourt, 1976). In terms of personality orientations, the concept distinguishes internals, who attribute events to their

own control, and externals, who attribute events in their life to external circumstances. In academic settings, students with a stronger sense of mastery may attribute their achievements or failures to their own abilities and efforts (Gershaw, 1989), whereas those who lack a sense of control may believe that their grades are the result of good or bad luck, or poor teachers, and are hence less likely to work hard for better grades.

A sense of control is also believed to be an important moderator of the impact of stressors. Studies have suggested that mastery reduces both types of mental health problems in response to stress because it encourages active problem solving (Mirowsky and Ross, 1989) whereas the feeling of powerlessness is itself depressing. Mastery also reduces mental health problems because people high in a sense of control are more likely to possess the skills and abilities required to resolve stressful circumstances (Turner and Avison, 1992).

In addition to the protective and stress-buffering influences of mastery, some evidence suggests that mastery affects the types of mental health problems people are likely experience as the result of stress, through its implications for attribution style. As children cognitively appraise their academic difficulties, different attributions for difficulty lead directly to feelings of internalized or externalized distress (Ames & Archer, 1988; Weiner, 1994). Despite the fact that an internal locus of control protects adolescents against depressive symptoms, internals are more likely to attribute poor academic performance to the self (such as personal incompetence), generating feelings of shame, self-doubt, low esteem, and alienation from learning (see Dweck & Wortman, 1982). In

contrast, children who attribute academic problems to the influence of hostile or unsupportive others generate feelings of anger, academic alienation, and hostility toward others (see Connell & Wellborn, 1991; Roeser, Eccles, & Strobel, 1998; Weiner, 1994). Therefore, the *second hypothesis* is that overall, although internal adolescents are less likely to have either internalizing or externalizing problems, an internal locus of control steers adolescents in the direction of more internalizing emotions when reacting to stressors such as academic problems. Specifically, high mastery or an internal locus of control is associated with a tendency to have internalizing mental health problems, while people with low mastery or an external locus of control are more likely to have externalizing problems than internalizing problems.

Self-esteem

Self-esteem reflects a person's overall appraisal of his/her own worth. Rosenberg (1986) theorized that the formation of self-esteem is determined by the nature and consistency of individual's cumulative experiences involving three principles: "reflected appraisal," a person's interpretation of how he or she is viewed by others, "social comparison," judgment of oneself by comparing with others in the absence of objective information about oneself, and "self-attribution," drawing conclusions about oneself from one's own success or failure. In developmental psychology, self-esteem or general self-regard has been repeatedly found to be correlated with grades (or teachers' ratings of achievement) (Marsh, 1990). This association is hypothesized to involve a reciprocal

causal relationship (Marsh, 1990; Mone, Baker, & Jeffries, 1995). (However, whether higher self-esteem improves students' actual performance still requires further investigation.)

In relation to mental health, associations between low self-esteem and adolescents' emotional and behavioral problems are well established in the literature, (Jessor, Vandenbos, Vanderryn, Costa, and Turbin, 1995; Masten, Garmezy, Tellegen, Pellegrini, Larkin, and Larsen, 1988). A low self-evaluation is not only depressing, it is also associated with feelings of insecurity, leading to a defensive aggressiveness. Self-esteem can also function as a coping resource and reduce the impact of stress on mental health. Adolescents with high self-esteem are both less likely to face stressors such as academic difficulties and more likely have the ability to cope with the stress. However, in recent developments on this subject, investigators have started to question the benefits associated with high self-esteem (Crocker & Park, 2004; Baumeister, Heatherton, and Tice, 1993) and pay attention to the possible negative consequences of high self-esteem, hypothesizing that inflated high self-esteem can also lead to problem behaviors. For example, Howard Kaplan's (1986) studies on the relationship between self-esteem and delinquency found a curvilinear relationship between self-esteem and delinquency -- those with very low and very high self-esteem may be more likely to be delinquent. These findings have challenged previous beliefs about behavioral problems being the outcome solely of low self-esteem. Recent research indicates that bullies' aggressive and sometimes delinquent behaviors are the result of unearned high

self-esteem (Baumeister, 2001).

Self-esteem also has implications for the directionality of mental health problems that adolescents experience. Specifically, confidence in the self can be a major factor influencing causal attributions of poor academic performance. Adolescents with low self-esteem are more likely to attribute poor performance to personal inadequacies (expressed as shame or incompetence) and experience internalizing problems, while adolescents with high self-esteem attribute poor performance to others' actions (expressed as anger and lack of trust). Therefore, my *third hypothesis* is that although high self-esteem is associated with reduced internalizing and externalizing problems, it also leads adolescents in the direction of more externalizing problems rather than internalizing problems.

Self-esteem and Mastery

Overall, self-esteem and mastery correlate positively -- people who see themselves as being in control of their lives also see themselves as people of worth (Turner, Lloyd, and Roszell, 1999). Self-esteem and mastery both can buffer the deleterious effect of stress on mental health and are therefore associated with better overall mental health status. This is possibly because self-attribution, one's history of successes and failures, which underlie mastery, is also one of the three principles of self-esteem (Thoits, 1994).

However, there are fundamental distinctions between the two (Gecas 1989;

Hughes and Demo 1989). An adolescent who sees himself or herself as a good person and well respected by others does not necessarily believe that most important outcomes in life are in his or her control. On the other hand, if a teen attributes her life outcomes to her own actions, this does not necessarily mean she has faith in her abilities. According to theory, the benefit of a sense of control lies in its effectiveness (Mirowsky and Ross 1989; Ross and Sastry 1999); that is, personal control increases effort, motivation, and persistence in problem solving, which improve the effectiveness of coping and thus reduces stress. Self-esteem has emotional benefits, such as low levels of depression (Kaplan, Robbins, and Martin 1983; Shamir 1986; Turner and Roszell 1994), but its behavioral consequences for academic success are less certain (Rosenberg, Schooler, and Schoenbach 1989).

As hypothesized in the previous sections, with respect to internalizing vs. externalizing problems, high self-esteem has been associated with more externalizing then internalizing behavior, while adolescents with high mastery have more internalizing problems than externalizing problems. Therefore, there is potentially an interaction effect between self-esteem and mastery on mental health. In fact, although mastery is generally seen as desirable due to its positive impact on overall mental health, “there must also be a limit on personal control,” as pointed out by Rotter (1975). It is possible that the effect of mastery on mental health can be influenced by self-esteem. High mastery or a strong internal orientation may need to be matched by positive self-esteem so that the person is able to successfully experience the sense of personal control and responsibility. Overly

internal people who lack self-esteem can become neurotic, anxious and depressed. Rotter (1975) suggested “many people may already feel that they have more control than is warranted by reality, and they may be subject in the future (or may have already been subjected) to strong trauma when they discover that they cannot control…” In other words, internals need to have a realistic sense of the extent of their influence in order to experience 'success'. Otherwise they can be psychologically unhealthy and unstable. On the other hand, externals with a high self-esteem may be much more prone to externalizing problems. Therefore, my *fourth hypothesis* is that there is an interaction between self-esteem and mastery in their effect on the direction of mental health problems; in other words, the combination of high mastery and low self-esteem should greatly increase adolescents’ tendency towards having internalizing problems, while the combination low mastery and high self-esteem should steer adolescents towards having more externalizing problems.

Gendered Vulnerability

Gender differences have been repeatedly found in many dimensions of adolescent life. First of all, girls do significantly better in overall academic performance as measured by National Assessment of Educational Progress (NAEP) (National Center for Education Statistics, Tables 112 and 125). Research also finds gender differences in psychological characteristics. Boys generally have slightly higher self-esteem than girls (Kling, Hyde, Showers, & Buswell, 1999), even though they do not perform as well as girls in academic

work. Boys also tend to have higher levels of mastery than girls (Cairns, McWhirter, Duffy, & Barry, 1990). As noted earlier, girls and boys exhibit distress in different ways as well. Empirical evidence indicates that internalizing problems such as depression and anxiety increase for girls but not for boys during adolescence (Ge, Conger, Lorenz, Shanahan, & Elder, 1995; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993; Lewinsohn et al., 1994). Boys, on the other hand, seem especially vulnerable to developing externalizing problems like delinquency (Gottfredson & Hirschi, 1990; Patterson, Reid, & Dishion, 1992).

However, the exact reasons for such significant gender differences in the risk of internalizing versus externalizing mental health problems have yet to be determined. The only attempt to answer this question so far has been made by Rosenfield, Lennon, and White (2005). Rosenfield and her colleagues argued that schemas about self-salience are the main cause of gender differences in internalizing versus externalizing problems. They propose that schemas that privilege others over the self (common in females) increase the risk of internalizing symptoms, including depressive symptoms and anxiety, whereas those that privilege the self over others (common in males) predispose individuals to externalizing behaviors of antisocial behavior and substance abuse. Due to limitations of the data, I will not be able to examine these schemas. Instead, given the gendered patterns described above, I will rely on the stress process theory to explain this phenomenon. My *fifth hypothesis* is that the differential risks of internalizing versus externalizing problems by gender in relation to academic problems can be explained by gender differences in the

availability and combinations of coping resources such as self-esteem and mastery.

Data and Methods

Data

Data from the National Longitudinal Study of Adolescent Health (Add Health) will be used, as in Chapter Two. High school GPA comes from wave III (obtained through official transcripts). All psychological variables and grade in school are measured at both wave I and II. SES variables come from the wave I parent questionnaire. A total sample of 20,103 cases was fielded in wave III and 15,197 respondents were successfully interviewed. Approximately 91.5% of Wave III respondents (N = 13,901) signed a valid Transcript Release Form, and Add Health was able to collect the transcripts for 12241 respondents. Among this initial sample, only 8,847 cases have sampling weights for the transcript data, which are used in the data analysis to correct for the sampling design and non-response[12] when the transcript data are used. Additionally, 2,119 respondents who were Asians, Hispanics, and Native Americans were excluded in this study. Further, 1,332 cases were dropped due to lack of high school GPA measures from the transcript data in wave III that correspond to wave I and II interviews[13]. The final analytic sample consists of 5,396 cases, including 2,500 males and 2,896 females.

[12] In order to detect possible patterns of attrition, a dummy variable for these 8847 cases (as 1 VS 0) was created and regressed on all independent variables from wave I using logistic regression. The results show that Black and male respondents as well as respondents with more violent delinquency, lower parent education and aspirations are more likely to drop out of the survey in wave III or not to provide transcripts. However, these attrition patterns will only make my findings more conservative.

[13] For the majority of these 1332 respondents, wave I and II interviews were conducted before they had entered high school.

Measures

Academic Performance. The transcript data newly available in Add Health wave III will be used to measure students' academic performance in high school. Four GPA variables were constructed by Add Health staff corresponding to means for each of the four high school years in courses across all subjects taken, including electives. These variables capture students' academic performance for each year of high school experience. The majority of students in this sample took courses on a semester basis, such that schools recorded two separate entries for a year-long course on the transcript, each designated with a grade. The GPA variables are calculated as the average grade across semester-length courses in a given year (for the yearly indicators)[14]. Fs are coded as 0, Ds are coded as 1, Cs are coded as 2, Bs are coded as 3, and As are coded as 4. Grades with +/- signs (such as B+ or B-) were treated the same as without (such as B). When students received a P for pass, a NG for not graded, a W for withdrew, a WF for withdrew failing, a WP for withdrew passing, or an I for incomplete, these courses were not included in the calculation of GPA. Students who did not take a course assigned a grade of A to F in a given year, but who were in school that year, have a missing value on the corresponding GPA variable.

[14] Less than 1% of all courses taken by the entire sample of students occurred on a trimester basis. For the purposes of the construction of academic indicators, trimesters are considered equivalent to semesters. Students who took courses designated as year long (and with only one grade recorded) are treated as having received the same grade for two semester-length courses.

These measures provide yearly indicators of students' academic performance in the core curricular subjects of all subjects taken. In contrast to self-reported data, these are official indicators of performance as recorded on the students' high school transcripts. For the purpose of this chapter, the GPA variables were rearranged according to wave instead of school grade. Two variables, GPA at wave I and GPA at wave II, were created to measure the respondents' academic performance at the corresponding high school grades (9^{th}-12^{th}) for wave I and II.

Psychological/Behavioral Problems. Externalizing problems, or delinquency[15], is measured by a series of problem behaviors the respondents conducted during the past year. In this study, the self-reported items of the delinquency measure are considered various ways to express the common underlying emotion of distress. Therefore, these items are treated as effect indictors. In the existing literature, delinquent behaviors are often categorized into serious delinquency and violent delinquency (such as Guo et al. 2008). Serious delinquency and violent delinquency are measured separately, each by a summed score of a series of items. Serious delinquency (Appendix A) is measured by a summed score of items that describe various mildly delinquent behaviors during the past year. The response categories of these items are never, once or twice, 3 or 4 times, and 5 or more times and are coded as 0, 1, 2, and 3, respectively. Violent delinquency

[15] Broadly, substance abuses such as alcohol consumption and drug use are also considered externalizing problems. However, many substance abuses are initiated by social reasons such as peer pressure. For the purpose of this study, I will focus on delinquency and violence only as those are the more likely to be responses to academic stressors for adolescents.

(Appendix B) is measured by a summed scale capturing the respondent's violently aggressive behaviors towards others during the past year. The response categories of these items are never, once, and more than once and coded as 0, 1, and 2, respectively. These two categories of deviant behaviors differ in their severity, which is assumed to reflect the intensity of the underlying emotions. However, there are no existing theories suggesting multiple dimensions in the measurement of delinquency. Reflected in data analysis, exploratory factor analysis showed very weak patterns with low factor loadings, indicating low correlations among the items, which is expected given that the items create an index of various delinquent behaviors rather than a scale of equivalent items. Also, these "factors" do not correspond to serious and violent delinquency. As shown in the exploratory data analysis, serious and violent delinquency showed very similar effects in the data analysis when examined separately. The serious delinquency scale and violent delinquency scale are therefore standardized and summed to form the measurement of delinquency finally used for the analysis.

Internalizing problems, or depression, is typically measured through adolescents' self-reported emotions, either through measures specifically concerned with mood or though items included in checklists of depressive symptoms. The Center for Epidemiological Studies Depression Scale (CES-D) is one of these key measurement instruments. Developed in 1976 for use in the general adult population (aged 18 or older), the standard CES-D is a 20-item self-report scale that measures depression (Radloff 1977, 1991). In this dissertation, the measurement of depression consists of a 19-item scale,

with two items left out[16] and the item "life is not worth living" added to suit adolescents. These 19 items are listed in Appendix C. This scale is commonly used in the literature, offering great comparability across different studies. Given the primary goal of this study is not to compare across racial/ethnic groups (Perreir et al. 2005), this measure is used to retain comparability to other studies in the literature. Individual items are coded on a four-point scale, from never or rarely (0) to most or all of the time (3) and refer to feelings the respondent had in the past week. Positively worded items are reverse coded. Theoretically, a confirmatory factor analysis, which is unbiased and free of measurement error, would be the best way to measure depression. However, considering the analytical model is already very complex, it would be very difficult to measure depression using a CFA in this chapter. Therefore, this paper uses a summed-score[17] to measure depression. Given that depression is a dependent variable in the model, a summed-score is more acceptable (Perreir et al. 2005).

Additionally, two properties of over all mental health problems (as internalizing and externalizing problems combined) are also included in this study. These two properties are *magnitude*, which describes the total amount of mental health problems (including both internalizing and externalizing problems) a respondent had experienced, and *directionality*, which measures the respondents' tendency towards either internalizing or externalizing problems when experiencing distress, net of the magnitude or amount of

[16] The items "my sleep was restless" and "I had crying spells" were not included in the Add Health.
[17] Several respondents did not answer all 19 questions in this scale. Their summed scores are divided by the number of questions they answered and then multiplied by 19 to make them more comparable to those who answered all questions.

his/her mental health problems. To construct these measures, measures of internalizing and externalizing problems are each standardized to have a standard deviation of 1 and a minimum value of 0. A zero value indicates not experiencing internalizing or externalizing problems. The two standardized measures are then summed to form the new measure of the total magnitude or volume of the respondent's mental health problems. Adolescents without either type of mental health problems have a value of 0 on this magnitude measure. Further, the standardized internalizing problems measure is subtracted from the standardized externalizing problems measure (delinquency-depression) to form the directionality measure of mental health, with positive values representing more externalizing problems and negative values indicating more internalizing problems. Adolescents with the same values on the standardized internalizing problems measure as the standardized externalizing problems measure therefore receive a value of 0 on directionality[18].

Self-esteem. Debate exists regarding self-esteem having one (self-worth) or two dimensions (competence and self-worth). Empirically, different study subjects supported different measurement approaches. Studies that used high school or college students

[18] The directionality measure is independent of the magnitude of mental health problems. One with no mental health problems has the same 0 value on directionality as one with equally high values on internalizing and externalizing problems. Question arises regarding whether combining adolescents with no problems and those with equally high problems will bias the estimates, given that self-esteem and mastery might operate differently for teens with low and high levels of mental health problems. Sensitivity analyses will be conducted by excluding respondents with no strong tendencies toward one or the other type of mental health problems. Another issue is that the directionality measure requires a large difference in the levels of the two mental health problems to have a large +/- directional value, which means one can only have a high tendency toward one type of problem and a very low score on the other. However, this measure is better than calculating the proportion of externalizing problems out of all problems because one can have a high directionality score while experiencing few mental health problems overall.

supported the scale's unidimensionality (Silbert and Tippett 1965; Crandal 1973; McCarthy and Hoge 1982), or obtained factors that were interdependent and had similar patterns of correlates (Rosenberg 1979; Hagborg 1993). In contrast, research on adults in the workforce has often supported a two-dimensional approach (http://www.mhsip.org/reportcard/rosenberg.PDF). In addition, the three "principles" of self-esteem discussed earlier are not dimensions. Instead, they are different sources of self esteem. Self-esteem items cannot be grouped according to these three principles. In this study, self-esteem is measured by a 4-item scale (listed in Appendix E). Given the above literature, these 4 items are considered effect indictors and load primarily on a single factor in exploratory factor analysis. This allows the 4 items to be summed to form the measure used in this paper. Three of the four items come directly from the Rosenberg scale (1965). The others are modified items with very good face validity for general self-esteem. Individual items are coded on a five-point scale, ranging from strongly disagree (1) to strongly agree (5)[19]. The internal reliability of the scale for boys and girls by wave are estimated by alpha (Cronbach, 1951); the results are shown in Appendix F. The alphas for females are 0.73 and 0.76 for wave I and II respectively and the alphas for males are 0.66 and 0.72 for wave I and II respectively, indicating good internal reliability.

Mastery/Locus of Control. Mastery is measured by a single item: when you get what you

[19] The item "you felt that you were just as good as other people" comes from the CES-D scale and is measured from 0 to 3. It has been rescaled to a 1-5 range before being included in the self-esteem measure.

want, it's usually because you worked hard for it. Mastery is measured on a scale from 1 to 5, where 1 is “strongly disagree” and 5 is “strongly agree,” with higher values representing higher mastery or more internal locus of control. Although this single item indicator lacks the complexity and reliability of the multi-item scales such as the popular Duttweiler’s 28-item Internal Control Index (1984) or Pearlin’s 7-item mastery scale (Pearlin et al., 1981), it does have good face validity and captures the concept of mastery, which is the extent to which one regards one’s life chances as being under one’s own control. However, a comprehensive scale would be desirable for future research on this subject. Finally, mastery should be treated as an ordinal instead of continuous measure but the analysis was limited by the available version of Mplus.

College Aspirations. College aspirations measures the respondents’ own expectations for future educational achievement. College aspirations are included in the data analysis to control for the respondents’ educational long term goals, which can potentially affect their emotional response to their own academic performance. The concept is measured by (1) how much the respondent wants to go to college (aspiration) and (2) how likely the respondent thinks it is that he/she will go to college (expectation). These two items are measured on a scale of 1 to 5, where 1 represents low and 5 represents high desire or likelihood. The first item is a more direct measure of college aspiration. However, these two items are well correlated with each other (Pearson’s correlation = .75). These two items are summed to provide a more realistic measure of college aspirations in the current

analyses given many young students have ungrounded high hopes or desires for the future.

