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Intelligence, Social Competence, And School Adjustment In Chinese Children

Abstract

Intelligence is an important general cognitive ability that influences learning and life adjustment; yet, it does not work in isolation in affecting human development. Multiple factors, such as personality and context, can work in tandem with individual intelligence to impact outcomes. Although the literature has demonstrated clear relations between intelligence and school adjustment, particularly academic achievement, surprisingly little research has been conducted to explore how social and personality factors may play a role in shaping the relations. Thus, the purpose of this study was to examine how social competence moderates relations between IQ and measures of school adjustment.

Participants in the study included 261 Chinese children (138 boys, 123 girls) from Jintan, China. Data were collected from multiple sources. Children's IQ was assessed using the Wechsler Preschool and Primary Scale of Intelligence during their last year of kindergarten. In a follow up study when participants were in fourth grade, peer assessments were measured to assess their social competence. In addition, the participants were asked to report their self-perceptions of academic performance. Peer nominations and teacher ratings were used to assess school competence, learning problems, and peer preference. Information on academic achievement was obtained from school records. The results showed that IQ was positively associated with all measures of school adjustment more strongly in individuals with low social competence than in individuals with high social competence, demonstrating a protective role that social competence can play in the development of school problems among children who are relatively lower in intelligence. These findings have implications for researchers, teachers, and parents in promoting social skills among children for success in school.

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ADJUSTMENT IN CHINESE CHILDREN

Jinsol Lee

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Supervisor of Dissertation

Xinyin Chen, Professor of Education

Graduate Group Chairperson

J. Matthew Hartley, Professor of Education

Dissertation Committee

Xinyin Chen, Professor of Education

Michael J. Nakkula, Professor of Practice

Jianghong Liu, Professor of Nursing

Douglas A. Frye, Associate Professor of Education

INTELLIGENCE, SOCIAL COMPETENCE, AND SCHOOL ADJUSTMENT IN
CHINESE CHILDREN

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Jinsol Lee

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ABSTRACT

INTELLIGENCE, SOCIAL COMPETENCE, AND SCHOOL ADJUSTMENT IN CHINESE CHILDREN

Jinsol Lee

Xinyin Chen

Intelligence is an important general cognitive ability that influences learning and life adjustment; yet, it does not work in isolation in affecting human development. Multiple factors, such as personality and context, can work in tandem with individual intelligence to impact outcomes. Although the literature has demonstrated clear relations between intelligence and school adjustment, particularly academic achievement, surprisingly little research has been conducted to explore how social and personality factors may play a role in shaping the relations. Thus, the purpose of this study was to examine how social competence moderates relations between IQ and measures of school adjustment.

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individuals with high social competence, demonstrating a protective role that social competence can play in the development of school problems among children who are relatively lower in intelligence. These findings have implications for researchers, teachers, and parents in promoting social skills among children for success in school.

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CHAPTER 1: REVIEW OF LITERATURE

Introduction

Decades of research have demonstrated clear long-term associations between indicators of intelligence and a variety of life outcomes, such as academic achievement, socioeconomic success, health, and mortality (e.g., Deary, Strand, Smith, & Fernandes, 2007; Der, Batty, & Deary, 2009; Gottfredson, 2004; Jensen, 1986; Whalley & Deary, 2001). As individual differences in cognitive ability undoubtedly exist within society, intelligence remains an important construct that influences learning and life adjustment. However, like many other aspects of human behavior and cognition, intelligence is a complex trait that does not work in isolation in affecting human development (Plomin & Deary, 2015; Heaven & Ciarrochi, 2012). Thus, it is crucial to investigate the influence of intellect alongside other relevant factors.

While studies have demonstrated clear relations between intelligence and school adjustment, particularly academic achievement, surprisingly little research has been conducted to explore how social and personality factors may influence the relations (Bergold & Steinmayer, 2018; Heaven & Ciarrochi, 2012). One important individual characteristic that plays a significant role in children's school adjustment is their social competence (Chen, Huang, Chang, Wang, & Li, 2010; Ryan & Ladd, 2012; Wentzel, 1991). Children who are socially competent are more likely to be more accepted by peers (Dodge, 1983; Ladd, 2005), have better student-teacher relationships (Legkauskas & Magelinskaite-Legkauskiene, 2019), and achieve higher academic scores (Komarraju, Karau, & Schmeck, 2009; Welsh, Parke, Widaman, & O'Neil, 2001). Beyond the direct effects, social competence may also serve as a protective factor that acts as a buffer

against the development of adjustment difficulties (Chen, Li, Li, Li, & Liu, 2000; Garnezy & Masten, 1991). As scholars in recent years have posited that the ability to excel at tasks designed to assess cognitive learning may be dependent on individual differences in social and emotional skills (e.g., Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Wentzel, 2012), it is important to consider how IQ and social competence may interact in predicting school adjustment for children.

Furthermore, the role of cognitive and social abilities in development may be affected by cultural norms and values. This study also considers the potential influence of the cultural context on these relations. Thus, I will first review the literature on intelligence and social competence, followed by its implications for the Chinese context.

Intelligence

The most widely used and established construct for studying individual differences in cognitive abilities is general intelligence (Gottfredson, 2002; Lubinski, 2004; Spearman, 1904). General intelligence, also known as *g* factor, can be defined as:

A very general mental capability that, among other things, involves the ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience. It is not merely book learning, a narrow academic skill, or test-taking smarts. Rather, it reflects a broader and deeper capability for comprehending our surroundings. (Gottfredson, 1997, p.13)

This conceptualization of intelligence as a broad or general mental ability was initially posited by Spearman (1904). He recognized that individual performance across different cognitive tasks had positive correlations, reflecting the fact that individuals who perform well in one mental task tend to do well in others, despite large differences in the content or administration of tests (Spearman, 1904). Therefore, researchers have argued

that the general intelligence underlying individual performance on specific cognitive tasks (i.e. verbal or math abilities) can often be measured and expressed by a single score (Spearman, 1904; Deary et al., 2007).

Numerous forms of intelligence tests have been developed over the years, with the score on these psychometric instruments typically described as an intelligence quotient or “IQ”. An IQ is a representative score that reflects one’s general intelligence in comparison to the greater population, established by calculating one’s average performance on a number of sub-tests. Many of the sub-tests typically involve questions that evaluate mathematical abilities, verbal comprehension, working memory, fluid reasoning, and information-processing speed (Becker, 2003; Wechsler, 2008). Most modern tests are designed with an average score of 100 and a standard deviation of 15 so that scores conform to a normal distribution curve (i.e. Wechsler Adult Intelligence Scale), in order to interpret the meaning of the IQ score.

Biological and environmental factors of intelligence. Since IQ measures a general intelligence, most researchers contend that attempts to raise individual IQs are considerably limited (Colom et al., 2010; Jensen, 1969) and that IQ is highly heritable based on genetic factors (Davies et al., 2011; Devlin, Daniels, & Roeder, 1997; Plomin & Deary, 2015). Biological theories emphasize the neuropsychology of intelligence, with studies that suggest the relation between IQ and neuropsychological performance is based on a common underlying biological factor (Jung, Yeo, Chiulli, Sibbitt, & Brooks, 2000). Studies have demonstrated that functional brain network efficiency predicts intelligence (Langer et al., 2012) and an increasing body of literature supports an association between

IQ and specific neuropsychological tests (Brittain, La Marche, Reeder, Roth, & Boll, 1991; Gallagher & Burke, 2007; Uchiyama et al., 1994).

Many longitudinal studies spanning multiple decades from adolescence into adulthood have demonstrated a remarkably high stability of individual differences in IQ (Bartels, Rietveld, Van Baal, & Boomsma, 2002; Schroeders, Schipolowski, Zettler, Golle, & Wilhelm, 2016). For instance, Deary, Pattie, and Starr (2013) found that among a sample of 100 Scottish participants, the correlation corrected for age restriction from 11 to 90 years was .67. Schalke et al. (2013) observed similar findings for participants in Luxembourg using the extended gf-gc model with $r_{gf}(12-52 \text{ years}) = .82$ and $r_{gc}(12-52 \text{ years}) = .81$.

While a large meta-analysis indicated that genes play an increasingly important role on the stability of intelligence as children get older, the environment has also shown to contribute to the stability of intelligence in early childhood (Tucker-Drob & Briley, 2014). Negative environmental factors, such as malnutrition and neglect (Hair, Hanson, Wolfe, & Pollak, 2015), lead exposure (Liu, Li, Wang, Yan, & Liu, 2013), and prenatal alcohol exposure (Streissguth, Barr, & Sampson, 1990) can be detrimental to intelligence, especially at a young age. However, generally programmatic attempts to raise individual IQs show only limited gains that appear to fade after the intervention (Jensen, 1981; Protzko, 2015).

Taken together, these findings demonstrate that intelligence has high heritability and is stable over time. While intelligence may be a core component of individual differences among humans, attempts to change individual IQs are considerably restricted. Hence, it is crucial to consider other individual characteristics that may be more

adaptable and thus, play a more important role in improving adjustment outcomes for children alongside intelligence.

Intelligence and Adjustment

Research has shown repeatedly over time that intelligence remains an important construct that influences learning and life adjustment (Deary et al., 2007; Der et al., 2009; Flouri, Moulton, & Plubidis, 2019). The associations between intelligence and adjustment outcomes are evident across the lifespan, from early developmental stages to late adulthood (Batty, Mortensen, & Osler, 2005; Hart et al., 2010; Zettergren & Bergman, 2014). Yet, intelligence does not impact human development in isolation. Despite some generally consistent findings in the intelligence literature, researchers have articulated that the relations between intelligence and outcomes can be highly intricate (Kanazawa & Hellberg, 2010; Lehman, D’Mello, & Person, 2010; Nisbett et al., 2012), especially as intelligence works together with other factors to influence outcomes. In the following paragraphs, I discuss how intelligence predicts outcomes alongside different interacting factors, such as personality and context.

