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# Academic Achievement and Depression Among Chinese Youth: The Role of Gender

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To the Graduate Council:

I am submitting herewith a thesis written by Qionghui Zhang entitled "Academic Achievement and Depression Among Chinese Youth: The Role of Gender." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Child and Family Studies.

Heidi E. Stolz, Major Professor

We have read this thesis and recommend its acceptance:

Brian K. Barber, Julia Malia

Accepted for the Council:

Dixie L. Thompson

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Dean of the Graduate School

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**ACADEMIC ACHIEVEMENT AND DEPRESSION AMONG CHINESE YOUTH:  
THE ROLE OF GENDER**

**A Thesis  
Presented for the  
Master of Science  
Degree  
The University of Tennessee, Knoxville**

**Qionghui Zhang  
August 2007**

**DEDICATION**

**To Mac and Beth Sells**

*Faithfulness makes life worthy.....*

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## ABSTRACT

A seemingly discrepant relationship between Chinese adolescents' academic achievement, depression and gender was revealed from the literature. Chinese adolescent girls have higher academic achievement than Chinese boys (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie, Zhang, & Zhang, 2001; Wan et al., 2003). Higher academic achievement was found to be inversely associated with depression among Chinese adolescents (Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996). It is then expected that Chinese girls have lower depression than Chinese boys. However, literature shows that Chinese girls have higher depression than Chinese boys (Hesketh et al., 2002; Lin, 2001; Unger et al., 2001; Wan et al., 2003).

Five possible models for gender, achievement and depression are proposed through the technique of data simulation to explain the seemingly conflicting relationship among the three variables. Secondary data analysis of cross-sectional survey data from mainland Chinese adolescents was used to investigate which model represents the relationship among academic achievement, depression and gender. None of the models was confirmed because two initial hypotheses were not supported. Girls did not demonstrate higher academic achievement than boys; and girls did not demonstrate a higher depression level than boys either. It was only found that academic achievement was inversely related to adolescent depression,  $F(1, 985) = 41.769, p < .001$ . The limitations of the study and the implications for future studies and research were discussed.

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## **CHAPTER ONE**

### **INTRODUCTION**

China has the largest population in the world. Over 20% of world's population is mainland Chinese (United Nations Population Division, 2005). Of the total Chinese population, 25% are youth aged from 10 to 24 (Population Reference Bureau, 2006), accounting for about one-fifth of the world's youth population (Greenberger, Chen, & Dong, 2000). The size of the youth population from mainland China warrants research efforts to better understand the functioning of Chinese youth. These research efforts benefit researchers, practitioners, and policy makers and also promote a comprehensive understanding of adolescents in the current world.

Over the last three decades, China has undergone a dramatic societal transformation with endorsement of economic reform and the one-child family policy (Barnouin, 1993). The practice of these socio-economic policies has shaped the life of contemporary Chinese youth in both positive and negative ways. On a positive side, contemporary Chinese youth enjoy quality education and better living conditions that promote healthy development in comparison with the situation three decades ago. On a negative side, contemporary Chinese youth encounter stress from intensive competition around limited resources and opportunities. The competition pressure for adolescents is especially focused on academic-related matters. Academic-related pressure is affecting Chinese youth's mental well-being; thus, it is important to understand the relationship between academic achievement and adolescent depression.

## Academic Achievement, Stress, and Depression

Researchers consistently have found that academic achievement is inversely related to adolescent depression (Crystal et al., 1994; Hesketh et al., 2002; Shen, 2003; Unger et al., 2001; Wan et al., 2003; Zhou, Peeverly, Xin, Huang, & Wang, 2003). Achievement-related stress is a process variable that explains why low academic achievement puts Chinese adolescents at risk for depression. In various large-scale investigations of modern Chinese adolescents' psychological health, Chinese youth consistently listed school-related issues as the leading cause for their stress, anxiety, and depressed mood (Ding & Wang, 2002; Hesketh & Ding, 2005; Sun, 2003).

Much research suggests that Chinese adolescents' achievement stress emerges from two processes related to academic matters. First, the stress stems from adolescents stretching their physical and cognitive limits to handle the intensive workload of learning tasks. Chinese students spend significantly more time on homework and supplementary learning materials than their counterparts around the world (Guang, 2003; Hesketh & Ding, 2005; Hofferth & Sandberg, 2001). According to the reports on Chinese youth (Chen, Rubin, & Li, 1995; Guang, 2003; Sun, 2003), over 50% of them do not get enough sleep, and about 80% of them do not get enough leisure time. Lack of sleep and lack of leisure activities produce stress in the lives of Chinese youth and put their psychological well-being at risk. Negative feedback from parents, teachers, and peers forms the second process through which achievement stress emerges. Chinese adolescents encounter frequent evaluation of their academic performance through quizzes and exams, and their individual scores are not treated with privacy. Release of information on a regular basis with regard to their class standing generates tremendous

stress in Chinese adolescents (Ding & Wang, 2002; Unger et al., 2001). Frequent testing and public updates of their achievement status force Chinese youth to either maintain a good record through hard work or feel stressed about their underperformance. The intensive workload and negative feedback from parents, teachers, and peers put Chinese adolescents at risk of depression (Crystal, Chen, & Fuligni, 1994).

It is expected that lower achievers encounter more achievement-related stress than high achievers. For example, they are more vulnerable to negative impact of making academic records public. Moreover, low-achieving adolescents deal with negative feedback from parents, teachers and peers more frequently than high-achieving adolescents. Therefore, the processes of achievement-related stress contribute to the negative association between academic achievement and depression.

The problem of depression among Chinese adolescents carries negative consequences. It affects youths' normal functioning and deprives them of pleasure in life. According to Hesketh and Ding (2005), serious depression can lead to suicidal ideation. Without timely intervention, the ideation may lead to attempted suicide. In fact, about 10% of adolescents who experience depressive symptoms have attempted suicide (Hesketh, Ding, & Jenkins, 2002; Liu, 2004). Statistics show that the suicide rate in China is three times the global average, accounting for 40% of all suicides reported worldwide (Murray & Lopez, 1996). The prevalent problem of adolescent depression and its severe consequences warrant research efforts to further examine the relationship between achievement and depression among Chinese youth.

## The Role of Gender

Much previous research suggesting a negative correlation between academic achievement and adolescent depression did not consider gender effects. In other words, the samples were not differentiated by gender when testing the relationship between academic achievement and depression. However, a voluminous body of research has indicated that gender is a strong predictor of adolescent academic achievement (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie, Zhang, & Zhang, 2003; Wan et al., 2003) as well as of adolescent depression among Chinese youth (Hesketh et al., 2002; Ji, Kleinmam, & Becker, 2001; Pritchard, 1996). Therefore, as a common third variable that is related to both the presumed cause and presumed outcome, gender should be included when examining the relationship between academic achievement and adolescent depression. Exclusion of gender as a common cause may lead to inaccurate presentation of the relationship between academic achievement and adolescent depression (see Keith, 2006).

Scrutinizing the literatures on gender, academic achievement, and depression yields a perplexing picture. Literature on academic achievement among Chinese adolescents indicates that adolescent females on average have higher academic achievement than adolescent males (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie et al., 2003; Wan et al., 2003). Therefore, it is intuitively anticipated that Chinese adolescent females on average should have a lower risk for depression than males given the fact that individuals with higher academic achievement are less likely to be depressed. However, research findings suggest that Chinese adolescent females actually are at significantly higher risk for depression than males

(Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996). The seeming discrepancy among the research findings about the relationship between gender, academic achievement, and adolescent depression warrants further research to examine these three variables together.

### Summary and Goal Statement

The magnitude of the Chinese youth population, the prevalent problem of adolescent depression, and the potentially severe consequences of adolescent depression warrant research efforts to understand the relationship between academic achievement and adolescent mental well-being within this population. The seeming discrepancy in the relationships among gender, academic achievement, and adolescent depression merits a thorough investigation of the relationships among them. Therefore, the primary goal of this study is to investigate the role of gender in the relationship between academic achievement and depression among Chinese youth.

The remainder of this thesis report will proceed in the following manner: Chapter Two will start with an introduction to the Chinese population and China's socio-historic context to help identify achievement-related depression as an important aspect of Chinese youths' lives. A theoretical framework then will be identified to organize the literature review and identify hypotheses related to achievement-related depression. Guided by the theoretical framework, an intensive literature review will be conducted on achievement and depression respectively. From the review, gender will emerge as the key to understanding the genuine relationship between academic achievement and depression among Chinese youth. Given gender as the key variable, literature on gender socialization and gender-based processes related to academic achievement and depression will be discussed. Next, a special section of data simulation will be devoted to speculating about

the potential role of gender. Chapter Two will conclude with research questions and related hypotheses. Chapter Three will give detailed descriptions of the sample, instrument, measures, and analysis plan. Chapter Four will present the results of the statistical analyses. Lastly, Chapter Five will discuss implications of the research findings as well as limitations of the study.

## **CHAPTER TWO**

### **REVIEW OF LITERATURE**

Of all the countries in the world, China has the largest population, thus it is important to understand this population. Over 20% of the world population is mainland Chinese (United Nations Population Division, 2005). However, many Western people's understanding of the Chinese population is restricted to Chinese immigrant groups. These groups only serve as an inaccurate proxy--small in magnitude and non-representative of the mainland Chinese people they seceded from at various points in Chinese history (Shek, 1997). Mainland Chinese individuals have their own distinctive features worthy of researchers' attentions. The population is not only large but also heterogeneous in composition. It has 56 ethnic groups, with Han as the largest ethnic group accounting for about 92% the total population (Sun, 2003). The mainland Chinese population is approximately 60% rural and 40% urban (National Bureau of Statistics, 2006).

Not only does China possess the largest proportion of the world's total population of any one country, but China is also home to more youth ages 10 to 24 than any other country (Greenberger et al., 2000). Mainland Chinese youth ages 10 to 24 account for about one-fourth of the total Chinese population (Population Reference Bureau, 2006). The Chinese youth population is approximately one-fifth the total youth population in the world (Greenberger et al, 2000). Chinese youth's ethnic composition is comparable to the population's overall ethnic configuration discussed above (Sun, 2003). As to the youth's rural vs. urban composition in comparison to that of the overall population, the rural vs. urban disparity is sharper among the youth population. About 75% of Chinese

adolescents and young adults are from rural areas (Sun, 2003). The magnitude of the mainland Chinese youth population warrants additional research efforts to better understand Chinese youths' functioning. These research efforts will benefit academicians, practitioners, and policy makers who are interested in understanding and serving this population. To avoid cumbersome wording, for the remainder of the text, *Chinese youth* will be used to refer to mainland Chinese youth unless otherwise specified.

### Socio-Historical Context of Chinese Youth

To understand the Chinese youth population, it is helpful to start with a review of the overarching socio-historical context. This broader context sets the stage for youths' development and often presents a unique picture of youths' functioning in the specific cultural context. Three salient aspects of the current Chinese socio-historical context are the focus of this review: the national economic system, the national one-child family policy, and the national educational system.

#### *The National Economic System*

The economic system of mainland China is a salient component of the overall socio-historical context because it determines the distribution of social resources and the organization of social relations. Formerly, the Chinese government practiced a command economy in which rewards were not distributed according to personal productivity. Rather, division of resources with maximum equality among people was practiced to reflect the Communist ideology of social equality (Larus, 2005). Under this economic system for almost three decades following 1949, the motivation of the Chinese people was inhibited because individuals' contribution was not properly compensated (Larus, 2005). The discouragement of individual efforts and contributions was at its worst during

the Cultural Revolution between 1966 and 1976 (Barnouin, 1993). As a result of the government-endorsed economic reform initiated at the conclusion of Cultural Revolution, the command economy gradually has given way to the practice of a market economy, under which the price for goods, including human labor, is regulated by the dynamics of supply and demand (Samuelson & Nordhaus, 1998). The shift of economic systems has impacted not only the Chinese economy but also the lives of Chinese people. Many scholars and policy-makers are assessing still the costs and benefits of the reform for the Chinese society (Sun, 2003). With respect to youth development and functioning, the practice of the new economy certainly produced both opportunities and challenges.

The introduction of the market economy created two major opportunities for the Chinese population. First, unlike the traditional command economy, the market economy brought incentives for individual efforts given the system's marketization of human capital. Second, the released power of productivity under the market economic system increased the provision of goods for personal consumption. As a result, living conditions greatly improved for Chinese youth (Samuelson & Nordhaus, 1998). Specifically, benefiting from the economic prosperity, modern Chinese youth now experience better living conditions and higher quality education in comparison with the situation three decades ago (Sun, 2003).

Although the market economy introduced new opportunities, it also created challenges for the Chinese population, especially for the youth. The main challenge is the pressure imposed on Chinese people to compete for limited resources and opportunities. Due to the overflow of labor resources caused by the size of the Chinese population, Chinese youth face tremendous employment pressure. Every year, the supply of college

graduates exceeds what the market can accommodate, and the reserve of unemployed college graduates builds up (Department of Planning Ministry of Education, 2003). This labor surplus makes it a challenge for college graduates to land a job with decent pay. Therefore, the economic reform has proved to be a double-edged sword. On the one hand, it promotes individual productivity and achievement motivation; on the other hand, it exerts on the Chinese population pressure to compete for limited resources and opportunities.

#### *The National One-Child Family Policy*

The implementation of the one-child family policy is another important component of the Chinese socio-historical context. Given the population overload and its burden on China's economic development, the Chinese government has been actively implementing a national policy of one child per family since 1979 (Milwertz, 1997). The policy was delivered through a wide range of incentives and penalties. A monthly allowance, as well as subsidized child care and health care, are major rewards for families who have only one child. For families who fail to comply with the policy, curtailing salaries and depriving promotion opportunities serve as their punishment (Davin, 1991). Although the government intends the policy to be enforced nation-wide, the one-child family policy is less effective in the rural areas than urban areas for two major reasons. First, the sporadic population distribution over the vast rural areas and the population fluidity make population management difficult in rural areas. Second, the traditional Chinese favoritism toward boys still prevails (Falbo, 1992). Chinese rural families tend to be large because they do not stop giving birth until they have at least one boy. Because of these reasons, the Chinese urban family has transformed in structure, whereas the

Chinese rural family has changed little. Structurally, formerly large Chinese families gradually have been replaced by modern compact-size families in urban areas. Thus, the one-child family policy has changed the landscape of the Chinese families and created distinctive familial structures for rural and urban youth.

These distinctive familial structures pose different advantages and disadvantages for urban and rural youth. Urban youth, who typically have no siblings, enjoy more family resources and parental involvement in their development than ever before. Research has shown that family resources and parental involvement are conducive to positive child outcomes such as high self-esteem and school success (Falbo & Poston, 1993; Jiao, Ji & Jing, 1996). Nevertheless, urban youth also pay a cost for being the only child in the family. They inescapably become the focus of their parents' attention and expectations and, thus, have to bear more pressure from their parents than do their rural counterparts. In Sun's (2003) report, urban youth in China spend significantly more time on schoolwork and enjoy less leisure time than rural youth. Also, according to Sun, the majority of the urban youth report experiencing anxiety about meeting parental expectations.

Rural Chinese youth face a reality opposite from that of their urban counterparts. Unlike urban youth, rural youth have limited resources for healthy development. First, the living conditions in rural areas are less advantageous for rural youth. Second, rural youth live in a less child-centered family environment because family resources and parental attention have to be shared among siblings. The larger familial structure makes it difficult for rural parents to attend to the specific needs of an individual child. Thus, rural youth on average receive less parental involvement and support for their personal

development than their urban peers. With regard to education, many rural adolescents with good academic prospects have to forgo their educational pursuits due to the lack of family financial support. Generally, the familial structure has put rural youth in a less advantageous position for the social competition as compared with their urban peers. However, on the other side of the coin, rural youth also may benefit from the large familial structure, in which they cannot be the focal point of the family's expectation. To sum up, structural change in Chinese families as a result of the one-child family policy impacts rural and urban youth differently.

### *The National Educational System*

In addition to the previously discussed economic reform and the one-child family policy, the current national educational system is another important aspect of the overall Chinese socio-historical context that sets the parameters for Chinese youths' development. A brief introduction to the Chinese educational system will be helpful in understanding its impact on Chinese youth. Since 1978, the State Education Commission has institutionalized a standardized testing system to select and stratify candidates into schools or universities of different ranks. Under this system, all students are allowed to take the standardized tests only once upon their graduation from elementary and later high school, and their test scores in the standard tests determine their eligibility for further education and their assignments to schools or universities of different ranks.

For secondary education, schools of different ranks are categorized into key schools and non-key schools. Key schools are those at higher ranks, including the national or municipal key schools. Key schools are entitled to more educational resources than non-key schools, and only the very best students with superior test scores can enter

the municipal or district key secondary schools. Two features of these key schools make them portend a good chance for their students to enter college, which attracts adolescents' and their parents' strong interest in admission. First, they provide exceptional, test-oriented teaching. Second, teachers from those key schools participate in writing and grading the college entrance examination test papers. Therefore, to some extent, key schools control the standards of secondary education and act as gate keepers for college admissions (Ross, 1991). In sum, the provision of quality training and the nationally acknowledged prestige of the key schools and universities give their students better prospects for the future than do non-key schools and universities (Epstein, 1991). The intense school-enrollment competition places academic-related pressure on Chinese adolescents.

