

Understanding Individual Differences in School Achievement: the Specific and Joint Impact of Motivation and Parenting Style Independent of Children's Measured Intelligence

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Abstract

Intelligence explains some variance in students' school achievement, but not all. Motivation and parenting have been well-documented as non-cognitive predictors and are crucial to students' school achievement. Better performance of students under Eastern culture could be attributed to motivation and parenting. The present research is dedicated to exploring the associations among motivation and parenting, as well as their specific and joint predictive power for school achievement, independent of intelligence, mainly on a Chinese sample.

Motivational theories from Bandura and Dweck have established the importance of ability self-perceptions and achievement beliefs to academic success. Yet their correlations with each other and with measured intelligence have not been fully explored. Better school performance of students under Eastern culture could be attributed to motivational reasons with adaption to Eastern culture remains unclear. The first study aimed to address this gap. In a sample of 199 first-year middle-school students from an open neighbourhood school in Beijing, students' achievement beliefs and ability self-perceptions were highly correlated, and each was moderately related to intelligence. Students' achievement beliefs had independent power to predict math scores after accounting for measured intelligence, while students' ability self-perceptions had independent explanatory power to predict Chinese scores. This study presents a preliminary investigation on integrating ability self-perceptions and achievement beliefs with Eastern adaption and the importance of intellectual ability in

relation. The uncovering of this strengthens the theoretical foundation to maximize students' achievement potential through non-cognitive approaches independent of one's measured intelligence in Chinese culture.

Parental intrusive control behavior on children generally correlates negatively with children's school achievement, yet nothing has been done to examine the validity of this relationship independent of intelligence and parental education. Child reports have mainly been used as the parental control indicator, and parental reports have rarely been explored. The second study assessed the validity of the associations between two parental control indicators and children's school achievement independent of intelligence and parental education. In a sample of 310 German elementary school children, a correlation of .67 between parents' and children's perceptions of parents' control behavior was found. Independent of measured intelligence and parental education, parent-perceived control behavior was significantly associated adversely with school achievement. Child-perceived control did not predict school achievement when parent reports were included in the model.

Under Eastern cultural backgrounds, however, the consistency of the negative association between parental intrusive control and children's school achievement has been questioned. The mediating roles of motivational constructs in this association yet remain unclear. The third study investigated the correlation between child-perceived parental control and motivation constructs, namely ability self-perceptions and achievement beliefs, as well as their specific predictive power on students' school achievement independent of measured intelligence in a Chinese sample. Results from Structural Equation Modeling (SEM) indicated that parental intrusive control as a

unidimensional construct was detrimental to children's school achievement, as in Western cultures. Although the motivational constructs and parental intrusive control were not correlated — they both predicted school achievement independent of measured intelligence. This finding yielded further insight into how specific parenting behaviors linked to children's learning motivation in Chinese culture.

Finally, a longitudinal study was conducted to explore the developmental link between parental intrusive control as a unidimensional construct and students' school achievement independent of measured intelligence. Over a 17-month interval, moderate negative path from previous school achievement to later child-perceived parental control independent of children's measured intelligence was found in a Chinese sample. Causal interpretation of this correlation, however, is limited regards to technic critics of cross-lagged models.

Findings from the present study demonstrated the importance of non-cognitive constructs including motivation and parenting on school achievement. The present integrative view of motivational constructs supports an underlying general motivational construct, which is dependent on individual's cognitive ability. Further insight into the motivational beliefs in Eastern cultural, which differentiated from the West, is needed. Parental intrusive control is detrimental for children's school success, despite of Western-Eastern cultural diversity. Motivational constructs and parental control predicted school achievement respectively independent of measured intelligence, though motivation and parenting are not correlated. Furthermore, school achievement predicts later child-perceived parental control independent of children's

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measured intelligence was found in a longitudinal setting. Interventions to boost students' school performance through improving students' motivation, as well as raising the awareness of the detrimental effect of parental intrusive control were presented.