Intelligence and academic adjustment outcomes. While the notion that intelligence can be measured and summarized by a particular score can be somewhat controversial (Bartholomew, 2004), IQ is often argued as the best single predictor of academic outcomes (Kuncel, Hezlett, & Ones, 2004; Mayes, Calhoun, Bixler, & Zimmerman, 2009; von Stumm, Gale, Batty, & Deary, 2009). Overall, children with higher IQ scores have stronger capacities to concentrate, obtain higher school grades, perform better on standardized achievement tests, and complete more years of education

(Deary et al., 2007; Flores-Mendoza et al., 2015; Jencks, 1979; Zettergren & Bergman, 2014). The estimated average correlation between intelligence and school performance is at around 0.50 (Bartels et al., 2002; Mackintosh, 1998; Roth et al., 2015). Since academic achievement reflects performance outcomes in intellectual domains taught at school, the strong relation between IQ and academic achievement is consistent with the theory of general intelligence described earlier (Spearman, 1904).

Some studies have shown that the relations between intelligence and academic achievement can be influenced by factors such as age (Caemmerer, Maddocks, Keith, & Reynolds, 2018) and school subject domains (Roth et al., 2015). However, few studies have examined whether other non-cognitive individual abilities or traits can also affect the relations. One study by Heaven and Ciarrochi (2012) found that for those with high levels of intelligence, Openness predicted good academic outcomes, but not among those with lower levels of intelligence. The researchers hypothesized that Openness dimension of personality seemed to be associated with important skills to master study in a range of different subject areas, which occurs amongst those with higher levels of intelligence (Heaven & Ciarrochi, 2012). Another study also found an interaction between the personality trait Openness and intelligence, but with slightly different results (Zhang & Ziegler, 2015). Here the researchers found that the effect of each trait is smaller with the higher score of the other, interpreting the results as “a disjunctive or compensatory relationship where one of both traits is sufficient to perform well, so that the other trait does not add to the variance explained when one trait is already high” (Zhang & Ziegler, 2015, p. 103). Meanwhile, a more recent study by Bergold and Steinmayr (2018) found that of the five personality traits, Conscientiousness (but not Openness) interacted with

intelligence when predicting academic achievement among a sample of German high school students, with the predictive value of intelligence being higher when students display higher scores on Conscientiousness. They explained these findings by speculating that students with high Conscientiousness might work especially hard, which might enable them to use their full cognitive potential.

Even though the findings are somewhat different, both Zhang and Ziegler (2015) and Bergold and Steinmayr (2018) approach their work using work performance models (Campbell, 1976; Maier, 1946), which state the performance is an interactive function of the capacity to perform (i.e. knowledge, intelligence) and the willingness to perform (i.e. motivation, cultural norms, and personality). Therefore, these studies view personality as a willingness or motivation to perform that interacts with intelligence as a capacity to perform. The findings present some initial findings on non-cognitive individual characteristics that can affect the relations between intelligence and academic achievement, demonstrating potential interaction processes involved. Yet, the results are varied and other individual characteristics that may interact with intelligence to predict academic achievement are largely unexplored. Since academic performance reflects more than just cognitive intelligence (Fernandez-Berrocal & Checa, 2016; Parker et al., 2004; Song et al., 2010), it is likely that social competence also influences how cognitive ability impacts academic achievement.

Intelligence and other adjustment outcomes. Beyond school performance, studies have demonstrated that intelligence is a predictor for numerous positive life outcomes, such as better occupation (Firkowska-Mankiewicz, 2002), upward social mobility (Deary et al., 2005), better general health (Der et al., 2009; Kanazawa, 2014),

and increased longevity (Gottfredson, 2004). Among adolescents, higher IQ was related to less criminal and mental problems (Zettergren & Bergman, 2014). Although it is not known exactly why more intelligent individuals live longer and stay healthier (Deary, 2008; Gottfredson & Deary, 2004), some researchers have speculated that having higher cognitive abilities allows individuals to cope better with the stressors that can cause problems and enhances individuals' care of their own health through effective learning and good reasoning skills (Midouhas, Flouri, Papachristou, & Kokosi, 2018). Similarly, other researchers suggest that "more intelligent individuals are better able to recognize and deal appropriately with evolutionarily novel entities and situations" (Kanazawa, 2014, p. 83). Some recent findings on the positive associations between IQ and quality of decision making also support these hypotheses (Flouri et al., 2019).

However, these relations are also multifaceted. For instance, even though IQ is a clear predictor of health outcomes, Kanazawa and Hellberg (2010) found that more intelligent children both in the United Kingdom and the United States were more likely to consume alcohol when they grow up, suggesting that the relations between intelligence, substance use, and health may be more complex than it appears. Sternberg (2019) also discusses the paradox of how an individual who acts against their own or other's biological adaptive interests can still be fairly high on the intelligence scale. To explain this type of phenomenon, he considers constructs other than intelligence that explain why individuals may act against their biological interests. In fact, Sternberg (2019) attempts to resolve the paradox by integrating those other constructs into his *augmented theory of successful intelligence*, which argues that "in order to be fully adaptive, intelligence requires not only the analytical skills that constitute general intelligence, but also

creative, practical, and wisdom-based skills” (Sternberg, 2019, p.7). Therefore, these findings and theories show the likelihood of different individual skills beyond the analytic skills of general intelligence that it may interact for adaptive outcomes.

Research also indicates that intelligence is associated with peer acceptance, which is an important index of school adjustment of school-age children (Bellanti & Bierman, 2000; Mathur, 2001). Czeschlik and Rost (1995) found that there was a positive relation between intelligence and ‘popularity’, and a negative relation between intelligence and ‘rejection’ among third grade students. Studies have consistently shown that low cognitive ability is predictive of low acceptance among peers (Bellanti & Bierman, 2000; Grossman & Wrighter, 1948). Some researchers have argued that when children with learning problems fail to do well socially, it is not academic difficulties that account for peer rejection but potentially the accompanying problematic social behaviors. For instance, Taylor (1990) identified two distinct subgroups of low-achieving children, an aggressive-disruptive and a non-aggressive group, and found that the low-achieving, nonaggressive children did not differ from average-achieving children in peer sociometric status. Similarly, Bellanti and Bierman (2000) found that low cognitive ability was particularly predictive of prosocial skill deficits, with social behavior mediating the relation between cognitive ability and peer preference.

However, some findings suggest that children with very high IQ can have more problems in social adjustment than children with average IQ (Gross, 2002; Terman, 1925; Hollingworth, 1942; Zettergren & Bergman, 2014). Researchers have speculated that highly intelligent children have social difficulty because of the complexity of their behaviors and interests that alienate peer groups, even in spite of efforts to underachieve

in order to gain acceptance from peers (Gross, 1993; Hollingworth, 1942). In other words, the highly intelligent children may experience a type of asynchronous development where their cognitive development outpaces other social, emotional, or physical developments that cause peers to view or reject them as “different” (Cross, Coleman, & Stewart, 1995; Silverman, 2012).

In summary, research has shown that intelligence is predictive of numerous cognitive and social adjustment measures. However, these relations are complex, with other interacting factors that can moderate the impact of IQ on developmental outcomes. While some of these individual traits that work with intelligence have been examined in literature, surprisingly fewer studies have explored the effects of non-cognitive abilities that can affect the relation between intelligence and school adjustment, especially regarding academic achievement. Therefore, it is critical to continue expanding our understanding by examining the effects of intelligence alongside other important abilities and characteristics, including an individual’s social competence.

Social Competence

The acquisition of social competence is an important developmental outcome for children due to its significance for the development of educational, health, and other adjustment outcomes (Bornstein, Hahn, & Haynes, 2010; Jones, Greenberg, & Crowley, 2015; Wentzel, 1991). Rubin and colleagues have defined social competence as “the ability to achieve personal goals in social interaction while simultaneously maintaining positive relationships with others over time and across situations” (Rubin & Rose-Krasnor, 1992, p. 285). Other researchers have coined numerous similar definitions of

social competence based on their study context. For instance, in early childhood, social competence has been defined as “the ability of young children to successfully and appropriately select and carry out their interpersonal goals” (Guralnick, 1990, p. 4) and socially competent young children are described as those “who engage in satisfying interactions and activities with adults and peers” (Katz & McClellan, 1997, p.1). Within the peer system, social competence can be referred to as “a child’s capacity to engage effectively and successfully at each level of analysis within his or her relevant culture” (Rubin, Bukowski, & Bowker, 2015, p.339).

As a result, social competencies include the ability to effectively engage in socially adaptive and prosocial behaviors (Rubin et al., 1998; Steedly, Schwartz, Levin, & Luke, 2008). The ability can include prosocial skills (i.e., being friendly, cooperating, demonstrating helpful behaviors) and self-control or regulatory skills (i.e. emotion management, delaying gratification, problem-solving abilities) (Dodge, 1986; Eisenberg & Fabes, 1992; Kostelnik, Whiren, Soderman, Stein, & Gregory, 2002). Another dimension of social competence includes the degree to which a child is socially motivated or interactive, which is known as sociability (Cavell, 1990; Chen & French, 2008).

It is understood that social competence is “a multi-faceted, dynamic construct that includes both individual characteristics and behavioral patterns” (Blair et al., 2015, p.1062). Despite variations in the specific definitions of social competence, most conceptualizations emphasize active participation or initiative in social interactions and its effectiveness within the social setting (Rubin & Rose-Krasnor, 1992). Taken together,

these definitions provide a foundation for indicators of social competence to understand its effect on individual development.

Difference from emotional intelligence. Among studies that attempt to examine social competence with intelligence, many are focused specifically on the relations between social competence and emotional intelligence rather than cognitive intelligence. Emotional intelligence (EI) has been defined “the ability to perceive emotions, to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively regulate emotions so as to promote emotional and intellectual growth” (Mayer & Salovey, 1997, p.10). Goleman (1995), another major researcher in the field of EI, has popularized the concept and argues that it comprises of five major skills: self-awareness, self-regulation, motivation, empathy, and social competence. Recent studies suggest that EI plays a separate yet significant role from IQ in predicting academic achievement (Di Fabio & Palazzeschi, 2015; Lanciano & Curci, 2014) and other life adjustment outcomes such as job performance (e.g. Ciarrochi, Chan, & Caputi, 2000; Joseph & Newman, 2010; Song et al., 2010), suggesting the importance of the competencies that EI encompasses.