This overview of the Chinese educational system has revealed several concerns about its impact on Chinese youth. First, as the previous introduction of the educational system indicates, the keen competition associated with limited educational opportunities places tremendous academic-related pressure on Chinese adolescents. The educational system's insufficient capacity to accommodate the educational needs of the world's largest number of students perpetuates a harsh selection process and keen competition among the test takers. For college education, only 15% of Chinese high school graduates have the luxury of receiving a college education (National Department of Planning Ministry of Education, 2003). To be among the 15% survivors, Chinese students make sacrifices of their sleeping and leisure time. According to Sun's report (2003), more than half of youths' sleeping time is short of what the state recommends; and the majority of youths spend more time on studying than the state required upper-limit despite the fact

that the school has reduced the load of homework assignments per the state's requirement (Guang, 2003). Second, the solely test-based educational system misguides the whole educational enterprise to be book-based and test-oriented. As a result, students who have superior non-book-based intelligence but inferior test-taking skills are penalized. Therefore, individual exploration and pursuit of other interests and talents are restricted, and many students are deprived of their intrinsic interest in studying. In Sun's (2003) investigation, about 90% of Chinese youth reported that they did not study for their own interest.

Not only do mainland China's limited educational capacity and its test-based educational orientation raise concerns, but the form of testing in the selection process also concerns people. College admissions are given to Chinese youth solely on the basis of their test scores in one-chance standardized exams. Thus, the standardized exams carry substantial weight in determining students' educational future, which arouses severe test anxiety and affects students' test performances. Entrance exams throughout the schooling process are reported as stressful life events by Chinese youth more often than other events such as being misunderstood, disharmony with classmates and friends, losing face in public, discrimination and rejection (Ding & Wang, 2002; Hesketh et al., 2002; Unger et al., 2001). The last but not the least concern is that the educational system fails to guide and channel Chinese youths' efforts and potentials to alternatives other than academic-related pursuits. The vast majority of Chinese youth are destined to not be able to enter the key secondary schools and colleges given the aforementioned insufficiency of national educational resources. Students in the non-key schools often feel lost and internalize a sense of being inferior to the key-school students (Epstein, 1991). In

addition, they tend to feel pessimistic about their futures (Epstein, 1991). All these negative impacts put Chinese youth at severe risk for various internalized and externalized problem behaviors (Ross, 1991). Thus, limited educational opportunities, the format of selection, and the lack of variety in education models have negative impacts on Chinese youth. Adolescents' concerns about their future can be alleviated by the State providing more guidance on vocational and technical education opportunities (Ross, 1991).

In summary, the socio-historic transformation of the Chinese society over the past six decades has had a profound impact on Chinese adolescents' lives and functioning. Following the Communist Revolution and the subsequent Cultural Revolution, the establishment of the market economy and the current educational system induce stressful competition as a theme of Chinese youths' life. In addition, the implementation of a one-child family policy changed the structure and dynamics of the familial context and differentiated youths' developmental contexts based upon the urban and rural distinction.

### Theoretical Framework

The above introduction sets the stage for an investigation of adolescent academic achievement and Chinese youths' psychological well-being. A theoretical framework needs to be in place to guide exploration of the relationships among academic achievement, depression, and other related variables in the lives of Chinese youth. Using theory to guide the identification of research questions will ensure that research findings are not incidental but can contribute to the body of knowledge in the field. Therefore, the rest of this chapter serves to (a) briefly introduce the theoretical framework used for the review of literature, (b) review the literature on academic achievement, (c) review the

literature on adolescent depression, and (d) formulate hypotheses regarding the relationships among academic achievement, depression, and gender in Chinese adolescents' lives. The review of gender literature is organized under the separate reviews on achievement and depression since gender is deemed to be an important individual characteristic influencing achievement and depression outcomes according to Bronfenbrenner's ecological theory.

Bronfenbrenner's ecological theory (1979a, 1979b, 1986) is a useful conceptual lens to model the complex reality of Chinese adolescents' lives. Bronfenbrenner identified an ecological structure of the environment, which was conceived as concentric layers of systems with the child situated at the center. The layers of ecological systems moving outward are the microsystem, mesosystem, exosystem, and macrosystem. All the systems are moving forward with the passage of the time, thus changes in the systems along the time axis are represented as the chronosystem. The theory (1979b) makes an important assumption that the child is an active human being who undergoes inner changes and is able to shape the environment. Thus, child development is conceived as the outcome of constantly bi-directional and reciprocal interactions between the child and the environment. Definitions provided in the following subsections will further the reader's understanding of this comprehensive model of child development.

### *Microsystems*

Microsystems are defined as the immediate settings for child development (Bronfenbrenner 1979b). An immediate setting is a place where the child can "readily engage in face-to-face interaction" (Bronfenbrenner, 1979b, p. 22) on a daily basis. In other words, microsystems consist of settings (such as family, school, and peers) where

child development occurs. According to Bronfenbrenner (1979a), these immediate developmental contexts play an important role in a child's development and, thus, are defined also as proximal contexts. Absent stable proximal contexts, the child is deprived of important resources for support of normal functioning and healthy development. Processes in proximal contexts bear long-term effects on child outcomes. It is not difficult to appreciate the strong influence of families, schools, and peers in Chinese youths' lives given the fact that social collectivism is greatly emphasized in Chinese society, as reflected in strong family ties and close adolescent-school connections (Sun, 2003).

### *Mesosystems*

Microsystems are not independent of each other according to ecological theory; therefore, Bronfenbrenner (1979b, 1986) used the term *mesosystems* to represent interactions between the microsystems as well as their joint influences on children. The mesosystem models real-life examples such as the influences of family-school partnerships and family-peer linkages on children. More basically, the mesosystem is "a system of microsystems" (Bronfenbrenner, 1979b, p. 25), indicating that processes in one proximal context affect the child's functioning in another proximal context (Bronfenbrenner, 1986). In fact, one of the key interests of this study--academic-achievement-related depression among Chinese youth--is a good example of how microsystems are not isolated in casting their influences on youths' developmental outcomes. Detailed discussion of a mesosystemic model for achievement-related depression among Chinese youth will be presented later in the review of depression literature.

### *Exosystems*

The term *exosystems* refers to a setting that does not contain the child but still can influence the child by way of influencing the child's microsystems (Bronfenbrenner, 1986). Exosystems might include parents' workplaces and parents' social networks where children are not directly involved. As the exosystem model represents, parents' experiences in the workplace and their conversations with friends can exert strong influences on them in terms of their parenting behaviors and parenting beliefs (Bronfenbrenner, 1979a). For example, conversations in workplaces between Chinese parents about their children's school performance tend to elicit competitive feelings in parents and enhance their involvement at home in promoting their children's achievement.

### *Macrosystems*

According to Bronfenbrenner (1979b), macrosystems are comprised of cultural values, laws, policies, and customs, which have intangible but powerful influences on child development by influencing all other parts of the ecological system. Therefore, macrosystems represent the broad developmental contexts that set parameters for child development. For example, children living in an aboriginal tribe have dramatically different life experiences from children living in a developed country. Shaped differently by their respective environments, they demonstrate differential developmental outcomes, such as different skills for living. The previously discussed Chinese educational system and size of the Chinese population are examples of macrosystemic factors that help one understand the keen competition that Chinese youths have to confront in their lives.

### *Chronosystem*

All the systems are constantly changing across time; therefore, Bronfenbrenner used the chronosystem to characterize the dynamics of the systems along the time dimension (Bronfenbrenner, 1979b, 1986). Changes with the passage of time include both internal changes related to the child's biology and external changes related to the environment. Internally, a child undergoes physical, cognitive, and socio-emotional changes as he/she grows. These changes from within adjust the child's modes of interaction with the systems. Externally, the environment is subject to all kinds of changes across time. According to Bronfenbrenner (1986), internal and external changes converge and sometimes account for major life transitions, which can be categorized into two kinds: normative (expected) and non-normative (unanticipated). Examples of normative life transitions are school entry, puberty, joining the labor force, marriage, entering parenthood, and retirement. Examples of non-normative transitions are unexpected death and illness in the family, divorce, and unemployment. All these events and their influences on children can be appropriately characterized by the model of the chronosystem (Bronfenbrenner, 1986). The outburst of the Chinese Cultural Revolution is an example of dramatic changes in the macrosystem affecting Chinese youths' lives. For example, their education was greatly disrupted since the educational system was closed down for a decade (Barnouin, 1993).

In sum, Bronfenbrenner's ecological theory is a useful theoretical framework for understanding academic achievement-related depression among Chinese youth and the role played by gender. First, it allows us to examine constructs of academic achievement and adolescent depression in a systematic manner by identifying their associated factors

and outcomes in multi-leveled contexts. Second, the theory also emphasizes the important role played by individual characteristics in the constant, bi-directional, and reciprocal interaction between the child and her or his ecological contexts. Although gender as an important individual characteristic can be integrated into the ecological framework, separate section will be devoted to discussion of gender as well, given that it is the key interest of this study.

Thus far, this text has covered a broad overview of China's demographic and socio-historic context and an introduction to Bronfenbrenner's ecological framework, both of which provide the foundation for a detailed inquiry into the relationships among gender, academic achievement and depression among Chinese adolescents. The remainder of this chapter will proceed in the following manner. First, Bronfenbrenner's ecological theory will be used to review the literature on (a) academic achievement and (b) youth depression respectively. The separate reviews of achievement and youth depression will identify gender as the key variable in the current study to understand the relationship between achievement and depression. Given gender as the key variable, literature on gender socialization and gender-based processes related to academic achievement and depression will then be discussed. After the literature review of the individual constructs in this study, the data simulation technique will be introduced to help identify mathematical possibilities of the relationship among gender, achievement and depression. Finally, hypotheses regarding the relationships among academic achievement, depression, and gender will be drawn and exploratory questions will be posed. The following literature review will emphasize research on Chinese adolescents, where possible.

It is worth mentioning that the subsequent literature review of achievement, depression, and gender will be extensive, although the current study only examines the relationship among gender, achievement and depression. A comprehensive review of literature is justified. First, a theory-guided comprehensive review of the literature itself is a contribution to the body of literature. It helps consolidate the knowledge especially when existing literature on Chinese adolescents is not systematic. Second, a well-defined body of literature ensures that the development of research questions is grounded in the literature and the research inquiry will fill in gaps in the literature.

### Academic Achievement Among Chinese Adolescents

Academic achievement is an important concept in Chinese society. Chinese adolescents, Chinese parents, teachers, and school officials are all concerned about academic achievement. For Chinese adolescents, academic achievement is associated not only with immediate benefits of gaining parents', teachers', and peers' favor but also with various prospective opportunities such as receiving a quality college education and enrolling in competitive programs, which in turn brings advantages in the competitive Chinese labor market. Chinese parents are even more concerned about their children's academic achievement than their children are (Sun, 2003). They are highly concerned with their children's future. Moreover, they regard their children's academic achievement as a manifestation of their own ability to successfully raise children and bring honor to the family (Lim & Lim, 2003). Having only one child further aggravates parents' concerns, especially among urban families (Davin, 1991). In addition to children and their parents, teachers and school officials also are highly concerned with students' academic achievement. Students' performance in nationally or provincially standardized

exams is an important evaluative component used by schools to assess teachers' performance. In the same manner, municipal bureaus of education, which are charged with ranking schools and allocating state or local financial support, also use student performance in the exams to assess schools' educational accomplishments (Eptein, 1991). Therefore, teachers and school officials, especially those of the key schools, are dedicated to pressing their students to study hard and perform well on the exams. In sum, adolescent academic achievement bears tremendous social significance in Chinese society.

Prior to presenting a substantive review on academic achievement, I deem it important to clarify the various ways researchers have measured this construct. In research, academic achievement is not simply defined as exam scores on standardized tests; researchers have more varied ways to operationally define it. Some researchers treat academic achievement dichotomously by measuring whether students attained high school diplomas (Morales & Trotman, 2004). Others measure students' grade point averages (GPAs), national examination test scores, or specific achievement tests (Jimerson, Egeland, & Teo, 1999; Magdol, 1994; Newmann, 1998), which provide more variability when quantifying the construct than does the dichotomous measure. Still others use youth-reported relative ratings to measure their academic achievement. The Cross-National Adolescent Project Chinese dataset used in the current study is one example in which relative ratings were employed.

The following review of academic achievement has three subsections: achievement predictors, outcomes of achievement, and achievement correlates. Achievement-related variables are categorized as achievement predictors or achievement

outcomes when there are conceptual, theoretical, or methodological grounds to justify directionality of the relationships between achievement and achievement-related variables. For example, family socio-economic status (SES) is an achievement predictor because (a) it is correlated with academic achievement and (b) it is conceptually easier to accept the idea that SES explains variability in adolescent academic achievement than the idea that adolescent achievement influences family SES (except later perhaps in the students' adult life). Achievement also can serve as a predictor of constructs of interest. For example, literature suggests that academic achievement contributes to depression more so than vice versa. Thus, for theoretical reasons, achievement is considered a predictor of depression. When it is conceptually or theoretically difficult to discern the direction of the relationships between achievement-related variables and achievement, and when the research design does not warrant causal interpretation, those variables are categorized as achievement correlates. For example, self-esteem is identified as a correlate of achievement in the subsequent review. Within each following section (achievement predictors, outcomes of achievement, and achievement correlates), Bronfenbrenner's ecological framework is used to organize the review of the literature.

### *Achievement Predictors*

Bronfenbrenner's ecological theory (1986) suggests that the on-going mutual interactions between individuals' intrinsic characteristics and factors from family, peer, school, community, and the cultural contexts are worthy of investigation in the study of adolescent academic achievement. Extensive research demonstrates support for this view derived from the theory. According to Furstenberg's (2000) decade review of adolescent research, the additive effects from a combination of contexts best represent the reality of

how adolescent academic achievement is shaped. Given that achievement predictors were found in various contexts (see Furstenberg), the following subsection will review achievement predictors one ecological context at a time, starting with individual characteristics.

*Individual characteristics.* Individual characteristics can impact academic achievement. In particular, gender is an important intrinsic characteristic that significantly impacts youths' academic outcomes. A voluminous body of research on Chinese and other ethnic groups indicates that girls have higher academic achievement than boys (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie et al., 2003; Wan et al., 2003). Gender-based processes that explain why girls have higher academic achievement will be discussed in detail later in the review section of gender.

*Microsystems.* Microsystems as discussed before contain the family microsystem, school microsystem and peer microsystem. This subsection of achievement predictors in microsystems will address each microsystem respectively.

According to Bronfenbrenner (1986), family is one of the primary contexts for adolescent development; thus, many achievement-facilitative or preventative factors dwell in the family context. Family SES is closely related to adolescent academic achievement. Some scholars have argued that family SES determines the amount and quality of resources necessary for adolescent academic achievement and, thus, plays an important role (Bradley & Corwyn, 2002; Magol, 1994). The influence of family SES on school achievement has been documented by much Western research, which consistently has indicated a significantly positive association between family SES and adolescent academic achievement (Linver, Brooks-Gunn, & Kohen, 2002; Sirin, 2005; Steinberg,

Dornbusch, & Brown, 1992). Chow (2004), in his study of Chinese Canadian adolescents, also found that family SES contributed significantly to the explanation of the adolescents' academic performance. However, I located little research on how family SES impacts academic achievement among mainland Chinese adolescents (for an exception, see Wan et al., 2003; their study of a sample of 1,069 mainland Chinese middle- and high-school students drawn from a stratified random sample indicated that middle- and high-school students' academic achievement was independent of family SES). More studies targeting the mainland Chinese population are needed to ascertain whether a genuine cultural anomaly exists concerning the relationship between family SES and academic achievement.

In addition to SES, familial structural stability is also a significant achievement predictor in the family microsystem. According to Western literature (Furstenberg, 2000; Linver et al., 2002), family structural stability can translate into basic provision of regulation and supervision for adolescents. This process, in turn, facilitates youths' academic achievement. Parents who are experiencing marital disruption and who are suffering financially and emotionally themselves are less likely to be physically and psychologically available for their adolescent children to provide them with supervision and support. Lack of supervision and support exert negative impacts on children's school performance (Amato & Keith, 1991). The influence of family structural stability on school outcomes has been researched extensively in the West; however, the influence of family structural stability is under-researched among mainland Chinese youth. In recognition of the increasing incidence of familial disruption and reorganization in China

(Wang, Zhen, & Zhao, 2004), research on the role played by family structure in Chinese adolescents' academic achievement is needed.

In the family microsystem, parenting style is another important proximal process that influences adolescent academic achievement. The related research is abundant yet far from conclusive. Researchers have documented significant variations in the roles of parenting styles among different cultural and ethnic groups (Steinberg et al., 1992). For European Americans, the authoritative parenting style (Baumrind, 1971) with its emphasis on reciprocal communication and reasoning consistently has been found to be predictive of positive child outcomes, including academic achievement. The authoritarian parenting style, characterized by parental restriction and punitiveness, has been found to be associated with negative child outcomes, including academic deficiency (Baumrind, 1971; Dornbusch, Ritter, Leiderman, & Roberts, 1987; Paulson, 1994). The authoritarian parenting style, which is achievement-inhibitive for European-American adolescents, however, has been found to be achievement-facilitative for African-American adolescents (Darling & Steinberg, 1993).

Similarly, this disparity also exists between the Chinese immigrant population and the European-American population. Authoritarian parenting practices are prevalent among Chinese immigrants; however, immigrant Chinese adolescents on average outperform their Western counterparts (Chao, 1994; Lim & Lim, 2003; Stevenson et al., 1990). In a cross-cultural study of Hong Kong-Chinese adolescents, European-American adolescents, and Australian adolescents, Leung, Lau, and Lam (1998) found that authoritative parenting had a significantly positive effect on grades for European-American and Australian samples but not for the Hong Kong-Chinese sample.