Control Variables. This study also controls for sociodemographic characteristics such as gender (Female versus Male), race (Black versus White), and school grade (8^{th}-12^{th}), as well as SES background. SES[20] is measured by parents' education, which was taken from the parental questionnaire. Parent's education is a measure of the highest level of education that either of the respondents' parents has achieved. The responses are 1="less than high school," 2="high school," and 3="college and above."

Methods

This study will use structural equation modeling (SEM) to model (1) internalizing problems and externalizing problems simultaneously as outcomes of academic difficulties and then (2) the magnitude and directionality of mental health problems both as dependent variables. Given wave I and II interviews were conducted very close to each other (less than one year), data from wave I and II will be pooled to form the analytic data used in this study. The data consists of 9,215 observations (4348 from wave I and 4990 from wave II) from 5,396 respondents. Larger sample size can give potentially better parameter estimates. However, pooling the wave I and wave II data together will

[20] Household income was originally included in the data analysis. However, it did not significantly affect either internalizing or externalizing problems after controlling for other variables in the model. Therefore it was not included for a more parsimonious analysis.

result in clustering such that most respondents are observed twice (once in wave I and again in wave II). Clustering between wave I and wave II observations from the same respondents violates the assumption that individual observations are independent from each other and will lead to biased estimation. This study uses the TYPE=COMPLEX option in Mplus (Version 4) to handle clustering in the data. This approach allows me to estimate the usual parameters but to compute errors and chi-square tests of model fit taking into account non-independence of observations due to repeated measures.

Pooling data from wave I and II and conducting a cross-sectional analysis do not take advantage of the longitudinal structure of the Add Health data. However, it may be the most appropriate approach given that most conventional longitudinal methods are not applicable in this study due to various data limitations. For example, the two waves (I and II) of data collection during high school rules out use of latent curve models (LCM). The change score method is also inappropriate for this study, as I later discovered. Generally, the change score method has the advantage over a cross-sectional analysis of eliminating the bias due to omitted time-invariant variables (Allison and Bollen, 1997). These variables are factors that are constant over time but affect the outcomes of the analysis. When left out, they can potentially bias the results of the analysis.

My use of the change score approach produced very different results from the cross-sectional method described above. Specifically, few factors in the change score analysis were related to mental health problems. There are two possible causes for such results. First, the change score method is more suitable for variables with developmental

trajectories that are less volatile, such as education, income, and self-esteem in the Allison and Bollen study (1997), than for mental health problems (especially depression), which display substantial fluctuation over time. Second, due to the short and uneven spacing between wave I and II (ranging from 7 to 14 months), the change scores may be capturing mostly random fluctuation rather than meaningful changes as reflected in adolescent development. Significant measurement errors in the change scores may have masked major correlations in this study. Therefore, I did not adopt the change score method in this paper. Since the most important time-invariant variables such as gender and race are already controlled and the focus of this study is on the moderation effects of self-esteem and locus of control instead of change, a cross-sectional data analysis is sufficient.

To handle the missing data, the models will be estimated with Direct Maximum Likelihood (DML)[21]. In this approach, the likelihood function is computed for each case using only those variables that are available for that case. The total likelihood is the sum of the values of the likelihood for each case. Therefore the DML method makes use of all available information in the data with no need to impute values. One of the most important properties of DML is that it can maintain the asymptotic properties of maximum likelihood estimators under the more relaxed assumption of missing at random (Bollen and Curran, 2006). Longitudinal weights (where data from wave I, II, and III are

[21] In Mplus version 4, this is specified as Estimator = MLR. This estimator is robust to non-normality and non-independence of observations with TYPE=COMPLEX.

used) for transcript data were used to correct for wave III transcript data non-response.

Analytical Strategy

The data analysis involves using SEM to model two sets of dependent variables: (1) internalizing and externalizing problems simultaneously as outcomes and (2) the magnitude and directionality of mental health problems both as dependent variables. Each set of dependent variables captures two dimensions of mental health problems in a different way and will be included in the model simultaneously. First, academic performance, self-esteem, mastery, and college aspirations, as well as control variables such as race, school grade at wave I, and parent education will be entered into the model. Independent variables that do not have significant effects on the dependent variable are not included for that specific dependent variable to increase parsimony. Then interactions among academic performance, self-esteem, and mastery will be included in the analysis separately to investigate the moderation effects of self-esteem and mastery on how academic problems lead to mental health problems and how self-esteem may moderate the effects of mastery on mental health[22]. Figures 3.1and 3.2 are diagrams illustrating this model with interaction effects. Figures 3.1 and 3.2 differ in dependent variables to investigate how independent variables are related to different dimensions of mental health problems.

Given that males and females have differential risks for internalizing versus

[22] A three-way interaction of GPA*esteem*mastery will not be tested here. The complex relations among these three variables make it much more prone to random errors and very difficult to detect.

externalizing problems (Hagan and Foster 2003), multiple group analysis (MGA) will be employed for all models. MGA enables the data analysis to be carried out separately for boys and girls and to compare coefficients to identify possible differences in the effects of GPA, esteem, locus of control, and their interactions on mental health problems. Sensitivity analysis will be carried out on combined male and female samples. Gender will be included in the sensitivity analysis as a predictor to examine whether coping resources mediate gender differences.

This paper does not model potential reciprocal relations between academic performance and mental health problems for the following reasons. First, reciprocal relation is not an issue for depression given there is temporal ordering in the measures themselves (depression is measured at the end of each high school year). For delinquency, it is unclear whether academic performance has an immediate effect or delayed effect. Results in chapter indicate that academic performance has a stronger influence on students' delinquency in the following year. In the approach of this chapter, delinquency is predicted by academic performance from the same year and these two variables are more likely to be reciprocally related. Not accounting for the reciprocal relations between academic performance and delinquency in this chapter may lead to over-estimating the effect of academic problems on delinquency. However, the focus of this paper is to establish how coping resources are related to the directionality of mental health problems. It is more suitable to construct directionality and magnitude measures using depression and delinquency from the same year/interview.

Results

Descriptive Statistics

Frequency distributions of the dependent variables for the entire sample are shown in Figure 3.3. The two histograms in the first row represent the distribution of depressive symptoms and delinquency among the respondents. Both distributions are skewed to the right, indicating most respondents do not have major mental health problems. The second row presents the histograms of directionality and magnitude of mental health problems. The distribution of directionality is very normal, with most respondents not showing a strong tendency toward experiencing a particular type of mental health problem (internalizing versus externalizing). The distribution of the magnitude, on the other hand, is skewed to the right, similar to internalizing or externalizing problems. The standardized depression and delinquency scores are then plotted against each other and shown in the third panel of Figure 3.3 separately for males and females. Note that one's directionality measure is a linear function of the distance between one's dot and a line passing through the (0, 0) and (1, 1) points. The distribution of the plots indicate that although some respondents show little tendency towards a particular type of mental health problem, the total combined amount of internalizing and externalizing mental health problems can still be large[23]. Therefore, it is important to model and discuss the magnitude alongside the directionality of the mental health

[23] For example, assume respondent A has a depression score of 3 (St.D) and a delinquency score of 2 and respondent B has a depression score of 3 (St.D) and a delinquency score of 1. Although respondent A has higher combined mental health problems (magnitude = 3 +2) than B (magnitude = 3 +1), A has lower tendency to have depression (directionality = 3 - 2) than B (directionality = 3 - 1) as B is further away from the line.

problems. In addition, these scatter-plots clearly show that males tend to have more delinquency and females tend to have more depression. These scatter-plots also indicate that delinquency and depression are both common among males while depression is much more common than delinquency for females.

Table 3.1 presents descriptive statistics by gender for all variables involved in the data analysis. The dependent variables, depression and delinquency, magnitude and directionality of mental health problems, and independent variables including GPA, esteem, locus of control, college aspirations, and school grade are wave-specific measures and listed separately for wave I and wave II. As expected, Table 3.1 reveals that females have statistically significant (at 95% confidence) higher depressive symptoms and lower delinquency. In addition, males have a significantly higher magnitude of mental health problems than females, which is because they are more likely to experience both internalizing and externalizing problems while females mostly have depressive symptoms. Finally, females have a clear tendency towards internalizing problems, while males do not show strong directionality[24].

Table 3.1 also shows that female respondents have slightly higher GPA and college aspirations, but also slightly lower self-esteem and mastery, similar to findings in many previous studies. No abrupt changes between wave I and II are found, providing support for pooling wave I and II data.

[24] A negative directionality for males is due to the difference in the distribution of depression and delinquency that low levels of depression are much more common, thus swaying the average directionality to negative.

Structural Equation Models

Tables 3.2 and 3.3 present the results of SEM with internalizing and externalizing problems both as outcomes, separately for males and females. Model 1 examines the main effects of the independent variables. The results are consistent with the stress process theory and show that lower GPA leads to high internalizing and externalizing problems for both males and females. However, females react to low GPA significantly more strongly with depression (-1.270 versus -0.740, significantly different according to chi-square test), while there is no gender difference in the association between GPA and delinquency once other variables are controlled. Stress process theory suggests that resources will reduce mental health problems, which is also reflected in the results. Significant and negative coefficients for self-esteem indicate higher esteem is strongly associated with lower internalizing and externalizing problems. And conversely, adolescents with lower self-esteem are at higher risk of internalizing and externalizing problems. However, there are statistically significant gender differences in the effects of self-esteem on mental health. Specifically, higher esteem is more protective of females in terms of depressive symptoms and slightly more protective of males in terms of delinquency. The effects of locus of control on mental health, however, are not as pervasive as self-esteem. According to the Model 1, feeling in control is only predictive of less delinquency among females and less depression among males.

To further examine the effects of these psychological variables, Model 1 also includes the squared terms of self-esteem and locus of control. However, they only

significantly predict depression, not delinquency (therefore squared locus of control is not included in the equations for delinquency). According to the results, the squared self-esteem measure has significant positive effect on internalizing problems and for both boys and girls. This indicates that although higher self-esteem is associated with reduced mental health problems, very high esteem is less helpful. The squared locus of control variable added to predict depression is only significant for males, indicating that although feeling in control greatly reduces males' depressive symptoms; too much control can increase depression. In addition, Model 1 shows that higher aspirations are negatively related to both types of mental health problems. Black respondents are more likely to have depressive symptoms than Whites. Higher parent education, especially college education, protects the respondents from both depressive symptoms and delinquent behaviors.

The literature suggests that coping resources should buffer the effects of academic problems on mental health. Interactions between GPA and self-esteem (shown in Model 2) and between GPA and locus of control (shown in Model 3) are therefore tested. According to Model 2, the interaction between GPA and esteem is only significant for females when predicting depressive symptoms. This result suggests that although poor academic performance is related to depressive symptoms, this relationship is conditioned upon the respondent's self-esteem. More specifically, low self-esteem will lead respondents to react with even more depression when they have poor academic performance. Model 3 shows significant interaction effects between GPA and locus of

control on internalizing problems for both males and females. This suggests that locus of control moderates the effect of poor grades on depressive symptoms. The sense that one's fate is determined by external forces leads to more depressive symptoms in reaction to poor academic performance.

Interaction effects between self-esteem and mastery (reverse coded for this analysis) on internalizing and externalizing problems was also tested, but no significant effects were found (results not shown). The bottom panels of Tables 3.2 and 3.3 provide information on the dependent variables, including the covariance between the two dependent variables, their means and variances. Noticeably, delinquency and depression are significantly correlated with each other, suggesting that some respondents experience both types of mental health problems[25].

Tables 3.4 and 3.5 presents the results of SEM with the directionality and magnitude of mental health problems simultaneously included as dependent variables, separately for males and females. The presentation of results is similar to that of Tables 3.2 and 3.3. Model 1 examines the main effects of the independent variables. The upper portions of Tables 3.4 and 3.5 present the coefficients of independent variables predicting the total magnitude of all mental health problems that adolescents experience. The results are similar to Table 3.2 and 3.3, where levels of internalizing and externalizing problems were predicted separately. The results show that that higher GPA is associated with lower

[25] Females have higher covariance than males (.88 vs. .54). But this is likely due to males' higher prevalence of delinquency, whose distribution is more skewed.

overall levels of mental health symptoms for both males and females. According to the results, higher self-esteem is associated with lower overall magnitude of mental health problems among boys and girls. However, these associations are all curvilinear, indicating diminishing returns with very high self-esteem. Locus of control also reduces the total magnitude of mental health problems respondents were experiencing, but most strongly for males, who also show a curvilinear effect of perceived control: at very high levels of mastery, depression is higher among males.

The lower panels of the Tables 3.4 and 3.5 show the coefficients of independent variables predicting the directionality of mental health problems. A positive coefficient indicates a tendency towards more externalizing mental health problems, while a negative coefficient indicates more internalizing than externalizing problems. The results indicate a very weak association between GPA and the direction of mental health problems. Among male adolescents, those with higher GPA have a slight tendency to have more internalizing problems than externalizing problems. GPA is not related to directionality of mental health problems among female adolescents. Based on theoretical arguments discussed in the background section, high self-esteem was expected to steer adolescents toward externalizing problems while high mastery should channel the adolescent towards more internalizing problems. The results generally support these arguments. According to the results, higher self-esteem is associated with a tendency towards externalizing mental health problems among both boys and girls. However, these associations are slightly curvilinear, indicating diminishing effects at very high self-esteem. Locus of control, on

the other hand, only affects the directionality of mental health problems among females. That is, girls with more internal locus of control are more likely to be depressed than delinquent.

Model 1 also shows that adolescents with high college aspirations overall have less mental health problems. Additionally, black respondents have more overall mental health problems than Whites. And compared to White respondents, Blacks have more internalizing problems than externalizing problems when other variables are controlled. Respondents with better educated parents, especially males, as indicated in the results, tend to have delinquent behaviors rather than depression.

The effects of interactions between GPA and self-esteem and between GPA and locus of control are examined in Model 2 and Model 3 respectively. However, few expected interaction effects were found. According to the results, only the interaction between GPA and locus of control (shown in Model 3) has a significant effect on the total magnitude of mental health problems, but only among males. This indicates that locus of control moderates the effect of GPA on overall mental health symptoms that males experience, suggesting that internals have less overall mental health problems due to poor academic performance. Interaction between self-esteem and mastery (reverse coded for this analysis) was tested for both the magnitude and directionality of mental health problems, but no significant effects were found (results not shown).

The bottom panels of Tables 3.4 and 3.5 provide information on the dependent variables, including the covariance between the two dependent variables, their means and

variances. Noticeably, the magnitude and directionality of mental health problems are significantly correlated with each other for males only. This is because both delinquency and depression are common among males while females most likely to have depressive symptoms (as shown in the scatter-plots of Figure 3.3), thus greater variation in directionality (variance: 1.67 for males and 1.17 for females). Therefore magnitude and directionality are not significantly correlated for females due to lack of variability in directionality for females.

A major concern with the directionality measure is that adolescents with both internalizing and externalizing problems and those with no mental health problems may have a similar near zero score on directionality. Sensitivity analysis was conducted to further examine the validity these findings. A multinomial variable (0 for those with above median depression and below median delinquency, 1 for those with below median delinquency and below median depression, 2 for those with above median delinquency and above median depression, 3 for those with above median delinquency and below median depression) was created and regressed on all independent variables using multinomial logistic regression (results not shown). Analyses were conducted to compare 1 vs. 0, 2 vs. 0, 3 vs. 0, 3 vs. 1, and 3 vs. 2. The results were very similar to the results for directionality reported in Tables 3.4 and 3.5.

Discussion

Mental health problems can be generally categorized as either internalizing problems (such as depressive symptoms) or externalizing problems (such as behavioral

misconduct). Both types of problems are exceptionally harmful to adolescent development and are becoming increasingly prevalent in recent years (Weist, 1997). Related to this trend, many studies on adolescent mental health problems have emerged. Mental health problems, according to the stress process theory, are human's psychological response to stress. For adolescents in high school, education is their primary task and one of the major sources of stress. Therefore, studying adolescents' emotional and behavioral response to their academic challenges and performances has special significance in understanding adolescent mental health.

Using structural equation modeling and data from the high school sample of the Add Health, this study investigated the psychological mechanisms that channel respondents toward internalizing and/or externalizing problems in academic settings. The effect of academic difficulties on internalizing problems and externalizing problems were modeled simultaneously to examine differential risks for internalizing and externalizing problems among adolescents. In addition to having separate internalizing and externalizing problems both being predicted, this study also examined a different set of dimensions of mental health including directionality and magnitude, which combines internalizing and externalizing problems. Boys and girls were examined separately using multiple group analysis given the significant gender differences in rates of depression and delinquency.

As expected, and consistent with stress theory, poor academic performance was associated with higher levels of depression and delinquency for both girls and boys. In

general, despite some gender differences (to be discussed in later paragraphs), self-esteem and locus of control were found to affect mental health in similar ways and both were negatively related to both internalizing and externalizing problems and the overall levels of combined mental health problems. In general, although self-esteem reduces depression, at very high levels of self-esteem, depression is greater, indicating a curvilinear relationship. The same was true for locus of control, but only among boys, not girls. Additionally, interactions were tested to examine the stress-buffering role of these coping resources. The results showed that self-esteem and mastery reduced the damaging effects of academic difficulties on depression, but not delinquency. Overall, these findings strongly support my first hypothesis based on the stress process theory that self-esteem and mastery protect adolescents from mental health problems (internalizing and externalizing), including those caused by academic problems.

However, when only directionality of the mental health problems was of concern, self-esteem and locus of control worked very differently as they steered adolescents towards different types of mental health problems. More specifically, this study found that high self-esteem among boys and girls promoted delinquent behaviors more than self-criticism, while higher mastery in girls lead them to depression more so than delinquency. Interactions were also tested to examine whether these coping resources moderated the direction of problems that students developed when facing academic difficulties. However, these interactions did not significantly affect the directionality of mental health problems. This suggests that self-esteem and mastery do not direct or

specify the types of mental health problems adolescents are likely to have when they experience academic difficulties. Thus, the results only partially supported my second and third hypotheses that self-esteem and mastery channel adolescents to different types of mental health problems (such as internalizing versus externalizing) either directly or in the presence of poor academic performance.

This study also investigated the interactive effects of self-esteem and mastery on mental health outcomes. No interaction between self-esteem and mastery was found to be significantly influencing any measure of mental health problems. My fourth hypothesis that the combination of high mastery and low self-esteem place adolescents at increased risk for internalizing problems or having a directional tendency towards internalizing problems was not supported. Similarly, low mastery combined with high self-esteem did not predict externalizing problems or a directional tendency toward those problems.

Finally, this study attempted to explain gendered risked of internalizing and externalizing problems using self-esteem and mastery. Significant gender differences were found in the effects of locus of control, in that an internal locus of control was more protective against depression for males and against delinquency for females. Strengthening this finding, higher locus of control was also associated with a tendency towards more internalizing than externalizing problems among females, but not among males. There was no gender difference found in the effects of self-esteem on mental health generally. However, it is worth repeating that girls with low self-esteem were especially vulnerable to depression when having academic difficulties. Additional

sensitivity data analysis was performed to directly test whether or not gender differences in mental health problems were mediated through self-esteem and mastery. Model 1 in Tables 3.2 or 3.3 and Tables 3.4 or 3.5 were both rerun without multiple group analysis, with and without self-esteem and mastery being included. Results from the rerun of Model 1 in Table 3.2, which has internalizing and externalizing problems both as outcomes, show that when self-esteem and mastery were included, the gender difference in depression reduced by half and the gender difference in delinquency was slightly bigger. These changes in the coefficients were likely due to gender differences in self-esteem and mastery as well as the effects of self-esteem and mastery on mental health described above. Results from the rerun of Model 1 in Table 3.4, which has magnitude and directionality of mental health problems both as outcomes, showed that girls' tendency towards internalizing problems was slightly reduced once self-esteem and mastery were added to the analysis and the gender difference in magnitude changed from girls having more overall mental health problems to less. Based on these findings, I conclude that my fifth and last hypothesis that the differential risks of internalizing versus externalizing problems by gender can be partially explained by gender differences in self-esteem and mastery is supported.