Although emotional intelligence has been applied broadly in recent years, it may be more important to study how social competence plays a role in shaping the relation between intelligence and adjustment. First, some critics remain dubious regarding the incremental validity of EI in adding to the explanation or prediction of some common outcomes (i.e. Landy, 2005; Locke, 2005; Van Rooy & Viswesvaran, 2004). Many researchers claim that the definitions of EI are so all-inclusive as to make the concept unintelligible (Locke, 2005) and difficult to measure, with no truly robust measure yet

(Dulewicz & Higgs, 2000). Murphy (2006) also argues that EI is often poorly defined and measured, and that “the relationship between EI and other concepts such as general intelligence, social skills, and personality, is not adequately understood” (p. 345).

However, social competence is a separate and more specific construct that has been more rigorously established and validated in literature over decades (e.g. Cavell, 1990; Ladd, 2005; Masten, Morison, & Pelligrini, 1985). Some elements of social competence may be included in the definitions and measures of EI (Gil-Olarte, Palomera Martin, & Brackett, 2006; Schutte et al., 2001), but EI encompasses a broader range of skills that are related to emotions. Thus, social competence is more valuable for gaining a clearer understanding of how other factors work together with IQ in predicting outcomes.

Furthermore, EI is typically measured through an ability test that aims to capture how well individuals identify, understand, and manage emotions (Mayer, Salovey, & Caruso, 2002). For instance, an item on the test may include an image of a person, and the participant is asked to indicate how much of an emotion (i.e. happiness, fear, surprise, sadness) is present in the picture (Mayer, Salovey, & Caruso, 2002). Meanwhile, social competence is often measured by peer reports, which may be more relevant in capturing how children’s social ability is realized in their everyday school environments. Therefore, since social competence emphasizes active participation or initiative in social interactions and its effectiveness within the social setting (Rubin & Rose-Krasnor, 1992), the measure of social competence may reflect more practical implications than EI in predicting outcomes among children.

Social Competence and Adjustment

Social competence is viewed as an integral component of healthy functioning and development across the lifespan (Ladd, Herald, & Andrews, 2006; Rubin, Bukowski, & Parker, 2006; Masten & Coatsworth, 1998). Among children and adolescence, empirical research has highlighted the function of children's social competence in their school adjustment (e.g. Ladd, Herald, & Kochel, 2006; Rose-Krasnor & Denham, 2009; Wentzel, 1991, 1993, 2012). Socially competent children are more liked by peers (Dodge, 1983; Ladd, 2005; Rubin et al., 2015) and perform better academically (Chen et al., 2000; Komarraju et al., 2009; Malecki & Elliot, 2002; Welsh et al., 2001). In the following paragraphs, I discuss empirical findings on the relations between social competence and school adjustment outcomes, including the theories about the relations and the processes involved.

Social competence and peer relationships in the classroom. The connection between social competence and peer acceptance within schools have been well recognized; children who have high social skills are more likely to be accepted among peers, whereas peer rejection often results from deficits in child social skills (e.g. Dodge, 1983; Ladd, 2005; Ladd & Mize, 1983; Stormshack et al., 1999; Wentzel et al., 2020). Children's social competencies that are related to peer acceptance include knowledge of appropriate and inappropriate strategies for making friends (Wentzel & Erdley, 1993), prosocial behavior (Ladd & Price, 1987; Slaughter et al., 2002), and good communication skills (Hazen & Black, 1989). Since the lack of peer acceptance has emerged as a high risk predictor of later delinquency and maladjustment (Coie, Lochman, Terry, & Hyman, 1992; Zettergren, 2003), many researchers and practitioners have developed different

interventions aimed at improving children's social competence, which in turn have increased peer acceptance (e.g. Bierman & Furman, 1984; Choi & Heckenlaible-gotto, 1998; Ladd, 1981).

Studies suggest that children differ substantially in their use of the necessary social skills to interact effectively with peers (Ladd et al., 2014). It has been argued that "children are differentially skilled and therefore bring different levels of competence to social tasks such as making friends or gaining acceptance in peer groups. Essentially, this perspective suggests children are, in part, 'the architects of their own social successes and difficulties' (Ladd, 2005) and emphasizes attributes that reside 'in the child.'" (Ladd & Sechler, 2014, p. 35). Thus, researchers concur that a causal pathway appear to exist from an individual's social competence to peer acceptance (Asher, 1983; Henricsson & Rydell, 2006).

Social competence is important for a child's successful interaction in classrooms not only with peers, but also with their teachers. Socially competent children tend to be well-liked by their teachers (LaFreniere & Sroufe, 1985), have secure attachments with them (Mitchell-Copeland, Denham, & DeMulder, 1997), and are more likely to maintain overall positive relationships with their teachers (Birch & Ladd 1997; Legkauskas & Magelinskaite-Legkauskiene, 2019). Since social competence has shown to be predictive of teacher preference (Wentzel, 1993), children's ability to engage in successful social interactions and maintain positive relationships is clearly noteworthy in the school context and has far-reaching implications.

Social competence and academic adjustment. Studies have demonstrated that children's social competence can be a significant predictor of academic achievement

(Chen et al., 2010; Malecki & Elliot, 2002; Wentzel, 1993, 2007). Since education in school is a socially situation process, attempts to understand academic achievement includes consideration of individual characteristics that influence social interactions (Elias & Haynes, 2008; Wentzel, 2012). While social competence clearly impacts positive relationships with peers and teachers, studies suggest the effects of social competence extend beyond peer acceptance and teacher preference in predicting academic achievement (Trentacosta & Izard, 2007; Wentzel, 1993).

Studies show that children who are able to make and maintain friendships develop more favorable school perceptions, participate in school more, and perform better academically, even when other relevant variables such as prior academic success is already taken into account (Denham, 2006; Ladd, 1990). Children who can sustain positive relationships with peers tend to be more motivated and engaged in academic tasks than those who have struggles in their peer relationships (Wentzel, 2017). However, children who lack social competence can experience a delay in the attainment of fundamental academic skills, have higher levels of school avoidance, and are more likely to experience academic failures (Ladd 1990; Ladd, Birch, & Buhs, 1999; Parker & Asher, 1987). Wentzel (1991) argues that these behavioral forms of competence can be stronger predictors of achievement than intellectual ability. Furthermore, Raver and Knitzer (2002) contend that the effects of social–emotional competence of young children on their academic performance, even when controlling for their cognitive skills and family backgrounds, persists into later elementary years.

Theories that emphasize the role of social behavior on learning support these findings (Bandura, 1977; Vygotsky, 1978). Vygotsky (1978) believed that learning is

facilitated better when children can work cooperatively together than children who work alone, because they would be behaving within each other's zone of proximal development. Bandura's (1977) Social Cognitive Theory posits that learning occurs in a social context, with interactions among the child, his or her behavior, and the environment. Thus, when children lack the ability to successfully interact with peers and teachers in their learning context, the effects are detrimental to their academic success and school adjustment.

Furthermore, academic achievement is often not only a measure of successful content learning but also a reflection of teacher perceptions of a child's development. For instance, Gustavsen (2017) found that teachers' grading of students is often not based only on students' knowledge but also on their social skills. Studies have shown significant correlations between teacher's perception of a child's social competence and teacher's assessments of their school adjustment (Legkauskiene, Legkauskas & Kepalaite, 2019). In fact, DiPrete and Jennings (2012) found that teachers' academic ratings had stronger associations with students' social skills than objective tests scores, suggesting that it is possible "that the teacher's evaluations of academic achievement are biased upward for students that they evaluate as being well adjusted to the school environment" (DiPrete & Jennings, 2012, p.10). Another study using latent variable modeling found a causal pathway from teacher perceptions of social competence to children's feelings about school engagement to children's academic achievement (Valeski, 2001). Given the extensive effects of social competence on school adjustment, the results demonstrate the importance of fostering positive social competence to promote academic achievement.

Protective factors of social competence. Empirical studies demonstrate the large individual differences among individuals who are relatively low in intellectual abilities in their response to stress and challenges at school, which may be reflected in their different relational and academic outcomes (Clarke, 2006; Masten et al., 1988; Rutter, 1985). One of the factors that may moderate relations between intelligences and school adjustment is the child's social skills (Ladd et al., 2014). In the psychopathological literature, social competence has been considered a protective factor, which refers to "influences that modify, ameliorate, or alter a person's response to some environmental hazard that predisposes a maladaptive outcome" (Rutter, 1985, p. 600). Protective factors modify the effects of risks and may also operate to enhance other promotive factors (Zimmerman et al., 2013).

Studies have shown that children's social competence can serve as a potential buffer against the development of adjustment difficulties at school (Chen et al., 2000; Garnezy & Masten, 1991; Griese & Buhs, 2014). Since socially competent children engage in effective interpersonal contact and are active in social settings, they are more likely to gain emotional and social support from others (Cohen, Sherrod, & Clark, 1986; Rubin & Asendorpf, 1993; Rubin, Chen, McDougall, Bowker, & McKinnon, 1995). Therefore, when children face limitations or challenges at school, socially competent children are more likely to have the social resources and the emotional support from others that act as a buffer against negative school adjustment (Chen & French, 2008; Cohen et al. 1986; Schwartz, Dodge, Pettit, & Bates, 2000).

While most of the previous studies have focused on victimization and other psychosocial outcomes, it is possible that social competence can have a buffering role for

other school adjustment outcomes. Based on these findings, it seems reasonable to argue that children's social competence may be a protective factor for children who are low in intelligence.

Cultural Context

The display and functional meanings of cognitive and social characteristics can vary based on the cultural norms and values of the context. While countless descriptions and conceptualizations exist, culture can be generally defined as a set of sustained behaviors, beliefs, and social norms that allow individuals to fit in society, are transmitted across generations, and are dynamic based on the environmental context (Cole, 1996; Morris, Hong, Chiu, & Liu, 2015; Schwartz, 2009; Taylor, 1871). Since culture is not rigid or hereditary, children are typically socialized to “acquire the beliefs, values, practices, skills, attitudes, behaviors, ways of thinking, and motives of their culture” (Gauvin & Parke, 2010, p.239) based on the environment they live in. Thus, the process of enculturation occurs when a child acquires appropriate values in communal context. Meanwhile, as children are socialized along a specific cultural path, they play an active role in influencing their surrounding systems as active members. This multilayered process of reciprocity through cultural processes plays a significant role in shaping developmental outcomes, as the skills and behaviors necessary for healthy development vary with the age of the child and the particulars of the social context. Consequently, it is important to examine developmental processes in varying environments and cultural contexts.