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Chapter I

Introduction

1.1 Cognitive and Non-cognitive Predictors for School Achievement

The individual's education level is of substantial importance for later life outcomes such as occupation, socioeconomic status, or even the performance of off-springs (Johnson, Brett, & Deary, 2010; Victoria, Huttly, Barros, Lombardi, & Vaughan, 1992). Better performance of children in their early school years is fundamental to later educational performances either in cognitive or socialization developments (Barnett, 1995; Goodman & Sianesi, 2005). Hence, education is important for the individual and society. How to raise the potential of successful education, especially for the early school years, then, is a necessary psychological enquiry.

There are two areas of individual differences that are considered to be particularly influential in predicting students' school achievement. On one hand, individual cognitive ability, especially that measured general intelligence, is one of the strongest predictors of students' school achievement (Rohde & Thompson, 2007). Higher general intelligence scores tend to associate with higher school achievement, either measured as school grades or standardized achievement test scores (Deary, Strand,

Smith, & Fernandes, 2007; Greven, Harlaar, Kovas, Chamorro-Premuzic, & Plomin, 2009; Gustafsson & Balke, 1993; Johnson, McGue, & Iacono, 2005). The correlation between general intelligence and school achievement is around .50 (Deary *et al.*, 2007; Spinath, Spinath, Harlaar, & Plomin, 2006). Educational psychologists, on the other hand, point out the power of non-cognitive constructs, *e.g.*, students' learning motivation, personality, parenting and family environment, in supporting students to achieve better grades at school (Bandura, 1977; Blackwell, Trzesniewski, & Dweck, 2007; Busato, Prins, Elshout, & Hamaker, 2000; Spera, 2005). The advantage of considering non-cognitive predictors for achievement success is that many believe that they can be improved to greater degrees than ability could. Evidence is accumulating to support the roles of these constructs in promoting school achievement directly or indirectly.

The purpose of present study is to examine issues that have emerged from incorporating cognitive and non-cognitive predictors of school achievement, mainly from three aspects. First, concern has been raised for the limited knowledge about how non-cognitive predictors (*e.g.*, motivation and parental control) are correlated with measured intelligence and also the extent that they influence achievement independent of measured intelligence — as well as the degrees to which the non-cognitive predictors can be manipulated to remain consistently high over time. The question is important because those who scores higher on tests of intelligence tend to show higher school achievement, and both intelligence and achievement measures tend to be persistently stable within individuals over time. Students achieve more when they are appropriately motivated, but that motivation is more difficult to

maintain when success comes only with considerable effort and investment of time. This is especially the case when people can see that others nearby others do not have to work as hard to succeed.

Second, Chinese students achieve higher test scores than North American students in the same examine setting has been constantly observed, especially in math and Science (*e.g.*, Chen & Stevenson, 1995). Reasons for this observed discrimination typically include the influence of learning motivations that rose from two categories of cultural frameworks: a Western tradition of emphasis on ability and an Eastern tradition of emphasis on effort (Georgiou, 2008; Hemmings & Kay, 2010). The Western tradition of emphasis on ability has nurtured at least two perspectives of motivation: Bandura's (1978) self-efficacy — people's believe in their own capacity, and Dweck's (1998, 1999) "belief in intelligence" — one's believe in whether intelligence is fixed or malleable. The need to study the Eastern tradition of emphasis on effort has risen, however, from contradictory results across culture. Although Dweck *et al.* (1999) has been systematically studied "belief in intelligence" in the West, not much information has been reported from competitive research of "belief in effort" in the East. The Eastern tradition of emphasis on effort remains uncovered.