Although studies on depression and delinquency have flourished in recent years, the issue of internalizing versus externalizing problems has largely been overlooked. Studies rarely venture beyond documenting the gendered risks in internalizing and externalizing problems. Very few studies actually attempted to investigate the

psychological mechanisms that lead to such differential risks. This study contributes to the sociological study of mental health by illustrating the role of coping resources such as self-esteem and mastery in influencing adolescents' tendency to have one type of mental health problem over the other as well as explaining gendered risks of internalizing versus externalizing mental health problems in academic settings. This study helps to establish an important link in the stress process that has been previously neglected.

The contributions of this study also include using more appropriate methodological approaches. Although internalizing and externalizing problems are very different routes of developmental psychopathology, they are fundamentally both reactions to various stressors adolescents encounter. These two types of mental health problems are not mutually exclusive, as demonstrated in Figure 3.3. Data analysis conducted on one type of mental health problem tends to over-estimate the effect sizes of the predictors. Modeling internalizing problems and externalizing problems simultaneously in SEM allows these two problems to correlate with each other, producing more accurate estimates of the effects of the independent variables. Moreover, this study took an innovative approach by combining internalizing and externalizing problems and measuring mental health problems with two new dimensions (directionality and magnitude), which allowed a direct investigation of adolescents' tendency towards experiencing one type of mental health problem over the other. The use of the directionality concept and measure provides a rare opportunity to more clearly examine the channeling effects of self-esteem and locus of control. These unconventional

methodological approaches further improved our understanding of adolescent mental health problems.

Overall, the independent variables included in the models account for more than twice as much variance in depressive symptoms as in delinquency. Future studies are needed to identify psychological aspects that better explain the differential risks of delinquency among adolescents, especially males. Furthermore, this study uses a comprehensive measure of delinquency, which included both serious delinquency and violent delinquency, to improve the coverage of externalizing behaviors. Sensitivity analysis showed that serious delinquency was more strongly correlated with academic difficulties than violent delinquency. Also, the independent variables were more predictive of serious delinquency than violent delinquency. The exact nature and cause of the differences between these two types of delinquency are beyond the scope of this paper. Further studies are needed to fully understand these different types of delinquency. In addition, self-esteem is more consistently and strongly related to mental health problems than mastery. However, this may have been caused by the less than ideal measure of mastery.

Limited by the number of waves of data collection during high school in the Add Health data, the data analysis in this study was cross-sectional, assuming that self-esteem and mastery divert adolescents toward internalizing versus externalizing problems, especially when they experience stressful difficulties. However, it is possible that the causal direction might be reversed, meaning that depression or delinquency could lower

the respondents' self-esteem and mastery. A longitudinal study using data with more waves of information could be useful in future studies to include temporal ordering to improve the understanding of causal directions. Longitudinal studies can also illustrate the role of self-esteem and mastery in the development of mental health problems during high school and identify possible changes in self-esteem and mastery's moderation effects over time. Fortunately, considerable research supports the direction of causal effects that I assume in this paper (Thoits 1994).

In addition to self-esteem and mastery, there are other factors that could potentially help to further explain the differential risks of internalizing and externalizing problems. For example, extraversion-introversion, one of the Big Five personality traits, is a possible candidate. Extraverted people are primarily concerned with what is outside the self, while the introverted are predominantly interested in their own mental life. In terms of mental heath, extraversion-introversion could lead some respondents to delinquency and others to depression in academic settings, respectively. A study by Myers (1992) found a correlation between extraversion and personal happiness; more introverted people are not as happy as the extraverted. When facing academic difficulties, preferences for being alone may exacerbate depressed mood, while an outgoing and sharing person may be cheered up by his/her social surroundings and reach out for support. On the other hand, extraverted youths are more likely to engage in delinquent behavior (Ryckman, 2004), expressing emotional frustration through social channels. Unfortunately, this measurement was not included in the Add Health data used in this

study. The recent advancement in biology may also promote a genetic explanation for internalizing versus externalizing problems. However, this direction, although promising, is beyond the scope of this discussion.

In sum, despite these limitations, this study found that higher self-esteem and an internal locus of control generally protect adolescents from either internalizing or externalizing problems. Their protective effect is even stronger against depression when adolescents face academic difficulties. This study also provided very clear evidence that self-esteem and locus of control sway adolescents toward different types of mental health problems, e.g., high esteem to externalizing problems for boys and girls except at the very highest levels of self-esteem and high mastery to internalizing problems for girls. However, these coping resources did not moderate the effects of academic stressors on mental health problems. Self-esteem and mastery were found to mediate gender differences in mental health problems. These are promising findings for further exploration by researchers attempting to account for gendered risks of different types of mental health problems.

Table 3.1 Descriptive Data Analysis

	Male (N=2500)			Female (N=2896)					
Variable	Obs	Mean	Std.	Obs	Mean	Std.	Min	Max	
Wave I									
Depression	1962	9.772	6.547	2261	12.027	8.202	0	54	*
Serious delinquency	1959	0.110	1.055	2255	-0.105	0.824	-0.792	6.476	*
Violent delinquency	1958	0.070	1.012	2256	-0.284	0.668	-0.595	6.260	*
Magnitude	1958	2.340	1.624	2255	2.268	1.589	0.000	11.870	*
Directionality	1958	-0.297	1.306	2255	-0.978	1.142	-6.214	8.301	*
GPA	1963	2.432	0.920	2262	2.737	0.876	0	4	*
Esteem	1961	16.736	2.350	2256	15.807	2.634	4	20	*
Locus of control	1961	3.960	0.820	2257	3.887	0.893	1	5	*
College aspirations	1959	8.402	2.134	2258	8.884	1.864	2	10	*
School grade	1945	10.111	0.950	2232	10.075	0.939	7	12	
Wave II									
Depression	2307	9.332	6.556	2680	11.395	7.717	0	56	*
Serious delinquency	2303	0.070	1.058	2681	-0.039	0.863	-0.701	8.349	*
Violent delinquency	2303	0.117	0.997	2681	-0.217	0.680	-0.558	6.270	*
Magnitude	2301	2.230	1.532	2679	2.218	1.483	0.044	12.129	*
Directionality	2301	-0.287	1.301	2679	-0.857	1.146	-5.756	8.851	*
GPA	2308	2.453	0.927	2682	2.768	0.850	0	4	*
Esteem	2308	17.091	2.325	2681	16.420	2.571	4	20	*
Locus of control	2307	4.131	0.814	2681	4.051	0.887	1	5	*
College aspirations	2278	8.427	2.166	2657	8.928	1.864	2	10	*
School grade	2226	10.566	1.119	2598	10.496	1.103	7	14	
Time Invariant									
Black	2500	22.9%		2896	27.1%				
Parent education - High School	2227	33.2%		2572	36.0%				
Parent education - College	2227	61.6%		2572	57.6%				

Note: An * indicate there is significant gender difference for that variable.

Table 3.2 Predicting Internalizing and Externalizing Problems: Males (N=2500)

Group MALE	Model 1		Model 2		Model 3	
	estimates	Est./S.E.	estimates	Est./S.E.	estimates	Est./S.E.
Depression ON						
High school GPA	-0.740**	-4.249	0.618	0.513	0.877	1.112
Esteem	-4.033**	-5.557	-3.981**	-5.527	-4.073**	-5.628
Esteem squared	0.086**	3.978	0.090**	3.918	0.087**	4.046
Locus of control	-5.152**	-4.357	-5.144**	-4.363	-4.530**	-3.725
Locus of control squared	0.678**	4.324	0.677**	4.326	0.715**	4.421
College Aspirations	-0.238**	-3.061	-0.241**	-3.123	-0.245**	-3.206
Black	1.767**	4.231	1.728**	4.102	1.769**	4.222
School grade	0.248*	2.121	0.249*	2.137	0.256*	2.204
Parent education - high school	-1.533	-1.899	-1.548	-1.915	-1.524	-1.885
Parent education - college	-1.900*	-2.347	-1.902**	-2.352	-1.876**	-2.316
GPA*Esteem			-0.081	-1.154		
GPA*Locus of control					-0.393**	-1.970
Delinquency ON						
High school GPA	-0.155**	-6.246	-0.291	-1.581	-0.087	-0.904
Esteem	-0.049**	-5.273	-0.069*	-2.303	-0.049**	-5.899
Locus of control	-0.024	-1.028	-0.025	-1.032	0.013	0.200
College Aspirations	-0.038**	-3.471	-0.038**	-3.402	-0.039**	-3.494
Black	0.030	0.510	0.034	0.587	0.030	0.513
School grade	-0.008	-0.499	-0.009	-0.509	-0.008	-0.455
Parent education - high school	0.353**	4.271	0.360**	4.385	0.353**	4.257
Parent education - college	0.410**	5.064	0.413**	5.106	0.411**	5.035
GPA*Esteem			0.008	0.748		
GPA*Locus of control					-0.017	-0.703
Delinquency WITH						
Depression	0.540**	4.155	0.543**	4.202	0.535**	4.126
Intercepts						
Depression	64.604**	9.413	62.553**	9.406	61.712**	9.020
Delinquency	1.565*	2.512	1.770*	2.510	1.425*	2.198
Residual Variances						
Depression	33.572**	17.712	33.542**	17.699	33.475**	17.901
Delinquency	0.740**	16.640	0.740**	16.581	0.740**	16.656

Note:

1. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
2. * $p<0.05$, ** $p<0.01$

Table 3.3 Predicting Internalizing and Externalizing Problems: Females (N=2896)

Group FEMALE	Model 1		Model 2		Model 3	
	estimates	Est./S.E.	estimates	Est./S.E.	estimates	Est./S.E.
Depression ON						
High school GPA	-1.270**	-6.575	0.759	0.763	0.473	0.746
Esteem	-5.157**	-10.156	-4.961**	-9.445	-5.161**	-10.011
Esteem squared	0.123**	7.649	0.127**	7.470	0.123**	7.549
Locus of control	-0.394	-0.432	-0.430	-0.476	-0.030	-0.033
Locus of control squared	0.062	0.500	0.067	0.551	0.168	1.313
College Aspirations	-0.340**	-3.973	-0.351**	-4.082	-0.350**	-4.090
Black	1.899**	5.129	1.843**	5.012	1.824**	4.914
School grade	0.222	1.766	0.221	1.767	0.217	1.728
Parent education - high school	-1.611*	-2.223	-1.601*	-2.228	-1.669*	-2.317
Parent education - college	-1.607*	-2.202	-1.546*	-2.134	-1.603*	-2.206
GPA*Esteem			-0.127*	-2.122		
GPA*Locus of control					-0.445**	-2.821
Delinquency ON						
High school GPA	-0.158**	-6.143	-0.052	-0.420	-0.214*	-2.107
Esteem	-0.027**	-4.897	-0.012	-0.755	-0.029**	-4.945
Locus of control	-0.058**	-2.920	-0.058**	-2.895	-0.094	-1.307
College Aspirations	-0.019*	-2.135	-0.019*	-2.211	-0.018*	-2.126
Black	0.005	0.112	0.002	0.053	0.006	0.155
School grade	-0.050**	-3.894	-0.050**	-3.895	-0.050**	-3.886
Parent education - high school	0.114	1.488	0.115	1.505	0.112	1.466
Parent education - college	0.190*	2.360	0.196*	2.431	0.189*	2.346
GPA*Esteem			-0.007	-0.874		
GPA*Locus of control					0.014	0.579
Delinquency WITH						
Depression	0.878**	7.326	0.874**	7.376	0.880**	7.486
Intercepts						
Depression	67.928**	15.517	63.782**	13.309	65.069**	14.316
Delinquency	2.260**	5.171	2.040**	4.182	2.385**	4.779
Residual Variances						
Depression	43.645**	27.062	43.558**	27.105	43.511**	27.173
Delinquency	0.409**	12.045	0.409**	12.074	0.409**	12.008

Note:

1. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
2. * $p<0.05$, ** $p<0.01$

Table 3.4 Predicting the Directionality and Magnitude of Mental Health Problems: Males (N=2500)

Group MALE	Model 1		Model 2		Model 3	
	estimates	Est./S.E.	estimates	Est./S.E.	estimates	Est./S.E.
Magnitude ON						
High school GPA	-0.294**	-7.069	-0.296	-0.954	0.037	0.223
Esteem	-0.612**	-3.848	-0.612**	-3.842	-0.619**	-3.889
Esteem squared	0.012*	2.446	0.012*	2.378	0.012*	2.491
Locus of control	-1.124**	-4.673	-1.124**	-4.674	-1.005**	-4.126
Locus of control squared	0.145**	4.483	0.145**	4.484	0.153**	4.578
College Aspirations	-0.071**	-3.927	-0.071**	-3.948	-0.072**	-4.041
Black	0.253*	2.454	0.253*	2.462	0.253*	2.445
GPA*Esteem			0.000	0.007		
GPA*Locus of control					-0.080*	-1.968
Directionality ON						
High school GPA	-0.103**	-2.811	-0.459	-1.767	-0.193	-1.159
Esteem	0.509**	4.643	0.494**	4.608	0.512**	4.661
Esteem squared	-0.013**	-3.868	-0.014**	-3.985	-0.013**	-3.889
Locus of control	-0.010	-0.253	-0.010	-0.254	-0.060	-0.523
Black	-0.226**	-2.766	-0.215*	-2.634	-0.226**	-2.766
School grade	-0.053*	-2.130	-0.053*	-2.147	-0.054*	-2.163
Parent education - high school	0.586**	3.760	0.595**	3.819	0.585**	3.756
Parent education - college	0.694**	4.525	0.697**	4.553	0.692**	4.511
GPA*Esteem			0.021	1.384		
GPA*Locus of control					0.022	0.538
Magnitude WITH						
Directionality	0.631**	7.963	0.631**	7.936	0.633**	8.022
Intercepts						
Directionality	-4.287**	-4.119	-3.746**	-3.560	-4.102**	-3.848
Magnitude	10.361**	7.954	10.366**	7.515	9.796**	7.444
Residual Variances						
Directionality	1.666**	18.759	1.664**	18.718	1.666**	18.750
Magnitude	2.042**	19.286	2.042**	19.287	2.039**	19.331

Note:

1. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
2. * $p<0.05$, ** $p<0.01$

Table 3.5 Predicting the Directionality and Magnitude of Mental Health Problems: Females (N=2896)

Group MALE	Model 1		Model 2		Model 3	
	estimates	Est./S.E.	estimates	Est./S.E.	estimates	Est./S.E.
Magnitude ON						
High school GPA	-0.371**	-8.153	0.015	0.069	-0.187	-1.128
Esteem	-0.855**	-9.212	-0.819**	-8.906	-0.857**	-9.199
Esteem squared	0.021**	6.816	0.021**	6.662	0.021**	6.816
Locus of control	-0.354	-1.747	-0.360	-1.768	-0.299	-1.464
Locus of control squared	0.039	1.443	0.040	-1.850	0.048	1.603
College Aspirations	-0.063**	-3.524	-0.065	1.471	-0.064**	-3.582
Black	0.245**	2.909	0.233**	2.818	0.237**	2.832
GPA*Esteem			-0.024**	-3.598		
GPA*Locus of control					-0.047	-1.133
Directionality ON						
High school GPA	-0.017	-0.479	-0.131	-0.656	-0.280	-1.788
Esteem	0.535**	5.354	0.524**	5.138	0.543**	5.367
Esteem squared	-0.012**	-4.022	-0.013**	-3.984	-0.013**	-4.064
Locus of control	-0.080**	-2.741	-0.080**	-2.741	-0.251*	-2.373
Black	-0.246**	-3.978	-0.242**	-3.942	-0.238**	-3.899
School grade	-0.099**	-4.778	-0.099**	-4.780	-0.098**	-4.769
Parent education - high school	0.360**	3.526	0.361**	3.528	0.360**	3.550
Parent education - college	0.481**	4.689	0.483**	4.697	0.478**	4.695
GPA*Esteem			0.007	0.582		
GPA*Locus of control					0.068	1.812
Magnitude WITH						
Directionality	-0.111	-1.933	-0.110	-1.918	-0.109	-1.890
Intercepts						
Directionality	-4.543**	-5.541	-4.303**	-4.638	-3.947**	-4.306
Magnitude	10.606**	13.640	9.823**	11.707	10.274**	12.727
Residual Variances						
Directionality	1.172**	20.632	1.172**	20.642	1.169**	20.574
Magnitude	1.787**	17.714	1.783**	17.811	1.785**	17.848

Note:

1. Est/SE above 1.962 or below -1.962 indicates a significant parameter estimate.
2. * $p<0.05$, ** $p<0.01$

Figure 3.1 Illustrative Diagram of the Structural Equation Model

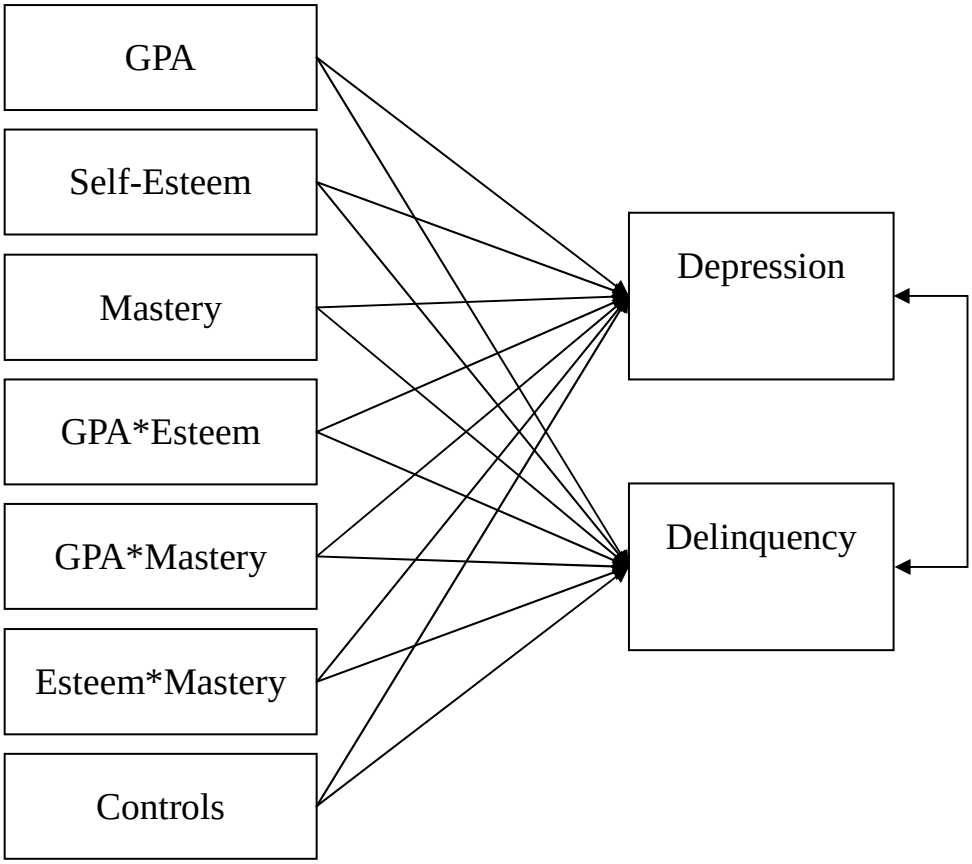


Figure 3.2 Illustrative Diagram of the Structural Equation Model for Directionality and Magnitude