Chinese culture. Group orientation or collectivism has played a critical role in shaping the attitudes and behaviors of Chinese people as a central aspect of the Chinese value system (Chen, Liu, Ellis, & Zarbatany, 2016; Ho, 1986). Thus, a major socialization goal in China is to help children develop attitudes and behaviors that are conducive to group functioning, such as interpersonal cooperation, prosocial attitudes, and self-constraint (Chen, 2000). Children are encouraged to seek the benefit and interests of the collective above their individual personal desires (Chen et al., 2000). These ideas stem from traditional Confucian views that believe in cultivating empathy, compassion, and a sense of concern for others in order to create a harmonious society (Luo, 1996). As a result, while the development of social competence is important for children's development across all contexts, the display and meanings of different dimensions of social competence can be influenced by these cultural values, which in turn may play a role in impacting adjustment outcomes.

For instance, studies have shown that some aspects of social competence, particularly sociability, may be less valued in traditional Chinese culture, even though they are relevant to school and socioemotional adjustment in Chinese children today (Chen et al., 2002; Gong, 1984). Other dimensions of social competence, such as effortful control and prosocial behaviors, tend to be more valued in traditional Chinese culture, which could arguably have a stronger influence on school performance than other aspects of social competence (Sanchez-Perez, Fuentes, Eisenberg, Gonzalez-Salinas, 2018; Zhou, Eisenberg, Wang, & Reiser, 2004; Wentzel, Jablansky, & Scalise, 2020). Thus, it is possible that students in China who are viewed as highly socially competent may have

certain qualities that have a stronger bearing on school performance and teacher evaluations.

With regards to academic achievement in China, the attainment of academic achievement is considered one of the most important tasks for school-age children in China (Phelps, 2005). The origins of these values derive from Confucianism ideals that endorse hard work and perseverance in education to establish oneself in life (Lee, 2000). Furthermore, academic achievement is highly esteemed not only as an indicator of individual success, but also as filial duty affecting the entire family (Fong, 2004; Salili & Hau, 2010). Confucian doctrine also endorses an obligation for children to enhance the status and reputation of the family, which is reflected in school performance (e.g., Ho, 1986). Despite the emphasis on academic achievement in China, there are only several studies of individual cognitive abilities and academic outcomes with data on intelligence within the Chinese population (Liu & Lynn, 2011; Wang & Oakland, 1995).

In Chinese schools, students are required to engage in regular public evaluation processes, in which they evaluate themselves and receive peer and teacher feedback regarding whether their performance reaches the school standard (Liu, Bullock, & Coplan, 2014). The rationale is that the social evaluation process can aid self-examination, which may encourage students to make greater efforts toward improving academic tasks. Students who perform well often receive approval from teachers and are respected by peers, while those who perform poorly can be criticized by adults and rejected by peers (Phillipson & Phillipson, 2007; Zhou, Main, & Wang, 2010). Scholars argue that in this context, individuals need to attend to others' views and evaluations

because how one is viewed by others is considered more important than how one views the self (Chen et al., 2016).

Consequently, it is possible that social competencies and skills may affect school adjustment in China where social evaluations are frequent and social sensitivity is encouraged more than in other societies (Chen et al., 2016; Ren, Knoche, & Edwards, 2016). The positive social reactions may help socially competent children maintain confidence in overcoming obstacles in schoolwork, even if their cognitive ability may not be as high as some other students. In a recent meta-analytic study, Wentzel et al. (2020) found that the relation between peer social acceptance and academic achievement is stronger for students from Asian countries than those in European and North American countries; the researchers speculated that it may be due to their collectivist culture where “students are socialized to work interdependently and to reward each other for conforming to adult standards and expectations” (Wentzel et al., 2020, p. 16). Therefore, it would be interesting to study the potential interactions between social competence and intelligence for adjustment among Chinese children.

The Present Study: An Overview

In the current study, the primary goal was to examine the relations between children’s cognitive ability, social competence, and school adjustment among children in Jintan, China. To achieve this goal, I investigated the interactions between intelligence and social competence on indicators of school adjustment outcomes, which include social and academic aspects (Ladd, Kochenderfer, & Coleman, 1996). In this study, school adjustment outcomes included scores in academic achievement from school records,

teacher-rated school competence, teacher-rated learning problems, self-perceptions of academic performance, and indicators of peer preference.

First, I sought to examine the main effects of IQ and social competence on school adjustment outcomes among Chinese children. Based on the findings of prior research, I anticipated that IQ would be positively and significantly associated with all the school adjustment outcomes measured in this study. Similarly, I anticipated that social competence would be positively and significantly associated with all the school adjustment outcomes measured in this study.

Second, I explored how IQ interacts with social competence to predict school adjustment outcomes. Based on the discussion above that indicate the importance of social competence in the school environment especially among early elementary students and the stress-buffering model (Cohen & Wills, 1985; Masten & Wright, 1998; Rutter, 1985, 1987), I expected that social competence would moderate the associations between IQ and school adjustment outcomes. Since children's social competence can act as a protective factor, particularly when facing stressful or difficult situations, I anticipated that the association between intelligence and school adjustment measures would be stronger for children with low social competence than those with high social competence. Students with low social competence may not have as much of the social support or resources as students with high social competence, and thus their individual cognitive ability may be more pronounced in predicting outcomes. In other words, low scores on IQ represents a risk factor in school adjustment. However, high social competence may be a protective factor that reduces risk and protects children with relatively low scores on IQ from developing school adjustment difficulties.

Statistically, this model may be represented by significant positive relations between IQ scores and school adjustment for children with low social competence and nonsignificant or weaker relations for children with high social competence. Below are the specific hypotheses:

- Social competence would moderate the association between IQ and academic achievement scores. IQ would be positively associated with academic achievement more strongly in individuals with low social competence than in individuals with high social competence.
- Social competence would moderate the association between IQ and teacher-rated school competence. IQ would be positively associated with teacher-rated school competence more strongly in individuals with low social competence than in individuals with high social competence.
- Social competence would moderate the association between IQ and teacher-rated learning problems. IQ would be negatively associated with teacher-rated learning problems more strongly in individuals with low social competence than in individuals with high social competence.
- Social competence would moderate the association between IQ and self-perceptions of academic performance. IQ would be positively associated with self-perceptions of academic performance more strongly in individuals with low social competence than in individuals with high social competence.
- Social competence would moderate the association between IQ and peer preference. IQ would be positively associated with peer preference more

strongly in individuals with low social competence than in individuals with high social competence.

CHAPTER 2: METHOD

Participants

The participants in the present study were originally recruited as part of the China Jintan Child Cohort study, a larger longitudinal project that initially began in 2004 to investigate the impact of environmental exposure on children's neurobehavioral outcomes (Liu et al., 2015; Liu, McCauley, Zhao, Zhang & Pinto-Martin, 2010). This cohort study recruited preschool students from rural, suburban, and urban locations in the city of Jintan, which is located in the southeastern coastal region of Mainland China. In China, preschools are called kindergartens and enroll children from ages 3-7, after which children enter the elementary school system.

This study focused on data from these original cohort members who also had follow-up peer data collected several years later when they were in primary school, which included a total of 261 participants (138 boys, 123 girls). Children were tested on their IQ in their last year of kindergarten (*mean* age = 6.68, *SD* = .36). The participants were mostly from either urban areas (46.4%) or from suburban areas (49.0%), with just a small number of participants from rural areas (4.6%). In the sample, approximately 32.2% of the fathers and 45.2% of the mothers had a middle school or lower education; 37.9% of the fathers and 35.2% of the mothers had a high school education; and 29.9% of the fathers and 19.6% of the mothers had a college or higher education.

Approximately four years after the IQ testing (*mean* age = 10.35, *SD* = .36), the data collection for follow-up studies expanded in breadth and depth, including domains such as personality, peer relationship, family dynamics, academic performance, and more (Liu et al., 2015). Types of evaluation utilized in this study include self, peer, and teacher

reports from school. Across the schools in China, children stay in the same classrooms with one head teacher in charge of the class. Therefore, children have extensive opportunities to interact with one another and the head teacher is very familiar with students in the classroom. The participants in this sample attended four different schools; each school had 5 to 8 fourth grade classes, with each class containing 30 to 58 students.

Procedure

IQ tests for neurocognition were administered to the cohort of preschool children between 2005-2007 during their last year of kindergarten. Then between 2009-2011 when the children were around fourth grade, children completed peer assessments of social behaviors and a sociometric nomination measure. Children also completed self-report measures of their own perceptions of academic performance. Teachers were asked to complete a rating scale for each participant concerning his or her school-related competence. In addition, data concerning children's academic achievement were obtained from school records.

The measures were translated and then back-translated to ensure comparability with the English versions. No evidence was found that the children had difficulties understanding the procedures or the items in the measures. Written consent was obtained from all children and their parents, and no incentives were provided for participating in the study. Approval from Institutional Review Boards was obtained from the University of Pennsylvania and the ethical committee for research at Jintan Hospital in China.

Measures

Intelligence. The Wechsler Preschool and Primary Scale of Intelligence (WPPSI) developed by Wechsler (1967) was used to measure the intelligence of the children. The WPPSI consists of 10 core subtests that represent intellectual functioning in verbal and performance cognitive domains. The verbal subtests (Information, Comprehension, Arithmetic, Vocabulary, and Similarities) are combined to produce a Verbal IQ (VIQ) and the performance subtests (Geometric Design, Animal House, Block Design, Mazes, and Picture Completion) are combined to produce a Performance IQ (PIQ). The composite score of all ten subtests produce a Full Scale IQ (FIQ), which is widely recognized as a good measure of general intelligence defined as an average of all cognitive abilities (e.g., Hollenbeck & Kaufman, 1973; Yule, Gold, & Busch, 1982). The Chinese version of the WPPSI, which was adapted according to the cultural background of Chinese children, has also been shown to have good reliability (Gong & Dai, 1988; Liu, Yang, Chen, & Lynn, 2012; Song & Yue-mei, 1987).