There are two competing approaches to address the potential cultural disparities discussed above. One is a culture-specific perspective that emphasizes unique, culture-based aspects of parenting styles and their influences on child outcomes. The other is a cross-cultural perspective that focuses on common aspects of parenting styles across cultures. Chao's (1994) study of Chinese parenting represents a culture-specific perspective. In her seminal publication on Chinese parenting, she indicated that the traditional conceptualization of parenting grounded on Baumrind's typological framework was not culturally sensitive enough to capture the nature of Chinese parenting. She proposed a construct *Guan* meaning "the notion of training" (Chao, 1994, p. 1112) with cultural roots in Confucianism. *Guan* represents restrictive, controlling, and sometimes disciplinary parenting behaviors for the purpose of training children to adhere to a set of socially desirable behaviors (including studentship and academic excellence). This set of behaviors might be mistaken for parental intrusiveness, mistrust, and parent-child hostility in the West. However, in Chinese culture, *Guan* conveys parental care, concern, and involvement. Chinese parents' good intentions behind their consistent efforts are appreciated by Chinese youth and supported in Chinese culture; thus, *Guan* has been found to contribute to school success among Chinese and other Asian immigrants to the U.S. (Chao, 1994). Chao's proposed construct *Guan* underscores a culturally specific approach to characterize a Chinese version of parenting that does not lend itself to cross-cultural studies.

From a cross-cultural perspective, parenting and its impact on children's developmental outcomes can be better understood by dismantling the traditional parenting typology into the dimensions it encompasses (Barber, 1997; Barber, Stolz, &

Olsen, 2005; Darling & Steinberg, 1993). According to Barber's dimensional framework of parenting styles, parental support (providing connection), behavioral control (providing regulation), and psychological control (lack of respect for individuality) are three underlying dimensions of parenting behaviors. The dimensional framework of parenting styles makes it easy to compare the influences of parenting styles on adolescents' outcomes across cultures. Specifically regarding achievement outcomes, Stolz et al. (2004) found that parental support and maternal regulation were significant adolescent achievement predictors across 10 ethnic groups, including the mainland Chinese population. There are only a few studies that have investigated the relationship between parenting styles and academic achievement among the mainland Chinese population, and, among these studies on mainland Chinese parenting, the dimensional approach was used. Li et al. (2003) in their study of Beijing adolescents from the seventh to ninth grades found that parental monitoring enhanced school achievement. Lau and Leung (1992) found among a large sample of Chinese seventh and eighth graders that parental support was positively correlated with academic achievement.

I located studies that compared Chao's cultural-specific construct with the dimensional framework (McBride-Chang & Chang, 1998; Stewart, Bond, Abdullah, & Ma, 2000). However, the comparative studies target only the Hong Kong-Chinese population. Specifically, Stewart et al. (2000) in their Hong Kong-Chinese youth sample found that *Guan* was highly correlated with two parenting dimensions: parental support and behavioral control, which were found to be positively associated with the adolescents' academic achievement. McBride-Chang and Chang (1998) found that measures of parents' beliefs in training their children (Chao, 1994) were not associated

with school achievement; however, psychological control was found to be detrimental to youths' academic achievement. At the end of my review on parenting styles, it is worth mentioning that most researchers categorize parenting styles as achievement predictors for theoretical reasons even though they recognize that adolescent academic achievement over time may gradually influence parenting styles. Therefore, I have placed parenting styles in the present review in the predictor subsection. It is worth reminding readers that academic achievement in the current study is treated only as the independent variable; thus, all the achievement predictors in this subsection are not the focus of the current investigation. However, as mentioned before, I deem it necessary to provide a comprehensive literature review on the academic achievement construct since a systematic understanding of the construct among Chinese adolescents is not available.

In addition to the family microsystem, the peer context is another primary developmental setting that contains important factors for academic achievement. Some scholars have even suggested that peer group context is more relevant to Asian students' academic achievement than familial context (Dornbush et al., 1987; Steinberg et al., 1992). However, the influences of peer context on adolescent academic achievement need to be interpreted with caution because adolescents tend to form homogeneous groups based upon their individual characteristics. Thus, only those studies that purposefully control for prior academic achievement and achievement-related individual characteristics provide support for peer factors to be considered as achievement predictors rather than just achievement correlates. One study that meets this methodological criterion and, therefore, provides evidence of peer functioning predicting achievement was conducted by Chen, Chang, and He (2003). In their study of Chinese

adolescents in Shanghai ages 9, 13, and 16, they found that adolescents' peer group's academic norm and functioning reinforced subsequent individual academic achievement beyond individual academic norm.

School is the third well-recognized microsystem that contains academic achievement facilitators. According to Bronfenbrenner (1986), the school microsystem is the place where learning experiences and major social interactions take place, thus characteristics of the school environment are important for students' academic achievement. Roeser and Eccles (1998), in their study of the Western population, reported that students' perceptions of the school environment accounted for almost the same amount of variance in school achievement as demographic and prior achievement factors. Stolz et al. (2004) found that teacher support was more predictive of Chinese youths' academic achievement than parental support. According to these researchers, the achievement-facilitative school environment is challenging and supportive; it offers youth a sense of autonomy and freedom to express different ideas and recognizes youth for their effort and improvement. Lau and Leung (1992) found that positive relations with school were conducive to Chinese adolescents' learning and academic performance.

*Mesosystems.* According to ecological theory (Bronfenbrenner, 1986), the mesosystem models the joint influences of microsystems on academic achievement and is, therefore, a useful analytical model for discussing the combined influences of the microsystems on academic achievement. However, published research on achievement predictors in the mesosystem is rare. Rodgers and Rose (2001) found that parental attendance at school events helped promote adolescents' attachment to school, which predicted school success. The gap in literature on the joint influences of microsystems

such as the parent-teacher linkage in enhancing youths' academic achievement indicates the need for more research efforts, including specifically targeting the Chinese population.

*Exosystems.* The exosystem is another important context theorized by Bronfenbrenner (1986). However, due to methodological limitations it too is under-researched with regard to its influences on academic achievement. Parents' employment place is a typical example of an exosystem that exerts significant influences on a child despite the child's physical absence in the system (Bronfenbrenner, 1986). Some Western scholars have begun to conduct research on the influences of employment on parenting behaviors, which in turn impact the children. However, the efforts have not progressed to the level of linking parents' experiences at work to specific child outcomes such as adolescent academic achievement (Bumpus, Crouter, & McHale, 2006).

Although the influences of the exosystem on Chinese youth, especially on their academic achievement, is still an uncharted research area, this analytic model is an important potential tool to appreciate some unique features of Chinese parenting. Chinese parenting is characterized as child-centered and achievement-driven (Chen, 2001; Lim & Lim, 2003; Stevenson et al., 1990), despite the fact that Chinese parents on average have lower educational attainment than their Western counterparts (Jessor et al., 2003). The achievement-oriented style of Chinese parenting can be attributed to some processes in the workplace exosystem. Conversation in workplaces about children's school performance may induce competition among parents that will motivate them to actively participate in their children's achievement processes. Moreover, parents experience the reality in their workplaces that their income and promotion opportunities are based upon their educational attainment. This experience may help them appreciate the importance of

education in their children's future and make them actively promote their children's current academic achievement. Thus, to some extent, the Chinese parents' work place is a likely medium in which to contextualize the influence of cultural values.

*Macrosystems.* The macrosystem is another potentially useful tool for understanding Chinese adolescents' academic achievement. The phenomenon that Chinese adolescents on average have higher academic achievement than their Western counterparts can be better understood when discussion of cultural contexts is introduced. Several unique factors in the Chinese cultural context contribute to Chinese youths' superior academic achievement when compared with their Western counterparts. The most relevant factor seems to be the cultural concept of superiority of intellect rooted in Confucianism (Lau, 1979). Throughout the long history of China (until the Cultural Revolution), intellectuals have been given more social respect than those in any other profession. Moreover, individuals have fulfilled their personal or social ambitions by pursuing intellectual excellence. The cultural value of education attaches substantial personal and family honor to individuals' educational success, as well as shame and stigma to educational failure, thus promoting strong individual achievement motivation.

The cultural influences on individuals are transmitted through the media of other ecological systems. As discussed above in exosystems, parents' experience is an example of an intermediate process through which the cultural value on education is internalized by parents and communicated to their children. Harkness and Super (1996) proposed parental ethnotheories, which from an anthropological perspective describe parents' belief systems as the intermediate process for cultural influences on children. According

to those authors, elements of culture are filtered into parents' cultural belief systems, which in turn impact the organization of daily life for children and families.

In addition to the cultural heritage, the Chinese economic system also has enhanced the value of education. The previous overview of socio-historic context covers this topic in detail. Cultural values of filial piety and parental authority are other influential factors on Chinese adolescents' achievement success. Chinese adolescents' respect for parental authority ensures the effectiveness of Chinese parenting characterized by authoritarianism, which might have exerted adverse effects as exemplified in the Western cultures (Baumrind, 1979). Thus, the cultural heritage and values can be seen as important macrosystemic factors for Chinese adolescents' academic achievement.

Macrosystemic factors such as a strong cultural heritage of achievement as well as the demands on individuals' achievement from the socio-economic system may somewhat boost Chinese adolescents' academic achievement in general. However, the macrosystemic factors also may pose a potential adverse effect on achievement-related depression. As discussed in the previous introduction to Chinese population and socio-historical context, Chinese adolescents experience tremendous pressure to achieve due to the overflow of population making competitive demands for limited resources and opportunities. Low achievers will be deprived of many future opportunities in higher education and employment. When achievement becomes a necessity for Chinese youths' future development and they are given no other options but to achieve academically, Chinese youth, especially low-achieving Chinese youth, can hardly have intrinsic motivation to learn. According to Boggiano and Pittman (1992) when adolescents' learning motivation largely stems from the presence of extrinsic reward and punishment,

they are more vulnerable to feelings of frustration at the failure of their efforts. Thus, lower achieving adolescents with their predominantly extrinsic learning motivation are expected to be at higher risk for developing learned helplessness. In sum, the macrosystem is relevant for understanding achievement-related depression. Although the current study will not measure any of the macrosystemic factors, the discussion of macrosystemic dynamics is helpful for readers to understand the potential processes underlying the negative relationship between achievement and depression. More discussion of the macrosystemic factors will be conducted later in the depression section.

#### *Outcomes of Academic Achievement*

This section provides a review of achievement-related variables that are considered outcomes of achievement for theoretical or methodological reasons.

Academic achievement has many positive outcomes. The outcomes include positive individual functioning and positive feedback from the microsystems.

*Individual functioning.* Academic achievement can buffer negative feelings such as stress and depression. Crystal, Chen, Fuligni, and Stevenson (1994) in a comparative study of the mainland Chinese, Taiwan-Chinese, Japanese, and American adolescents found that high-achieving Chinese youth reported less frequent depressive moods and fewer depressive symptoms than their low-achieving peers. In fact, in their study, high-achieving Asian students reported feelings of stress less frequently than low-achievers. The impact of academic achievement on adolescents' mental well-being as well as theoretical reasons why academic achievement is referred to as the cause and depression as the outcome will be discussed in more detail in the subsequent literature review of depression predictors.

*Microsystems.* Academic achievement can not only cushion negative feelings, but it can also induce positive feedback from the microsystems. Parents, teachers, and peers consider academic achievement a desirable outcome--an expression of desired personal qualities such as intelligence and diligence. Thus, high achievers are more likely to elicit positive reinforcement from others in the microsystems. Research findings indicate that high achievers have higher levels of parental acceptance (Lim & Lim, 2003; Nie, Zhang, & Zhang, 2001; Zhang & Zhang, 2002), teacher acceptance, and peer acceptance (Ding & Wang, 2002; Lau & Leung, 1992; Wang, Zhang, & Leung, 2005). Barber et al. (2005) demonstrate with longitudinal data that, at least in the United States, parental acceptance predicts a composite social initiative measure controlling for prior levels of the dependent variable. Thus, although the studies cited in this section do not meet the methodological criteria for inclusion in the outcomes section, there is reason to believe that parental acceptance is related to subsequent levels of youth positive goal-directed behavior more so than vice versa.

#### *Achievement Correlates*

Achievement-related factors that fail the standards of predictors and outcomes fall into the category of achievement correlates. They are labeled as correlates because the directionality of the relationship between achievement and achievement-related factors cannot be ascertained on a conceptual, theoretical, or methodological ground.

Achievement correlates mainly exist in the individual context where a host of individual characteristics are closely related. A few factors are present also in other ecological contexts such as microsystems.

*Individual functioning.* In the individual context, adolescent academic achievement is positively correlated with various positive individual characteristics and negatively correlated with negative youth functioning. Much research has found positive relationships between academic achievement and internalized constructs of adolescents, such as self-esteem. In an investigation of the mental health of 1,224 Chinese junior high school students, Tan, Qiu, and Li (2004) found that academic achievement was positively associated with the adolescents' self-esteem. The linkage between academic achievement and self-esteem is universal, not only demonstrated among the mainland Chinese population (Liu, 1998; Wang & Chen, 2001) but also among the Hong Kong-Chinese population (Cheung, 1986), the Taiwan-Chinese population (Chen & Page, 1989; Hong, Veach, & Lawrenz, 2004), and various other ethnic groups (Roth, 2005; Stewart et al., 1998).

Social competence is another individual characteristic that is positively correlated with academic achievement. Chen, Chen, and Kaspar (2001), in their study of Chinese elementary and high school students' social functioning and school adjustment, indicated that students with better academic achievement reported higher social competence. Additionally, several studies of Chinese adolescents indicated that, unlike several decades ago, current high-performing Chinese students demonstrate strong social skills and leadership as reported by their teachers and peers (Chen, Chen, Li, & He, 2005; Chen, Li, & Li, 1994; Chen, Rubin, & Li, 1995).

In addition to its positive associations with positive individual characteristics such as youths' self-esteem and social competence, academic achievement has been found to be negatively correlated with negative individual characteristics and functioning also. For

instance, youth behavioral problems are negatively correlated with academic achievement. A large-scale, cultural-comparative study between Chinese and American adolescents (Jessor et al., 2003) indicated that students with higher academic achievement were at lower risk for problem drinking and cigarette smoking in both ethnic groups. Li, Fang, Stanton, and Su (2003) found in a Beijing sample of seventh, eighth and ninth graders that academic achievement was negatively associated with problem behaviors. Many studies on Chinese adolescents have reported that the correlation between poor academic achievement and behavioral problems is stronger as age increases (Eadaoin, 2000; Shu, Liu, Wang, 2001; Wang, Zhang, & Leung, 2005).

In addition to behavioral problems, academic achievement also is inversely correlated with negative feelings such as anxiety. Shen (2003) found that, on average, low achievers scored higher on anxiety tests than higher achievers. Among all the groups --fourth-grade, 1<sup>st</sup>-year junior high school, and 1<sup>st</sup>-year senior high school--the relationship was the strongest among the junior high school students. Similarly, Wan et al. (2003) found in their Chinese sample of 7<sup>th</sup> to 12<sup>th</sup> graders that higher academic achievement was related to lower levels of anxiety. In a college-student sample, Song, Wu, and Zhao (2002) found that average achievers (but not necessarily the high achievers) exhibited lower levels of anxiety than low achievers.

*The family microsystem.* Achievement correlates primarily reside in the individual context as discussed so far. The review of literature for the present study identified only one achievement correlate from another ecological context: Specifically, family functioning is an achievement correlate in the family microsystem. According to Wentzel (1994), American adolescents from poorly functioning families had lower

academic achievement than those from normally functioning families. Shek (1997) reported the same results in his study of a large sample of Hong Kong-Chinese adolescents. Due to the lack of conceptual and methodological support for a causal relationship, I have placed family functioning in this correlate section. It is worth mentioning that there is no strong methodological reason why parenting styles in the family microsystem are classified as achievement predictors, whereas family functioning is classified as an achievement correlate. In the current review, parenting styles are framed into the predictor section mainly because a large body of literature refers to parenting styles as achievement predictors, whereas no study either presents or supports family functioning as an achievement predictor.

The above review of literature on achievement correlates helps illuminate potential intermediate processes for achievement-related depression. Although these correlates will not be examined in the current study, the discussion of the dynamics between self-esteem and achievement and the dynamics between social functioning and achievement provide insights on understanding why achievement is negatively correlated with depression.

### Depression Among Chinese Adolescents

The current review on adolescent depression is not organized into sections on outcomes and correlates (the structure that the prior achievement review utilized). The previous organizational structure cannot deliver the depression review in a balanced manner because the bulk of research focuses on predictors. Thus, the review of the literature on depression is organized as follows: First, statistics on depression rates and the negative impacts of depression on individuals are discussed to help the reader

appreciate the importance of adolescent depression as a problem. Second, definitions and a pathological mechanism of depression are discussed to establish a foundation for understanding the etiology of adolescent depression. Third, Bronfenbrenner's ecological theory is used to identify depression predictors one ecological context at a time, starting with the microsystems. It should be noted that predictors at the individual level are placed purposefully at the end of this section to help segue to the focus on gender. In addition, predictors in each context are further classified into risk factors and protective factors based upon whether they increase or decrease the risk of depression.

### *Importance*

Depression is a prevalent problem among Chinese youth. Hesketh, Ding, and Jenkins (2002) found in their sample of 1,567 mainland Chinese students ages 13 to 17 that one third reported symptoms of severe depression. Liu et al. (1999) in their multi-site random sample of 2,462 Chinese youth ages 13 to 22 found that 16.9% had moderate to severe levels of depression. In that study, the rate was even higher for the adolescents ages 13 to 18, since the risk of depression dramatically decreased from age 18 upward.