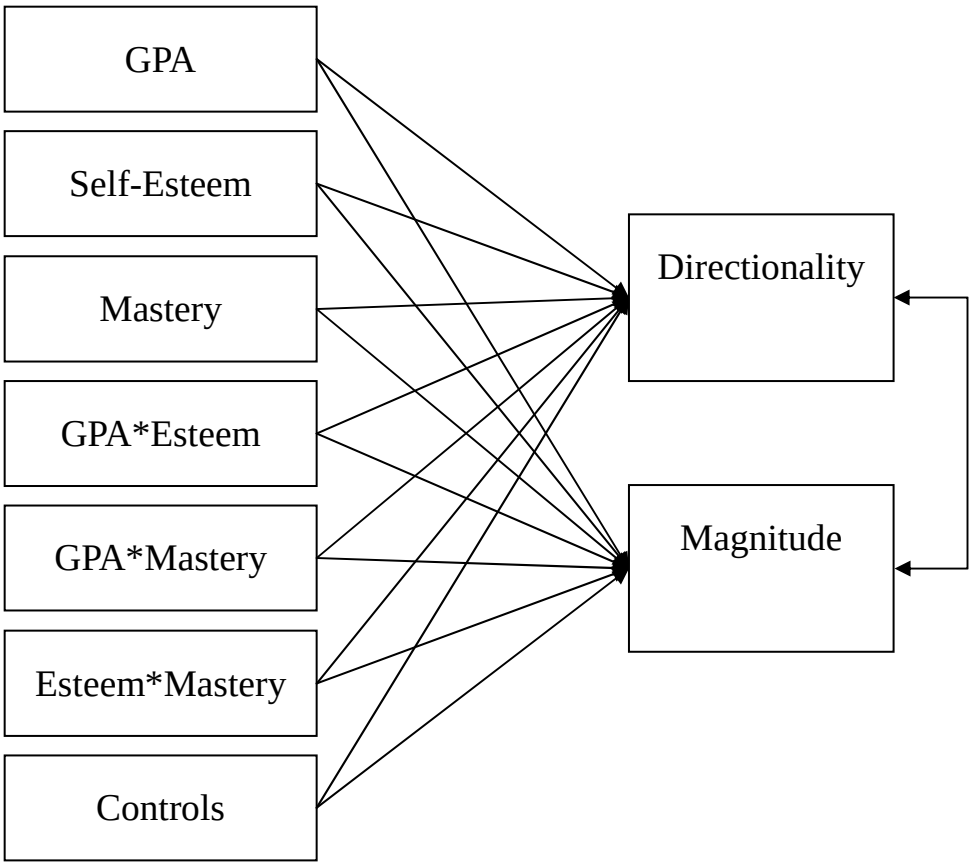
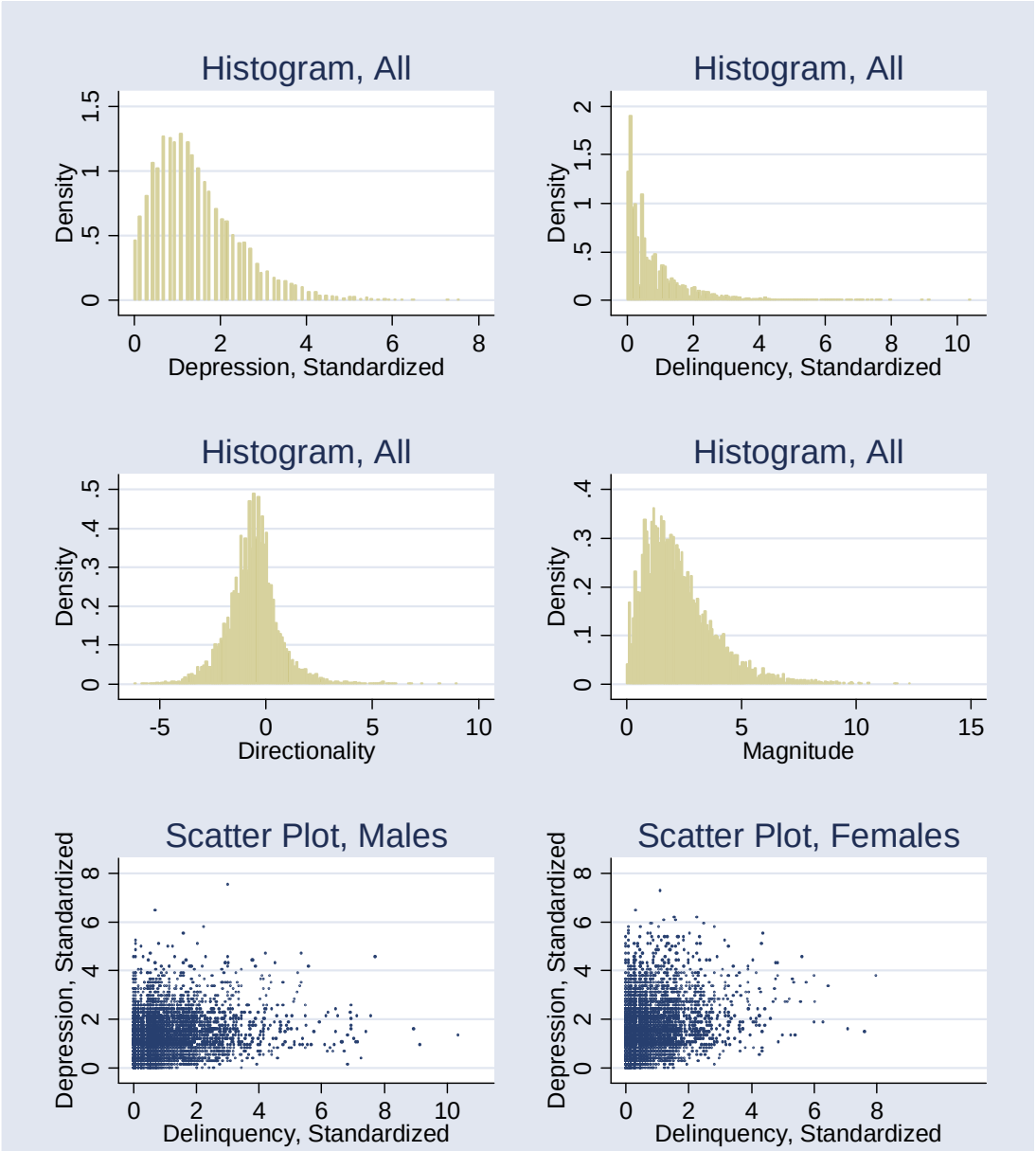


Figure 3.3 Histograms and Scatter Plot of the Dependent Variables



Source: National Longitudinal Study of Addolescent Health

CHAPTER FOUR

The Impact of Adolescent Mental Health and Academic Performance on College Enrollment

Introduction

A college education is the normative pathway to success, for 38% of high school graduates are not able to attend college (Mortenson and Wu, 1990). Research has identified various factors that might prevent adolescents from going on to post-secondary education. Among them, a less advantaged socioeconomic background (see review by Baker and Vélez, 1996) has been the center of attention and was repeatedly found to be associated with a lower likelihood of continuing on to higher education after high school. These studies of college attendance were largely guided by a status attainment perspective (see, for example, Sewell and Shah, 1978; Cabrera and La Nasa 2000) which posits that high socioeconomic background can lead to higher social status of offspring through educational achievement (Hearn, 1984). However, status attainment research cannot fully explain the rate of college attendance associated with higher socioeconomic status (SES; Hearn, 1988).

Recently, there has been increasing attention to the psychological well being of students in academic settings. Studies show that many students who have academic

difficulties also have mental health problems (including both internalizing and externalizing problems) and there is a reciprocal relationship between the two (EcclesWigfield, and Schiefele 1998). However, few studies focus on the role of high school students' mental health in determining college attendance.

This study attempts to broaden our understanding of college attendance by integrating the literature on developmental psychology and education and exploring the effects of adolescents' psychological experiences during high school and their academic performance. Specifically, this study focuses on the following objectives. The first objective is to investigate how the mental health, college aspirations, and academic performance of high school students channel them toward or away from post-secondary education. A second objective of this study concerns whether the effects of adolescent mental health on college attendance are mediated by academic performance and college aspirations. My last objective is to examine whether or not the psychological characteristics and academic performance (see objective one) explain SES influences on college attendance as well as the gender difference in college enrollment. In what follows, I develop from the literature the hypotheses to be tested in the data analysis.

Background

Socioeconomic Background and Parenting

Overall, offspring from more advantaged socioeconomic backgrounds tend to be able to maintain their socioeconomic status through their educational attainment. College

education is a gateway to future economic success in the U.S. According to the Current Population Surveys, college graduates on average have significantly higher income than those with only high school or equivalent degrees. Social and economic status is a crucial determinant of college attendance (McDonough 1994; Cabrera and La Nasa 2001). Families differ greatly in the amount of economic resources they have at their disposal and also in the proportion they set aside for the higher education of their children. Working-class or lower status parents not only tend to have fewer resources, they are also less likely to value higher education compared middle class parents (Ball, Davies, David, and Reay 2002; Bowen and Fincher 1996) and therefore are less likely to set aside money for their children's college educations.

Besides economic resources, parents of different SES also value education differently and exhibit different parenting styles. Higher status parents, often having advanced degrees themselves, generally understand the importance of education better and value education more. Parents of middle and upper class backgrounds also tend to show higher levels of parental involvement, utilize positive child management practices, and encourage their children to think independently (Lareau, 1987; Lareau, 2002). However, a review by Hossler and Stage (1992) suggests that the effect of SES and parenting on college attendance is likely to be mediated by other factors. For example, studies have suggested that the effects of SES on college attendance are partly mediated through academic performance (Cabrera and La Nasa 2000). Students from advantaged family background often achieve better academic performance as measured by

standardized test scores and GPA due to greater resources and parental tutoring. An engaged and supportive parenting style, together with high parental educational expectations, has been found to improve children's academic interest and performance (Conklin and Dailey, 1981). More resources and positive parenting also protect against mental health problems (Barnes, Farrell, & Cairns, 1986; Chassin, Pillow, Curran, Molina, & Barrera, 1993; Conger, Rueter, & Conger, 1994; Coombs & Landsverk, 1988), which may be related to a reduced likelihood of entering college. The theoretical model suggested by these findings is illustrated by Figure 4.1. Each component of the model will be discussed further below.

Academic Performance

Often used as admission criteria, overall high school academic performance (measured by cumulative GPA) has far greater direct influence on college attendance than anything else (Sewell and Hauser, 1975; Hearn, 1988; Persell, Catsambis, and Cookson, 1992). However, cumulative or static measures of academic achievement cannot capture the dynamics of academic performance. At the same level of cumulative GPA, students who have been improving their academic standing over the high school years may have a different possibility of entering college than those whose performances have been declining. In this study, I will incorporate measures of academic performance trajectories to predict college attendance. My first hypothesis is that in addition to consistent high performance, a trajectory of increasing academic performance is also associated with

higher likelihood of college attendance.

Mental Health

Despite the traditional focus on the influences of social-economic background on college attendance, scholars have been increasingly paying attention to the deleterious effects of adolescents' mental health problems (either internalizing or externalizing problems such as depressive symptoms and physical fighting, respectively) on education. Studies show that youth with mental health problems are significantly less likely than other youth to graduate from high school and to enroll in postsecondary education (Coutinho and Denny 1996; Ensminger and Slusarcick 1992; Entwisle, Alexander, and Olson 2005; Greenbaum and Dedrick 1996; Neel, Meadows, Levin, and Edgar 1988; Vitaro, Brendgen, Larose, and Tremblay 2005; Wagner 1995). Despite the fact that mental health has been occasionally used to explain educational attainment (for example, McLeod and Fettes, 2007), its long term impact on entering post-secondary education is unclear. This study proposes two possible ways that mental health in high school can affect college attendance.

First, mental health problems can undermine academic performance, one of the most important aspects influencing college admission. Mental health problems, including both internalizing and externalizing problems, have been frequently studied in relation to academic performance. There is evidence that mental health problems and academic

difficulties often co-occur among what is likely a small (e.g., 12%) but socially significant minority of school-age children (Dryfoos, 1994; Knitzer, Steinberg, and Reisch, 1991; Weist, 1997). Research by Eccles et al. (1998) and others has suggested that these two problems are reciprocally related and tend to influence each other increasingly over time.

In one direction, academic difficulties are a source of stress and can lead to either internalizing emotions or externalizing behaviors (Ames and Archer, 1988; Weiner, 1994), depending on children's attribution style. Children who attribute poor academic performance to personal incompetence experience feelings of shame, self-doubt, and low esteem (e.g., internalizing distress, see Dweck and Wortman, 1982). Alternatively, children who attribute academic problems to the influence of a hostile environment or unsupportive teachers and peers display feelings of anger, and hostility toward others (see Connell and Wellborn, 1991; Roeser, Eccles, and Strobel, 1998; Weiner, 1994). These studies also showed that both attribution styles can lead to academic alienation. In the reverse direction, emotional distress influences cognitive processes, resulting in mood-congruent biases of memory and attention (e.g., Gotlib and MacLeod, 1997), which in turn lead to subsequent academic problems. Negative, mood-induced biases can divert the investment of psychological resources into self-protective goals and coping efforts rather than into academic goals and learning strategies (Boekaerts, 1993), precipitating subsequent academic problems. Negative mood can also influence academic functioning through the biasing effect of mood on attention. Children experiencing high

levels of distress in academic settings may discount positive experiences (e.g., moments of academic success or support by others), and focus instead on mood-consistent experiences (e.g., difficulties with learning and unsupportive others).

The reciprocal relationship between mental health and academic problems put some adolescents in a downward spiral, reducing their chances to enter post-secondary education. Although poor academic performance is only half of the problem, it affects college attendance much more strongly and directly. And mental health, as important as it is, is not part of the college admission criteria. Therefore, this study theorizes that mental health affects college attendance through academic performance, instead of the reverse. Based on this, my second hypothesis states that academic performance mediates the effects of mental health on college attendance.

A second way that mental health is related to college attendance is through college aspirations, another strong predictor of college attendance (McLeod and Fettes, 2007). Students who attribute their poor performance to unsupportive others (such as peers and teachers) and exhibit externalizing problems are likely to have a reduced sense of belonging in a school environment (Pittman and Richmond, 2007). Lack of a sense of belonging in school can reduce students' academic performance (Pittman and Richmond, 2007) and college aspirations (Faircloth and Hamm, 2005). Therefore my third hypothesis is that the effects of mental health problems, or at least externalizing problems, on college attendance are partly mediated by low aspirations.

The significance of psychological wellbeing in academic settings also lies in its

relationship with SES. Studies have shown that adolescents from less advantaged family backgrounds are at an increased risk of academic and mental health problems (e.g., Johnson, Cohen, Dohrenwend, Link, and Brook 1999; Miech, Caspi, Moffi, Wright, and Silva 1999; Ritsher, Warner, Johnson, and Dohrenwend 2001) and are less likely to have high expectations for the future (Conklin and Dailey, 1981). Figure 4.1 shows a diagram of the theoretical model that illustrates these mediation effects. My fourth hypothesis, therefore, is that mental health and the development of educational aspirations, mediate the effects of socioeconomic background, accounting partly for variations in college attendance.

Gendered Patterns

The effects of psychological factors on college attendance described above maybe gender specific. There are well documented gender differences regarding mental health and college attendance. First, many studies have found that adolescent boys and girls respond to stress with psychological symptoms. However, girls seem to be at greater risk of internalizing problems such as depression and anxiety (Ge, Conger, Lorenz, Shanahan, and Elder, 1995; Lewinsohn, Hops, Roberts, Seeley, and Andrews, 1993; Lewinsohn et al., 1994). Boys, on the other hand, seem especially vulnerable to developing externalizing problems like delinquency (Gottfredson and Hirschi, 1990; Patterson, Reid, and Dishion, 1992). Second, statistics show girls have had a higher college attendance rate compared to boys since 1976 (Mortenson, 1991:15). By 2005 women comprised

57% of all college students (Buchmann, DiPrete, and McDaniel 2008). However, how the mental wellbeing of high school boys and girls is related to gender differences in rates of college attendance remains unknown. The gendered patterns provide a unique opportunity to further examine the relationship between specific types of mental health problems and college attendance. Given the gender group that is more prone to internalizing problems is also more likely to attend college, it is possible that externalizing problems reduce the probability of attendance. As mentioned earlier, theoretically, students with externalizing problems may attribute their poor academic performance to external forces (such as unsupportive peers and teachers). External attributions create alienation from and distrust of the educational system. Respondents with such problems are more likely to have reduced motivation to invest in learning in school settings, and in turn are more likely to enter the labor force early. Therefore, my fifth and last hypothesis is that externalizing problems have greater deleterious impact on the continuation of education than internalizing problems and differential risks to specific mental health problems have caused fewer males attend college than females.

Data and Methods

Data

Data from the National Longitudinal Study of Adolescent Health (Add Health) is used. Add Health is a nationally representative, school-based sample of 20,745 adolescents in grades 7-12 surveyed during the 1994–1995 academic year. The sampling

frame consisted of all high schools in the United States. A total of 80 high schools were selected with probabilities proportional to size and a sample of 52 feeder middle schools was attached to the sample of high schools. The response rate for the 132 participating schools was 78.9%. Of the over 90,000 students who completed the in-school survey in 1994 a baseline sample of 20,745 adolescents was selected for further data collection. The adolescents were interviewed three times during a 7-year period in 1994–1995, 1995–1996, and 2001–2002. The overall sample is representative of United States schools with respect to region of the country, urbanicity, school type (e.g., public, parochial, private non-religious, military, etc.), and school size. Further details regarding the sample are available at http://www.cpc.unc.edu/projects/adhealth/. In order to detect possible patterns of attrition, a dummy variable for attrition by wave III (0, 1) was created and regressed on all independent variables from wave I or the averages of wave I and II using logistic regression. The results show that male respondents as well as respondents with more delinquency and lower PVT scores are more likely to drop out of the survey in wave III. However, these attrition patterns will only make my findings more conservative.

Respondents who were not enrolled in high school during wave I or II interviews are excluded. In addition, due to the small sample size of Asians and Native Americans and the relatively heterogeneous backgrounds of Hispanic students, only non-Hispanic Whites and non-Hispanic Blacks are included in the sample for this study. The total sample size for this paper is 9249. To serve the analytical goal of this chapter, the sample

is limited to those who have completed high school by wave III (N=9143). Due to missing values on some variables, primarily SES variables[26] which come from the parent questionnaire, the final analytical sample consists of 2882 males and 3358 females. The dependent variable, college attendance, comes from wave III. All independent variables come from wave I and II except for high school GPA, which comes from the wave III transcript data.

Measures

College Attendance. My dependent variable is a trinomial measure indicating whether respondents have ever been in two-year and four-year college by Add Health wave III. The respondents who have graduated from or are currently in a four-year college are coded as 2. For the rest, those who have graduated from or are currently in a two-year college are coded as 1. And the remaining sample, these who have never attended college, are coded as 0. The respondents in the last category could be either in the labor force or unemployed at the time of wave III interview.

Childhood SES and Parenting. Childhood SES measures include indicators of the family of origin's household income and parental education. Both were taken from the Wave I survey of the respondent's parent. Household income is a measure of total income that

[26] Sensitivity analyses were conducted on all models by substituting the missing values on household income and parent education with the corresponding means. The results changes very little, indicating the missingness on these variables did not bias the estimation.

the respondent's family (before taxes) received in 1994 and includes the income of everyone in the household, and income from welfare benefits, dividends, and all other sources. It is measured in units of 10,000 dollars. Parent's education is a measure of the highest level of education that either of the respondents' parents has achieved. The responses are 1="less than high school," 2="high school," and 3="college and above." The analysis also includes sociodemographic characteristics such as gender (female vs. male) and race (Black vs. White).

Parenting is measured by a summed scale of items reported by the respondents regarding parental involvement (Appendix D). The information regarding the parental involvement scale is collected from a yes/no checklist. Parenting was measured in both wave I and II. However, considering that the parenting of adolescents is a relatively stable behavior of mature adults as well as the complexity of the models in the current study, the average of parental involvement across waves I and II is taken to represent the overall measure and used as a time invariant covariate in the models. Respondents who have only one wave of measurement are treated as having reported the same value for waves I and II. The items listed reflect choice or conscious intentions, and thus I consider these as effect indicators of parents' voluntary involvement in their children's development. The internal reliabilities of the scales described above are estimated by alpha (Cronbach, 1951). The results for boys and girls by wave are shown in Appendix F.