Third, the role that parental control behavior plays in motivating individuals is another primary focus of understanding the interactivity between non-cognitive predictors of school achievement. According to the self-determination theory, people are born with the need to feel autonomous, but not to feel being controlled (Deci, Eghrari, Patrick,

& Leone, 1994). Parental intrusive control on children mostly links with children's school achievement problems, physical in-adaptability and poor mental health in the Western studies (*e.g.*, Halgunseth, Ispa, & Rudy, 2006; Carper, Fisher, & Birch, 2005). However, when Chinese parents seems to be more controlling (Chiu, 1987), Chinese students outperform their, *e.g.*, White, African American peers (Steinberg, 1996). Thus, whether parental control undermining children's academic performance can be generalized, especially to the Chinese cultural group is an issue to be examined. Moreover, little study has examined whether parental control has detrimental effects on children's school achievement after controlling for children's intellectual ability in the West, not to mention the magnitude of the correlation between parental control and motivation independent of children's intellectual ability. Specific to the Chinese group, the effectiveness of parental control on children's ability self-perception and achievement beliefs independent of intelligence nevertheless remains unclear. Additionally, the representativeness of parental control from children's report or parental report is another issue to be investigated.

1.2 Research Aim and Dissertation Structure

In order to shed light on the questions discussed, this dissertation reports on four studies, and incorporates the following objectives:

1. Providing a literature review on the importance of cognitive and non-cognitive predictors for school achievement. (Chapter 2).

2. Examining the correlation between motivational constructs and measured intelligence, and discussing the predictive power of motivational constructs independent of measured intelligence on school achievement. (Chapter 3).
3. Exploring report validity of child- and parent- perceived parental intrusive control and their predictive effect independent of measured intelligence and parental education on school achievement in a German sample. (Chapter 4).
4. Demonstrating the correlations between motivational constructs and parental intrusive control, as well as their correlation with school achievement in a Chinese sample. (Chapter 5).
5. Evaluating the developmental link between parental intrusive control and school achievement through a longitudinal cross-lagged model. (Chapter 6).
6. Discussing the findings, limitations, and implications of the present research. (Chapter 7).

To explore the associations between the motivational theories of Bandura's ability self-perceptions and Dweck's achievement beliefs, and their dependence on measured intelligence, in the first study (Chapter 3), a preliminary model of integrating achievement beliefs and ability perceptions to predict school achievement domains independent of measured intelligence were proposed and discussed. Study 2 (Chapter 4) aimed to integrate the assessments of both child and parent-perceived parental intrusive control to explore their interrelationships and their predictive effect independent of children's measured intelligence and parental education. The third study (Chapter 5) was designed to provide evidence on the possible mediating role of

motivation constructs (*e.g.*, ability self-perceptions and achievement beliefs) between the association of parental control and students' school achievement when measured intelligence was controlled. Finally, Study 4 (Chapter 6) was conducted to discover the developmental link of students' achievement and parental control by a longitudinal analysis: whether parental excessive control decreases students' achievement over time, or students' failure at school evokes more intensive parental control.

As societies increasingly rely on their populations being well-educated and responsible for creating a proper environment for individual education, it is important to understand the transactions among intelligence, motivation, and parenting, especially in order to develop better methods for retaining motivation in students who tend not to score highly on intelligence tests in school, and to alert possible parentally disruptive behavior towards children so that children may achieve their potential.

Chapter II

Literature Review

2.1 Intelligence

Intelligence and education have been studied together since the earliest empirical research on these topics (Deary *et al.*, 2010). The IQ tests were originally constructed to identify those children who would not benefit from normal education. Higher general intelligence scores tend to be associated with higher school achievement, either measured as school grades or standardized achievement test scores (Deary, Strand, Smith, & Fernandes, 2007; Greven, Harlaar, Kovas, Chamorro-Premuzic, & Plomin, 2009; Gustafsson & Balke, 1993; Johnson, McGue, & Iacono, 2005). The correlation between general intelligence and school achievement is around .50 (Deary *et al.*, 2007; Spinath, Spinath, Harlaar, & Plomin, 2006). The understanding of this correlation is, however, complex. The cross-sectional correlation between intelligence and education may refer to the issue that people with higher intelligence gain access to a higher-level of education, or vice versa that more education leads to higher intelligence test scores. Longitudinal studies have been carried out on to look into this

relationship, but evidence for both directions have been found. For example, in a study of approximately 70,000 children in the UK, cognitive ability tests taken at age 11 correlate 0.81 with national school examinations taken at age 16 (Deary *et al.*, 2007). Findings from age-cutting studies (refers to the comparison with children in similar age who made or missed an arbitrary cutoff date of begin school) demonstrated that earlier schooling produced marked improvements in selected aspects of children's cognitive development (Morrison, Smith, & Dow-Ehrensberger, 1995). So far, it seems likely that the intelligence and education have mutual influence on each other, and this relationship is more likely to be reciprocal.