The problem is further highlighted when comparing Chinese adolescents with those from other nations. In several studies that compared adolescents' psychological adjustment across cultures, Chinese youth were reported to have the highest rate of depression, exceeding both Japan and the U.S (Chan, 1985; Crystal et al., 1994; Yamamoto, 1985). Such statistics raise grave concerns about Chinese youths' psychological health.

Adolescent depression has negative consequences in both the short and long runs. In the short run, depressive mood affects its victims' normal functioning and

consequently results in displeasure in life (Grant et al., 2003). Even worse, the inability to enjoy is related to both suicidal ideation and actual attempts, which, if successful, lead to the tragedy of death (Grant et al., 2003). In a large-scale investigation of Chinese adolescents' psychological health conducted by Hesketh et al. (2002), 16% of those who had depression admitted to having suicidal ideation, and 9% of participants with depression confessed that they had attempted suicide. In another large-scale report, Liu (2004) found similarly high rates of suicidal ideation and suicidal attempts: 9.3% and 10.5% respectively. Overall, the suicide rate in the Chinese population is three times the global average, accounting for 40% of all suicides reported worldwide (Murray & Lopez, 1996). Murray and Lopez said they suspected that the suicidal incidences in Chinese rural areas tend to be underreported, suggesting an even higher actual suicide rate.

In addition to its potential short-term negative impact, adolescent depression also can affect individuals in the long run. In a longitudinal study of a European-American sample, Devine, Kempton, and Forehand (1994) found that adolescent depression often led to depression or other psychological difficulties in adulthood. Reinherz, Giaconia, Hauf, Wasserman, and Paradis (2002) found that youths' self-report of depressive symptoms in early adolescence consistently predicted major depressive disorders at age 21. The research findings were drawn from Western samples. More research is needed to investigate whether a similar long-term link exists among Chinese youth.

### *Definitions and Etiology of Depression*

Definitions of depression and its closely related constructs are helpful for a thorough understanding of adolescent depression. Therefore, this section will offer well-received definitions for depression, stress, and stressors. In general, definitions for

constructs take various forms. Some are descriptive in nature; some take the form of classification systems to lay out dimensions of the construct. Others are operational definitions to provide the basis for conducting research (Whitley, 2001). As a multi-dimensional construct, depression is most commonly defined in the form of a classification system. To date, the Diagnostic and Statistical Manual of Mental Disorders text revision (*DSM-IV-TR*) developed by the American Psychiatric Association (2000) is the most well-recognized official classification system for mental disorders including depression. With the help of this classification system, individuals can be diagnosed on the basis of a set of common characteristics and syndromes if they have depression or other similar mood or mental disorders. According to its clinical diagnostic criteria (*DSM-IV-TR*; American Psychiatric Association, 2000),

The essential feature of a major depressive episode is a period of at least 2 weeks during which there is either depressed mood or the loss of interest or pleasure in nearly all activities. In children and adolescents, the mood may be irritable rather than sad. The individual must also experience at least four additional symptoms drawn from a list that include changes in appetite or weight, sleep, and psychomotor activity; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating, or making decisions; or recurrent thoughts of death or suicidal ideation, plans or attempts. (p. 349)

Several important features are worth highlighting from the above definition. First, depression is expressed in slightly different ways across development (*DSM-IV-TR*; American Psychiatric Association, 2000). Therefore, when depression is operationally defined for a specific research purpose, the age group of the target population is relevant.

Second, to be clinically diagnosed as major depression, the depressive episode must persist for certain duration of time. Third, depression affects a person's overall functioning including disturbances in individuals' somatic, behavioral, emotional, and cognitive regulation (*DSM-IV-TR*; American Psychiatric Association, 2000).

Stress and stressors are two constructs closely connected with depression. The definitions of these two constructs are helpful for understanding the etiology of depression. The definition of stress offered by Lazarus and Folkman (1984) is the most widely accepted as the conceptual basis for research on stress. According to these researchers, "Psychological stress involves a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19). In close connection with stress, the term *stressors* thus refers to events and experiences appraised by individuals as stressful. Stressors play a substantial contributing role in the development of depression among adolescents and adults (Goodyer, 2001; Robinson, Garber, & Hilsman, 1995). However, not all individuals under stress develop depression. Extensive research has documented influences that moderate the relationship between stressors and depression (Grant et al., 2003; Hankin & Abela, 2005). According to Holmbeck (1997), moderators are conceptualized as factors existing prior to the stressor(s) that increase or decrease the likelihood of the development of depression. The direction of the influences in relation to depression divides moderators into vulnerabilities and protective factors. Moderating variables for the relationship between stressors and depression primarily reside in two ecological contexts: the individual context and microsystems. Moderators in the individual context are age, gender, ethnicity, temperament, and cognitive styles. Parental

support is a moderator in the family microsystem (Hankin & Abela, 2005). In the current literature review, I have classified depression predictors into only two categories: risk factors and protective factors, based upon the nature of their impact. Vulnerability factors and stressors are both referred to as risk factors here.

### *Risk and Protective Factors*

Given the social significance of adolescent depression, it is important to have systematic knowledge of risk and protective factors of depression. The knowledge can promote understanding of the development of adolescent depression and shed light on prevention and intervention programs. Therefore, I will use Bronfenbrenner's ecological theory as the organizing framework to review risk and protective factors one ecological context at a time starting with microsystems.

*Microsystems.* Microsystems contain both risk and protective factors of adolescent depression. The subsection of review on microsystems will first review risk factors and protective factors in the family, school and peer microsystems respectively.

The microsystem is an important context that contains risk factors of depression. As its definition suggests, depression involves individuals' inner world of feelings derived from their experiences in the immediate environment. Thus, negative experiences that elicit stressful and anxious feelings in the family, school, and peer contexts are major causes for the development of adolescent depression.

Family is an important microsystem where risk factors for depression reside. Stressful experiences in the family have a strong impact on the formation of depressive mood. According to Greenberger, Chen, and Dong (2000), parent-child conflict is a strong risk factor for adolescent depression among Chinese youth. Additionally, Ngai and

Cheung (2002) found that parent-child conflicts surrounding academic issues, choice of clothing, and family finances especially were related to adolescent distress. In addition to parental behaviors and the parent-child relationship, researchers also have documented that Chinese students' perceptions of their parents' expectations are strongly related to their levels of psychological well-being. Students who reported having high parental expectation had greater levels of psychological distress (Chen, Rubin, & Li, 1995). Li (2003) added that parents' persistent high expectations produced depression among Chinese youth. Thus, pressure from parents and frustration from communicating with parents can endanger Chinese youths' psychological well-being. In addition to finding effects from parent-child conflicts and parental expectations, researchers also consistently found siblings' effects on adolescents' depression. Hesketh et al. (2002) and Hesketh and Ding (2005) found that presence of siblings in the family increased the risk of adolescent depression. Ngai and Cheung (2002) indicated that conflicts with siblings were significantly related to depression in adolescents from multi-sibling families. In sum, adolescents' negative experiences in the familial context put adolescents at risk for depression.

School is another important microsystem that harbors risk factors for adolescent depression. Academic achievement produces an enormous amount of stress among Chinese adolescents and is a predominant contributory source of depression. Chinese adolescents spend most of their time at school, where intensive competitive learning activities take place. In various investigations of current Chinese adolescents' psychological health, Chinese adolescents consistently rated school as the leading cause of their stress, anxiety, and depressed mood (Ding & Wang, 2002; Hesketh & Ding, 2005;

Sun, 2003). Chinese adolescents who reported school as a source of stress were more likely to experience depression than those who did not (Chen, 1997). Therefore, depression for Chinese youth is much driven by academic-related stressors.

Given the fact that depression for Chinese youth apparently is related to academic achievement, a discussion of potential processes is necessary. Literature suggests that academic achievement-related stress mainly emerges from two different processes. First, stress can stem from adolescents stretching their physical and cognitive limits to deal with learning tasks. Chinese students spend significantly more time on homework and supplementary learning materials than their counterparts around the world (Guang, 2003; Hesketh & Ding, 2005; Hofferth & Sandberg, 2001). The intensive load of school homework and supplementary learning tasks beyond the curriculum push Chinese adolescents' physical and cognitive resources to the limit. According to reports (Chen, Rubin, & Li, 1995; Guang, 2003; Sun, 2003), over 50% of Chinese youth are short of sleep, and about 80% of the Chinese youth are short of leisure time. Lack of sleep and leisure time produces academic achievement-related stress.

Frequent and public evaluation of academic achievement forms the second process through which achievement stress emerges. Chinese adolescents encounter frequent evaluation of their academic performance through quizzes and various exams. Even worse, their individual scores are not treated with privacy. Frequent testing and public updates of their achievement status force Chinese youth to either maintain a good record through hard work or otherwise deal with negative evaluation about their underperformance. Intensive efforts to increase their class rank or maintain their superior class standing produces stress, as discussed above. Negative evaluation of their

underperformance weakens adolescents' self-concept and also puts their psychological health at risk (Crystal et al., 1994; Ding & Wang, 2002; Unger et al., 2001). Fear of bad grades, peer rejection, school punishment, and teachers' rejection are reported by Chinese youth as sources of stress in the school context (Chen, Cen, Li, & He, 2005; Ding & Wang, 2002; Qin & Huang, 2000; Unger et al., 2001; Wan et al., 2003; Wang, 2003). In general, students with better achievement performance encounter these challenges to a lesser extent. It has been reported consistently that Chinese students with better academic performance are less likely to experience depression (Crystal et al., 1994; Hesketh et al., 2002; Shen, 2003; Unger et al., 2001; Wan et al., 2003; Zhou et al., 2003).

In addition to family and school microsystems, the peer context is the third important microsystem that hosts risk factors for adolescent depression. Given the fact that Chinese adolescents spend most of their time at school, peer interaction occurs primarily in the school context. Thus, there is overlap between the peer context and the school context. As discussed in the previous review of literature on school context, peer evaluation and competition with regard to adolescents' academic achievement are great stressors. In addition to achievement-related risk factors, disharmony and conflicts with classmates and friends are also risk factors for adolescent depression (Ding & Wang, 2002). Various studies have found that peer rejection was significantly related to adolescent depression (Chen et al., 2005; Wang, 2003; Wang, Zhang, & Leung, 2005). Lau, Chan and Lau (1999) reported that peer rejection was more predictive of adolescent depression than parental rejection.

The microsystem contains not only risk factors but also protective factors that moderate the relationship between stressors and adolescent depression. While negative

events and experiences in the microsystem put adolescents at risk for depression, positive experiences in the microsystem can buffer the negative effects of risk factors.

Researchers have documented that certain characteristics of the microsystems can reduce risk of adolescent depression.

The family microsystem can play an important role in protecting Chinese youth against depression. Specifically, the quality of the parent-child relationship and the characteristics of parenting behaviors largely define whether the family is a source of depression or a source of support against non-familial risk factors (Steinberg, 1999). According to Crystal et al. (1994), Chinese adolescents who perceived high parental satisfaction had fewer somatic complaints and lower risks of depressive moods than those who perceived low parental satisfaction. Similarly, Chen et al. (1995) and Greenberger et al. (2000) found that maternal warmth helped reduce depressive symptoms among children who had academic difficulties, whereas maternal rejection predicted more depressive symptoms among Chinese youth. Thus, adolescents' positive experiences in the family microsystem, especially with parents, provide them psychological resources for coping with risk factors of depression in other, non-familial settings.

The school microsystem can generate protective factors against adolescent depression as well, despite the fact that it predominantly plays an active depressing role in Chinese youths' lives. Specifically, teachers play an important role in Chinese adolescents' life. Chinese adolescents spend more time at school with their teachers than at home with their parents. In Chinese high schools, each class is assigned an individual master teacher who stays with the students throughout their high school years. The master teacher shoulders special responsibilities for students' overall performance, in addition to

teaching one of their major subjects. The average size of the Chinese high school class is about 50 students, thus it is challenging for the master teacher to pay enough attention to every student in the class, which partially explains why Chinese students reported lower levels of teacher support as compared with the other nine adolescent ethnic groups in their study (Stolz et al., 2004). Research findings indicate that teachers' support significantly buffered Chinese adolescents' risk of depression posed by academic difficulties (Tan, Qiu, & Li, 2004; Wang, 2003). However, little research was available on how schools overall can help alleviate Chinese youths' stress and play a protective role against adolescent depression.

In addition to parents and teachers, the peer microsystem also can protect adolescents from the attack of depressive feelings. Several studies demonstrated the positive impact of peer acceptance in buffering Chinese adolescents from depression (Chen et al., 2005; Wang et al., 2005). Peer integration and intimacy also were found to be negatively correlated with adolescent depression (Chen, Li, & Li, 1994; Chen, Rubin, & Li, 1995). More recently, Wang (2003) found that warm and helpful peer relationships buffered depressive feelings, whereas peer rejection induced adolescent depression among Chinese youth. In sum, factors in the microsystems such as positive parent-child and peer relationships and strong teacher support are major protective factors against adolescent depression (Steinberg, 1999).

*Mesosystems.* Examination of the risk and protective factors in the microsystems makes it clear that risk and protective factors do not exist in isolation. Thus, the mesosystem is a relevant analytic model for understanding the complexity of depression. The literature review of the microsystems thus far suggests that depression in Chinese

youth has a strong root in academic-achievement-related stress. Parents, teachers, and peers all play an important role in either enhancing or alleviating academic-achievement-related stress for individual adolescents. As aforementioned, there was much overlapping of peer and school microsystems in terms of the risk factors for adolescent depression. In addition, risk factors in the family microsystem such as parent-child conflicts and parental rejection to a large extent stem from school-related issues for Chinese youth. Therefore, the risk factors for Chinese adolescents' depression do not seem to originate from a single microsystem but rather from the interaction of the microsystems. However, despite the fact that the mesosystem represents a better conceptual explanation of the causes of depression, few studies specifically have utilized this analytical model to examine adolescent depression among Chinese youth. Unger et al. (2001) was able to record the psychological impact of the parent-teacher connection on Chinese youth. Within their large sample of Chinese adolescents, a parent-teacher meeting was listed as one of the most stressful events by adolescents. Thus, unlike in Western cultures where frequent parent-teacher communication and strong parent-teacher linkage promote positive youth outcomes (Beyer, Patrikakou, & Weissberg, 2003; Rosenfeld et al., 2000), the parent-teacher connection in the Chinese context seems to play a negative role, undermining Chinese youths' psychological well-being. In sum, more research is needed to examine adolescent depression under the model of the mesosystem to identify positive and negative dynamics of the interaction between microsystems.

*Exosystems.* Like the mesosystem, the exosystem is another relevant analytical term for understanding adolescent depression among the Chinese population. However, I was able to find only a little empirical research that paid attention to the relevance of

exosystem factors in understanding depression among Chinese adolescents. Scholars advocate for provision of social services and counseling programs in China to promote the mental well-being of Chinese adolescents (Hesketh et al., 2002; Sun, 2003). More empirical research is needed to investigate the effects of social services that are suspected to be protective factors against adolescent depression.

*Macrosystems.* The macrosystem also holds a key to understanding why depression prevails so strongly among Chinese youth. Specifically, three components of the macrosystem contribute to academic-related stress among Chinese youth and put them at serious risk for depression. First, as discussed in the previous overview of Chinese socio-historical context, the Chinese educational system engenders achievement pressure on Chinese youth, who have to push their physical, cognitive and psychological limits to meet the demands of intensive learning tasks and harsh competition (Sun, 2003). Second, traditional cultural values about the superiority of intellectual achievement encourage individuals to concentrate their efforts on academic achievement but devalue other kinds of achievement (Lau, 1979). The lack of options for fulfilling individual potentials is likely to elicit depressive feelings among many Chinese adolescents. Third, Chinese culture emphasizes self-control and inhibition of personal feelings. In response to stress in their daily life, adolescents are more likely to develop internalized psychological problems than externalized behavioral problems (Hankin & Abela, 2005). It is important to remind readers that the present study will not be measuring risk and protective factors, other than achievement and gender, from any of Bronfenbrenner's systems. It is nonetheless important to review these underlying risk and protective factors for the sake of a comprehensive understanding of the development of depression.

*Individual characteristics.* Ecological theory not only helps identifying risk and protective factors of depression in the developmental contexts, it also helps to suggest the active role of individuals in any developmental outcome. Stressors in the environment only put adolescents at risk for developing depression. The development of depression is also attributed to how individuals respond to risk and protective factors in the environment. Under the same risk factors, some individuals are more likely to develop depressive symptoms than others. Likewise, protective factors may work effectively on some individuals but not others. Thus, individuals have varying predispositions to depression.

Gender is an individual characteristic that puts Chinese adolescents at differential risks for depression. Multiple studies consistently have reported that Chinese female adolescents are at a significantly higher risk for depression than Chinese male adolescents (Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996). Moreover, Chinese females have higher levels of depression than Chinese males (Hesketh et al., 2002), and depressed adolescent females are more likely to have suicidal ideation and attempted suicides than adolescent males (Jin & Zhang, 1998). In the subsequent section on gender, gender socialization and gender-based processes related to academic achievement and depression will be discussed in detail to explain why Chinese adolescent girls have higher academic achievement and depression than Chinese adolescent boys.

Self-esteem is another important individual characteristic that varies adolescents' risks for depression. Adolescent self-esteem is inversely correlated with adolescent depression (Hesketh et al., 2002; Jin & Zhang, 1998; Liu, Ma, Kurita, & Tang 1999). In fact, self-esteem may partially account for gender differential effects in adolescent

depression. In adolescence, due to biological changes, girls on average have lower self-esteem than boys (Wang & Ollendick, 2001). Thus, to some extent, self-esteem is the process variable that might explain why females are more likely to be depressed than males in adolescence.