Social competence. Peer assessments of social competence were measured using a Chinese version of the Revised Class Play (RCP; Masten et al., 1985). Following the procedure outlined by Masten et al. (1985), during administration, the research assistant read a behavioral descriptor (e.g., “someone who is a good leader”), and children were requested to nominate up to three classmates who could best play the role if they were to direct a class play. The same peer could be selected for more than one role. When all the children in the class completed their nominations, they turned to the next item.

Subsequently, nominations received from all classmates were used to compute each item

score for each child. The item scores were standardized within the class to adjust for differences in the number of nominators.

The items in the measure of social competence tapped several aspects of social competence (e.g., “makes new friends easily,” “helps others when they need it,” “someone you can trust” “likes to play with others rather than alone”). The internal reliability score for social competence was .94. Studies have shown that the measure is reliable and valid in Chinese as well as in other cultures (e.g. Casiglia, Lo Coco, & Zappulla, 1998; Chen, Rubin, & Li, 1997).

Academic achievement. Information concerning academic achievement in Chinese, mathematics, and English was obtained for all participants from the school records, which were based on objective examinations conducted by the school. The grades in these subjects have proved to be a valid measure of academic achievement in Chinese children (e.g., Chen et al., 1997). The maximum score for each of the subjects was 100; a test score of 60 is usually considered the cutoff between a pass and a failure in a course. In the present study, scores on Chinese, mathematics, and English were significantly correlated ($r = .69 - .77, ps < .01$; see Appendix A for details) and were thus summed to create a single index of overall academic achievement. The scores of academic achievement were standardized within the class.

Teacher ratings. As mentioned previously, since one teacher is usually in charge of a class in Chinese schools, the teachers are very familiar with the students. Consistent with the procedures outlined by Hightower et al. (1986), teachers were asked to complete a Teacher-Child Rating Scale (T-CRS) for each participant. The scale included a measure of the child’s school competence (e.g., “participates in class discussion,” “copes well

with failure”), which is a global score that measures overlapping areas of frustration tolerance, assertive social skills, and task orientation. Teachers also completed a measure on children’s learning problems (e.g., “has difficulties learning academic subjects,” “is poorly motivated to achieve”). Teachers rated how well each of the items in the measure described each child, utilizing a 5-point scale ranging from 1 (*not at all*) to 5 (*very well*). The teacher rating scores were standardized within the class in order to control for the teacher’s response style and to allow for appropriate comparisons. In the present study, the internal reliability of school competence was .94 and the internal reliability of learning problems was .86. The T-CRS has proved to be reliable and valid in Chinese children (Chen & Rubin, 1994; Chen, Rubin, & Li, 1995).

Self-perceptions of academic performance. A measure adapted from the Self-Perception Profile for Children (Harter, 1985) was used to assess students’ self-perceptions of academic performance. Students were asked to rate, on a 5-point scale, ranging from 1 (*not at all true*) to 5 (*always true*), how well each item described themselves. The measure of self-perceptions of academic performance includes five items (“I am very good at my school work,” “I feel I am not as smart as other kids,” “I can do my school work quickly,” “I do very well at my school work,” “I have troubles figuring out answers in school”). The internal reliability of this measure was .76 in the present study. The measure has proved reliable and valid in previous studies in Chinese children and adolescents (e.g., Chen, Rubin, Li, & Li, 1999; Chen et al., 2004).

Peer preference. Children were asked to nominate up to three classmates with whom they most liked to be with and three classmates whom they least liked to be with (positive and negative sociometric nominations). Children were permitted to nominate

peers of both sexes to increase the stability of measurement (Terry & Coie, 1991). The nominations received from all classmates were totaled and then standardized within each class for appropriate comparisons. The positive and negative nominations received from peers provided indexes of peer acceptance and peer rejection within the class. Following Coie, Dodge, and Coppotelli's (1982) procedure, an index of peer preference, indicating the overall likability of the child in the class, was formed by subtracting negative nomination scores from positive nomination scores. Social preference scores have demonstrated a high level of concurrent and predictive validity, with the advantage of including information about both liking and disliking (Coie et al., 1982).

CHAPTER 3: RESULTS

Descriptive Analyses

A multivariate analysis of variance (MANOVA) was conducted to examine the effects of gender and region on intelligence, social competence, and adjustment variables. The analysis indicated that there was only a significant main effects of gender, Wilks' $\Lambda = .87$, $F(7, 243) = 5.00$, $p < .001$, with no significant main effect of region and no significant interaction effect of gender and region. The means and standard deviations of the variables for boys and girls are presented in Table 1. The analyses of the gender differences showed that compared to boys, girls had higher scores on social competence, academic achievement, and school competence, $F(1, 254) = 4.56$ to 15.96 , $ps < .05$.

Inter-correlations among intelligence, social competence, and adjustment variables are presented in Table 2. As shown in the table, the correlations among the variables were mostly low to moderate, suggesting that the measures tapped different but related constructs across cognitive and social domains. Intelligence was positively related to self-perceptions of academic performance, academic achievement, school competence, and negatively related to learning problems. Similarly, social competence demonstrated similar patterns with the academic and social adjustment variables, but it was also positively related to peer preference.

Table 1

Means and Standard Deviations of Intelligence, Social Competence, and School Adjustment Variables

	Boys	Girls
IQ	113.09 (14.23)	110.89 (13.75)
Social competence	-.23 (.64)	.25 (1.14)
Academic achievement	-.05 (.95)	.27 (.72)
School competence (TR)	-.38 (.89)	.28 (.92)
Learning problems (TR)	.21 (.96)	-.23 (1.00)
Self-perceptions of academic performance	3.73 (.72)	3.86 (.73)
Peer preference	-.06 (1.07)	.17 (1.03)

Note. Standard deviations are in parenthesis

TR = teacher-ratings

Table 2

Correlations among Intelligence, Social Competence, and School Adjustment Variables

	1	2	3	4	5	6
1. IQ						
2. Social competence	.29**					
3. Academic achievement	.29**	.32**				
4. School competence (TR)	.22**	.50**	.51**			
5. Learning problems (TR)	-.16*	-.38**	-.57**	-.56**		
6. Self-perception of academic ability	.24**	.30**	.38**	.27**	-.30**	
7. Peer preference	.12	.50**	.21**	.36**	-.31**	.11

Note. TR = teacher-ratings

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

Relations between IQ and Social Competence on Adjustment Outcomes

A series of hierarchical multiple regression analysis was conducted to examine the main effects of IQ and social competence on school adjustment measures, and the moderating effects of social competence on the relation between IQ and school adjustment measures. Child gender was entered into the model as a control variable in the first step. The preschool region was initially entered into the model as a control variable but no significant effects were found, and was thus excluded in the final analysis. Secondly, IQ and social competence were entered in the next step simultaneously. Third, interactions involving gender were included for IQ and social competence. Finally, interaction term between IQ and social competence computed and entered as the final step.

As recommended by Aiken and West (1991), the variables were centered first before entering them into the model and computing interaction terms to reduce the multicollinearity. If significant interactions were found, simple slope tests were conducted in order to understand the nature of the interactions. The relations between IQ and adjustment variables were plotted at a high value (1 SD above the mean) and a low value (1 SD below the mean) of social competence. The effects of the predictors on academic and social adjustment outcomes are presented in Table 3.

Table 3

Effects of IQ, Social Competence, and Interactions in Predicting Adjustment Outcomes

<i>Adjustment Outcome</i>	<i>Effect (b)</i>	<i>SE</i>	<i>t-test</i>
Academic achievement			
IQ	.17	.05	3.32**
Social competence	.36	.08	4.76***
IQ*social competence	-.21	.07	-3.26**
School competence (TR)			
IQ	.09	.05	1.67
Social competence	.56	.08	7.22***
IQ*social competence	-.20	.07	-2.92**
Learning problems (TR)			
IQ	-.04	.06	-.63
Social competence	-.50	.09	-5.65***
IQ*social competence	.21	.08	2.72**
Self-perceptions of academic performance			
IQ	.11	.05	2.29*
Social competence	.29	.07	4.31***
IQ*social competence	-.13	.06	-2.30*
Peer preference			
IQ	-.10	.06	-1.53
Social competence	.82	.09	9.31***
IQ*social competence	-.29	.08	-3.86***

Note. Child gender was controlled in the model

TR = teacher-ratings

* $p < .05$ ** $p < .01$ *** $p < .001$

Main effects of IQ and social competence. As shown in Table 3, after controlling for gender, IQ positively predicted academic achievement and self-perceptions of academic performance. However, there were no significant associations with school competence, learning problems, or peer preference. Meanwhile, social competence positively predicted academic achievement, school competence, self-perceptions of academic performance, and peer preference. Social competence also negatively predicted teacher-rated learning problems. The results showed that increased IQ is generally associated with better academic adjustment outcomes, while increased social competence is associated with both better academic adjustment and social adjustment outcomes.

Interaction effects. First, there was just one significant gender interaction between gender and social competence in predicting peer preference. The simple slope test showed that the positive relation between social competence and peer preference was stronger for boys, $b = .98$, $SE = .12$, $t = 8.50$, $p < .001$ than for girls, $b = .43$, $SE = .07$, $t = 5.83$, $p < .001$. Since the results concerning interactions between IQ and social competence were virtually the same when controlling for gender interactions, the following results were based on the analyses without controlling for the gender interactions so that the results could be interpreted in a more straightforward manner.