2.2 Motivation

Even though intelligence has such strong theoretical and practical ties with education, this is not the whole issue. Given that general intelligence explains about 25% of the variance in school achievement (Kuncel, Hezlett, & Ones, 2004), there is much space to search for other concepts that might add to the explained variance. Motivational predictors are thought to be the core from the non-cognitive perspective (Steinmayr & Spinath, 2009). Motivational theories are concerned with the energization and direction of behavior, i.e., what gets individuals moving toward activities or tasks (Pintrich, 2003). From flourishing perspectives of motivation, the present study deals with the motivational theories of Bandura (1977) and Dweck (1999), which have established the importance of ability self-perceptions and achievement beliefs to academic success. Yet, the correlation between ability self-perceptions and achievement beliefs remains unclear in terms of their associations with measured

intelligence, as well as the developmental view of how motivational constructs and school achievement interact. This study aims to address this gap in knowledge.

2.2.1 Ability self-perceptions

2.2.1.1 Self-perceived ability

Albert Bandura (1977, 1986) proposed an influential set of motivational theories focusing on the beliefs that people have about themselves. According to these theories, such beliefs are key elements which frame cognitive and affective structures including the ability to symbolize, learn from others, plan alternative strategies, regulate behavior, and engage in self-reflection (Pajares, 1996). Bandura proposed self-efficacy, or peoples' judgments of their capabilities to organize and execute courses of action required to attain designated types of performances (Bandura, 1986, *p.* 391) as the core component of this system of beliefs. According to the theory, students with high senses of efficacy for accomplishing educational tasks will participate more readily, work harder, and persist longer when they encounter difficulties than those who doubt their capabilities (Schunk, 1982, 1985).

Self-perceived ability for school achievement is usually measured domain-specifically (Eccles *et al.*, 1983). Results from recent motivation studies have revealed support for associations between self-perceived ability and school achievement, typically in the .4 to .6 range (*e.g.*, Guay *et al.*, 2003; Spinath *et al.*, 2006). The association between

self-perceived ability and measured intelligence is generally smaller, with correlations between .2 and .5 (Chamorro-Premuzic, Harlaar, Greven, & Plomin, 2010). In a longitudinal study, Marsh (1990) reported that prior intelligence level influenced subsequent ability self-perceptions in a longitudinal study. This might imply that students develop perceptions of their general academic abilities through their experiences with academic tasks they are assigned, experiences that at least to some degree accurately reflect their relatively stable measured intelligence levels. This has not generally been considered in the literature, however.

2.2.1.2 Self-perceived Intelligence

Another related construct is self-perceived intelligence (Furnham, 2001; Furnham, Chamorro-Premuzic, & McDougall, 2002; Storek & Furnham, 2013). Self-perceived intelligence tends to be self-estimated “overall intelligence” which is a composite of verbal, mathematical and spatial intelligences, and so on (Furnham, 2000), in contrast to content-specific self-perceived abilities. Self-perceived intelligence reflects self-knowledge, which may influence effectiveness of self-regulation and goal-setting in academic, professional, and interpersonal situations (Beyer, 1999). Associations between self-perceived intelligence and measured intelligence are typically around $r = .20$, with variations among different gender and ethnic groups (Furnham, 2001; Storek, & Furnham, 2013). In this sense, self-perceived intelligence cannot be considered particularly accurate, and must be influenced by other factors such as success in attaining specific goals and comparisons thereof with peers. This suggests

the importance of understanding the role of self-perceived intelligence within the motivation and ability nomothetic net.