Academic Performance Trajectory. The transcript data newly available in Add Health

wave III are used to measure students' academic performance in high school. Four GPA variables were constructed as means for each of the four high school years in courses across all subjects that were taken, including electives. These variables index students' academic performance for each year of high school experience. The majority of students in this sample took courses on a semester basis, such that schools recorded two separate entries for a year-long course on the transcript, each designated with a grade. The GPA variables are calculated as the average grade across semester-length courses in a given year (for the yearly indicators)[27]. Fs are coded as 0, Ds are coded as 1, Cs are coded as 2, Bs are coded as 3, and As are coded as 4. Grades with +/- signs (such as B+ or B-) were treated the same as without (such as B). When students received a P for pass, a NG for not graded, a W for withdrew, a WF for withdrew failing, a WP for withdrew passing, or an I for incomplete, these courses were not included in the calculation of GPA. Students who did not take a course assigned a grade of A to F in a given year, but who were in school that year, have a missing value on the corresponding GPA variable.

These measures provide yearly indicators of students' academic performance in the curricular subjects of all courses taken. In contrast to self-reported data, these are official indicators of performance as recorded on the students' high school transcripts. This detailed and accurate information on respondents' academic record during high school gives me the opportunity to model the trajectories of academic performance by

[27] Less than 1% of all courses taken by the entire sample of students occurred on a trimester basis. For the purposes of the construction of GPA, which is average points received of all courses taken in a school year, trimesters are considered equivalent to semesters given the courses are graded on the same 4-point scale. Students who took courses designated as year long (and with only one grade recorded) are treated as having received the same grade for two semester-length courses.

school grade (9^{th}-12^{th}) using latent curve models (LCM). Factor scores such as a baseline or intercept factor, a slope factor, and a possible quadratic factor were extracted from the latent trajectories of high school academic performance. These factor scores were included in the data analysis to represent the developmental trajectories of students' academic performance over the four high school years. Results of latent curve models on GPA are shown in Table 4.1. Overall the quadratic trajectory model showed the best model fit (CFI=0.996; TLI=0.975; RMSEA=0.078). The results (Intercept=2.61, Slope=-0.12, Quadratic=.05) suggest a U-shaped trajectory for respondents' high school GPA. On average, the respondents' academic performance declined in the first two or three years of high school and increased in the senior year as they approached their graduation. One possibility is that towards the end of the high school years, students are increasingly motivated to perform better to meet the GPA criteria for the specific colleges they desire.

Sensitivity analysis of the respondents' academic performance trajectories was performed using Growth Mixture Models (GMM)[28]. GMM estimates trajectories for each individual respondent (similar to LCM) and then groups respondents with similar trajectories together to form clusters. An 8-cluster solution was chosen because it demonstrated the best fit. Each of the 8 clusters has a distinct academic trajectory profile,

[28] The only purpose for me to include the mixture analysis is to demonstrate that high school GPA does change from grade to grade, as least for some. At the same overall cumulative GPA, different students may have different GPA trajectories. This analysis is an additional illustration (and an arguably more intuitive way) to show the need to incorporate GPA trajectory to understand the influence of academic performance on college entrance. Therefore I do not pursue the discussion of who those 8 groups are and whether these are 8 theoretical groups that exist among students.

as illustrated by the graph in Appendix G. The graph revealed a wide variety of academic performance trajectoriesamong students. Some respondents were able to perform consistently well in academic tests, while others experienced significant increases or decreases of academic performance, regardless of their overall GPA. The graph also suggests that respondents with medium or poor performance are more likely to produce inconsistent GPAs while those who are on top of the game are more likely to perform consistently well.

Psychological/Behavioral Problems. Externalizing problems, or delinquency[29], is measured by a series of problem behaviors the respondents conducted during the past year. In this study, the self-reported items of the delinquency measure are considered various ways to express the common underlying emotion of distress. Therefore, these items are treated as effect indicators. In the existing literature, delinquent behaviors are often categorized into serious delinquency and violent delinquency (such as Guo et al. 2008). Serious delinquency and violent delinquency are measured separately, each by a summed score of a series of items. Serious delinquency (Appendix A) is measured by a summed score of items that describe various mildly delinquent behaviors during the past year. The response categories of these items are never, once or twice, 3 or 4 times, and 5 or more times and are coded as 0, 1, 2, and 3, respectively. Violent delinquency

[29] Broadly, substance abuses such as alcohol consumption and drug use are also considered externalizing problems. However, many substance abuses are initiated by social reasons such as peer pressure. For the purpose of this study, I will focus on delinquency and violence only as those are the more likely to be responses to academic stressors for adolescents.

(Appendix B) is measured by a summed scale capturing the respondent's violently aggressive behaviors towards others during the past year. The response categories of these items are never, once, and more than once and coded as 0, 1, and 2, respectively. These two categories of deviant behaviors differ in their severity, which is assumed to reflect the intensity of the underlying emotions. However, there are no existing theories suggesting multiple dimensions in the measurement of delinquency. Lack of references in the literature to multiple dimensions is reflected in data analysis: exploratory factor analyses produced very weak patterns with low factor loadings, indicating low correlations among the items which is expected given that the items create an index of various delinquent behaviors rather than a scale of equivalent items. Also, these "factors" do not correspond to serious and violent delinquency. Serious and violent delinquency showed very similar effects in the data analysis when examined separately. The serious delinquency scale and violent delinquency scale were standardized and summed to form the measurement of delinquency finally used for the analysis.

Internalizing problems, or depression, is typically measured through adolescents' self-reported emotions, either through measures specifically concerned with mood or though items included in checklists of depressive symptoms. The Center for Epidemiological Studies Depression Scale (CES-D) is one of these key measurement instruments. Developed in 1976 for use in the general adult population (aged 18 or older), the standard CES-D is a 20-item self-report scale that measures depression (Radloff 1977, 1991). In this dissertation, the measurement of depression consists of a 5-item scale, all

items of which are effect indicators representing a single dimension (Perreir et al. 2005). One of the 5 items is "life is not worth living," which was added to the original CES-D to suit adolescents. These 5 items are listed in Appendix C. Compared to a full 20-item scale, a 5-item scale has the advantage of being less contaminated by indicators of other concepts and also being more comparable across racial/ethnic groups (Perreir et al. 2005). Individual items are coded on a four-point scale, from never or rarely (0) to most or all of the time (3) and refer to feelings the respondent had in the past week. One positively worded item is reverse coded. Theoretically, a confirmatory factor analysis, which is unbiased and free of measurement error, would be the best way to measure depression. However, considering the analytical model is already very complex, it would be very difficult to measure depression using a CFA in this chapter. As the 5-item measure is single-dimensional and all the indicators are effects, its internal reliability can be measured by Cronbach's alpha. The alphas are listed by gender and wave in Appendix H and show very good internal reliability. Therefore, this paper uses a summed-score[30] to measure depression. Given that depression is a dependent variable in the model, a summed-score is more acceptable (Perreir et al. 2005).

College Aspirations. College aspirations measures the respondents' own expectations for future educational achievement. The concept is measured by (1) how much the

[30] Several respondents did not answer all 5 questions in this scale. Their summed scores are divided by the number of questions they answered and then multiplied by 5 to make them more comparable to those who answered all questions.

respondent wants to go to college (aspiration) and (2) how likely the respondent thinks it is that he/she will go to college (expectation). These two items are measured on a scale of 1 to 5, where 1 represents low and 5 represents high desire or likelihood. The first item is a more direct measure of college aspiration. However, these two items are highly correlated with each other (Pearson's correlation = .75). These two items were summed to provide a more reliable measure[31] of college aspirations in the current analyses.

Parenting practices, delinquency, depression, and college aspirations are measured at both Add Health wave I and II, the two waves being one year apart. In the analysis, the averaged values of the two measures from wave I and II are used because there are not enough repeated measures available to create stable trajectories for these variables. Respondents who have only one wave of measurement are treated as having reported the same value for wave I and II.

Control Variables. The data analysis in this study controls for gender (female vs. male), race (Black vs. White), school grade at wave I, and cognitive capability. Cognitive capability is measured by scores on the Add Health Picture Vocabulary Test (PVT). The wave I percentile rank score was used. The percentile rank has an advantage over the standardized score because all age groups have the same floor (0) and ceiling (100) values. Thus, it provides an index of relative standing among same-age peers that is comparable across age groups, which makes interpreting analysis results easier.

[31] Many young students have ungrounded high hopes or desires for the future.

Methods

Previous analyses have typically modeled college attendance as a binary status of college versus non-college. Such analyses do not address the substantial differences between respondents who go to 2-year colleges and those who enter 4-year colleges after graduating from high school. Given the rapid development of community colleges, the presence of major differences between the two types of colleges may conceal importance differences among the respondents. As such, analyses that distinguish between those two types of colleges provide richer information on college attendance in the U.S. (e.g., Perna and Titus 2005).

I use multinomial logistic regression to model the respondents' college attendance after high school. Coefficients are exponentiated to provide a more intuitive interpretation. Odds of entering 2-year college and 4-year college versus not doing so are presented. Ratios higher than 1 indicate a positive association between the independent variable and the odds of entering 2/4-year college versus non-college, while those less than 1 indicate a negative association. Variables indicated above are introduced to the models by block to examine their effect on college attendance. In addition, I perform sensitivity analyses in which male and female samples are estimated separately to detect differences between male and female respondents. Survey multinomial logistic regression in STATA 9[32] is

[32] This method allows for stratified sampling such as region and school in Add Health as well as weights. The weights used in this chapter are for data analyses that include data from all three waves.

used to take into account the stratified survey sampling structure and over-sampling of certain special interest groups.

Results

Table 4.2 shows the descriptive statistics by gender. About the same proportions of male and female respondents (22%) in the sample were able to enter 2-year College. But females were much more likely to enter a 4-year college than males (45% vs. 37%). This gender difference is well reflected in academic performance with females showing better academic performance. Their trajectories have higher intercept (2.78 vs. 2.50) and a shallower downward slope (-0.11 vs. -0.13). Female students also have higher college aspirations than males (8.96 vs. 8.50). The table clearly shows a gendered pattern of mental health problems in which female respondents are more likely to have depressive symptoms (11.4 vs. 9.5), while males show more externalizing problems (.19 vs. -.14).

Odds ratios of the multinomial regression analysis are presented in Table 4.3. The first model established a baseline by introducing variables that will be included in all the models to be analyzed. The effects included in this baseline model include demographic variables, SES and parent-related variables, as well as a cognitive capability variable. Model 2, 3, and 4 shows the influences of delinquency and depression on college attendance respectively and then together. Model 5 examines the effects of the respondents' aspirations on college attendance. High school academic performance trajectory factors are introduced in the sixth and final model.

Model 1 shows the results of the baseline model. As expected, higher household income, better educated parents, more parental involvement, and higher PVT scores all increase the odds of the respondents entering college, regardless of 2-year or 4-year college. School grade at wave I, which is entered as a control for cohort, was not significant for 2-year college but was significant for 4-year college, indicating that generally younger respondents are as likely to have entered 2-year college as older respondents but less likely to have entered 4-year college at wave III. With the above variables controlled in the model, females and black students are more likely to attend college than males and whites.

Models 2 and 3 separately examine the extent to which college attendance is affected by respondents' delinquency and depression. While only depression affects respondents' chances of going to 2-year college, both types of mental health problems are significantly related to reduced odds of entering a 4-year college. These results generally confirm what the literature has suggested. Given only depression is related to 2-year college attendance and its influence is very weak, it did not seem to mediate the effects of SES and parenting. On 4-year college attendance, there are some slight changes in the odds ratio of SES and parenting variables once mental health measures were introduced. However, adding delinquency (in Model 2) increases the effects of SES and parental involvement, while adding depression (in Model 3) reduces the effects of SES and

parental involvement[33]. The effects of depression and delinquency are also shown in Figure 4.2 as predicted probabilities[34] for each of the three outcomes (no-college, 2-year and 4-year college) by gender. As we can see, higher depression or delinquency can lead to a reduced probability of entering a 4-year college and an increased probability of no college. However, these mental health problems do not strongly affect the probability of entering a 2-year college. As shown in Figure 4.2, the probability of entering a 4-year college decreased from 50 percent to about 25 percent and 5 percent as depression and delinquency increase from the lowest to the highest, while the probability of no college increased from 25 percent to over 50 percent.

Depression and delinquency are both entered in the Model 4. Depression ceases to affect 2-year college attendance. Also, once depression and delinquency entered the model together to predict 4-year college attendance, their effect sizes became smaller than when they entered the model individually. The fact that some respondents have experienced both types of mental health problems during adolescence may have contributed to this reduction in odds ratios. The results also show that once mental health problems are included in the model, the higher likelihood of Black students entering a 4-year college compared to Whites becomes even greater.

Model 5 investigates the influence of college aspirations on college attendance

[33] Notice that although some of changes in odds ratio (OR) are very small, there might still be significant change. For example, the rate of change for the OR of parental involvement on 4-year college attendance from Model 1 (OR1) to Model 3 (OR3) is reflected in comparing OR_1-OR_3=1.24-1.22=0.2 to OR_1-1=0.22, which indicates a 10% reduction in effect size.

[34] The predicted probabilities for delinquency, depression, and college aspirations were calculated based on model 2, 3, and 5 respectively. The predicated probability represents the likelihood of being in one of the three categories of the dependent variable college attendance as a function of delinquency, depression, or college aspiration by gender.

and tests whether aspiration mediates the effects of mental health. The results show that college aspiration is significantly and positively related to entering college, both 2-year and 4-year. Comparing the odds ratios and significance levels of other variables of Model 5 with those of Model 4 reveals evidence of mediation effects. First, the odds ratios of household income, parent education, and parenting involvement all showed small to significant reductions. This indicates that socioeconomic advantages and protective influences have enhanced the respondents' likelihood of entering college partially by helping the respondents develop higher aspirations. The effect sizes of mental health problems on 4-year college attendance also decreased once college aspirations were introduced into the model; the odds ratio of internalizing problems is no longer significant and the odds ratio of externalizing problems become closer to 1, indicating reduced effects.

These results provide strong evidence that the influences of mental health problems on 4-year college attendance are partially or fully mediated by the respondents' college aspirations. Finally, college aspirations also mediate the effect of race; Black students are more likely to enter college partly due to their higher aspirations. The effects of college aspiration on college attendance are also shown in Figure 4.2 as predicted probabilities. The figure shows that the probability of entering 4-year college increases from near zero to about 50 percent as aspiration increases from the lowest to the highest value. For the same increase of aspirations, the probability of entering 2-year college also increased over 20 percent, while the probability of no college decreased from near 100

percent to only 25 percent.

The sixth and final model shows the effects of academic performance trajectory and investigates its mediation effects. The odds ratios for all three factors, including the intercept, the slope, and the quadratic, are highly significant and positive for both types of college. But the effect sizes for 4-year college attendance are much stronger than 2-year college attendance. Academic performance trajectories also exhibit strong mediation effect. The results indicate that academic performance mediates the effect of SES and parental involvement on college attendance, but mostly for 4-year college attendance. In addition, academic performance trajectories mediate the effects of the mental health variables, specifically the effects of delinquency on 4-year college attendance, as delinquency is no longer significant once academic performance is introduced. The results also show that part of the effects of college aspiration on 4-year college attendance is also mediated through academic performance.

Finally, Table 4.3 provided some evidence that could help to explain a gendered pattern of college attendance. For example, adding delinquency in Model 3 reduced females' advantage in college attendance and adding depression in Model 3 increased the odds of female respondents entering college. However, when both mental health problems were entered in Model 4, the odds ratios for female changed little from those of Model 1. Once college aspiration was entered in Model 5 and academic performance trajectories in Model 6, female students' higher probability of college completely disappeared, showing the strong mediation effects of these two variables.

Discussion

College attendance has been an important topic in sociology of education. Although access to college has been rising during the past two decades, a considerable portion of high school students are unable to enter college. Such failure has important consequences at the individual level given that success in the educational system is a critical determinant of many later-life opportunities and experiences, including occupational achievement, financial security, and long-term health (Kessler, Foster, Saunders, et al 1995). An educated citizenry is also the key for a nation to increase its standard of living and civic engagement.

For a long time, the field viewed socioeconomic background (see review by Baker and Vélez, 1996) as the primary way to understand the differential likelihood of entering college. The current study has moved beyond traditional SES centered explanations of disparities in college attendance by employing a more comprehensive approach that incorporates mental health. The past 10 years has seen an increasing recognition of the importance of mental health and other psychological aspects of adolescent development by academic researchers. Psychological well being of students in academic settings has been examined in multiple studies to understand its relationship with academic performance. These studies show that many students who have academic difficulties also have psychological/behavioral problems and there is a reciprocal relationship between the two (Eccles, Wigfield, and Schiefele 1998). Based on this line of research, the current study investigated the influence of high school academic

performance trajectory and mental health on college attendance using data from Add Health. This study also extensively examined possible mediation effects such as whether or not mental health mediates the effect of SES and gender on college attendance and whether its own effects on college attendance are being mediated through academic performance and college aspirations.

Broadly, a number of aspects in adolescents' lives determine their chances of college enrollment. The results of the analyses generally reflected what has been repeatedly found in previous research in terms of respondents' socioeconomic background, parents' influences, and cognitive capability. That is, more advantaged socioeconomic status, greater parental involvement, and high cognitive capability can lead to higher likelihood of college education. However, this study extends previous research on college attendance in several ways.

First, instead of one highly heterogeneous college category, this study distinguishes 2-year college and 4-year college attendance. The community college system has contributed significantly to the increase of college attendance in the U.S. Today, one in every 3 (as shown in Add Heath) college students is enrolled in community colleges. Generally, 2-year colleges are less demanding with respect to admission criteria. The relatively relaxed admission policy provides some young people with an opportunity to continue to advanced education even though they are unable to enter formal 4-year colleges for various reasons. However, most previous studies have mixed the two types of colleges into one big category and failed to take into account their distinct characteristics.

In this study, I was able to investigate more specifically how individuals with these two types of college attendance are different from those who never went to college. This hierarchy of requirements of different college types is well reflected in the results. Students who attend a 4-year college have much higher SES background and more involved parents, as well as higher cognitive capability, college aspirations, and academic performance. Also, mental health problems are more likely to hold the students back from attending a 4-year college than a 2-year college.

Second, moving beyond conventional cumulative or static measures of academic performance, a dynamic measure was used to predict college attendance in this study. Academic performance trajectories for each respondent were constructed by extracting factor scores from latent curve analysis of high school yearly GPAs. These factor scores describe the baseline, linear and quadratic rate of change of the students' GPA. These factor scores were then included in the regression analysis to examine how academic performances are related to respondents' chances of entering college. It was not surprising to find that an overall high school cumulative GPA is highly correlated to college attendance (Sewell & Hauser, 1975; Hearn, 1988; Persell, Catsambis, and Cookson, 1992). The innovation of this study is that it examined changes in academic performance during high school and how these changes affected the college enrollment of students. On average, the respondents' academic performance declined in the first two or three years of high school and increased somewhat in the final years as they approached their graduation. It is possible that towards the end of the high school years, students are

increasingly motivated to perform better to meet GPA criteria for the specific colleges they desire. The results of the sensitivity analysis using Growth Mixture Models (GMM) vividly revealed the true diversity of the respondents' academic performance trajectories (shown in Appendix G). Some respondents were able to perform consistently well in academic tests, while others experienced significant increases or decreases of academic performance, regardless of their overall GPA. Over all, this study found that changes in academic performance are not only common, but also highly and positively related to college enrollment as indicated by a significant odds ratio for the slope factor. This supports my hypothesis that students who have been improving their academic standing over the high school years show higher probability of entering college than those whose performances have been declining. This finding indicates that the road to college enrollment involves a process. Students who failed to have an outstanding start in high school can still significantly increase their chances if they keep improving their academic performance.