Significant interaction effects were found between IQ and social competence in predicting academic and social adjustment outcomes. Follow-up simple slope tests demonstrated that social competence moderated the effects of IQ on academic adjustment outcomes (Figures 1, 2, 3, 4, and 5). The simple slope test showed that the positive relation between IQ and academic achievement was only significant for those with low

social competence, $b = .38$, $SE = .08$, $t = 5.10$, $p < .001$; the association was not significant for those with high social competence, $b = -.07$, $SE = .09$, $t = -.79$, $p > .05$. Similarly, the positive relation between IQ and teacher-rated school competence was only significant for those with low social competence, $b = .27$, $SE = .08$, $t = 3.41$, $p < .01$; the association was not significant for those with high social competence, $b = -.18$, $SE = .10$, $t = -1.83$, $p > .05$. Again, the negative relation between IQ and learning problems was only significant for those with low social competence, $b = -.24$, $SE = .09$, $t = -2.72$, $p < .01$, and the association was not significant for those with high social competence, $b = .21$, $SE = .11$, $t = 1.95$, $p > .05$. The positive relation between IQ and self-perceptions of academic performance was also only significant for those with low social competence, $b = .24$, $SE = .07$, $t = 3.69$, $p < .001$; the association was not significant for those with high social competence, $b = -.04$, $SE = .08$, $t = -.44$, $p > .05$. Finally, simple slope tests demonstrated that social competence moderated the effects of IQ on peer preference. Interestingly, there was a positive relation between IQ and peer preference among children who had low social competence, $b = .20$, $SE = .09$, $t = 2.38$, $p < .05$, but there was a negative relation between IQ and peer preference among children with high social competence, $b = -.36$, $SE = .11$, $t = -3.48$, $p < .01$.

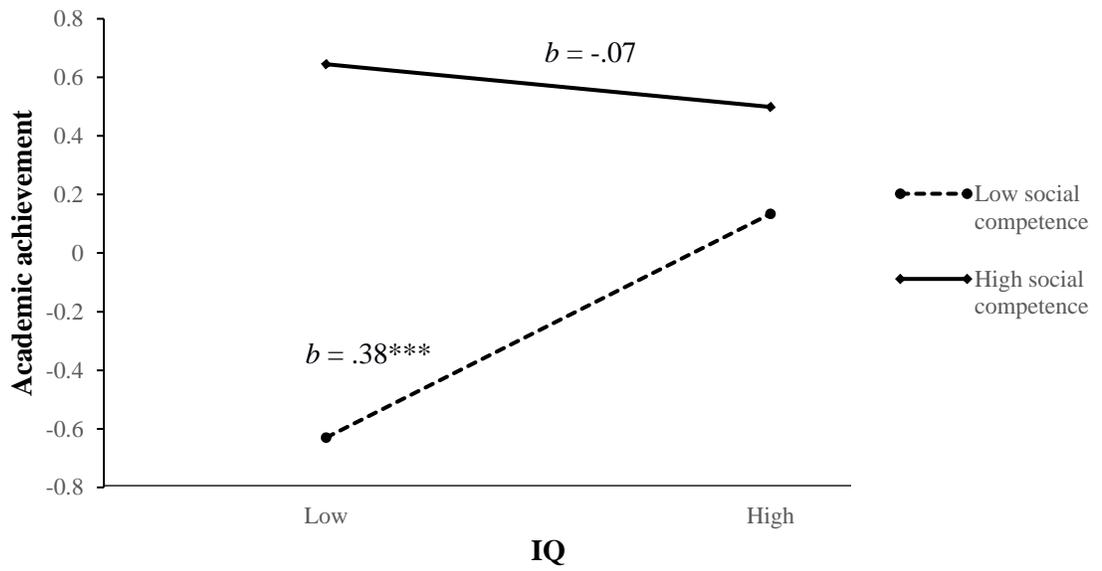


Figure 1. Interaction between social competence and IQ in predicting academic achievement

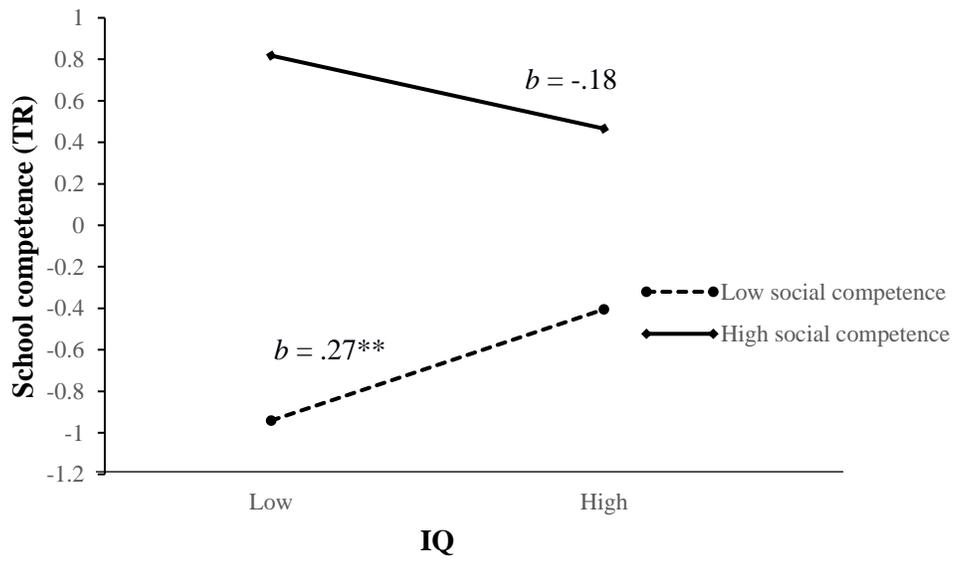


Figure 2. Interaction between social competence and IQ in predicting school competence

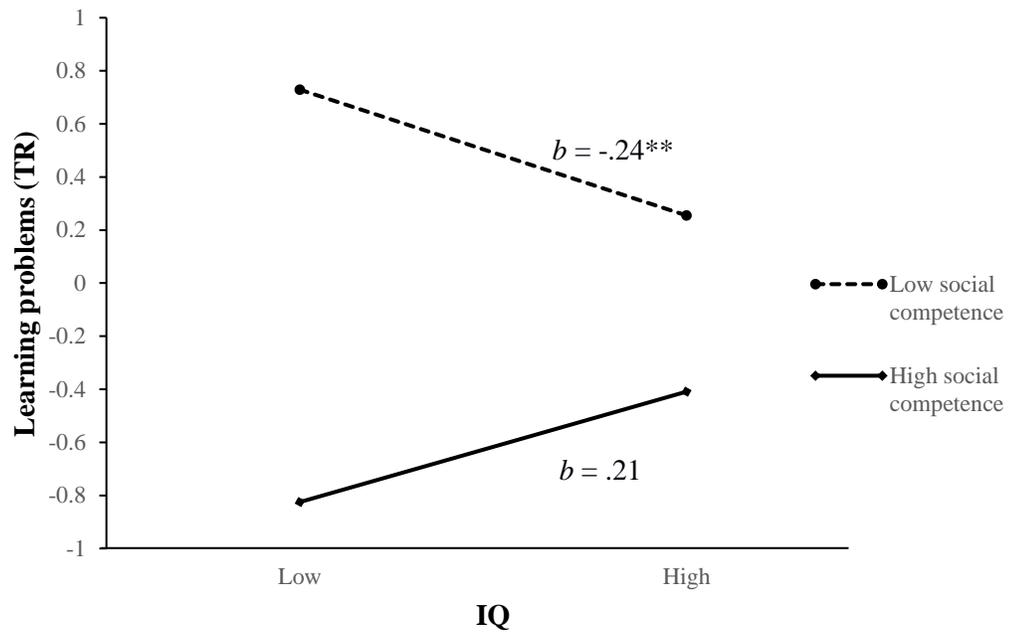


Figure 3. Interaction between social competence and IQ in predicting learning problems

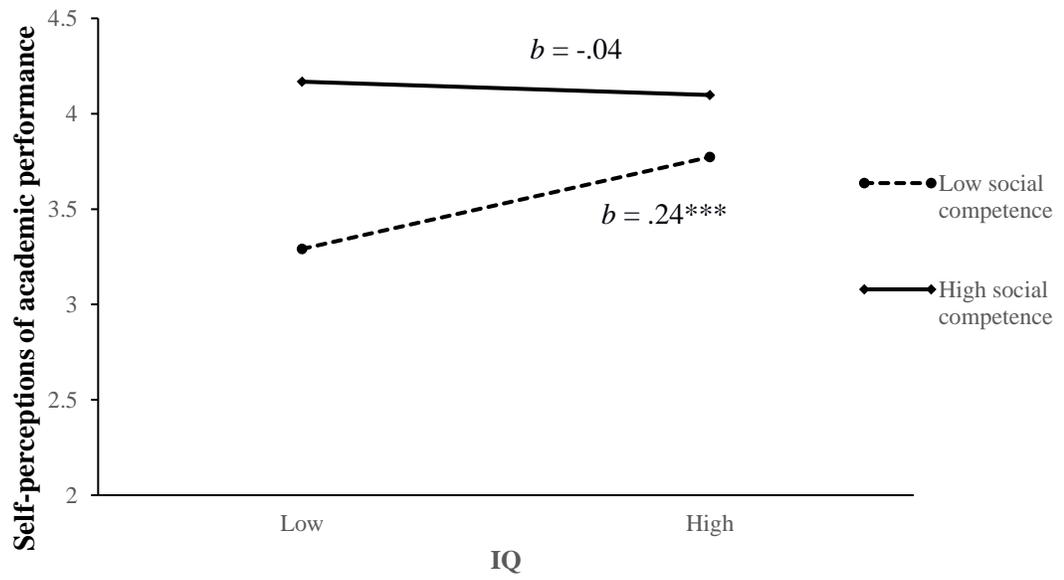


Figure 4. Interaction between social competence and IQ in predicting self-perceptions of academic performance