2.2.2 Achievement beliefs

2.2.2.1 Intelligence Beliefs

Dweck and colleagues were among the first to conduct studies of individual differences in personal beliefs about intelligence (Dweck, 1999, 2006; Dweck & Leggett, 1988). They proposed that individuals experience achievement situations differently depending upon how they view their intelligence. Students who believe that their intelligence is fixed and that they cannot do much to change it hold so-called “entity theories” about intelligence. In contrast, other students hold “incremental theories” and tend to think that their intelligence can be improved through effort. According to the theory, entity and incremental views of intelligence shape different motivational attitudes and activities, such as learning strategies, goal orientations, effort in school, and responses to success and failure (King, 2012; Dweck, 1999, 2006). When individuals holding incremental theories of intelligence encounter study difficulties, they have higher mastery goals and are more likely to increase effort, look for new strategies, and improve performance than those who hold entity theories (Dweck, 1999; Dweck, Chiu, & Hong, 1995; Dweck & Leggett, 1988). Additional evidence for this has come from intervention and neuroscience studies (Blackwell, Trzesniewski, & Dweck, 2007). The theory thus reflects an optimistic view that once

one holds an incremental belief about intelligence one is on the right track to academic success.

Relevant research on intelligence beliefs, however, has rarely referred to measured intelligence. A few intelligence belief-related studies, nevertheless, have contributed to this concern. Ziegler *et al.* (2006, 2010) argued that individuals need different beliefs about the value of continued efforts following different experiences of failure and success. The effect of intelligence beliefs would therefore differ depending on an individual's measured intelligence level. For example, holding an entity theory may not necessarily be negative for people with high intellectual abilities. Ziegler *et al.* (2010) demonstrated in a cross-cultural sample of intellectually gifted students that both incremental theory and entity theory scores positively correlated with school grades. Storek and Furnham (2013), moreover, have observed significant negative correlations between incremental intelligence beliefs and two general intelligence measures. They questioned Dweck's (1999) assertion that measured intelligence does not play a role in implicit intelligence beliefs. Therefore, awareness has arisen that intelligence beliefs' influence on learning processes might differ depending on the level of measured intelligence.

2.2.2.2 Achievement Expectation

Achievement expectation -- which refers to students' beliefs about how well they will do in upcoming tasks, either in the immediate or longer-term future -- has been

posited to have an important role in learning motivation (as in the Expectancy-Value model (Wigfield & Eccles, 2000), for example). Expectation is assumed to be influenced by task-specific beliefs (*e.g.*, perceptions of the difficulty of different tasks and individuals' goals), individuals' perceptions of other peoples' attitudes and expectations for them, and by their own interpretations of their previous achievement outcomes (Eccles & Wigfield, 2002; Wigfield & Eccles, 2000). Achievement expectation, whether from students themselves or parents, has been found to predict school performance (Tavani & Losh, 2003; Phillipson & Phillipson, 2007). Studies have found that students' expectations shape their beliefs and effort behaviors, which then influence their achievement (*e.g.*, Domina, Conle, & Farkas, 2011; Dweck & Elliott, 1983; Eccles, 1983).

2.3 Intelligence and motivation

The present study builds on the core of Bandura's self-concepts theory and Dweck's intelligence beliefs theory. Ability self-perceptions and achievement beliefs were taken from "how good you think you are" and "how much you think you can improve" in the study process.

Few studies have explored the association between achievement beliefs and ability self-perceptions. One study using a Thai sample found that individual differences in entity belief negatively correlated with students' self-perceived ability in the study domains of physics and biology (Lerdpornkulrat, Koul, & Sujivorakul, 2012),

presumably because entity belief holders tended to avoid trying difficult tasks to avoid appearing stupid (performance-avoidance goals). Several studies have shown that high ability self-perceptions and incremental achievement beliefs both predict mastery learning orientations, high effort, and better learning strategies (*e.g.*, Bell & Kozlowski, 2002; Haimovitz, Wormington, & Corpus, 2011). However, further research is required to determine the extent that achievement beliefs and ability self-perceptions are directly related.