Furthermore, this study investigates the influences of psychological well being on college attendance. Without ignoring the traditional focus on family background, the current study draws upon theories and findings from the rapid development of adolescent mental health research in recent years. In developmental psychology and stress process literature, mental health has been shown repeatedly to be related to academic performance (Eccles, Wigfield, & Schiefele, 1998; Kendall & Dobson, 1993). However, only a few studies have examined the effects of mental health on educational attainment

(Kessler, Foster, Saunders, Stang 1995; McLeod and Fettes 2007). Considering the deleterious effects of mental health problems, it is important to look into the long term effects of such psychological characteristics. The results indicated that internalizing mental health problems are predictors of a lower likelihood of 2-year college attendance. Both internalizing and externalizing problems reduce the likelihood of 4-year college enrollment, suggesting that mental health problems can have long term consequences for young people's educational attainment. High college aspirations enhance the ability of students to enter college by encouraging goal oriented efforts.

Lastly, this study explored factors that could mediate the effects of mental health and examined the mediation effects of psychological factors. The data analysis showed that the effects of both internalizing and externalizing problems on college attendance, 4-year college in particular, were mediated by academic performance and college aspirations, supporting my second and third hypothesis. Mental health problems, no matter whether they are internalizing or externalizing problems, potentially caused the respondents to be alienated from education as an institution, leading to lower aspirations for advanced education and lower academic performance. In addition, it was hypothesized that mental health well being and the development of educational aspirations mediate the effects of socioeconomic background, accounting partly for variations in college attendance. According to the results, internalizing problems and college aspirations do partially mediate the effect of SES and parental involvement on college attendance. Students with more advantaged SES backgrounds and warm,

communicative parents are less likely to be depressed and have higher aspirations, both of which improve GPA and thus likelihood of entering college. However, adding externalizing problems to predict college attendance resulted in increases in the odds ratios of SES variables and parental involvement. Overall, the results support my fourth hypothesis that mental health and the development of educational aspirations, mediate the effects of socioeconomic background, accounting partly for variations in college attendance.

Another mediation effect is related to gender differences in college attendance. This study attempted to explain the gender differences in college enrollment using differential mental health risks. It has been commonly accepted that psychological well being and mental health are gender specific. Females are more likely to have internalizing problems (Ge, Conger, Lorenz, Shanahan, and Elder, 1995) while still maintaining a high rate of college attendance. Males, on the other hand, are more at risk of externalizing problems (Patterson, Reid, and Dishion, 1992) and are less likely to go to college compared to females (Buchmann, DiPrete, and McDaniel 2008). The results showed that the advantage of females in college attendance decreased when delinquency was controlled but increased when depression was controlled. This pattern is clearly caused by the differential risks of different mental health problems for males and females. However, when both types of mental health problems were included in the data analysis, there was only a small reduction (about 5%) in the gender differences in college attendance. This reduction, although relatively small, does provide some support for my

hypothesis that differential risks to specific mental health problems lead fewer males to attend college than females. In other words, the greater prevalence of externalizing problems among males has greater negative influence on their likelihood of 4-year college attendance than females' higher risk of internalizing problems.

To further understand how gendered risks of different mental health problems may have led to gender differences in college attendance, sensitivity analyses were conducted by adding interactions between mental health and female to Model 4 to detect gender difference in the effects of mental health on college attendance. However, these interactions were not significant, suggesting that the negative influences of mental health problems on college attendance for young women is as consequential as for young men. However, differences in college aspiration and academic performance have contributed to most of the gender difference in college attendance.

The current study also has a number of limitations. First, although all respondents included in the data analysis have graduated from high school, some respondents were relatively young when interviewed in wave III. It is possible that some of these respondents will enter college later, after spending some time in the labor force. Another potential weakness of the study is that the independent variables come from wave I and II. Due to the multi-cohort design, some respondents were interviewed in the early years of high school, while others were interviewed in later years of high school. It is possible that the psychological variables are more highly related to college attendance in later years than earlier years, hence making the results more conservative. Third, the academic

performance trajectory was limited to the high school years only. It may be helpful to have students' test scores from middle school or even elementary school for an improved coverage in constructing academic performance trajectory. It is possible that some of the major changes in academic performance have already started in earlier years. Last, due to data limitations, this study was only able to study the effects of mental health on college enrollment. Given that people's psychological characteristics, including their mental health, have a moderate degree of stability over time, it is reasonable to assume that mental health status in high school not only is related to the likelihood of entering college, but also has implications for finishing it. Overall, the consequences of mental health problems on educational attainment are understudied given its importance. Given the high rate of college drop outs, future study on the long term effect of mental health in high school on post-secondary education is needed given that more students with mental health problems are entering college (Benton, Robertson, Tseng, Newton, and Benton 2003).

In sum, despite the limitations described above, this study found: (1) an increasing academic performance trajectory is associated with greater likelihood of entering 2-year or 4-year college; (2) internalizing and externalizing mental health problems affect students' 4-year college attendance through college aspiration and academic performance; (3) the effects of SES and parenting is partially mediated through mental health; (4) although female students' higher risk of internalizing problems and male students' higher risk of externalizing problems both reduces their likelihood to enter 4-year college, male

students suffered greater consequences from mental health problems due to potentially more harmful influences of externalizing problems on college attendance.

Table 4.1 Latent Curve Analysis of Students' GPAs

Means	Estimates	Est./S.E.
I	2.606**	279.606
S	-0.122**	-16.990
Q	0.048**	20.560
Variances		
I	0.672**	33.658
S	0.123**	5.854
Q	0.014**	9.965
Covariances		
I with S	-0.009	-0.430
I with Q	-0.010	-1.960
S with Q	-0.035**	-7.285
Fit Indices		
CFI	0.996	
TLI	0.975	
RMSEA	0.078	

Table 4.2 Descriptive Data Analysis

	Male (N=2882)		Female (N=3358)				
	Mean/%	St.D	Mean/%	St.D	Min	Max	
No College	39.8%		32.1%				*
2-year College	21.9%		22.7%				
4-year College	37.3%		45.2%				*
Whites	78%		75%				
Blacks	22%		25%				
Household Income	48.81	41.32	50.08	51.59	0	999	
Parent Education (High School-)	5%		6%				
Parent Education (High School)	34%		36%				
Parent Education (College+)	61%		58%				
Parental Involvement	3.55	1.65	3.94	1.62	0	10	*
School Grade at Wave 1	9.49	1.60	9.44	1.64	7	12	
PVT Score at Wave 1	58.77	27.14	54.37	27.55	0	100	*
Delinquency	0.19	1.01	-0.14	0.71	-0.73	7.23	*
Depression	1.99	1.86	2.57	2.31	0	15	*
College Aspirations	8.50	1.95	8.96	1.64	2	10	*
GPA for the 9^{th} Grade	2.46	0.89	2.72	0.87	0	4	*
GPA for the 10^{th} Grade	2.41	0.91	2.71	0.87	0	4	*
GPA for the 11^{th} Grade	2.42	0.91	2.73	0.86	0	4	*
GPA for the 12^{th} Grade	2.59	0.88	2.93	0.80	0	4	*
GPA Trajectory							
Intercept	2.50	0.78	2.78	0.74	0.22	3.92	*
Slope	-0.13	0.19	-0.11	0.18	-1.11	0.98	*
Quadratic	0.05	0.07	0.05	0.07	-0.26	0.40	

Note: An * indicates there is a significant gender difference for that variable.

Table 4.3 Odds Ratios of Multinomial Logistic Regression Predicting College Attendance (Reference=No College)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
2-yr College vs. no College	OR	OR	OR	OR	OR	OR
Female	1.51***	1.47***	1.56***	1.51***	1.33**	1.08
Black (Ref=White)	1.33*	1.34*	1.34*	1.35*	1.14	1.41**
Household Income	1.12***	1.12***	1.12***	1.12***	1.10***	1.08***
Parent Education (High School)	1.91**	1.94***	1.89**	1.92***	1.79**	1.77**
Parent Education (College)	2.55***	2.59***	2.52***	2.56***	2.21***	2.15***
Parental Involvement	1.14***	1.14***	1.14***	1.14***	1.09**	1.07*
School Grade at Wave 1	1.05	1.05	1.06	1.06	1.10*	1.10*
PVT Score at Wave 1	1.01***	1.01***	1.01***	1.01***	1.01***	1.01***
Delinquency		0.90*		0.92	0.97	1.06
Depression			0.96*	0.97	1.01	1.03
College Aspirations					1.35***	1.32***
Intercept of GPA Trajectory						2.13***
Slope of GPA Trajectory						3.38**
Quadratic of GPA Trajectory						41.1***
4-yr College vs. no College	OR	OR	OR	OR	OR	OR
Female	1.89***	1.67***	2.04***	1.78***	1.49***	0.87
Black (Ref=White)	1.77***	1.85***	1.81***	1.87***	1.52**	2.77***
Household Income	1.24***	1.24***	1.23***	1.24***	1.20***	1.17***
Parent Education (High School)	3.34***	3.55***	3.19***	3.42***	2.94***	2.88***
Parent Education (College)	6.92***	7.48***	6.65***	7.21***	5.43***	4.99***
Parental Involvement	1.30***	1.29***	1.28***	1.28***	1.18***	1.13***
School Grade at Wave 1	1.12**	1.11**	1.14***	1.13***	1.16***	1.20***
PVT Score at Wave 1	1.03***	1.03***	1.03***	1.03***	1.02***	1.01***
Delinquency		0.63***		0.66***	0.75***	1.01
Depression			0.89***	0.92**	0.98	1.02
College Aspirations					1.92***	1.68***
Intercept of GPA Trajectory						8.90***
Slope of GPA Trajectory						39.41***
Quadratic of GPA Trajectory						10444***
N	6240	6240	6240	6240	6240	6240
* p<0.05, ** p<0.01, *** p<0.001						

Figure 4.1 Diagram of the Theoretical Model

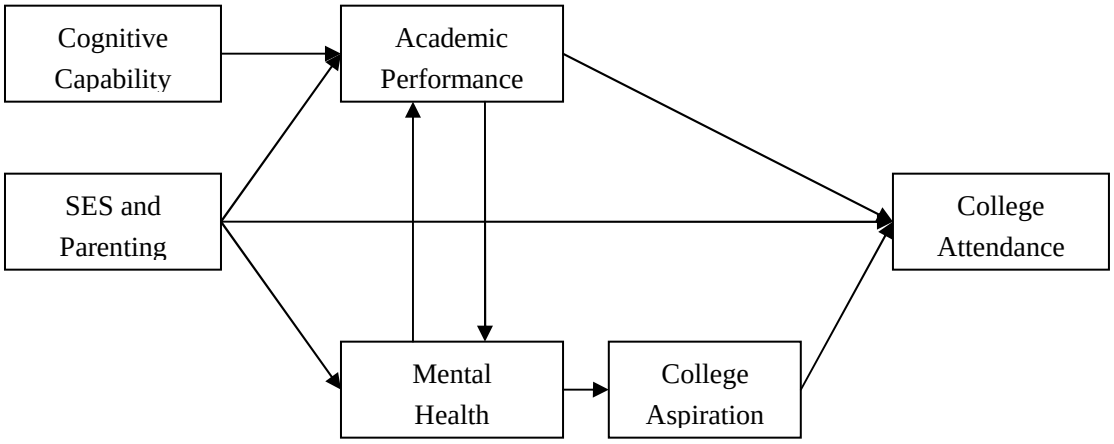
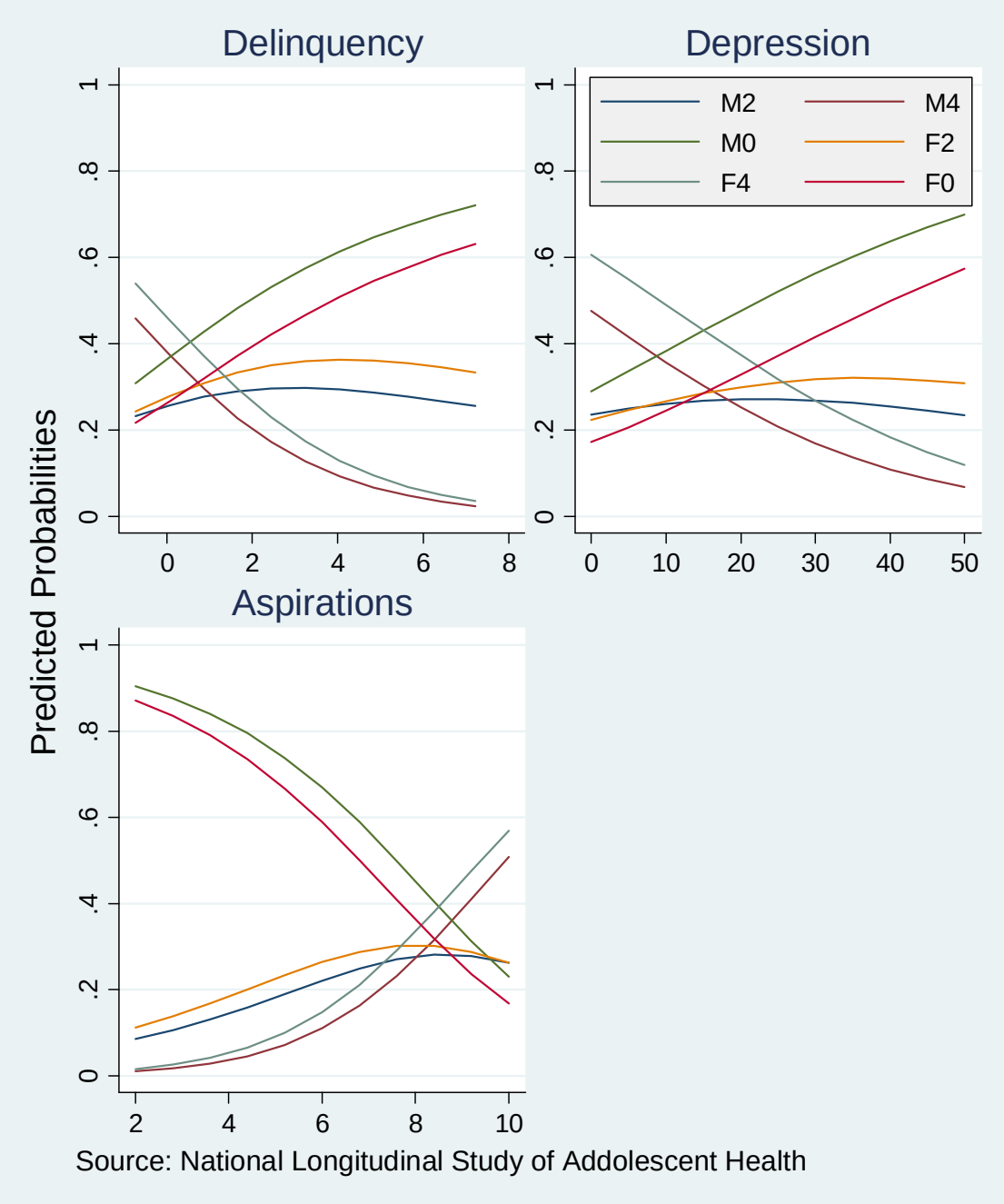


Figure 4.2 Predicted Probabilities of College Enrollment by Gender



Note: Predicted probabilities for the effects of depression and delinquency are based on Model 2, while predicted probabilities for the effects of aspirations are based on Model 4.

Legend: M2 = Male, 2-year college; F2 = Female, 2-year college
M4 = Male, 4-year college; F4 = Female, 4-year college
M0 = Male, non-college; F0 = Female, non-college

CHAPTER FIVE

Conclusion

This study takes an interdisciplinary approach to co-occurring academic and mental health problems, with special attention to "the interdependent, individual-level processes that underlie academic success, difficulty, or disability" (Roeser and Eccles, 1997). The objective of the substantive chapters was to provide a greater understanding of developmental processes, linking mechanisms, and consequences of such joint occurrences using Add Health data and a variety of methods.

Chapter 2 investigated the overall relationship between academic difficulties and mental health problems over the high school years. This chapter found that academic difficulties persistently lead to internalizing and externalizing problems during high school. However, the effect of academic problems on depression decreases while its effect on delinquency grows over time. On the other hand, mental health problems also increase the size of academic problems throughout high school, although their effects remain relatively low over time. In addition, this study showed that gendered risks of internalizing and externalizing problems found in previous studies are present in academic settings. This study also showed that greater parental involvement reduces mental health problems among adolescents. However, positive parenting only protects

against depressive symptoms, not delinquency. And it might be less protective for females and Blacks.

Chapter 3 focused on how academic problems lead to one type of mental health problems (such as internalizing and externalizing) versus another. In this chapter, I found that higher self-esteem and an internal locus of control generally protect the adolescents from both internalizing and externalizing problems. Their protective effect is even stronger against depression when adolescents face academic difficulties. This study also provided very clear evidence that self-esteem and locus of control are related to the types of mental health problems adolescents tend to experience, e.g., boys and girls with high esteem tend to have externalizing problems more than internalizing problems and girls with high mastery are more likely to have internalizing problems than externalizing problems. However, self-esteem and mastery was not found to affect the tendency of depressed effect versus delinquent behavior in situations of academic stress. Instead, these coping resources contributed directly to the gendered risks of different types of mental health problems.

The goal of Chapter 4 was to examine whether, and if so, how the interrelated academic difficulties and mental health problems affect differential rates of college attendance. This chapter found that: (1) an increasing academic performance trajectory is associated with a greater likelihood of entering a 2-year or 4-year college; (2) internalizing and externalizing mental health problems adversely affect students' college attendance through lower college aspirations and academic performance; (3) the effects

of SES and parenting are only partially mediated by mental health; (4) gender differences in college attendance are partly due to gender differences in the risk of internalizing and externalizing problems.

This study has been guided by a dynamic, developmental perspective which is reflected in the study in a number of ways. For example, I use longitudinal analysis in Chapter 2 to examine the relationship between academic problems and mental health over time. From adolescence to young adulthood, a developmental approach offers greater understanding of the process by which academic and mental health problems evolve over time. Additionally, attention to timing in the measurement of mental health problems enabled a better design for models that more closely matched the relation of internalizing and externalizing problems to academic performance. Temporal order in this longitudinal study provided a stronger case regarding the directionality of the association between academic performance and mental health problems. When a low yearly GPA predicts depression at the end of a school year after controlling for depression in the previous year, it provides more compelling evidence that academic performance is affecting symptoms of depression rather than the reverse. Another example of the developmental perspective is found in Chapter 4 which examined how the changes in academic performance during high school affected the probability of college enrollment. Changes in academic performance are common, and highly related to college enrollment.

The use of sophisticated statistical techniques made modeling these developmental processes and complex scenarios possible. The analytic approach of

Chapter 2 enabled me to relate academic and mental health problems and assess the reciprocal relationships between them over time. The use of SEM in Chapter 3 facilitated the model of internalizing and externalizing problems as outcomes and in terms of magnitude and directionality as outcomes. Modeling two inter-correlated dimensions of mental health problems simultaneously in SEM allows them to correlate with each other, producing more accurate estimates of the effects of the independent variables. In Chapter 4, the use of LCM and factor scores made extracting trajectories of academic performance of individual respondents possible.

Testing various theories and ideas based on the literature benefited from improved and innovative measures. Chapter 3 took an innovative approach by combining internalizing and externalizing problems and measuring mental health problems with two new dimensions (directionality and magnitude). This allowed a direct investigation of the tendency by adolescents towards experiencing one type of mental health problems over the other. The use of the directionality concept and measure provided a rare opportunity to more clearly examine the channeling effects of self-esteem and locus of control. In addition, instead of one highly heterogeneous college category, Chapter 4 distinguished both 2-year and 4-year college attendance. Most previous studies have mixed the two types of higher education into one big category and therefore failed to take into account their differences such as the stringency of their admission criteria. By contrast, I was able to investigate more specifically the effects of mental health problems on 2-year and 4-year college attendance.