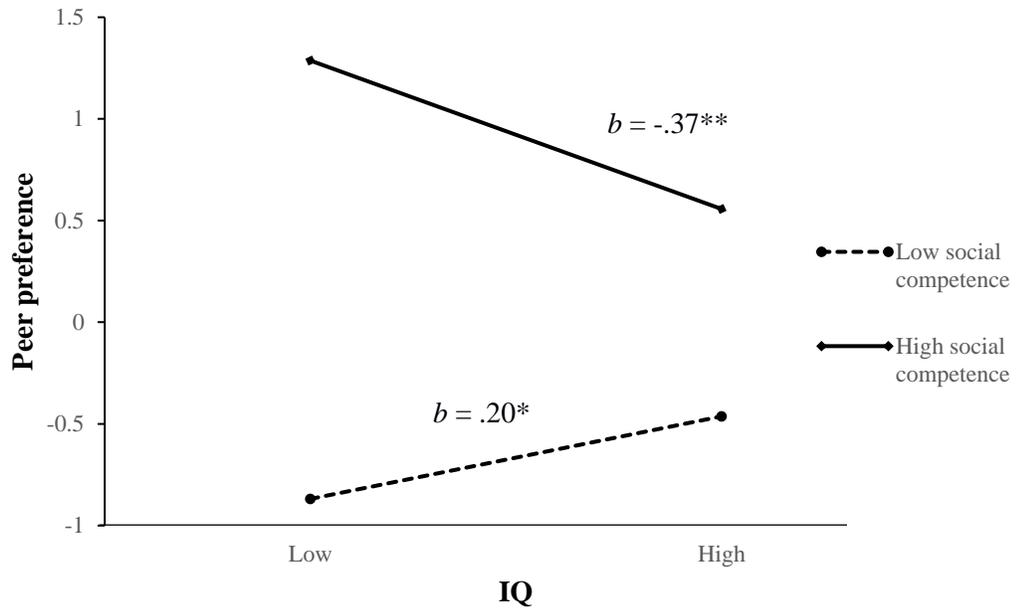


Figure 5. Interaction between social competence and IQ in predicting peer preference

CHAPTER 4: DISCUSSION

While research has shown that intelligence remains an important predictor of school outcomes (e.g. Deary et al., 2007; Flouri et al., 2019), intelligence does not work in isolation in impacting a child's development and adjustment (Plomin & Deary, 2015; Heaven & Ciarrochi, 2012). The relations between intelligence and school adjustment may not be straightforward, as other factors work together with IQ in impacting developmental outcomes. Yet, how other individual characteristics or abilities, particularly social competence, may interact with intelligence to predict school adjustment has been largely unexplored. Furthermore, few studies have examined the relations between IQ and school adjustment specifically among Chinese children, which is important as cultural context can influence the effects of cognition, emotion, and behavior (e.g. Chen et al., 2002; Sternberg, 2004; Wentzel et al., 2020). As a result, the primary goal of this study was to fill the research gap by examining the relations between children's cognitive ability, social competence, and school adjustment among children in Jintan, China. To achieve this goal, I investigated the interactions between intelligence and social competence in predicting school adjustment outcomes, which include both academic and social components.

Overall, the findings from this study indicated that IQ and social competence are positively related to school adjustment outcomes, as anticipated from the previous literature (e.g. Deary et al., 2007; Ladd, 2005; Wentzel, 2007). IQ significantly predicted academic achievement scores and self-perceptions of academic performance. Meanwhile, social competence significantly predicted academic achievement scores, teacher-ratings of school competence, teacher-ratings of learning problems, self-perceptions of academic

performance, and peer preference. Furthermore, the findings from this study indicated significant interaction effects of IQ and social competence in predicting measures of school adjustment. Generally, IQ was positively associated with measures of school adjustment outcomes more strongly in individuals with low social competence than in individuals with high social competence. These findings are further discussed in detail in the following sections.

IQ and Social Competence on Adjustment Outcomes

As hypothesized, the findings show that children who demonstrate higher IQ scores at an early age are more likely to have higher academic achievement scores later in childhood, which is unsurprising since most school tasks are intended to reflect cognitive learning. Additionally, since IQ is a measure of cognitive ability that tends to be highly heritable based on genetic factors (Davies et al., 2011; Plomin & Deary, 2015), the positive association between early IQ and later academic achievement is in line with literature on the developmental function of intelligence (e.g. Deary et al., 2007; Kuncel et al., 2004; Zettergren & Bergman, 2014).

However, IQ was surprisingly not significantly associated with the measured teacher-rated school adjustment outcomes (school competence and learning problems) or peer preference. The findings are contrary to some prior studies indicating that intelligence is generally predictive of numerous positive school outcomes, including better relations with peers and teachers (e.g. Bellanti & Bierman, 2000). Despite the lack of a significant main effect, IQ was significantly correlated with teacher-rated school

adjustment variables, $r(\text{school competence}) = .22$ and $r(\text{learning problems}) = -.16$, even though IQ was not significantly correlated with peer preference.

The lack of significant main effects may be attributed to the fact that, as some prior researchers have speculated, subjective teacher assessments may have stronger associations with students' social skills than objective tests scores (DiPrete & Jennings, 2012; Gustavsen, 2017; Legkauskiene et al., 2019). There may also be a developmental component, as studies have suggested that “indices of academic achievement often represent both ability and conduct in the elementary grades, whereas evaluations of academic performance in junior high and high school reflect only intellectual skills” (Wentzel, 1991, p. 1067). Furthermore, other researchers have found that the relations between intelligence and peer acceptance are less clear for those of average or higher intelligence (Gross, 2002; Zettergren & Bergman, 2014). It would be interesting to examine more closely how teacher-rated school adjustment measures are shaped in order to better understand some of these outcomes.

Meanwhile, the findings of the present study demonstrated that children with higher IQ had more positive self-perceptions of their academic ability. It is plausible that the reciprocal contributions between self-perceptions of academic performance and academic achievement during development (Fu et al., 2020) play a role in the relations between early IQ and later self-perceptions of their academic performance. Students may undergo a process of shaping and reshaping their academic self-perceptions by experiences and feedback of their school performance (Calsyn & Kenny, 1997). Particularly since Chinese students are required to engage in regular self-evaluative processes at school (Zhou et al., 2010), the cultural context may further enhance these

relations. Overall, these findings on IQ and academic adjustment outcomes are consistent with prior studies that demonstrate IQ is a positive attribute for child's learning.

Social competence was significantly associated with all the school adjustment variables measured. The findings on the positive relations between social competence and school adjustment outcomes were as anticipated. The results suggest that socially competent children are more likely to achieve higher academic achievement scores than those who are less socially competent. This finding is in line with theories that emphasize the role of social behavior on learning (Bandura, 1977; Vygotsky, 1978) and other studies that demonstrate the importance of effective social skills for success at school (e.g. Wentzel, 2007). It should be noted that the mutual contributions of social competence and academic achievement can vary with developmental stage and tend to be more salient during the earlier years of a child's development (Chen et al., 2010), so it is possible that these relations may be weaker for older children.

Interestingly, the findings show that socially competent children are also more likely to have higher self-perceptions of their academic performance. While findings suggest the distinctness of perceived competence across different domains (e.g. Cauce, 1987), studies have demonstrated that social competence is significantly related to subsequent general self-concept (Houck, 1999). Furthermore, theory and research support the notion that peers and teachers can inform children's development of self-perceptions (e.g. Gest, Domitrovich, & Welsh, 2005; Harter, 1990). Therefore, it is conceivable that their academic self-perceptions are likely to be influenced by their successful social interactions rather than just their academic performance, especially at a young age. It

would be interesting in future studies to examine how social competence might influence different self-concepts among children.

Consistent with other findings and the literature (e.g. Birch & Ladd 1997; DiPrete & Jennings, 2012), social competence was significantly associated with teacher ratings of school competence and learning problems. Beyond the association between social skills and academic achievement, socially competent children are more likely to maintain overall positive relationships with their teachers (Legkauskas & Magelinskaite-Legkauskiene, 2019). Findings also demonstrate that social competence is positively associated with peer preference. These patterns are in line with the social competence hypothesis, which acknowledges the variability across children regarding their individual attributes that allow them to interact effectively with peers (Ladd et al., 2014). Together, the findings on social competence illustrate how the abilities that children need to foster in order to succeed at school extend beyond mere cognitive ability or effort.

In summary, these findings indicate the value of nurturing both cognitive and social abilities in children. Even though intelligence has a strong biological basis (Colom et al., 2010; Jung et al., 2000), negative environmental factors can be detrimental to intelligence, especially for young children. Therefore, it is critical to protect children from such harm, including malnutrition, neglect, or exposure to harmful substances (Hair et al., 2015; Liu et al., 2013; Streissguth et al., 1990). Meanwhile, fostering children's social competence cannot be dismissed, as it can directly impact children's school performance in addition to their relations with their teachers and peers.

The Moderating Role of Social Competence

While there is clear evidence that intelligence and social competence individually influence children's school adjustment outcomes, it is important to consider how these traits can work together, as there are only few studies in the current body of literature that have examined these two characteristics in tandem. The findings from the current study demonstrated that interaction effects exist between intelligence and social competence in predicting outcomes for children in school.

Moderating role of social competence in relations between IQ and academic achievement. As hypothesized, a significant difference between children with low and high social competence was found in the relation between IQ and academic achievement. The results from this study showed a significant positive association between IQ and academic achievement among individuals with low social competence but not among those with high social competence. In other words, for children who are less socially competent, their level of intelligence plays a larger role in predicting their academic outcomes, with higher IQ leading to higher academic scores. Meanwhile, socially competent children seemed to have higher academic achievement regardless of whether they had higher or lower IQ. These patterns of interactions were consistent for children across the different academic subjects, which were math, Chinese, and English (see Appendix A).

These findings overall contribute to a growing body of knowledge that emphasizes the importance of social competence for academic adjustment (Malecki & Elliot, 2002; Wentzel, 1993, 2007). The interactions particularly highlight the role of social competence as a protective factor (Ladd et al., 2014). Since socially competent

children engage in effective interpersonal contact and are active in social settings, they are more likely to gain social and emotional support from others, which may act as a buffer against poor academic outcomes when they face limitations or challenges at school (Chen & French, 2008; Garmezy & Masten, 1991; Schwartz et al., 2000). It is plausible that among these fourth-grade participants in this study, the students with low IQ may encounter some cognitive challenges in their schoolwork, but among them, those who have high social competence may be utilizing their social and emotional resources to attain positive academic results. Meanwhile, students with high IQ may not need the protective factor of social competence in order to perform well academically.

Moderating role of social competence in relations between IQ and teacher ratings. Social competence also significantly moderated the relations between IQ and teacher ratings of children's school competence and learning problems. The findings demonstrated that IQ was positively associated with teacher ratings of children's school competence only among individuals with low social competence, while there was no significant difference among individuals with high social competence. Meanwhile, IQ was negatively associated with teacher ratings of children's learning problems in individuals with low social competence, while there was no significant difference among individuals with high social competence. In other words, having poor social competence exacerbated teacher perceptions of students' learning problems for children with low IQ.