In addition to gender and self-esteem, attribution style is another individual characteristic that varies adolescents' risk for development of depression. According to Wang and Chen (2001), adolescents' attribution style explaining their success or failure in academic performance is related to the development of depression. Specifically, adolescents who favorably attribute success to their own abilities and failure to extrinsic factors are better able to guard against the attack of depressive feelings than those who fail to do so. In fact, self-esteem and attribution styles are closely related. According to Liu (1998), adolescents who have higher self-esteem are more likely to have positive attribution styles than adolescents who have lower self-esteem. Therefore, attribution style is also another process variable that describes a potential mechanism through which high self-esteem reduces risks for adolescent depression.

In sum, ecological theory is a useful framework to understand the formation of depression by systematically identifying risk factors and protective factors. Guided by the theory, the researcher would see adolescent depression as the outcome of interaction between individual characteristics and a host of protective and risk factors in the environment. In addition to its role as a navigational tool to map risk and protective factors, the theory also guides our understanding of the active role played by individuals, who carry predispositions that can vary their risks for depression. The previous comprehensive review of literature on achievement and depression among Chinese

adolescents helps familiarize readers with Chinese socio-historical background and provides a theory-guided understanding of achievement and depression among Chinese adolescents. The foundation of background and theoretical knowledge makes it easy to later interpret potential processes pertinent to understanding specifically the relationships among gender, achievement and depression.

### Gender and Gender Socialization

The previous review of achievement and depression literatures points to potential interesting processes associated with gender such that girls have higher levels of achievement and depression than boys. Since gender is the focus of the current inquiry, discussion of the construct of gender and gender-based socialization is indispensable for understanding the underlying processes that yield differences between boys and girls in achievement and depression. The subsequent review of gender and gender socialization literature will start with a broad overview of gender and gender socialization theories and then delve into contemplation of specific processes that help explain gender differences in achievement and depression respectively.

Prior to discussing gender socialization, it is worth highlighting that gender as a social construct is distinguished from an individual's actual biological sex. Individuals' biological sex is determined at birth based upon their external sexual organs by parents who later rear their children differentially (Hoyenga & Hoyenga, 1993). The interaction of biological factors such as chromosomes and hormones with socializing forces determines individuals' gender identity--individuals' psychological perceptions of themselves as being male or female (Hoyenga & Hoyenga, 1993; Johansson, 2007). Thus, the term *gender* emphasizes psychological aspects of masculinity and femininity, and the

term *sex* emphasizes biological aspects of masculinity and femininity (Hoyenga & Hoyenga, 1993). It is worth mentioning that sometimes biological labeling of sex is incongruent with individuals' gender identity. Hoyenga and Hoyenga (1993) explained that the powerful influences of biological forces such as the individual's chromosomes, gonads, and hormones dominate her or his development of gender identity. Due to the differences between biological sex and gender, it is important for researchers to be clear about what their specific interest is and use appropriate measures accordingly.

Gender socialization theories help explain processes through which individuals come to understand gender roles for each sex and develop their own gender identity. Gender socialization theories emphasize socialization influences but do not negate biological influences. Theorists and researchers have arrived at a general understanding that the gender socialization process is the interplay between biological and social factors (Crusec & Hastings, 2007). Gender socialization is multi-dimensional. No single theory can illustrate the complex picture completely. Social learning theory, cognitive development theory and gender schema theory all contribute to the understanding of how individuals develop their gender roles and gender identity (for detailed discussion, see Crusec & Hastings, 2007; Stockard, 1999). However, the focus of this review section is the gender-based socialization processes that help explain gender differences in achievement and depression. Social learning theory is most relevant for the current focus.

Social learning theory emphasizes the influences of microsystemic factors such as parent-child interaction and peer interaction. According to social learning theory, gender-typed behaviors are developed largely due to gender-based differential reinforcement and behavioral modeling in microsystems (Stockard, 1999). For example, parents introduce to

sons and daughters different types of toys, games, and clothing. Moreover, parents employ different modes of interaction with their sons and daughters respectively (Fagot & Leinbach, 1987). Gender roles and gender-typed behaviors serve boys and girls differentially in terms of academic achievement and development of depression.

#### *Gender-Based Differential Risks for Academic Achievement*

There are two potential explanations that help illuminate why girls have higher academic achievement than boys. First, it has been found that universally girls spend substantially more time on homework than boys and achieve higher school grades (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie et al., 2003; Wan et al., 2003). As a result, girls on average tend to have higher academic achievement than boys. The stronger studentship among girls may result from gender-based differential socialization. In many cultures, socially appropriate behaviors are emphasized more for girls than for boys (Hickman, Greenwood, & Millder, 1995; Li, Fang, Stanton, & Su; 2003). By practicing socially-approved behaviors such as being reserved and respectful, girls may acquire a higher level of self-control and concentration than boys. The emphasis on girls' behavioral appropriateness, thus, may have functioned in reality as a powerful facilitator for girls' school success (Crouter, Manke, & McHale, 1995; Gibson-Cline, 1996; McGinty, 1999).

On the other hand, girls' higher academic achievement than boys may result from gender bias built into the achievement evaluating system. As discussed before, the Chinese educational system emphasizes book-based intelligence, and Chinese adolescents are frequently evaluated on textbook materials (Sun, 2003). This form of academic evaluating system tends to reward personal characteristics that girls are more

likely to possess, such as diligence and the ability to concentrate. Thus, girls tend to show higher achievement than boys when using school grades for academic achievement evaluation. Duckworth and Seligman (2006) reported that girls' achievement advantage over boys when evaluated by school-reported GPAs diminishes when they are evaluated by aptitude tests or IQ tests.

#### *Gender-Based Differential Risks for Depression*

The gender-based differential risks of adolescent depression is a universal phenomenon (see Nolen-Hoeksema, 1990 for their meta-analysis of studies in various countries), which has been engaging researchers in the West to render explanations. The explanations focus on differences between males and females biologically, socially and psychologically. Since gender is the specific interest in this study of achievement-related depression, it is necessary to understand potential processes that contribute to gender-based differential risks for adolescent depression.

Biological explanations seem to be most plausible. According to Nolen-Hoeksema's (1990) review of various studies (mainly Western studies and a few from Hong Kong), children do not demonstrate differential risks for depression until the age of puberty. The fact that gender difference do not emerge until puberty is often attributed to the dramatic hormonal changes in girls (Brooks-Gunn & Reiter, 1990; Fechner, 2003). According to them, the cyclical change in estrogen starts at puberty. Estrogen increases cortisol (a stress hormone) secretion in females and prolongs the duration of time for cortisol levels to return to normal. Therefore, adolescent females are more vulnerable to depression.

Socialization factors are also considered to contribute to the gender differences in depression. Theories suggest that socialization of children is gender-based in many ways (Handel, Spencer, & Elkin, 2007; Leaper & Friedman 2007; Stockard, 1999). According to these scholars, gender-based socialization accounts for some behavioral differences between boys and girls. For example, under stress girls tend to develop internalized emotional problems whereas boys tend to exhibit externalized problem behaviors (Handel, et al; Leaper & Friedman). Stockard argues that boys' and girls' differences in response to stress result from combined biological and social influences. Fivush (1993) found that parents tend to employ elaborative styles of speaking to their daughters and pragmatic styles of speaking to their sons. Elaborative styles of speaking are rich in details and laden with feelings. With parents' unconscious, gender-based training of their children through gender-specific communicative styles, females develop a tendency to ruminate the details of negative events and retain negative feelings associated with the events (Davis, P. J., 1999; Murakumi, 2002; Nolen-Hoeksema, 1990). Based upon this argument, it is expected that lower achieving girls are more likely to feel depressed than lower achieving boys.

Another explanation for gender differences in depression from a gender socialization perspective is that males are taught not to express their feelings of depression to others (Joiner, Alfano, & Metalsky 1992; Real, 1997). According to Joiner et al., depressed male students seeking emotional support are treated with social isolation, whereas depressed female students seeking social support are not sanctioned for disclosing their emotional vulnerability. As a result, females are more willing to report

their depressive symptoms than males. It is believed that females' tendency to report accounts partially for their higher depression rate as compared with males.

In addition to biological and social explanations, there is also a psychological explanation for the higher depression rate among female adolescents. According to the theory of learned helplessness (Seligman, 1975), repeated negative experiences that one feels no control over produces helpless feelings and symptoms of depression. Marcott (1999) found that as age increases, male adolescents' confidence in their problem-solving skills increases whereas female adolescents' confidence in their problem-solving skills decreases. Moreover, girls were found to report a greater number of stressful events and a lower sense of control than boys. The decreased sense of control in females as their age increases may account for a higher depression rate among female adolescents (Murakumi, 2002; Nolen-Hoeksema, 1999).

Apart from all these theoretical explanations from biological, social and psychological perspectives, some scholars argue that the higher depression rate among female adolescents is artificial (Joiner, Alfano, & Metalsky 1992; Real, 1997). According to them, depression measures tend to include items which describe depressive feelings that females are much more likely to experience, such as crying. However, some adolescent depression symptoms that males tend to exhibit are not included in depression measures, such as serious problem behaviors (Joiner, Alfano, & Metalsky 1992; Real, 1997). According to them, the depression score is inflated for females and when a certain cut-off point applies, females appear to be at higher risk of depression. Thus, the higher depression rate among female adolescents is illusionary. In sum, the topic of gender

differential risks of depression is stimulating, and no single perspective can help understand the phenomenon entirely.

### Achievement, Depression, and Gender

The topic of the current study is the relationship between achievement and depression among Chinese youth with a focus on the potential role played by gender. The overview of Chinese socio-historical context helps the reader appreciate the unique features of the macrosystems that set the stage for Chinese youths' development. The extensive review of achievement and depression literatures provides a comprehensive view of the current state of knowledge regarding constructs of interest. The discussion of gender-based socialization processes helps provide insights on why girls have higher achievement and depression than boys. This comprehensive review of the body of literature ensures that the development of research questions is grounded in the literature, and that the current research effort will contribute to the body of the literature.

From the previous review of literature, the researcher can draw many research questions about achievement and depression among Chinese youth; however, the focus of this study is to investigate specifically the relationships among gender, academic achievement, and depression. The overview of the Chinese socio-historical context and the review of literature on depression helps reveal that academic-achievement-related pressure is a prevalent problem among Chinese adolescents, which puts them at high risk for depression. Specifically, academic achievement has been found to be inversely related to Chinese adolescent depression (Hesketh et al., 2002; Unger et al., 2001; Wan et al., 2003). In other words, Chinese adolescents who have higher academic achievement are less likely to be depressed than those who have lower academic achievement. In addition,

the literature review generally suggests that academic achievement is the cause and depression the outcome. The temporality principle that cause should precede outcome may be the underlying argument for why achievement is commonly identified as the cause and depression as the outcome in the literature. In reality, researchers measure children's depression at a point when they have already had years of educational experience and developed certain achievement status. Thus, the current study will make the same assumption as the mainstream literature does: Achievement is recognized as the presumed cause and depression the presumed outcome.

Research findings suggest that gender is a strong predictor of both adolescent academic achievement and depression. Specifically, researchers have consistently reported that Chinese adolescent females on average have higher academic achievement than adolescent males (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie et al., 2001; Wan et al., 2003). Various studies have indicated that Chinese adolescent females are more likely to be depressed than their male counterparts (Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996). Given the association of gender with achievement (the presumed cause) and depression (the presumed outcome), gender is considered a "common cause variable" (Keith, 2006, p. 67) for the relationship between achievement and depression. According to Keith, the common cause variable must be included in the analytical model to obtain an accurate picture about the relationship between a presumed cause and a presumed outcome. Thus, the current study will investigate these three variables together.

After justifying the inclusion of gender in the model, the researcher must address the next important question of what role gender plays in the model. There is a

discrepancy in the literature that suggests gender plays an interesting role in the relationship between achievement and depression in Chinese adolescents. Given the fact that Chinese adolescent females on average have higher academic achievement than adolescent males (Duckworth & Seligman, 2006; Hunley et al., 2005; Liang & Sun, 2000; Nie et al., 2003; Wan et al., 2003), it is anticipated that Chinese adolescent females on average should have a lower risk for depression than males because individuals with higher academic achievement are less likely to be depressed (Hesketh et al., 2002; Unger et al., 2001; Wan et al., 2003). However, research findings suggest that Chinese adolescent females are at significantly higher risk for depression than males (Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996). These counter-intuitive research findings lead one to wonder how it is possible for girls to have both high academic achievement and depression given that high achievement is associated with low levels of depression. To move toward answering this question, the role played by gender in the relationship between academic achievement and depression needs to be examined.

Two possibilities about the role of gender in the model can be excluded. First, gender cannot be a dependent variable. As argued before, one cannot define individuals' gender by their achievement status or levels of depression. Second, gender cannot be a mediator because it cannot be a variable that is transmitting the influence of presumed cause to a presumed outcome. In order to assume a mediating role, a variable should be able to play a role of a dependent variable. In other words, achievement does not change individuals' gender and then gender influences individuals' level of depression. Thus, when using statistical models to represent the relationships between gender, academic achievement, and depression to make them satisfy the three findings supported by

substantial research: (a) girls have higher academic achievement than boys; (b) girls have higher levels of depression than boys; and (c) achievement and depression are inversely related, gender can play two potential roles. First, gender can be a confounding variable that contributes a main effect. More specifically, the relationship between achievement and depression for boys and for girls can be graphically displayed by two parallel lines. Second, it can be a moderating variable that contributes an interaction effect. In other words, the relationship between achievement and depression is different between boys and girls and should be graphically displayed as two non-parallel lines. The researcher's task is to determine which of these two possible roles gender plays.

### Simulation

Prior to my accessing the data that will be used in this study, one approach to scrutinizing the potential roles of gender is to simulate data using computer software. MatLab 7.0 was used for data simulation. After translating certain constraints into programming languages, the software develops searching algorithms and returns different sets of parameters that satisfy all the constraints. The number of sets of parameters that characterize the relationships among gender, depression, and academic achievement is infinite because the magnitude of the relationships can vary on a continuous numeric range without changing the nature of the relationships that hold all the constraints. The endless numeric results may not be informative unless their patterns are summarized. Thus, it is important to identify patterns and display them graphically. With potential patterns of the relationship identified, it is then easy to answer the question of how, mathematically, it can be possible for girls to have both higher achievement and higher

depression than boys while overall high achievement is negatively associated with depression.

The major constraints on parameters in the data simulation are: (a) girls have a higher mean in academic achievement than boys; (b) girls have a higher mean in depression than boys; and (c) academic achievement and depression are inversely related when pooling the female and male samples. These three constraints correspond to the three findings supported by substantial literature about the relationship between gender, achievement, and depression. Additional information about measures for achievement and depression was incorporated in the simulation such that the achievement score should range between 1 and 5 and the depression score should range between 10 and 30 to match the potential range of the actual data set that will be used later. With the constraints specified above, the software applies searching algorithms and generates two random samples each time: 100 boy observations and 100 girl observations on academic achievement, and depression. Based upon the simulated data, the set of parameters was returned.

Five possibilities of how gender, academic achievement, and depression relate to each other were identified, and they are presented below. More specifically, these five possibilities represent distinctive patterns in which pooled estimates bias or misrepresent individual samples despite the fact that the three specified constraints on the relationship between the variables are well satisfied. In four of these possibilities, gender plays a moderating role in the relationship between achievement and depression. In only one case does gender play a confounding role contributing a main effect only. It is worth mentioning that there may be other varied representations; however, I think these five

possibilities summarize possible patterns distinctively and sufficiently. Detailed discussion of these five patterns is offered below. For the graphic display of these five possibilities, see the Appendix.

### *Possibility One*

In this situation where gender is a moderator, the estimate for the relationship between academic achievement and depression based upon the pooled sample is accurate for the boys' sample but not for the girls' sample. As shown in Figure 1-a, the girls' sample has higher mean academic achievement than the boys' sample. As shown in Figure 1-b, the girls' sample has higher levels of depression across each level of academic achievement. It is also illustrated that the linear fit of the relationship between academic achievement and adolescent depression for the pooled sample assumes a negative relationship, as shown in Figure 1-b. Thus, the predetermined conditions are satisfied by the simulated model. The unique aspect of this simulated model is that the linear fit based upon the pooled sample is accurate only for the boys' sample but is an underestimate of the true relationship for the girls' sample. This inference is based upon the fact that the line of the pooled sample linear fit is parallel to the line of the boys' sample linear fit and less steep than the line of the girls' sample linear fit, as shown in Figure 1-b. In a practical sense, this simulated model conjures up a situation in which higher academic achievement is associated with lower levels of depression for both boys and girls. However, the association is stronger for girls than for boys.

This mathematical possibility is also conceptually reasonable according to the previous literature review. The stronger negative association between achievement and depression for girls than for boys is forged by substantially higher depression of lower-

achieving girls than low-achieving boys, as shown Figure 1-b. In other words, girls are more affected by low academic achievement than are boys. As discussed before, girls tend to ruminate over details of negative effects, and negative feelings are sustained longer for girls than for boys (Davis, 1999; Murakumi, 2002; Nolen-Hoeksema, 1990). The gender-differential cognitive styles may contribute to lower-achieving girls' substantially higher depression. In addition to differences in cognitive styles, literature also suggests that girls suffer a dramatic decrease in self-esteem at adolescence (Liu, 1998). Boys' higher self-esteem also may account for their low depression in the face of low achievement status. In contrast, girls with lower self-esteem tend to regard low achievement as a reflection on their ability and develop more intensive negative feelings (Liu, 1998). The previous discussion of the Chinese socio-historic context also suggests that protective factors such as parental support and encouragement may be more available for Chinese boys than for Chinese girls, especially in rural areas. Consequently, one would expect to see low-achieving males in China having lower levels of depression than their female counterparts.