Aside from the contributions above, this study is also limited in the following ways. First, measurement is less than ideal in some cases. For example, a single item locus of control measure was used because a comprehensive scale of locus of control was not available in the Add Health data. Furthermore, instead of confirmatory factor analysis, summed scores, which have greater measurement errors, were used to measure depression, delinquency, and self-esteem to avoid over-stressing the already complex models. Second, this study was not able to (fully) implement certain longitudinal approaches due to data limitation. For example, in Chapter 2, having only two waves of repeated measures of depression and delinquency presented serious convergence problems for multivariate latent curve models (LCM). In Chapter 3, a cross-sectional analysis was adapted since conventional longitudinal methods such as LCM and the change score method were not suitable for the particular analyses due to unique characteristics of the data. In addition, this study also posts several new questions to be answered. Below I discuss possible ways that this research can be improved and expanded in the future.

Overall, this study found that the relationship between academic stressors and externalizing mental health problems is not as strong as with internalizing problems for both boys and girls. Future studies are needed to identify psychological aspects that better explain the differential risks of delinquency among adolescents, especially males. Furthermore, this study used a comprehensive measure of delinquency, which includes both serious delinquency and violent delinquency, to improve coverage of externalizing

behaviors. Sensitivity analysis showed that serious delinquency was more strongly correlated with academic difficulties than violent delinquency. Also, the independent variables were more predictive of serious delinquency than violent delinquency. Further studies are needed to fully understand the exact nature and cause of the differences between these types of delinquency.

In addition to self-esteem and mastery, there are other factors that could potentially help to further explain the differential risks to internalizing and externalizing problems. For example, extraversion-introversion, one of the Big Five personality traits, is a possible candidate. Extraverted people are primarily concerned with what is outside the self, while the introverted are predominantly interested in their own mental life. In terms of mental heath, extraversion-introversion could lead some respondents to delinquency and others to depression in academic settings, respectively. A study by Myers (1992) found a correlation between extraversion and personal happiness; introverted people are not as happy as the extraverted. When facing academic difficulties, preferences for being alone may exacerbate depressed mood, while an outgoing and sharing person may be cheered up by his/her social surroundings and reach out for support. On the other hand, extraverted youths are more likely to engage in delinquent behavior (Ryckman, 2004), expressing emotional frustration through social channels. Unfortunately, this measurement was not included in the Add Health data used in this study. Recent advances in biology may also promote a genetic explanation for internalizing versus externalizing problems. However, this direction, although promising,

is beyond the scope of this discussion.

The trajectory of academic performance in this study was limited to high school only. It may be helpful to have students' test scores and mental health measures from middle school or even the elementary school years for more extensive coverage of the trajectory of academic and mental health problems. It is possible that some of the significant developments have already begun in earlier years. In addition, this study was only able to study the negative influences of mental health problems on college enrollment due to data limitations. Given that people's psychological characteristics, including their mental health, have a moderate degree of stability over time, it is reasonable to assume that mental health status in high school not only is related to the likelihood of entering college, but also has implications for finishing it. Overall, the consequences of mental health problems on educational attainment are understudied considering its importance for the long-term life chances of young people.

Appendix A
Serious Delinquency Scale, Chapter 2, 3, and 4

	In the past 12 months, how often did you ...
1	paint graffiti or signs on someone else's property or in a public place?
2	deliberately damage property that didn't belong to you?
3	lie to your parents or guardians about where you had been or whom you were with?
4	take something from a store without paying for it?
5	run away from home?
6	drive a car without its owner's permission?
7	steal something worth more than $50?
8	go into a house or building to steal something?
9	sell marijuana or other drugs?
10	steal something worth less than $50?
11	act loud, rowdy, or unruly in a public place?

Appendix B
Violent Delinquency Scale, Chapter 2, 3, and 4

	During the past 12 months, how often did each of the following things happen?
1	You got into a physical fight?
2	You pulled a knife or gun on someone?
3	You hurt someone badly enough to need bandages or care from a doctor or nurse?
4	You shot or stabbed someone?
5	You used or threatened to use a weapon to get something from someone?
6	You took part in a fight where a group of your friends was against another group?

Appendix C
19-item CES-D Scale, Chapter 2, 3, and 4

	Now, think about the past seven days. How often was each of the following things true during the past seven days?
1	You were bothered by things that usually don't bother you.
2	You didn't feel like eating, your appetite was poor.
3*	You felt that you could not shake off the blues, even with help from your family and your friends.
4	You felt that you were just as good as other people.
5	You had trouble keeping your mind on what you were doing.
6*	You felt depressed.
7	You felt that you were too tired to do things.
8	You felt hopeful about the future.
9	You thought your life had been a failure.
10	You felt fearful.
11*	You were happy
12	You talked less than usual.
13	You felt lonely.
14	People were unfriendly to you.
15	You enjoyed life.
16*	You felt sad.
17	You felt that people disliked you.
18	It was hard to get started doing things.
19*	You felt life was not worth living.

Items with * make up the 5-item scale used in chapters 2 and 4. The full-19 item scale is used in chapter 3.

Appendix D
Parental Involvement Scale, Chapter 2, 3, and 4

	Which of the things listed on this card have you done with your {Mother/Adoptive Mother/Stepmother/Foster mother/etc.} and {Father/Adoptive Father/Stepfather /Foster Father/etc.} in the past 4 weeks?
1	gone shopping
2	played a sport
3	gone to a religious service or church-related event
4	talked about someone you're dating, or a party you went to
5	gone to a movie, play, museum, concert, or sports event
6	had a talk about a personal problem you were having
7	talked about your school work or grades
8	worked on a project for school
9	talked about other things you're doing in school

Appendix E
Self-esteem Scale, Chapter 3

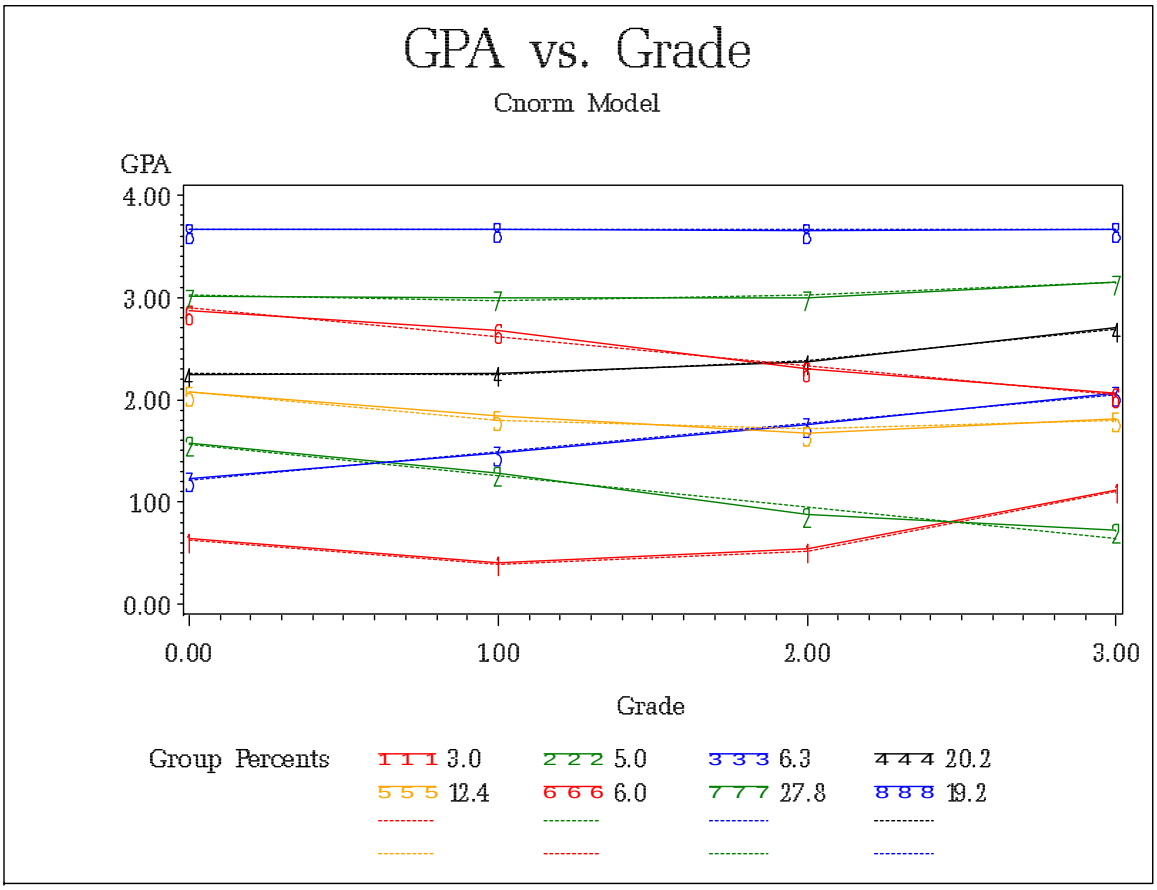
1	You have a lot of good qualities.
2	You have a lot to be proud of.
3	You like yourself just the way you are.
4	You feel like you are doing everything just about right.

Appendix F

Cronbach's Alpha for various measurement scales by gender and wave, Chapter 2, 3, and 4

	Wave I		Wave II	
	Female	Male	Female	Male
Violence Scale	0.72	0.75	0.55	0.62
Delinquency Scale	0.79	0.82	0.76	0.82
Depression Scale	0.82	0.77	0.82	0.78
Self-esteem Scale	0.73	0.66	0.76	0.72
Parental Involvement	0.69	0.72	0.7	0.73

Appendix G
Clusters of Academic Performance Trajectories, Chapter 4



Note: This graph shows the result of Growth Mixture Models (GMM). GMM groups respondents with similar trajectories together to form clusters. The results show 8 clusters, each with a distinct academic trajectory profile.

Appendix H
Theorized Association between Coping Resources and Mental Health Problems, Chapter 4

Coping Resources	Mental Health Problems
low esteem	more both problems but even more internalizing problems
high esteem	less both problems but even less internalizing problems
low mastery	more both problems but even more externalizing problems
high mastery	less both problems but even less externalizing problems
low esteem + high mastery	much more internalizing problems
high esteem + low mastery	much more externalizing problems

References

Achenbach, T. M. (1991). `Comorbidity' in Child and Adolescent Psychiatry: Categorical and Quantitative Perspectives. *Journal of Child and Adolescent Psychopharmacology* 1, 271-278.

Allen JP, Leadbeater BJ, Aber JL. (1994). The Development of Problem Behavior Syndromes in At-risk Adolescents. *Development and Psychopathology* 6, 323-42.

Ames C, Archer J. (1988). Achievement Goals in the Classroom – Students Learning-Strategies and Motivation Processes. *Journal of Educational Psychology* 80, 260-7.

Aneshensel CS, Rutter CM, Lachenbruch PA. (1991). Social Structure, Stress, and Mental-health - Competing Conceptual and Analytic Models. *American Sociological Review* 56, 166-78.

Angold A, Costello EJ. (1995). Developmental Epidemiology. *Epidemiologic Reviews* 17, 74-82.

Angold A, Rutter M. (1992). Effects of Age and Pubertal Status on Depression in a Large Clinical-sample. *Development and Psychopathology* 4, 5-28.

Astor. R. A. (1998). Moral Reasoning about School Violence: Informational Assumptions about Harm within School Subcontexts. *Educational Psychologist* 33, 207-221.

Baker, T., and Velez, W. (1996). Access to and Opportunity in Postsecondary Education in the United States: A Review. *Sociology of Education* 69, 82-101.

Barkley, R. A. (1998). Attention-deficit Hyperactivity Disorder. *Scientific American* 279, 66-71.

Ball, Stephen J., Jackie Davies, Miriam David and Diane Reay (2002). 'Classification' and 'Judgement': Social Class and the 'Cognitive Structures' of Choice of Higher Education. *British Journal of Sociology of Education* Vol. 23, No. 1, pp. 51-72.

Barnes, G. M., Farrell, M.P., and Cairns, A. (1986). Parental Socialization Factors and Adolescent Drinking Behaviors. *Journal of Marriage and the Family* 48, 27-36.

Baumeister RF, Heatherton TF, Tice DM, (1993) When Ego Threats Lead to

Self-regulation Failure – Negative Consequences of High Self-esteem. *Journal of Personality and Social Psychology* 64(1), 141-156.

Baumeister, R., Smart, L. and Boden, J. (1996). Relation of Threatened Egotism to Violence and Aggression: The Dark Side of Self-esteem. *Psychological Review* 103, 5–33.

Baumeister, Roy F. (2001). Violent Pride. *Scientific American* 284(4), 96–101.

Baumeister, Roy F., et al. (2003). Does High Self-Esteem Cause Better Performance, Interpersonal Success, Happiness, or Healthier Lifestyles? *Psychological Science in the Public Interest* 4 (1), 1–44. (ed: other researchers: Jennifer D. Campbell, Joachim I. Krueger and Kathleen D. Vohs).

Benton, S. A., Robertson, J. M., Tseng, W. C., Newton, F. B., and Benton, S. L. (2003). Changes in Counseling Center Client Problems across 13 years. *Professional Psychology: Research and Practice* 34, 66-72.

Blechman. E. A., McEnroe, M. L Carella, E. T., and Audette, D. P. (1986). Childhood Competence and Depression. *Journal of Abnormal Psychology* 95, 223-227.

Boekaerts, M. (1993), Being Concerned with Well-being and with Learning. *Educational Psychologist* 28, 149-J67.

Bollen, K. A. and P. J. Curran. (2006). *Latent Curve Models: A Structural Equation Approach*. New York: Wiley.

Bowen, Howard and Cameron Fincher (Introduction) (1996). *Investment in Learning: The Individual and Social Value of American Higher Education*. Transaction Publishers.

Buchmann C, DiPrete TA, McDaniel A (2008). Gender inequalities in education. *Annual Review of Sociology* Volume 34, pp. 319-337.

Burbach, D. M., and Borduin, C. M. (1986). Parent-child Relations and the Etiology of Depression: A Review of Methods and Findings. *Clinical Psychology Review* 6, 133-153.

Cabrera, Alberto F., Steven M. La Nasa (2000). Understanding the College-Choice Process. *New Directions for Institutional Research* Volume 2000 Issue 107, pp. 5-22.

Cabrera, AF, SM La Nasa (2001). On the Path to College: Three Critical Tasks Facing America's Disadvantaged. *Journal Research in Higher Education* Volume 42, Number 2, pp. 119-149.

Cairns, E., McWhirter, L., Duffy, U., and Barry, R. (1990). The Stability of Self-concept in Late Adolescence: Gender and Situational Effects. *Personality and Individual Differences* 11, 937-944.

Chassin, L., Pillow, D. R., Curran, P. J., Molina, B. S. G., and Barrera, M., Jr. (1993). Relation of Parental Alcoholism to Early Adolescent Substance Use: A Test of Three Mediating Mechanisms. *Journal of Abnormal Psychology* 102, 3-19.

Cicchetti D. (1984). The Emergence of Developmental Psychopathology. *Child Development* 55, 1-7.

Cicchetti D, Toth SL. (1998). The Development of Depression in Children and Adolescents. *American Psychologist* 53, 221-41.

Cohn E, Cohn S, Balch DC, and Bradley JJ. (2004) Determinants of Undergraduate GPAs: SAT Scores, High-School GPA and High-school Rank. *Economics of Education review* 23(6), 577-586.

Conger, R. D., Rueter, M. R., and Conger, K. J. (1994). The Family Context of Adolescent Vulnerability and Resilience to Alcohol Use and Abuse. *Sociological Studies of Children* 6, 55-86.

Conklin, M. E., and Dailey, A. R. (1981). Does Consistency of Parental Educational Encouragement Matter for Secondary School Students? *Sociology of Education* 54, 254-262.

Connell, J. P., and Wellborn, J. G. (1991). Competence, Autonomy and Relatedness: A Motivational Analysis of Self-system Processes. in M. R. Gunnar and L. A. Sroufe (Eds.), *Self-processes in Development: Minnesota Symposium on Child Psychology* 23, 43-77. Hillsdale, NJ: Erlbaum.

Coombs, R. H., and Landsverk, J. (1988). Parenting Styles and Substance Use during Childhood and Adolescence. *Journal of Marriage and the Family* 50, 473-482.

Coutinho, Martha J., and R. Kenton Denny. (1996). National Leadership for Children and Youth with Serious Emotional Disturbance: Progress and Prospects. *Journal of*

Child and Family Studies 5, 207–27.

Cronbach, L. J. (1951). Coefficient Alpha and the Internal Structure of Tests. *Psychometrika* 16(3), 297-334.

Crocker, J., and Park, L. E. (2004). The Costly Pursuit of Self-esteem. *Psychological Bulletin* 130(3), 392–414.

Curran, P. J. (2000). A Latent Curve Framework for Studying Developmental Trajectories of Adolescent Substance Use. Pp. 1-42 in J. Rose, L. Chassin, C. Presson, and J. Sherman (Eds.). *Multivariate Applications in Substance Use Research*. Hillsdale, NJ: Erlbaum.

Dishion, T. L., French, D. c., and Patterson, G. R. (1995). The Development and Ecology of Antisocial Behavior. In D.Cicchetti and D. J. Cohen (Eds.), *Developmental Psychopathology: Volume 2. Risk, Disorder, and Adaptation* (pp. 421-471). New York: Wiley.

Downey, G., and Coyne, J. C. (1990). Children of Depressed Parents: An Integrative Review. *Psychological Bulletin* 108, 50-76.

Dryfoos. J. G. (I994) *Full Service Schools: A Revolution in Health and Social Services for Children, Youth and Families*. San Francisco: Jossey-Bass.

DuBois, D. L., Felner, R. D., Brand, S., Adan, A.M., and Evans, E.G. (1992). A Prospective Study of Life Stress, Social Support, and Adaptation in Early Adolescence. *Child Development* 63, 542-557.

Duttweiler, P.C. (1984). The Internal Control Index: A Newly Developed Measure of Locus of Control. *Educational and Psychological Measurement* 44, 209-221.

Dweck. C. S., and Wortman, C. B. (1982). Learned Helplessness, Anxiety, and Achievement Motivation: Neglected Parallels in Cognitive, Affective, and Coping Responses. In H. Krohne and L. Laux (Eds.), *Achievement, Stress, and Anxiety* (pp. 93-125). Washington, DC: Hemisphere.

Eccles. J. S., Wigfield, A., and Schiefele, U. (1998). Motivation to Succeed. In W. Damon (Ed.), N. Eisenberg (Series Ed.), *Handbook of Child Psychology: Vol. 3. Social, Emotional, and Personality Development 5th ed.* (pp. 1017-1095). New York: Wiley.

Ensminger, Margaret E., and Anita L. Slusarcick. (1992). Paths to High School Graduation or Dropout: A Longitudinal Study of a First-Grade Cohort. *Sociology of Education* 65, 95–113.

Entwisle, Doris R., Karl L. Alexander, and Linda Steffel Olson. (2003). The First Grade Transition in Life Course Perspective. Pp. 229–50 in J. T. Mortimer and M. J. Shanahan (Eds.) *Handbook of the Life Course*. New York: Kluwer/Plenum.

Faircloth BS, Hamm JV (2005). Sense of Belonging among High School Students Representing 4 Ethnic Groups. *Journal of Youth and Adolescence* 34(4), 293-309.

Ge XJ, Best KM, Conger RD, Simons RL. (1996). Parenting Behaviors and the Occurrence and Co-occurrence of Adolescent Depressive Symptoms and Conduct Problems. *Developmental Psychology* 32, 717-31.

Ge XJ, Conger RD, Lorenz FO, Shanahan M, Elder GH. (1995). Mutual Influences in Parent and Adolescent Psychological Distress. *Developmental Psychology* 31, 406-19.

Gecas, V. (1989). The Social Psychology of Self-efficacy. *Annual Review of Sociology* 15, 291-316.

Gershaw, D.A., (1989) A Line on Life, Preventing Suicide. Adapted from Simons, Irwin and Drinnin's *Psychology: The Search for Understanding*. p 542. West Publishing, 1987.