Motivational theorists posit that the development of ability-related beliefs is influenced primarily by prior achievement, success or failure experiences, and cultural environment (Thomas & Mathieu, 1994; Wigfield & Eccles, 2000). Cognitive abilities, however, have a large impact on students' prior achievement and experiences (Chamorro-Premuzic, Harlaar, Greven, & Plomin, 2010). Given that measured intelligence is a relatively stable trait, and of importance to school achievement as the representation of one's ability to learn (Deary *et al.*, 2004; Spinath, *et al.*, 2006), there is reason to investigate individual differences in measured intelligence, achievement beliefs, and ability self-perceptions in one study.

2.4 Parental Control

Families and schools have long engaged in collaborations to promote children's academic success (Hill & Taylor, 2004). Among all parenting facets, parental control has been identified as one of the dimensions most effective in undermining children's psychological development (van de Bruggen, Stams, & Boegels, 2008; Dwairy &

Achoui, 2009; Pomerantz & Wang, 2009), fostering behavior problems (Braungart-Rieker, Garwood, & Stifter, 1997; Gaylord-Harden, 2008) and diminishing school achievement (Fulton & Turner, 2008; Garg, Levin, Urajnik, & Kauppi, 2005).

Early scholars viewed control as pressure, intrusiveness, and domination, which are considered detrimental to children (Baldwin, 1955). Later the definition was operationalized as the amounts and forms of control which parents exerted. In the last two decades, a model proposed by Baumrind (1991) has become dominant. Baumrind (1991) classified parenting in four categories based on parents' "demandingness/control" and "responsiveness/warmth". According to this model, authoritative parenting is characterized by both high expectations for behavior and responsiveness/warmth. The idea is that parents who are authoritative firmly set rules and standards, but communicate with their children openly so that the children understand the reasons for these standards, and parents can help them learn to follow the standards autonomously. The authoritarian style also has high expectations for behavior but is low on responsiveness/warmth. Authoritarian parents show high parental control and supervision, with emphasis on obedience to their authority as the means of achieving the desired behaviors. Permissive parenting is low in demandingness/control and high on responsiveness/warmth, and neglectful parenting is low in both demandingness/control and responsiveness/warmth (Boon, 2007; Chao, 2001; Pong, Hao, & Gardner, 2005). Previous research has found that authoritarian, permissive, and neglectful parenting were negatively associated with school grades and school engagement, whereas the authoritative style of parenting has often been

associated with optimum academic, social, and psychological development (Boon, 2007; Spera, 2005; McBride-Chang & Chang, 1998).

Questions have arisen surrounding Baumrind's definition of control. Most of the literature has characterized authoritative parenting as high warmth and high control, assuming that control and warmth are independent. However, Boon (2007) as well as Fulton and Turner (2008) have found moderate to high correlations between parental warmth and control.

Concerns have also been raised about generalizing this framework beyond European-American and European middle-class cultural groups. Campbell *et al.* (1990) found that Asian-American and Chinese parents applied higher levels of pressure and monitoring on their children than non-Asian American parents. Similarly, Pong *et al.* (2005) found that Asian-American and Hispanic-American families were more authoritarian than European-American families. Approximately 74% of a Korean-American sample did not fit any of Baumrind's types (Kim & Rohner, 2002). Consequently, the positive relationship between authoritative parenting and school achievement appears relevant primarily to middle-class European-American families; studies in Chinese Americans (Chao, 1994), African-Americans (Smetana, 2000) and Korean-Americans (Kim & Rohner, 2002) have not produced similar results. More importantly, it remains unclear whether it is the warmth, the control, or some interaction between the two that affects achievement. That is, we do not know whether the association between parental control and achievement derives from presence or absence of parental warmth or from the extent of control itself. Grolnick and

Pomerantz (2009) also noted that such a multi-dimensional definition of parental behavior brought confusion in interpreting results. For example, parental “structuring”, “regulation”, or “guidance” behaviors which are quite different from “intrusiveness” but sometimes also considered control, might show positive rather than negative associations with children’s achievement.