#### *Possibility Two*

In this situation where gender is a moderator, the estimate based upon the pooled sample is inaccurate for both the girls' sample and the boys' sample. Specifically, the pooled sample estimate is an overestimate for the boys' sample and an underestimate for the girls' sample. As shown in Figure 2-a, the girls' sample has a higher mean for academic achievement than the boys' sample. As shown in Figure 2-b, the girls' sample has a higher mean depression score than the boys' sample. More specifically shown in Figure 2-b, the dispersion of means in the depression measure for boys and girls

diminishes across the levels of academic achievement. In other words, at the lower end of academic achievement, girls are more depressed than boys. As their achievement level increases, the genders' differences in depression levels decrease. At the highest achievement level, girls and boys experience the same level of depression. Examining skewness of distributions, I found that the distribution of depression for the boys' sample is negatively skewed and the distribution of depression for the girls' sample is positively skewed. In sum, the negative association between academic achievement and depression is found for the boys' sample, the girls' sample, and the pooled samples. However, the pooled sample estimate is not sensitive to the differences in the strength of the relationship unique to the individual boys' and girls' samples. The same conceptual reasons as discussed in Possibility One also apply here to support the conceptual validity of this mathematical possibility.

### *Possibility Three*

In this situation where gender is a moderator, the pooled sample estimate for the relationship between academic achievement and depression is simply misleading. The pooled sample estimate underestimates the true relationship for the girls' sample and misrepresents the direction of the true relationship for the boys' sample, despite the fact that all three constraints are satisfied. As shown in Figure 3-a, the girls' sample has higher mean academic achievement than the boys' sample. As shown in Figure 3-b, the girls' sample has a higher mean depression score than the boys' sample. In the addition, the pooled sample's linear fit presents a negative association between achievement and depression. Thus, the simulated data meet the requirements established by the literature. However, as indicated in Figure 3-b, the negative association between achievement and

gender based upon the pooled sample underestimates the true relationship for the girls' sample and misrepresents the true relationship for the boys' sample, which actually bears a positive association between achievement and the depression. This scenario is presented only as a mathematical possibility for the relationship between achievement, depression, and gender. No empirical or theoretical evidence seems to suggest that boys' depression increases as their achievement increases. Instead, it is more likely that boys' depression decreases as their achievement increases. Thus, this mathematical possibility lacks conceptual grounds.

#### *Possibility Four*

In this situation, gender also plays a moderating role. Moreover, like the scenario in Possibility Three, Possibility Four also illustrates a situation in which the pooled sample estimate is misleading. However, in the current scenario, the girls' sample demonstrates a positive association between achievement and depression, and the boys' sample bears a negative association between achievement and depression, as shown in Figure 4-b. Similarly, it is easy to see that the current simulated situation satisfies all three constraints. The seeming negative association between achievement and depression for the pooled sample is forged by a negative association among boys greater in magnitude than the positive relationship among girls. In other words, the estimate based upon the pooled sample underestimates the magnitude of the relationship for boys and mispredicts the direction of the relationship for girls.

This mathematical possibility seems to be supported by previous literature as well. In this scenario, girls have almost invariably high levels of depression. As discussed before, adolescent girls' drop in self-esteem is a predominant process that contributes to

their higher depression levels. Moreover, in this scenario, as achievement increases, girls' depression slightly increases. Although there is no research supporting that, it is still conceptually possible that girls' depression slightly increases as their achievement increases. As discussed earlier, Chinese adolescents encounter frequent tests and frequent public updates of their achievement status. It may be that high-achieving girls experience more stress to maintain their achievement records, whereas low- and average-achieving girls only experience pressure to improve. The intensive insecure feelings in high-achieving girls may bring them higher depression.

#### *Possibility Five*

Distinctive from the prior four scenarios in which gender moderates the relationship between achievement and depression, Possibility Five represents a situation in which gender contributes only a main effect to the model while the three constraints still hold. As shown in Figure 5-a, girls on average have higher achievement than the boys. Girls have higher levels of depression than boys across achievement levels, as illustrated in Figure 5-b. Moreover, the linear fit of the relationship between achievement and depression for the girls' sample is parallel to the linear fit for the boys' sample, which indicates that the relationship between achievement and depression is the same for boys and girls. However, this does not suggest that gender can be excluded from the model. As shown in Figure 5-b, the pooled sample linear fit is not accurate for either sample. This scenario illustrates that gender confounds the relationship between achievement and depression because the pooled sample estimate is masked by gender.

This mathematical possibility is conceptually reasonable as well. This scenario suggests that the same processes between achievement and depression exist between boys

and girls. The previous introduction to the Chinese population and Chinese socio-historic context suggests that achievement carries a similar meaning for urban Chinese boys and girls. Urban Chinese boys and girls are socialized similarly to deem achievement as critical means for pursuing personal success. Moreover, urban Chinese boys and girls experience a similar social reality that academic achievement is essential for future opportunities. The similar socialization environment may build the same dynamics of achievement and depression for boys and girls. In this scenario, although the relationship between achievement and depression is the same for boys and girls, the two lines of individual estimates are not identical, but rather, parallel to each other. More specifically, the line of the estimate for girls is above the line of the estimate for boys because girls' depression is proportionally higher than boys' across each achievement level. As discussed before, girls' consistently higher depression than boys' is supported by a substantial body of research (Unger et al., 2001; Wan et al., 2003).

#### *Comparison and Integration*

All of these scenarios confirm the necessity of including gender in the model. In Scenario One, the estimate of the relationship between achievement and depression without differentiating gender is representative of only one sample. In Scenario Two, the pooled sample estimate is only correct in predicting the direction of the relationships for the two samples but is erroneous about the magnitude of the relationship for either sample. In Scenarios Three and Four, the pooled sample estimate is simply inaccurate and misleading. In the first four scenarios, a gender-by-achievement interaction effect is present in the model. Scenario Five represents the situation in which only main effects are present. In sum, two insights can be drawn from the simulation. First, a pooled

estimate that is not gender-sensitive is inaccurate; thus, it is important to include gender in the model. Second, the simulation suggests that theoretically gender can play either a moderating role or a confounding role. Thus, if the three conditions reported in the literature are also found to be present in the real-world data used for the present study, I will examine which of the five possibilities can be deemed to best reflect the data.

### *Research Questions and Hypotheses*

To test a potential role of gender in the model, I will sequentially investigate the following research questions and some corresponding hypotheses:

Q1: Does gender predict academic achievement for Chinese adolescents?

H1: Chinese female adolescents will have higher levels of academic achievement than their male counterparts.

Q2: Does gender predict depression for Chinese adolescents?

H2: Chinese female adolescents will have higher levels of depression than their male counterparts.

Q3: Is academic achievement inversely related to adolescent depression for Chinese youth?

H3: Higher achievement will be associated with lower levels of depression among Chinese youth.

Exploratory questions:

Q4: Does academic achievement predict adolescent depression differentially for Chinese boys and girls?

Q5: If gender is not a moderator, is the main effect of gender significant after controlling for academic achievement?

Including gender in a model of the impact of achievement on depression is justified only when the first three hypotheses are supported. Therefore, only if the first three hypotheses are supported will the next two research questions be examined sequentially. The next two research questions are exploratory in nature and examine the role of gender. The first question is whether gender moderates the relationship between achievement and depression. If gender is identified as a moderator, it will be interesting to examine which pattern the current data support among the four simulated scenarios where gender is a moderator. Previous discussion suggests that gender can be either a moderating variable or a confounding variable to make the three literature-supported conditions hold. However, it is important to examine empirically if this argument is the case. Thus, the second question is whether gender, if it is not identified as a moderator, is a confounding variable contributing a main effect.

## CHAPTER THREE

### METHODS

Secondary data analysis was conducted to address the research questions of this study. Data for this study stem from the Chinese sample of the Cross-National Adolescence Project (C-NAP), a survey and interview study conducted in 1997 to test the key socialization constructs in the primary developmental contexts for adolescents from 10 national groups (see Barber et al., 2005). This current study only used the survey data because the six open-ended interview questions after the survey were not pertinent to the current study. The remainder of this chapter includes a description of the sample, instrument, measures, and plan of analysis for the study.

#### Sample and Instrument

The Chinese sample included 1,027 adolescents 12 to 20 years old from a middle school (from grade 7 to grade 12) in Beijing. Of them, 453 are boys, 541 are girls and the other 33 were not recognized of their gender. The 33 observations were deleted from the sample that was analyzed because missing value analysis indicated that deletion would not bias the statistical results. Detailed discussion of unbiasedness of these missing values is available in Chapter Four. The majority of the sample are adolescents 14 ( $n = 390$ ) and 17 years old ( $n = 385$ ). In the sample, there was one adolescent ages 20 and two adolescents ages 12. These three observations with extreme values on age were not excluded from the sample to be analyzed because preliminary analysis did not suggest age was related to achievement and depression. Boys and girls are equally represented

within these two age groups. Among the seven ethnic groups identified among the sample, Han is the biggest ethnic group, accounting for 87.2% of the total sample.

All the C-NAP data were obtained by means of paper-pencil surveys administered to school-going youth in classrooms of selected schools within metropolitan school districts. Specifically, the Chinese data were gathered in a school in Beijing. The survey included basic demographic information and numerous scales and questions tapping adolescent psychosocial well-being and their experiences in family, peer, school, community, and religious contexts. For the Chinese sample, the survey was translated from English into Chinese and back-translated into English to ensure the maximum equivalency of the two versions. In the translating process, a native collaborator was consulted on the cultural relevance of survey questions. No major modification was deemed necessary as a result of this process.

Surveys were conducted only among students who attended class on the day of survey administration; no procedure was taken to include students who were absent on that day. Surveys were administered in classroom groups. Passive consent was obtained prior to administering the survey. Surveys were administered in Mandarin and under the supervision and consultation of an on-site, native researcher.

### Measures

Academic achievement, depression and gender are the three key variables in the current study. Measures for these three variables are introduced below.

#### *Academic Achievement*

For the purpose of this study, academic achievement was measured by the following item: “In general, how well did you do in school? Would you say your grades

were . . .?” Response categories ranged from 1 (*well above average*) through 3 (*average*) to 5 (*well below average*). These items were reverse-coded so that higher scores would reflect higher levels of achievement.

### *Depression*

Depression was measured with a 10-item version of the Child Depression Inventory (CDI; Kovacs, 1992). For each item, youth were asked to choose one of the three statements that best describes them. Items are as follows:

1. I am sad once in a while.  
I am sad many times.  
I am sad all the time.
2. Nothing will ever work out for me.  
I am not sure if things will work out for me.  
Things will work out for me O.K.
3. I do most things O.K.  
I do many things O.K.  
I do everything wrong.
4. I hate myself.  
I do not like myself.  
I like myself.
5. I feel like crying every day.  
I feel like crying many days.  
I feel like crying once in awhile.
6. Things bother me all the time.

Things bother me many times.

Things bother me once in awhile.

7. I look O.K.

There are some bad things about my looks.

I look ugly.

8. I do not feel alone.

I feel alone many times.

I feel alone all the time.

9. I have plenty of friends.

I have some friends, but I wish I had more.

I do not have any friends.

10. Nobody really loves me.

I am not sure if anybody loves me.

I am sure that somebody loves me.

Responses for each item were coded 1 to 3 such that a higher total score reflected a higher level of depression. The mean of individuals' total score of 10 items was used to measure their level of depression with possible values ranging from 1 to 3. It should be noted that the reliability of the Child Depression Inventory has not been well established within a Chinese sample. Because a measure with low reliability for the dependent variable decreases the effect size and consequently statistical power, the internal consistency of the items were examined prior to investigating the research questions. Alpha values with the deletion of each individual item were calculated and then compared with the alpha value calculated with all the items taken into account. The

following criterion was applied: Item(s) that, when removed from the scale, lead to significant improvement in alpha values will be deleted to increase the internal consistency of the scale. Using this approach to increase the reliability of the measure is necessary because the scale is not widely used among Chinese youth, and it is not appropriate to make the assumption that a reliable scale among one population is a good measure for a different population. Although I selected an empirically driven approach to examine the depression scale, the reliability analysis did not indicate that removal of any items could lead to significant increase in reliability. Thus, all the 10 items were retained in the scale. Cronbach's index of internal consistency for this sample is satisfactory,  $\alpha = .77$  (criterion:  $\geq .7$ ).

### *Gender*

Gender was measured by youths' responses on the demographic question about their gender. Males were coded 1, and females were coded 2.

### Methods of Analysis

The Statistical Package for the Social Sciences (SPSS) software version 14.0 was used to conduct various statistical analyses. First, descriptive statistical analyses were conducted to (a) determine relevant descriptive statistics such as sample size, mean, and standard deviation and (b) detect the presence of unusual data values and patterns of missing values. Second, inferential statistical analyses were conducted to examine individual hypotheses. Specifically, a two-tailed  $t$ -test for independent samples was used to test H1: that female Chinese adolescents have higher levels of academic achievement than their male counterparts. Another two-tailed  $t$ -test for independent samples was used to test H2: that female Chinese adolescents have higher levels of depression than their

male counterparts. A simple linear regression was run to test H3: that achievement is inversely related to youths' depression score.

The original plan of analysis also called for examining two additional research questions if H1, H2, and H3 were all supported--Q4: "Does academic achievement predict adolescent depression differentially for Chinese boys and girls?" and Q5: "If gender is not a moderator, is the main effect of gender significant after controlling for academic achievement?" Multiple regression would have been the appropriate statistical tool to examine these two questions if H1, H2 and H3 were supported. Specifically, to examine Q4, the depression variable should be regressed on gender, academic achievement, and the gender-by-achievement interaction term simultaneously. The creation of the gender-by-achievement interaction term deserves some detailed illustration. First, the gender-by-achievement interaction term is created by taking the product of the two variables. Second, the gender variable should be coded in 0 and 1 to reflect that gender is a binary variable in nature. This 0-1 dummy coding technique for binary variables ensures that the software will yield correct results (Keith, 2006). Third, the achievement variable should be centered--deducting the mean value of achievement from all the achievement data values. Centering can help reduce multi collinearity among the predictors in the model and make sure that the results are not problematic (Keith, 2006). Interpretation of the *p*-value associated with the interaction term is the key to Q4 in terms of whether gender is a moderator variable. A significant *p*-value suggests that academic achievement predicts adolescent depression differentially for Chinese boys and girls. With a significant *p*-value suggesting the presence of interaction, a simple slope analysis would have been useful to further characterize the form of the interaction. A

nonsignificant  $p$ -value of the interaction term suggests no significant interaction and leads to examining Q5--If gender is not a moderator, is the main effect of gender significant after controlling for academic achievement? To answer this question, depression should be regressed on gender and academic achievement.

## CHAPTER FOUR

### RESULTS

#### Descriptive Statistics

Sample statistics are provided in Table 1. There are 33 participants who did not report their gender, contributing the 3.2% missing data on the key independent variable of gender. These 33 participants were treated as an individual group when examining achievement and depression. This missing value analysis technique helps determine whether results are biased or not with missing values of independent variables discarded (Keith, 2006).

With regard to the depression measure, only 998 out of 1,027 participants provided responses to all 10 items. According to Keith (2006), missing values on a multiple-item scale can be imputed properly using a mean replacement technique or multiple regression technique if missing values occur only on one item. Since missing values occurred on more than two items of the depression scale, the values could not be imputed properly. Thus, observations with incomplete responses on the depression scale were discarded whenever analyses involving depression were conducted.

#### Gender and Academic Achievement

Girls' achievement was found to not be significantly higher than boys' at an alpha level of .05,  $t(540, 452) = 1.682, p = .093$ . The result was not biased by the missing data on gender because whether participants responded to the gender question or not was not dependent upon their academic achievement as indicated by a  $t$  test comparing means of

academic achievement of the group who responded vs. the group who did not respond,  $t(33, 992) = -.995, p = .320$ .

#### Gender and Depression

Girls' depression level in this sample is not significantly higher than boys' at an alpha level of .05,  $t(526, 431) = .684, p = .494$ . The result was not biased by the missing data on gender because whether participants responded to the gender question or not was not dependent upon their depression level as indicated by a  $t$  test comparing means of depression of the group who responded vs. the group who did not respond,  $t(31, 957) = .080, p = .946$ .

#### Academic Achievement and Depression

The effect of academic achievement on depression was found to be statistically significant,  $F(1, 985) = 41.769, p < .001$ . Despite the highly significant relationship, the effect size of the relationship is small,  $r = .202$ , according to Cohen (1998)'s rule of thumb that  $r < .3$  is considered a small effect size. The strength of the relationship indicated by the standardized coefficient is  $-.202$ , suggesting that depression level decreases .202 standard deviation with 1 standard deviation increase in academic achievement.

#### Summary

Only the hypothesis about the negative relationship between achievement and depression was supported by the current data. The other two hypotheses about the gender differences in achievement and depression were not supported by the current data. The additional exploratory research questions about the role played by gender were not investigated because as discussed in Chapter Three, unless all the three hypotheses are

supported, an inquiry of the role played by gender in the relationship between achievement and depression is not justified. Thus, the originally planned regression test to examine the model of the three variables together was not conducted and no results on gender effect in the model were able to be reported. Post-hoc analysis of the relationship between gender and depression by treating depression as a dichotomous variable was conducted. Detailed discussion of the post-hoc analysis is available in Chapter Four.