Goodenow, C. (1993). The Psychological Sense of School Membership among Adolescents: Scale Development and Educational Correlates. *Psychology in the Schools* 30, 79-90.

Gotlib,I. H., and MacLeod. C. (1997). Information Processing in Anxiety and Depression: A Cognitive-developmental Perspective. In J. A. Burack and J. T. Enns (Eds.), *Attention, Development, and Psychopathology* (pp. 350-378). New York: Gudford Press.

Gottfredson, Michael R. and Travis Hirschi (1990). *A General Theory of Crime*. Stanford University Press.

Greenbaum, Paul E., and Robert F. Dedrick. (1996). National Adolescent and Child Treatment Study (NACTS): Outcomes for Children with Serious Emotional and Behavioral Disturbance. *Journal of Emotional and Behavioral Disorders* 4,

130–46.

Hagan J, Foster H. (2003). S/He's a rebel: Toward a Sequential Stress Theory of Delinquency and Gendered Pathways to Disadvantage in Emerging Adulthood. *Social Forces* 82, 53-86.

Hearn, J. C. (1984). The Relative Roles of Academic, Ascribed, and Socioeconomic Characteristics in College Destinations. *Sociology of Education* 57, 22-30.

Hearn, James C. (1988). Attendance at Higher-Cost Colleges: Ascribed, Socioeconomic, and Academic Influences on Student Enrollment Patterns. *Economics of Education Review* 7, 65-76.

Hearn JC. (1991). Academic and Nonacademic Influences on the College Destinations of 1980 High-school Graduates. *Sociology of Education* 64, 158-71.

Hill, K. T. and Wiglield, A. (1984). Text Anxiety: A Major Educational Problem and What Can be Done about It. *Elementary School Journal* 85, 105-126.

Hinshaw, S. P. (1992). Externalizing Behavior Problems and Academic Underachievement in Childhood and Adolescence: Causal Relationships and Underlying Mechanisms. *Psychological Bulletin* 111, 127-155.

Hossler, D., and Stage, F. K. (1992). Family and High School Experience Influences on the Postsecondary Educational Plans of Ninth Grade Students. *American Educational Research Journal* 29, 425-51.

Hughes, M., and D. H. Demo. (1989). Self-Perceptions of Black-Americans – Self-esteem and Personal Efficacy. *American Journal of Sociology* 95, 132-159.

Jessor, R., J. Vandenbos, J. Vanderryn, F. M. Costa, and M. S. Turbin. (1995). Protective Factors in Adolescent Problem Behavior – Moderator Effects and Developmental-change. *Developmental Psychology* 31:923-933.

Johnson, J.G., Cohen, P., Dohrenwend, B.P., Link, B.G. and Brook, J.S. (1999) A Longitudinal Investigation of Social Causation and Social Selection Processes Involved in the Association between Socioeconomic Status and Psychiatric Disorders. *Journal of Abnormal Psychology* 108(3), 490–9.

Kaplan, H. B., C. Robbins, and S. S. Martin. (1983). Antecedents of Psychological Distress in Young-adults – Self-rejection, Deprivation of Social Support, and Life

Events. *Journal of Health and Social Behavior* 24, 230-244.

Kaplan, H. B., R. J. Johnson, and C. A. Bailey. (1986). Self-rejection and the Explanation of Deviance – Refinement and Elaboration of a Latent Structure. *Social Psychology Quarterly* 49, 110-128.

Kaplan, H. B., S. S. Martin, and R. J. Johnson. (1986). Self-Rejection and the Explanation of Deviance – Specification of the Structure among Latent Constructs. *American Journal of Sociology* 92, 384-411.

Kellam, Sheppard G., Lisa Werthamer-Larsson, Lawrence J. Dolan, C. Hendricks Brown, Lawrence S. Mayer, George W. Rebok, James C. Anthony, Jolene Laudolff, Gail Edelsohn and Leonard Wheeler (1991). Developmental epidemiologically based preventive trials: Baseline modeling of early target behaviors and depressive symptoms. *American Journal of Community Psychology* Volume 19, Number 4.

Kellam, S. G., Rebok, G. W. Mayer, L. S., Ialongo, N., and Kalodner, C. R (1994). Depressive Symptoms over First Grade and Their Response to a Developmental Epidemiologically Based Preventive Trial Aimed at Improving Achievement. *Development and Psychopathology* 6, 463-481.

Kellam, S. G., Mayer L. S., Rebok, G. W., & Hawkins, W. E. (1998). Effects of improving achievement on aggressive behavior and of improving aggressive behavior on achievement through two preventive interventions: An investigation of causal paths. In B. Dohrenwend (Ed.), *Adversity, Stress, and Psychopathology* (pp.486-505). London: Oxford University Press.

Kendall, P. C., and Dobson, K. S. (1993). On the Nature of Cognition and Its Role in Psychopathology. In K. S. Dobson and P. C. Kendall (Eds.); *Psychopathology and Cognition* (pp. 1-18). San Diego, CA: Academic Press.

Kling, K. C., J. S. Hyde, C. J. Showers, and B. N. Buswell. (1999). Gender Differences in Self-esteem: A Meta-analysis. *Psychological Bulletin* 125, 470-500.

Knitzer J, Steinberg Z, Fleisch B. (1991). Schools, Childrens Mental-health, and the Advocacy Challenge. *Journal of Clinical Child Psychology* 20, 102-111.

Kovacs, M. (1992). *Children's Depression Inventory Manual*. North Tonawanda, NY: Multi-Health Systems.

Lazarus, R. S. (1991). *Emotion and Adaptation*. New York: Oxford University Press.

Lazarus RS (1993). From Psychological Stress to the Emotions: a History of Changing Outlooks. *Annual Review of Psychology* 44, 1-22.

Lareau, A. 1987. Social-class Differences in Family-school Relationships – The Importance of Cultural Capital. *Sociology of Education* 60, 73-85.

Lareau A (2002). Invisible Inequality: Social Class and Childrearing in Black Families and White Families. *American Sociological Review* 67(5), 747-776.

Lefcourt, H. M. (1976). *Locus of Control: Current Trends on Theory and Research*. New York: Lawrence Erlbaum Associates.

Lewinsohn PM, Roberts RE, Seeley JR, Rohde P, Gotlib IH, Hops H. (1994). Adolescent Psychopathology .2. Psychosocial Risk-factors for Depression. *Journal of Abnormal Psychology* 103, 302-15.

Lewinsohn PM, Hops H, Roberts RE, Seeley JR, Andrews JA. (1993). Adolescent Psychopathology .1. Prevalence and Incidence of Depression and Other DSM-III-R Disorders in High-school-students. *Journal of Abnormal Psychology* 102, 133-44.

Loeber R, Stouthamer-Loeber M. (1998). Development of Juvenile Aggression and Violence - Some Common Misconceptions and Controversies. *American Psychologist* 53, 242-59.

Marsh, H. W. (1990). Causal Ordering of Academic Self-concept and Academic-Achievement – A multiwave, Longitudinal Panel Analysis. *Journal of Educational Psychology* 82, 646-656.

Masten AS, Garmezyn, Tellegen A, et al. (1988). Competence and Stress in School-children – the Moderating Effects of Individual and Family Qualities. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 29(6), 745-764.

Masten, A. S., N. Garmezy, A. Tellegen, D. S. Pellegrini, K. Larkin, and A. Larsen. (1988). Competence and Stress in School-children – The Moderating Effects of Individual and Family Qualities. *Journal of Child Psychology and Psychiatry and Allied Disciplines* 29, 745-764.

McDonough, Patricia M. (1994). Buying and Selling Higher Education: The Social

Construction of the College Applicant. *The Journal of Higher Education* Vol. 65, No. 4, pp. 427-446.

McLeod JD, Fettes DL (2007). Trajectories of Failure: The Educational Careers of Children with Mental Health Problems. *American Journal of Sociology* 113(3), 653-701.

Meadows, Sarah O., J. Scott Brown and Glen H. Elder Jr. (2006). Depressive Symptoms, Stress, and Support: Gendered Trajectories from Adolescence to Young Adulthood. *Journal of Youth and Adolescence* Volume 35, Number 1, pp. 89-99.

Miech, R.A., Caspi, A., Moffi tt, T.E., Wright, B.R.E. and Silva, P.A. (1999). Low Socioeconomic Status and Mental disorders: A Longitudinal Study of Selection and Causation during Young Adulthood. *American Journal of Sociology* 104(4), 1096–131.

Mirowsky, J., and Ross, C. E. (1989). Psychiatric Diagnosis as Reified Measurement. *Journal of Health and Social Behavior* 30, 11-25.

Mirowsky, John and Catherine E. Ross. (1986). Social Patterns of Distress. Pp. 23-45 in *Annual Review of Sociology*. Palo Alto: Annual Reviews Inc.

Mirowsky, John and Catherine E. Ross. (2003). *Social Causes of Psychological Distress, 2nd Ed*. NY: Aldine de Gruyter.

Mone, M. A., D. D. Baker, and F. Jeffries. (1995). Predictive-validity and Time Dependency of Self-efficacy, Self-esteem, Personal Goals, and Academic-performance. *Educational and Psychological Measurement* 55, 716-727.

Mortenson TG (1991). *Equity of Higher Educational Opportunity for Women, Black, Hispanic, and Low Income Students (ACT Student Financial Aid Research Report No. 91-1).* Iowa City, IA: American College Testing Program.

Mortenson, T. G., and Wu, A. (1990). *High School Graduation and College Participation of Young Adults by Family Income Backgrounds, 1970 to 1989*. Iowa City: American College Testing Program.

Neel, Richard S., Nancy Meadows, Phyllis Levin, and Eugene B. Edgar. (1988). What Happens after Special Education: A Statewide Follow-up Study of Secondary Students Who Have Behavioral Disorders. *Behavioral Disorders* 13, 209–16.

Nolen-Hoeksema, S., Girgus, J. S., and Seligman. M. E. P. (1986). Learned Helplessness in Children: A Longitudinal Study of Depression, Achievement, and Explanatory Style. *Journal of Personality and Social Psychology* 51, 435-442.

Nottelmann, E. D., and Jensen, P. S. (1995). Comorbidity of Disorders in Children and Adolescents: Developmental Perspectives. *Advances in Clinical Child Psychology* 17, 109-155.

Ollendick, T R., Weist, M. D., Borden, M. c., and Greene. R. W (1992). Sociometric Status and Academic, Behavioral and Psychological Adjustment: A five-year Longitudinal Study. *Journal of Consulting and Clinical Psychology* 60, 80-87.

Parker, J. G., and Asher, S. R. (1987). Peer Relations and Later Personal Adjustment: Are Low-accepted Children at Risk? *Psychological Bulletin* 102, 357-389.

Patterson, G. R., Crosby, L., and Vuchinich, S. (1992). Predicting Risk for Early Police Arrest. *Journal of Quantitative Criminology* 8, 335-355.

Patterson, G. R., Reid, J. B., and Dishion, T. (1992). *Antisocial Boys: A Social Interactional Approach (Vol. 4).* Eugene, OR: Castalia Publishing Company.

Pearlin L I.; EG. Menaghan; M. Lieberman; JT. Mullan (1981). The Stress Process. *Journal of Health and Social Behavior* 22(4), 337-356.

Pearlin, L. I., and C. Schooler. (1978). Structure of Coping. *Journal of Health and Social Behavior* 19, 2-21.

Perna, Laura Walter and Marvin A. Titus (2005). The Relationship between Parental Involvement as Social Capital and College Enrollment: An Examination of Racial/Ethnic Group Differences. *The Journal of Higher Education* Vol. 76, No. 5, pp. 485-518.

Perreira, K. M., N. Deeb-Sossa, K. M. Harris, and K. Bollen. 2005. “What Are We Measuring? An Evaluation of the CES-D across Race/Ethnicity and Immigrant Generation.” Social Forces 83 (4):1567-1601.

Persell CH , Sophia Catsambis, and Peter W. Cookson (1992). Differential Asset Conversion: Class and Gendered Pathways to Selective Colleges, *Sociology of Education* 65(3), 208-225.

Pittman LD, Richmond A (2007). Academic and Psychological Functioning in Late Adolescence: The Importance of School Belonging. *Journal of Experimental Education* 75(4), 270-290.

Radloff, L. (1977). The Center for Epidemiologic Studies Depression Scale: A Self Report Depression Scale for Research in the General Population. *Applied Psychological Measurement* 1(3), 385-401.

Radloff, L. (1991). The Use of the Center for Epidemiologic Studies Depression Scale in Adolescents and Young-adults. *Journal of Youth and Adolescence* 20(2), 149-166.

Ritsher, J.E., Warner, V., Johnson, J.G. and Dohrenwend, B.P. (2001). Inter-generational Longitudinal Study of Social Class and Depression: A Test of Social Causation and Social Selection Models. *British Journal of Psychiatry Supplement* 40, 84–90.

Robertson, J., and Simons, R. L. (1989). Family Factors, Self Esteem, and Adolescent Depression. *Journal of Marriage and the Family* 51, 125-138.

Rodewalt, F. and Tragakis, M. W. (2003). Self-esteem and Self-regulation: Toward Optimal Studies of Self-esteem. *Psychological Inquiry* 14(1), 66–70.

Roeser RW and Eccles JS (2000). Schooling and Mental Health, in Sameroff AJ, Lewis M, and Miller SM (Eds.), *Handbook of Developmental Psychopathology,* 8, 134-156. Kluwer Academic/Plenum Publishers.

Roeser, R. W., C. Midgley, and T. C. Urdan. (1996). Perceptions of the School Psychological Environment and Early Adolescents' Psychological and Behavioral Functioning in School: The Mediating Role of Goals and Belonging. *Journal of Educational Psychology* 88, 408-422.

Rogoff. B. (1990). *Apprenticeship in Thinking: Cognitive Environment in Social Context*. New York: Oxford University Press.

Rosenberg, M. (1965). *Society and the Adolescent Self-image*. Princeton, NJ: Princeton University Press.

Rosenberg, M. (1986). *Conceiving the Self (reprint ed.)*. Melbourne, FL: Academic Press.

Rosenberg, M., Schooler, C., and Schoenbach, C. (1989). Self-esteem and Adolescent Problems: Modeling Reciprocal Effects. *American Sociological Review* 54,

1004-1018.

Rosenfield, S., M. C. Lennon, and H. R. White. (2005). The Self and Mental health: Self-salience and the Emergence of Internalizing and Externalizing Problems. *Journal of Health and Social Behavior* 46, 323-340.

Ross, Catherine E. and Jaya Sastry. (1999). The Sense of Personal Control: Social Structural Causes and Emotional Consequences. In Carol S. Aneshensel and Jo C. Phelan (Eds). *The Handbook of the Sociology of Mental Health*. (Pp 369–394) NY: Plenum.

Ross, E.R., and Broh, B.A., (2000). The Roles of Self-esteem and the Sense of Personal Control in the Academic Achievement Process, *Sociology of Education* 73, 270 –284.

Rotter, J. B. (1966). Generalized Expectancies for Internal vs. External Control of Reinforcement. *Psychological Monographs* 80, 1-28.

Rotter, J. B. (1975). Some Problems and Misconceptions Related to Construct of Internal Versus External Control of Reinforcement. *Journal of Consulting and Clinical Psychology* 43, 56-67.

Sameroff, A. J. (1987). The Social Context of Development. In N. Eisenberg (Ed.). *Contemporary Topics in Developmental Psychology* (pp. 273-291). New York: Wiley.

Scaramella, L. V., Conger, R. D., Spoth, R., and Simons, R. L. (2002). *Evaluation of a Social Contextual Model of Delinquency: A Cross-study Replication. Child Development* 73(1), 175-195.

Segal. Z. V, and Cloitre, M. (1993). Methodologies for Studying Cognitive Features of Emotional Disorder. In K. S. Dobson and P. C. Kendall (Eds.). *Psychopathology and Cognition* (pp. 19-50). San Diego: Academic Press.

Sewell W.H. and V.P. Shah, (1978). Social Class, Parental Encouragement, and Educational Aspirations, *American Journal of Sociology* 73, 559–572.

Shamir, B. (1986). Self-esteem and the Psychological Impact of Unemployment. *Social Psychology Quarterly* 49(1), 61-72.

Simons, R. L., Wu, C., Conger, R. D., and Lorenz, F. O. (1994). Two Routes to

Delinquency: Differences between Early and Late Starters in the Impact of Parenting and Deviant Peers. *Criminology*, 32, 247-274.

Snyder, J., Dishion, T., and Patterson, G. R. (1986). Determinants and Consequences of Associating with Deviant Peers during Preadolescence and Adolescence. *Journal of Early Adolescence*, 6, 29-43.

Sroufe LA, Rutter M. (1984). The Domain of Developmental Psychopathology. *Child Development* 55,17-29.

Thoits, PA. (1991) Patterns in Coping with Controllable and Uncontrollable Events. In E. Mark Cummings, Anita L. Greene, and Katherine H. Karraker (eds.), *Life-Span Developmental Psychology: Perspectives on Stress and Coping*. (Pp. 235-258) Hillsdale, NJ: Lawrence Erlbaum.

Thoits, PA, (1994). Stressors and Problem-Solving: The Individual as Psychological Activist. *Journal of Health and Social Behavior* 35, 143-59.

Thoits, PA. (1995). Stress, Coping and Social Support Processes: Where Are We? What Next? *Journal of Health and Social Behavior* (Extra Issue), 53-79.

Turner, R. J., and Avison, W. R. (1992). Sources of Attenuation in the Stress-distress Relationship: An Evaluation of Modest Innovations in the Application of Event Checklists. In J. Greenley and P. Leaf (Eds.), *Research in Community and Mental Health* (pp. 265-300). JAI Press.

Turner, R. Jay and Patricia Roszell, (1994). Psychosocial Resources and the Stress Process. In William R. Avison and Ian H. Gotlib (Eds.), *Stress and Mental Health: Contemporary Issues and Prospects for the Future*, Plenum Press: New York, pp. 179-210.

Turner Jay , Donald A. Lloyd and Patricia Roszell. (1999). Personal Resources and the Social Distribution of Depression. *American Journal of Community Psychology* 27(5), 643.

Vitaro, Frank, Mara Brendgen, Simon Larose, and Richard E. Tremblay. (2005). Kindergarten Disruptive Behaviors, Protective Factors, and Educational Achievement by Early Adulthood. *Journal of Educational Psychology* 97, 617–629.

Wagner, Mary M. (1995). Outcomes for Youths with Serious Emotional Disturbance in

Secondary School and Early Adulthood. *Future of Children* 5, 90–112.

Weiner, B. (1986). *An Attributional Theory of Motivation and Emotion*. New York: Springer-Verlag.

Weiner, B. (1994). Integrating social and Personal Theories of Achievement Striving. *Review of Educational Research* 64, 557-573.

Weist, M. D. (1997). Expanded School Mental Health Services: A national Movement in Progress. In T. H. Ollendick and R. J. Prinz (Eds.), *Advances in Clinical Child Psychology* 19, 319-352. New York: Plenum Press.

Wentzel, K. R. (1993). Does Being Good Make the Grade – Social-behavior and Academic Competence in Middle School. *Journal of Educational Psychology* 85, 357-364.

Wentzel, K. R. (1997). Student Motivation in Middle school: The Role of Perceived Pedagogical Caring. *Journal of Educational Psychology* 89, 411-419.

Wheaton, B. (1983). Stress, Personal Coping Resources, and Psychiatric Symptoms: An Investigation of Interactive Models. *Journal of Health and Social Behavior* 24, 208-229.

Wigfield, A., and Eccles, J. S. (1989). Test Anxiety in Elementary and Secondary School Students. *Educational Psychologist* 24, 159-183.

Willett, J. B. and A. G. Sayer. (1994). Using Covariance Structure Analysis to Detect Correlates and Predictors of Individual Change over Time. *Psychological Bulletin* 116, 363-381.

Zahnwaxler C. (1993). Warriors and Worriers – Gender and Psychopathology. *Development and Psychopathology* 5, 79-89.