The moderating effects of social competence for teacher-rated school adjustment outcomes are consistent with those of academic achievement and their self-perceptions of academic performance; these findings align with expectations, given the high correlation between teacher ratings and academic performance found in literature (e.g. Hoge &

Coladarci, 1989). The same mechanisms for social competence as a protective factor described earlier are likely to be involved in these relations. Also, it is possible that these patterns are particularly salient given the context of Chinese school where the head teacher who is designed to oversee the class usually instructs the same group of children over several years and becomes very familiar with the students in the classroom.

Moderating role of social competence in relations between IQ and self-perceptions of academic performance. Again, a similar significant interaction effect was found for the relations between IQ and social competence on children's self-perceptions of academic performance. The results showed that IQ was positively associated with self-perceptions of academic performance in individuals with low social competence, whereas there were no significant relations in individuals with high social competence. These findings suggest that for children who have high social competence, even those with low IQ viewed themselves as being just as smart and cognitively capable as children with high IQ. However, for children who have low social competence, those with low IQ had lower self-perceptions of their academic performance than those with high IQ.

Studies have shown that academic achievement and self-perception of academic ability have reciprocal effects on each other (Fu et al., 2020; Marsh & Martin, 2011); thus, the similar results of the interaction between IQ and social competence in predicting these two outcomes are not surprising. Again, social competence may act as a protective factor, so that even if a student has low cognitive ability, their capability to attain school goals through their social skills may allow them to think highly of their own academic ability. Furthermore, it has been argued that the evaluations of teachers and peers can

play a meaningful role in the process of developing and even changing children's academic self-perceptions (Cole, 1991; Skaalvik & Valas, 1999). It is possible that given the strong emphasis on social-evaluative processes in Chinese school (Liu et al., 2014; Zhou et al., 2010), socially competent children at this age may conflate their ability to develop positive connections with peers and teachers with indicators of their ability to do well in school. However, this argument is speculative and further research is necessary to understand the processes involved.

Moderating role of social competence in relations between IQ and peer preference. I hypothesized that IQ would be positively associated with peer preference more strongly in individuals with low social competence than in individuals with high social competence. This hypothesis was only partially supported by the findings of the study. Surprisingly, the results showed that while IQ was positively associated with peer preference among children with low social competence, there was a negative association between IQ and peer preference among children with high social competence. Put differently, for socially competent children, they were more likely to be liked and accepted by their peers if they had lower IQ than higher IQ.

The relations between IQ and peer preference were as anticipated for children with low social competence. Studies have generally indicated that intelligence has been associated with peer acceptance at school, indicating that low cognitive ability is predictive of low acceptance among peers (Bellanti & Bierman, 2000; Mathur, 2001). Having low IQ with low social competence is likely to result in heightened problems with acceptance among peers. Meanwhile, it is possible that for children who are low in social competence but high in IQ, their ability to think and to likely perform well academically

may help their ratings of peer preference. This may be particularly true in the Chinese context, where the attainment of academic achievement is considered one of the most important tasks for school-age children (Phelps, 2005).

On the other hand, the findings showed a surprising reverse trend among children with high social competence, where higher IQ was predictive of lower peer preference. Several explanations may be offered for this finding. First, some prior studies on children with very high IQ have shown that highly intelligent children can have social difficulties because of the complexity of their play behavior and interests that alienate peer groups (e.g. Gross, 2002; Zettergren & Bergman, 2014). The cognitive development of highly intelligent children may outpace others' that cause peers to view or reject them as "different" (Cross et al., 1995; Silverman, 2012). It should be noted that in the present study, the average IQ was 112.05 so the IQ of the sample was somewhat higher than the national norm of 105 in China (World Population Review, 2020).

Another possible explanation is that some children with high social competence and high intelligence may have certain prominence or reputation within the class, which may create a type of social distance that contributes to lower peer preference ratings. Prior studies have established distinctions in peer status of social preference and perceived popularity, with aggression contributing to the differences in preference and popularity (Cillessen & Mayeux, 2004; Peters, Cillessen, Riksen-Walraven, & Haselager, 2010). However, this argument is highly speculative. While it is outside the scope of the current research, subsequent work may find it useful to consider integrating other potentially relevant social dimensions or social mapping to examine these factors within and across peer groups.

Limitations and Future Directions

Several limitations and weaknesses in the current study should be noted. First, in the present study, the measure of IQ was conducted while the participants were in preschool, whereas the measure of social competence was taken several years later in fourth grade, at the same time as the school outcome variables. In other words, the study demonstrates how early contributions of IQ to school adjustment is moderated by concurrent social competence. Due to the cross-sectional design between social competence and the outcome measures, it is difficult to know whether there are longitudinal moderating effects as well. Furthermore, some studies have indicated that the association between early intelligence and later adjustment is mediated by conduct problems and social circumstances, so given the time gap between the measure of IQ and the other variables, it is unclear whether the low IQ scores may have contributed to development of potential conduct difficulties or other mediating factors (Fergusson, Horwood, & Ridder, 2005; Gottfredson, 1997).

Second, the sample selected for this study was taken from a larger project (The China Jintan Child Cohort Study; Liu et al., 2010) by choosing participants who had complete data, specifically those children who had early IQ measures and later measures of social competence and school adjustment outcomes. As a result, the participants in this study were all part of the “original cohort”, who had their IQ tested in preschool, but not all participants in the original cohort had follow-up data. There was a significant difference in the IQ scores between the participants in this study and the other members of the original cohort who lacked follow-up data, where the current participants had a

higher mean IQ score (see Appendix B). Consequently, the participation and attrition biases may undermine the generalizability of the results of the current study.

Third, the study was conducted only in China. While I note the importance of cultural context and its potential impact on the findings, there were no comparison group data from another cultural context. Many of the potential cultural explanations are speculations based on the literature (e.g. Chen et al., 2000; Liu et al., 2014; Zhou et al., 2010). Thus, it is unclear whether the moderating effect of social competence is universal or specific to the Chinese context. From a theoretical review in the introduction, it is conceivable that children in Western societies also may benefit from social competence as a protective factor when facing cognitive limitations. Consequently, the moderating effect of social competence may be similar. However, studies have demonstrated cultural differences in the display and functions of social competence, including its different dimensions (e.g. Chen et al., 2002; Chen & French, 2008). Researchers have also argued that the effects of intelligence cannot be fully or meaningfully understood outside its cultural context (e.g. Sternberg, 2004). Therefore, it will be important to replicate this study in different cultural contexts to observe whether a similar interaction effects would be produced for school adjustment outcomes and how contextual factors influence these relations.

Fourth, the study only examined a specific stage of development; a longitudinal model that examines these patterns over multiple time points will be a valuable future area for study. The findings may be different for older children and adolescents, as studies suggest that the effects of protective factors vary with age (Rutter, 1985). Additionally, academic achievement may reflect both ability and conduct in the

elementary grades, whereas evaluations of academic performance in later years may represent more intellectual skills (Wentzel, 1991).

Finally, this study utilized a more general measure of social competence without examining the effects of its different dimensions. It would be interesting to look at more specific dimensions of social competence, such as prosocial behavior and sociability, as studies have shown that different dimensions can make unique contributions to adjustment (i.e. Chen et al., 2000). Future studies on the particular dimensions of social competence have practical implications by helping researchers better understand the protective mechanisms that support children who may face cognitive difficulties and allowing practitioners to develop more specific and targeted social competence interventions.

Despite these limitations, the current study provide insight into how IQ and social competence work together to predict children's adjustment outcomes. The findings revealed the importance of social competence as a protective factor in moderating the relations between IQ and several dimensions of school adjustment, contributing to a growing body of knowledge that highlight the importance of developing positive social skills among children. This study affirms the work of scholars in recent years who argue that excelling at school adjustment is dependent on individual differences in social and emotional skills, as well as the broad-level social influences that reflect cultural values and practices (e.g. Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Wentzel, 2012). These findings have major implications, as parents, teachers, and policy makers seek ways to help improve school adjustment outcomes for children. While studies have shown that efforts to increase IQ may be limited, research suggests that social

competency skills have the potential to be developed and nurtured through intervention and skill training programs (e.g., Elias et al., 1997; Domitrovich, Cortes, & Greenberg, 2007; Taylor, Oberle, Durlak, & Weissberg, 2017). Based on this study and the growing evidence on the far-reaching implications of social and emotional skills, researchers and policy makers can push efforts to teach these non-cognitive skills as part of school curriculum to support children's development and adjustment.

APPENDIX A

Results of Separate Academic Subjects

Table 4

Means and Standard Deviations of Academic Subjects

	Boys	Girls	Total
Chinese scores	-.14 (.96)	.31 (.74)	.07 (.89)
Math scores	.07 (.90)	.16 (.81)	.12 (.86)
English scores	-.08 (1.03)	.28 (.72)	.09 (.91)

Note. Standard deviations are in parenthesis

Table 5

Correlations among Academic Subjects

	1	2	3
1. Chinese			
2. Mathematics	.69**		
3. English	.77**	.71**	

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

Table 6

Effects of IQ, Social Competence, and Interactions in Predicting Academic Subjects

<i>Adjustment Outcome</i>	<i>Effect (b)</i>	<i>SE</i>	<i>t-test</i>
Chinese scores			
IQ	.26	.05	4.16***
Social competence	.34	.08	4.35***
IQ*social competence	-.22	.07	-3.35**
Math scores			
IQ	.12	.05	2.32*
Social competence	.38	.08	4.93***
IQ*social competence	-.22	.07	-3.21**
English scores			
IQ	.12	.06	2.10*
Social competence	.29	.09	3.47**
IQ*social competence	-.16	.07	-2.21*

Note. Child gender was controlled in the model

* $p < .05$ ** $p < .01$ *** $p < .001$

APPENDIX B

Data on Participant Sample

Table 7

Means and Standard Deviations of IQ

	IQ Score
Participants in study with follow up data	111.93 (14.27)
Original cohort without follow up data	102.30 (13.77)

Note. Standard deviations are in parenthesis

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