Table 1

*Descriptive Statistics of Academic Achievement and Depression*

Variables	<i>N</i>	<i>M</i>	<i>SD</i>
<b>Gender</b>			
Boys	453		
Girls	541		
Non-Identified	33		
All	1,027		
<b>Academic Achievement</b>			
Boys	452	3.208	1.072
Girls	540	3.317	0.937
Non-Identified	33	3.091	.947
All	1,025	3.262	1.000
<b>Depression</b>			
Boys	431	1.510	.331
Girls	526	1.524	.317
Non-Identified	31	1.523	.291
All	998	1.518	.322

## CHAPTER FIVE

### DISCUSSION

The results of this study do not provide support for the hypotheses that girls have higher academic achievement than boys or that girls have higher depression than boys. This is unexpected given that previous research findings suggest that Chinese girls have higher academic achievement than Chinese boys (Liang & Sun, 2000; Nie et al., 2001; Wan et al., 2003) as commonly found in the West (Duckworth & Seligman, 2006; Hunley et al., 2005). Moreover, Chinese girls also are commonly found to have higher levels of depression than Chinese boys (Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996).

The results do provide support for the third hypothesis that academic achievement is inversely related to depression. Since gender was not found as a significant predictor for either academic achievement or depression, exploratory questions 4 and 5 about the role played by gender were not examined here.

#### Gender and Achievement

There are several potential explanations for the lack of a significant relationship between gender and achievement found in the present study. First, the measure for academic achievement may not be sufficient for the present study. The present study used secondary data from the Cross-National Adolescence Project, which was conducted to study socialization constructs in the primary developmental contexts for adolescents from 10 national groups. Since academic achievement was not the primary research interest of the original study, the researchers used a one-item measure for academic achievement by

asking adolescents to rate their achievement standings on a 5-point scale. The one-item youth report of their perceived achievement standings relative to their peers on a 5-point scale is unlikely to reflect their actual achievement as well as school-reported data of students' GPA would, for instance.

Studies that were cited in the literature review perhaps demonstrated a significant relationship between gender and achievement due to their better measurement of academic achievement. Duckworth and Seligman (2006) in their study of eighth-graders in an American urban magnet school used two different measures of academic achievement: course grades and achievement aptitude tests. These researchers found that girls outperformed boys in terms of course grades and were marginally better than boys on the aptitude tests with an alpha level of .10. As compared with the measure of youth-reported relative ratings, these two achievement measures are directly based upon adolescents' actual achievement performance. As to the current study, it is possible that lack of validity of the achievement measure mitigates the validity of the insignificant relationship found between gender and academic achievement. Additionally, several studies were able to find that Chinese adolescent girls attain higher academic achievement than Chinese adolescent boys by using school-documented data of students' GPA (Liang & Sun, 2000; Nie et al., 2001) or standardized tests (Wan et al., 2003). The validity and multi modality of the measurements used in their studies give weight to their findings.

This explanation for insignificant gender differences found due to the lack of measurement validity probably is especially relevant to studying Chinese youths. It is suspected that the youth-reported relative-ratings of achievement measure used in current

study is potentially gender-biased. It may be that, with lower self-esteem or a socially-trained modest attitude, Chinese girls tend to give themselves lower ratings than their actual standing, whereas Chinese boys, with higher self-esteem and a socially-trained extroverted attitude (McGinty, 1999), tend to give themselves higher ratings than their actual standings. If these dynamics were true in this sample, the measure would have diminished the actual difference in academic achievement between boys and girls, perhaps making the observed difference insignificant.

The second measurement-related potential explanation for the lack of a significant relationship between gender and achievement is the restricted precision on variability of the achievement measurement. With a one-item, 5-point scale measure, respondents may have had difficulty choosing one of those 5 points to reflect their exact perceptions of their achievement levels. In other words, perhaps the measure is not precise enough to detect the actual variability in adolescents' academic achievement. An achievement measure using students' GPAs or students' standard test scores can reflect the actual variability to a more precise level because individuals' GPAs and test scores theoretically can rest on any point of a continuum. In our current study, the standard deviation of achievement was .94 for girls and 1.07 for boys. Using students' GPAs, Hunley et al. (2005) reported that the standard deviation of achievement was .83 for girls and .93 for boys; and Duckworth and Seligman (2006) reported that the standard deviation of achievement is 0.65 and 0.69 for girls and boys respectively. The smaller standard deviations of achievement measurements in the Hunley et al. and Duckworth and Seligman studies indicate better precision in their measurements than that of the current

study. According to Keith (2006), everything else being equal, better measurement precision increases the statistical power to detect differences.

The third possible explanation for the inability of the current study to find significant relationship between gender and achievement is related to the sampling method employed by the C-NAP study. The sample was taken from classroom groups in a high school in Beijing. Moreover, only those who attended school on the day when the survey was administered were studied. The sampling method yields a non-random, biased sample that represents only urban Chinese youth. The non-randomness of the sample inhibits the generalizability of the research finding. In other words, the finding of an insignificant relationship between gender and academic achievement is only applicable to schools with characteristics similar to the one being studied situated in metropolitan cities in China.

As to smaller cities or rural areas, the current study was not able to provide insights. Maybe there is indeed no genuine relationship between gender and achievement even among urban Chinese youth indeed. As discussed in the review of Chinese socio-historical context, Chinese rural and urban youths are situated in different developmental contexts (Sun, 2003). In urban areas, most families only have one child, and parents are highly orientated toward their children's academic achievement. One would expect that urban parents' expectation and encouragement of their children's academic achievement does not dependent much upon the child's gender, given that they just have one child. If this is true, the socialization context for Chinese youth in urban areas may not differentiate boys and girls with regard to their academic achievement. In rural areas, many rural families have multiple children, and the traditional cultural value of

superiority of males over females still prevails (Falbo, 1992). Thus, rural Chinese boys tend to receive more morale and material support from their parents for their pursuit of academic achievement, whereas rural Chinese girls are likely to be discouraged from their pursuit of academic achievement because the educational cost is high for rural families and education is not perceived as useful for girls by rural Chinese parents (Falbo, 1992). It is likely that Chinese girls in rural areas have lower self-esteem, achievement motivation, and academic achievement than Chinese boys in rural areas as a result of gender-based socialization. Hesketh et al. (2002) included both rural and urban Chinese adolescents in their sample, which makes their findings more generalizable to Chinese youth overall and perhaps helps explain why they found a significant relationship.

It is also likely that the sampling method resulted in a homogeneous group with regard to their academic achievement and achievement-related characteristics. In other words, there may be a genuine relationship between gender and achievement among urban Chinese youths; however, the sampling of a homogeneous group from one school was not able to reveal the relationship. As discussed in Chapter Two, under the Chinese educational system all the students are assigned to schools of different ranks solely based upon their test scores in the unifying standard test. As a result, boy and girl students in one school are very similar with regard to their achievement level and individual characteristics for further achievement, such as learning capacity and achievement motivation. The data suggest that, on average, this is a group of high-achieving adolescents ( $M = 3.26$ ,  $SD = 1.00$ ), or at least, they perceived themselves as high achieving. Moreover, boys' academic achievement ( $M = 3.21$ ,  $SD = 1.07$ ) does not vary much from girls' academic achievement ( $M = 3.32$ ,  $SD = .94$ ). Wan et al. (2003) used

stratified random group sampling and found that adolescent girls have higher academic achievement (measured by standard tests) ( $M = 216.67$ ) than adolescent boys ( $M = 196.37$ ) in a medium-size city in China. By using stratified random group sampling, Wan and colleagues chose four schools that were representative of schools at different ranks in the city. Thus, their sample is more heterogeneous with regard to academic achievement.

Lastly, the sampling method employed in C-NAP study raises the concern that the sample was also biased containing only those students who attended school on the day of survey administration. The number of students who missed school was not reported by the C-NAP study. Perhaps, the number is negligible or the information was not able to be obtained. At any rate, students who miss school seem likely to share certain achievement-related characteristics, such that they tend to be low-achieving students, or they tend to be male students. Without the information about those students who missed school, we cannot safely conclude that the finding is credible.

#### Gender and Depression

Given the sufficient evidence in the literature on the gender differences in depression (Hesketh et al., 2002; Ji et al., 2001; Pritchard, 1996), the anomaly of no significant gender differences in the current study first leads one to question the validity of the depression measure--the Child Depression Inventory (CDI; Kovacs, 1992). Despite the fact that this depression measure was well received in the West, the Child Depression Inventory has not been widely used within the Chinese population. Moreover, the original measure had to be translated into Chinese to be administered to the Chinese adolescents in the current study. Although a back translation procedure was taken to ensure the

maximum equivalency of English and Chinese versions, the internal validity of the measure in the Chinese version was not established.

An examination of the face validity of the measure raises skepticisms on two items. First, the wording of the last item may have caused confusion among Chinese adolescents. The last item asked adolescents to choose among the three statements: (a) *Nobody really loves me*; (b) *I am not sure if anybody loves me*; and (c) *I am sure that somebody loves me*. The word *love-- Ai* in Chinese has a connotation of romantic love. When Chinese adolescents were asked whether there is someone who loves them, they tend to think in association with romantic feelings. Thus, this last item may have failed to tap Chinese adolescents' feelings of being cared and supported as the item intended. The word *care--Guan Xin* in Chinese, would be of more appropriate use for the last item. Although the translation of love into *Ai* may have undermined the validity of the depression measure, the mistranslation should have affected Chinese boys' and girls' interpretation of the question similarly and cannot adequately explain why there was no gender difference in depression in the current sample.

The other item that raises concern of measurement validity is the one that asks adolescents about how frequently they feel like crying. As discussed in Chapter Two, this item introduces a gender bias into the measure since girls tend to exhibit depressive feelings by crying whereas boys tend to exhibit depressive feelings in the form of problem behaviors (Joiner, Alfano, & Metalsky 1992; Real, 1997). However, the inclusion of this gender-biased item should have boosted girls' depression score and increased the difference in depression between boys and girls. Therefore, the item may be

problematic but does not explain the anomaly of no gender difference in depression in the current study.

Because the Child Development Inventory is not widely used in China, the measurement validity was examined in the first place. But the above examination of the measurement validity did not seem to suggest that no gender difference in depression in the current study was due to lack of measurement validity. In fact, the western measure of depression should have a good external validity to generalize across the Chinese urban culture because the socializing context in modern Chinese urban areas should be comparable to the socializing context in the West due to the homogenizing power of the globalization.

Although the measurement validity does not explain the lack of gender difference in depression, the mathematical treatment of the measure may have contributed to the anomaly in findings. When compared with previous studies of depression among the Chinese population, it is found that the current study used a different mathematical approach to answer the question of gender differences in depression. The current study treated depression as a continuous variable to examine whether boys and girls differ in their mean scores of depression using a *t* test. Hesketh et al. (2002) in their study of depression among Chinese youth treated adolescents' *yes-or-no* responses on five items as five dichotomous variables and conducted Chi-square tests to examine whether girls and boys were distributed in the depressed and nondepressed categories equally.

Although Hesketh et al. (2002) found that girls were significantly more likely to respond *yes* on all five items asking whether they have the described depressive feelings and symptoms, their statistical approach is questionable. A problem of inflated Type I error

arises when conducting multiple individual Chi-square tests. Hesketh et al. (2002) is not alone in using this questionable approach. Unger et al. (2001) concluded that Chinese girls are at higher risk of depression based upon the results of nine individual Chi-square tests. In their cases, multivariate statistical treatment should have been employed to compare boys and girls on the set of multiple items in a controlled manner.

In addition to conducting non-controlled multiple comparisons, dichotomizing the depression measure may also result in greater likelihood of finding a significant relationship than treating depression measure as a continuous scale. Various studies dichotomized the depression measure and reported that girls have higher depression than boys (Ji et al., 2001; Pritchard, 1996). Like the current study, Ding and Wang (2002) used a depression scale and treated depression as a continuous variable; however, they were not able to find a gender difference.

The discrepancy in conclusions generated by different mathematical approaches motivated the author to examine whether a significant relationship would occur if the depression measure was dichotomized. Therefore, post-hoc analysis was conducted to reexamine the relationship between gender and depression by using a cut-off point of 2.48, which is 3 standard deviations higher than the mean. The criterion of three standard deviations away from the mean is most commonly used in statistical techniques to identify observations with extreme values (Keith, 2006). Thus, the author used this criterion as a dichotomizing standard. Still, no significant relationship was found. Therefore, the finding of insignificant relationship in the current study is not due to the statistical approach of treating the depression measure as a continuous scale rather than a dichotomous scale.

As indicated above, different mathematical approaches delivered the same result that there was no gender difference in depression in this sample. It is then natural to further examine conceptual reasons why there might be no relationship between gender and depression in the target population that the sample represents. As mentioned before, the sample was taken from classroom groups in a high school in Beijing. The shared environment of adolescents in one school may result in similar rates of depression between boys and girls (Murakumi, 2002). Ding and Wang (2002) were not able to find gender as a predictor for depression in their Chinese sample perhaps for the same reason. They sampled participants from two schools in two metropolitan cities that share geographic proximity. Other studies that found a significant relationship between gender and achievement included a more diverse sample. Hesketh et al. (2002) included both rural and urban Chinese adolescents in their sample. Unger et al. (2001) sampled their participants from four schools with two of them in urban areas, one in a small town, and one in a rural area.

In addition, the sampling of only urban youth also may have contributed to the finding of a nonsignificant relationship between gender and depression. In urban areas, Chinese male and female adolescents are treated equally favorably because most urban families have only one child. In rural areas, families have multiple children, and boys are given more favor and higher status than are girls under the influence of the traditional cultural value of *Nan Zun, Nu Bei* (“men superior, women inferior”; Falbo, 1992). The traditional cultural value of *Nan Zun, Nu Bei* is transmitted to Chinese rural females by their parents’ and grandparents’ preferential treatment of their brothers. In rural areas, it is normal for older sisters to stay at home taking care of their little brothers (Hesketh,

2005). Moreover, girls' individual achievement, such as excellent school performance, is not highly prized by families. To the contrary, rural Chinese females are sometimes forced to drop out of school in order to allow their families' resources to be invested in boys' best interests, such as boys' higher education and boys' marriage (Ji et al., 2001). It is not difficult to imagine that Chinese adolescent girls in rural areas will internalize their living reality into inferior and helpless feelings, which puts them at higher risk of depression as compared with their male counterparts (Hesketh et al., 2005; Ji et al., 2001). In contrast, male and female adolescents in urban areas are living a more equal reality, which to some extent explains why no significant relationship was found in the current study of Chinese urban youth.

#### Contributions to the Body of Literature

Despite the failure to find gender as a predictor of academic achievement and adolescent depression, the current study still contributes to the body of literature in several ways. First, the negative relationship between achievement and depression was further confirmed. Previous studies (Hesketh et al., 2002; Unger et al., 2001) that reported a significant negative relationship between achievement and depression actually treated depression as a dichotomous variable and used a crosstabulation statistical technique to examine the odds ratio of high-achieving adolescents having depression over low-achieving adolescents having depression. So, their findings should be more accurately interpreted as evidence that adolescents with higher academic achievement are less likely to experience depression than adolescents with lower academic achievement. The current study treated depression as a continuous variable and used a simple regression technique to examine whether depression decreases as the achievement level

increases. Thus, the current study examines the relationship between achievement and depression from a slightly different angle and arrives at the same conclusion about a negative relationship between achievement and depression as previous studies did.

Second, the current study proposed the data simulation technique to explore relationship models prior to analysis of the actual secondary data. Simulating data to reflect what already has been supported in the literature as well as other given information can help develop specific potential testing hypotheses.

#### Directions for Future Research

The current study leaves unresolved the most important question of why girls can have both high achievement and depression whereas high achievement is associated with low depression. Future studies are needed to complete the inquiry. The current study was not able to answer the question about the role played by gender because gender was not found to be related to either achievement or depression. Future studies should use more sufficient measures and more representative sampling. With regard to the achievement measure, school data can provide better measurement validity and precision as compared to data collected with youth-report relative ratings. Measurement precision can increase the statistical power to find significant relationships, and measurement validity can increase the weight of the finding.

As to the measurement of depression, the literature seems to suggest the potential danger of statistical artifacts by applying different statistical techniques. One way for researchers to protect their studies against the potential problem is to apply different mathematical treatments to see whether the same conclusion can be drawn. If not, the inconsistency associated with different statistical techniques should be brought to

readers' awareness. Another common problem should be avoided when treating depression as a dichotomous variable. Many researchers have failed to control Type I error when conducting multiple tests (Hesketh et al, 2002; Unger et al., 2001). Multivariate statistical methods should be applied to control the risk of inflated Type I error when depression is measured on a host of yes-or-no responses.

Sampling method is another important issue for future studies. Collecting data is an expensive process. Convenience sampling such as taking classroom groups in one school may be efficient to obtain a large amount of data. However, convenience sampling restricts a researcher's ability to detect the relationship for the current research questions. Moreover, even if significant relationships are found, the generalizability of the findings is restricted. Therefore, researchers have to choose between the considerations in the tradeoff. The introduction to the Chinese population in Chapter Two indicates that 75% of Chinese adolescents live in rural areas. However, only a small number of studies have been conducted to understand Chinese rural youths' lives. Therefore, if convenience sampling has to be used due to limited resources for conducting studies, researchers should target rural Chinese adolescents. If more resources are available for conducting studies, sampling both rural and urban Chinese youth will be helpful to make a comparative study of the two sub populations living in different sub cultures--one is representative of modernized China and the other is representative of traditional China.

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## **APPENDIX**

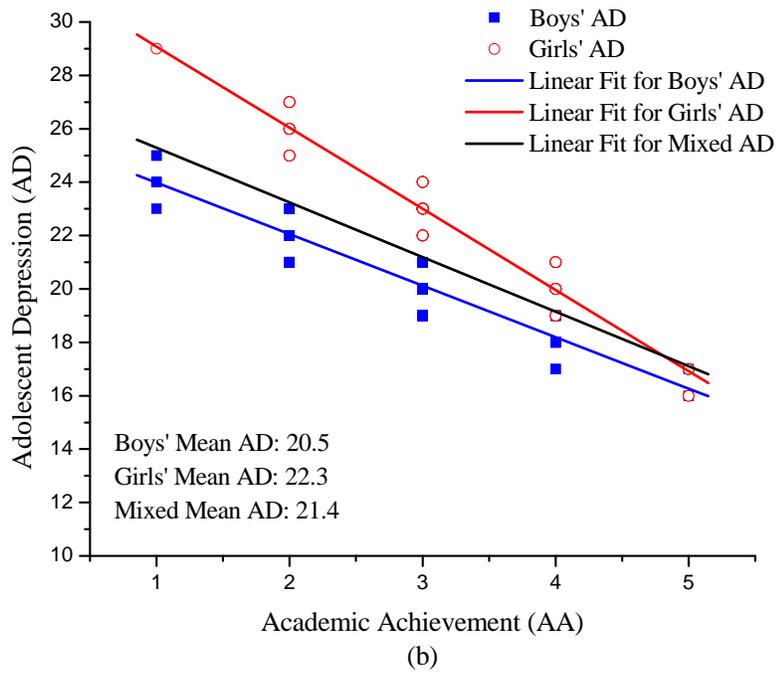
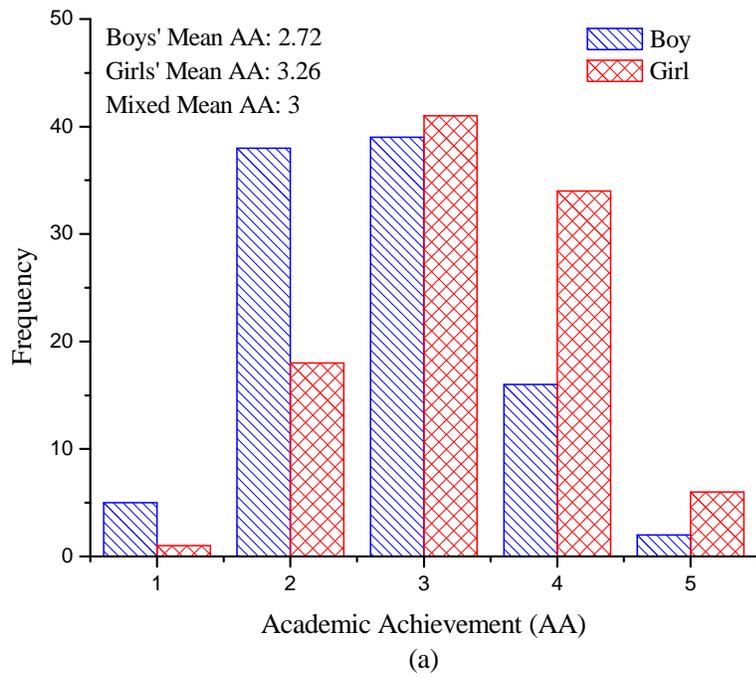
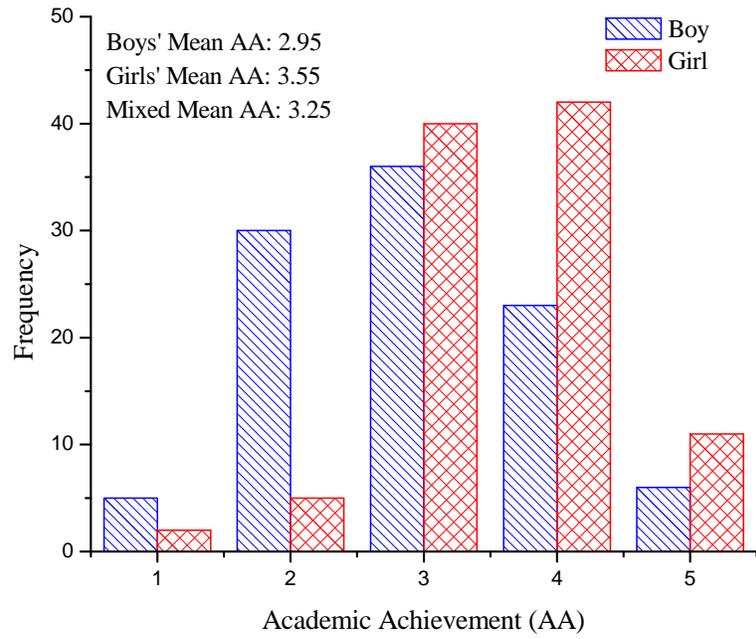
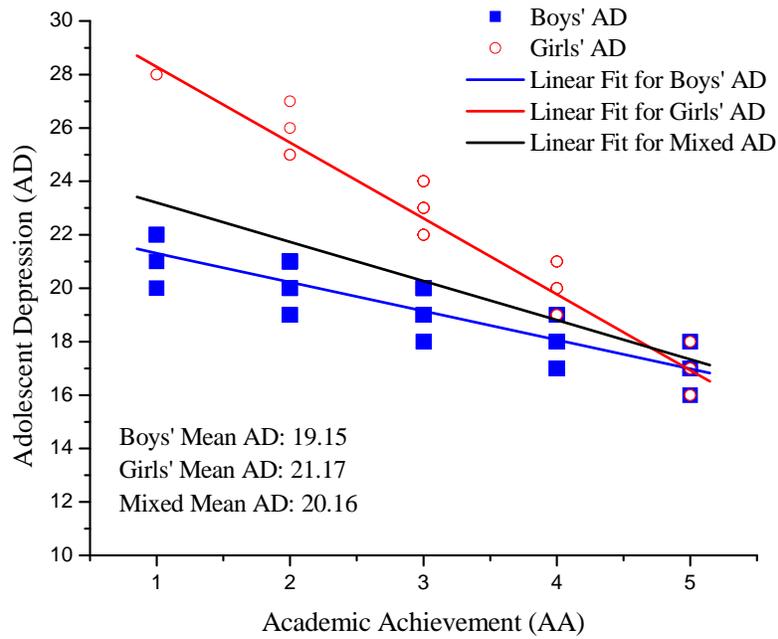


Figure 1. Possibility One: Pooled sample estimate is accurate only for the boys' sample.



(a)



(b)

Figure 2. Possibility Two: Pooled sample estimate overestimates the relationship for boys and underestimates the relationship for girls.

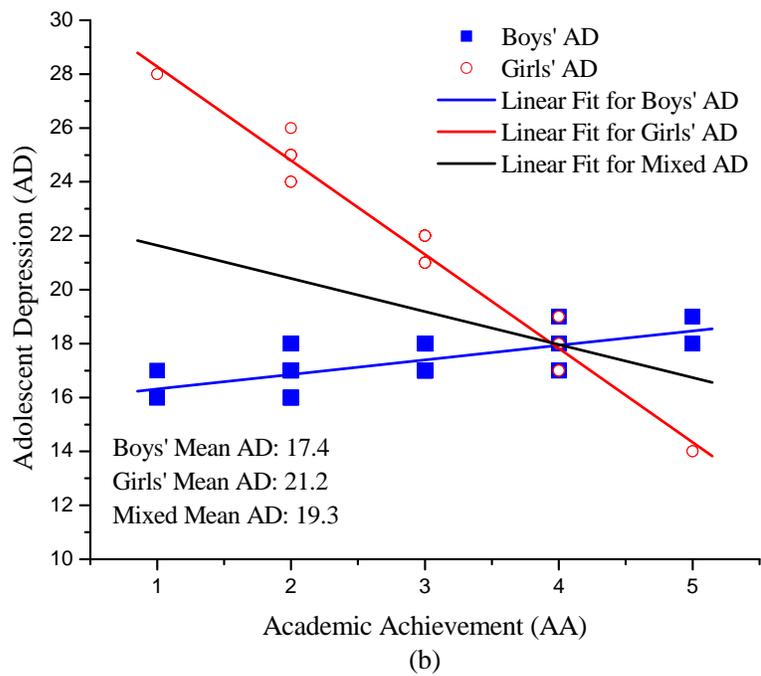
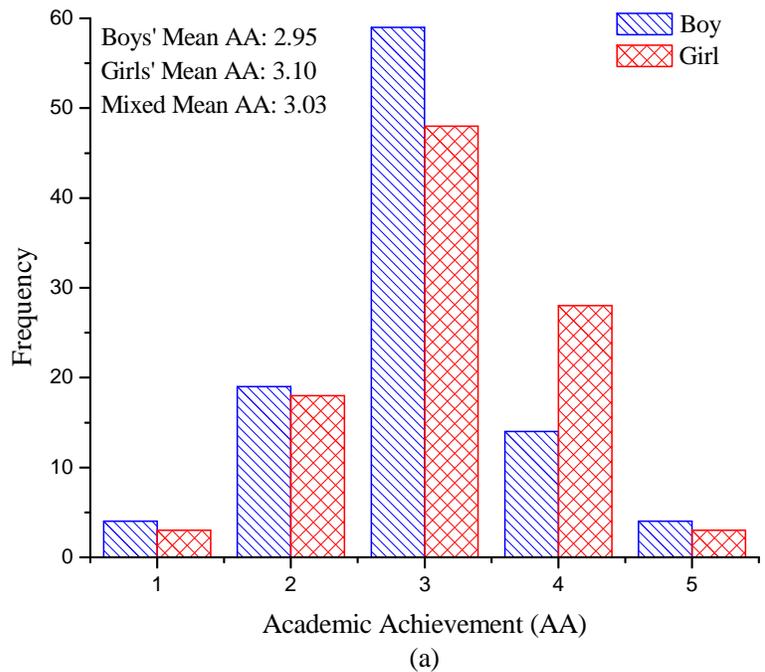


Figure 3. Possibility Three: Pooled sample estimate is erroneous for both samples. For boys, as academic achievement increases, depression increases.

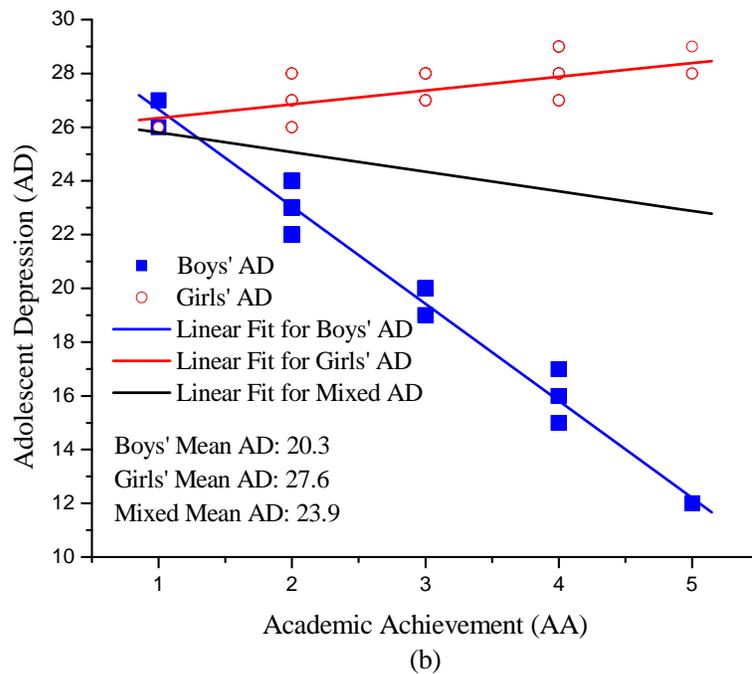
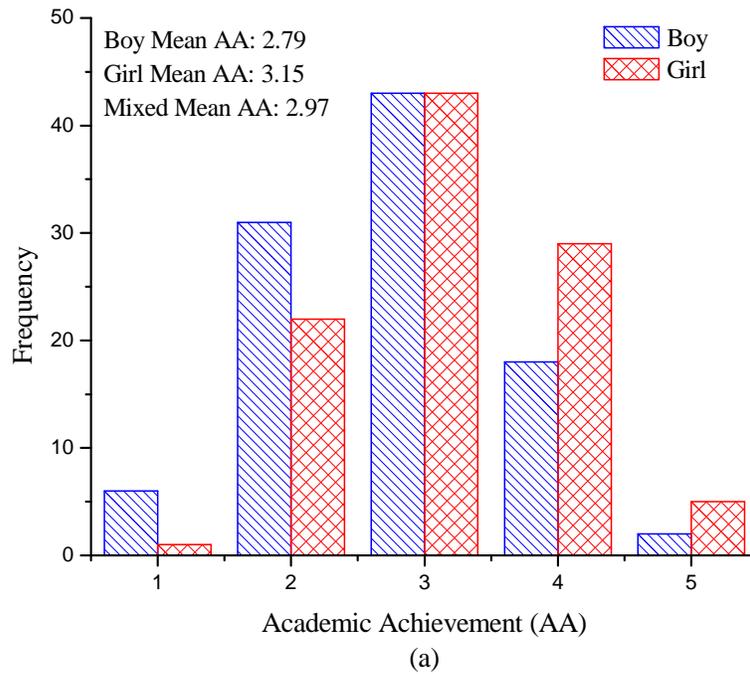


Figure 4. Possibility Four: Pooled sample estimate is erroneous for both samples. For girls, as academic achievement increases, depression increases.

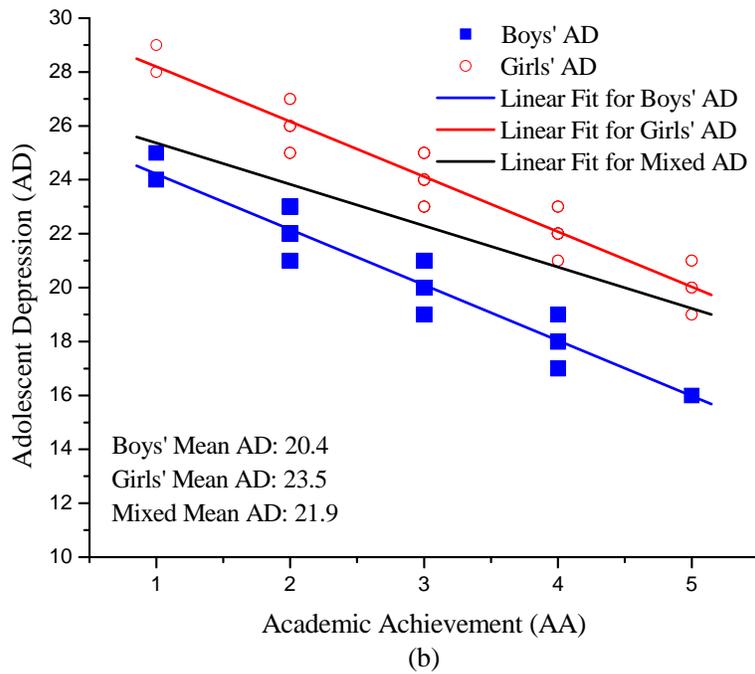
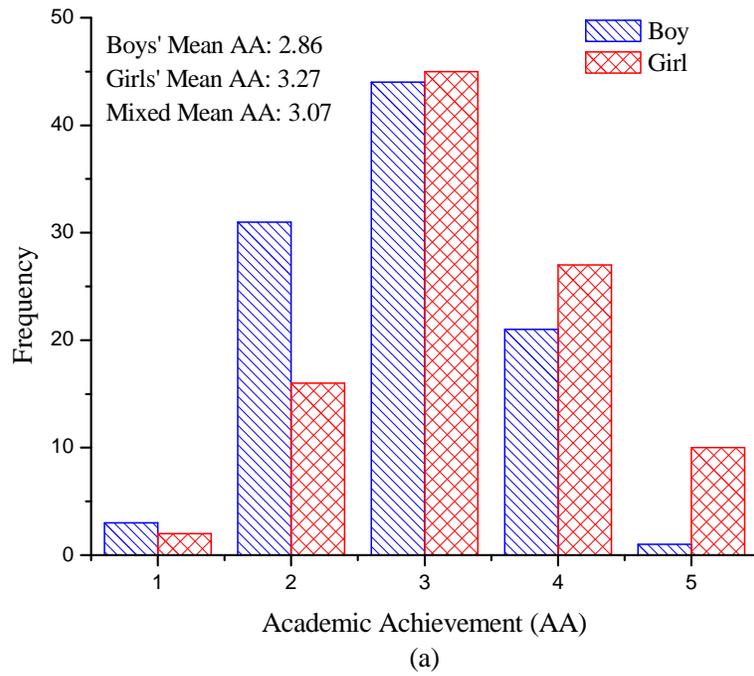


Figure 5. Possibility Five: Pooled sample estimate is confounded by gender.

## VITA

Qionghui Zhang was born in China. She graduated with a Bachelor of Arts degree in English from Huazhong University of Science and Technology in 2001. She was an English teacher in China. In 2004, she entered the University of Tennessee, Knoxville and received her Master's degree in Child and Family Studies in 2007. Her research interest includes parenting, gender socialization and design of experiments.