Consistent with Grolnick and Pomerantz (2009), the present study thus focused on parental control specifically defined as intruding, pressuring, or dominating behavior by parents that is intended to coerce their children to behave as the parents expect. In recent decades parental intrusive control has received increasing attention as an important way in which parents undermine children’s behavior discipline, psychological development, and academic success (Braungart-Rieker, Garwood, & Stifter, 1997; Gaylord-Harden, 2008; Boon, 2007; Dwairy & Achoui, 2010; Fulton & Turner, 2008; Singh-Manoux, Fonagy, & Marmot, 2006).

2.5 Parental Control and Academic Achievement Independent of Intelligence

Though parental control has been negatively associated with school achievement in several studies, few have examined whether parental control can explain variance in children’s school achievement independent of general cognitive ability and parental education. Intelligence and parental education could influence the correlation between parental control and children’s school achievement in many ways. Many assume that

parental education has important direct or indirect influence through family socioeconomic status (Hauser-Cram, 2009). Parental education has also been observed to predict both parental involvement (Keith *et al.*, 1998) and parents' education-related expectations for their children. Englund *et al.* (2004) found that more educated mothers had higher achievement expectations and more frequently visited their children's schools. England *et al.* (2004) suggested that those practices have positive effects on children's achievement later on, even after accounting for children's IQ. Karbach *et al.* (2013) found that parental control and structuring predicted school achievement after controlling "g" and parental education. Karbach *et al.* (2013) also observed that associations between parental education and school grades were no longer significant when recognizing the association between general cognitive ability and parental education. It seems that better-educated parents tend to have higher IQ children. Parental education tends to influence children's achievement through their influence on children's intellectual development.

Children's intelligence is closely correlated with educational attainment. Measurement of intelligence is designed to assess students' educational potential, but the association is reciprocal as students' education predicts their intelligence scores too (Ceci, 1991; 1996). However, the extent to which education affects intelligence and vice versa (Deary & Johnson, 2010) remains a point for discussion. Thus, if parental education and child intelligence is correlated with parental control behavior, controlling for parental education and intelligence in statistical analyses of the association between parental control and school achievement may remove relevant variance, understating the extent of association.

2.6 Parental Control from Parents' and Children's Perspectives

Children's report tend to be reasonably informative about their own behavior or traits (e.g., behavioral problems, depression, anxiety) compared with peer- or parents-reports, both in clinical and community samples (Becker, Hagenberg, Roessner, Woerner, & Rothenberger, 2004; Epkins & Meyers, 1994; Stöber, 1998). However, the reliability and validity of children's reports of parents' parenting behavior is still unclear. Children's reports of parenting may be less valid because they may not accurately report actual parental behavior, due to their youth and lack of any other experience as well as to their positions as the object of the parental behavior. However, Schaefer (1965) argued that children's reports of parental behavior have shown general reliability and validity, and significantly associations with other data on parent-child relationships, even though children's perceptions of their parents' behavior may be more related to their own adjustment than to the actual behavior of their parents. Parental control thus has primarily been assessed from children's perspectives (e.g., Alkharusi, Aldhafri, Kazem, Alzubiadi, & Al-Bahrani, 2011; Chao & Aque, 2009; Dwairy & Achoui, 2010; Okagaki & Frensch, 1998).

Yet parents' reports, by comparison, are generally more accurate than children's self-reports of children's personalities, and the same could be true of their reports of their own parental behavior due to greater maturity and life experience. However, in the western samples on which most studies have been based, parents' excessive controlling behavior to their children is often discouraged in the popular media. It has

been suggested that self-reports may provide distorted information especially for high socially evaluative traits (*e.g.*, agreeableness, irritability) in comparison with neutral traits (*e.g.*, extraversion, talkativeness) in personality assessments (John & Robins, 1993). Parents might thus hesitate to convey their actual levels of controlling behavior when they are aware that such behavior is often considered socially undesirable. Yet, controversy remains whether to take children or parents as reporters for parents' excessive control behavior. Therefore, in the present study, both children's and parental reports were assessed.

A few studies have looked into inter-rater agreement. Schwarz *et al.* (1985) have found moderate inter-rater agreement among family members, namely mother, father, child and sibling. Some other studies that have done so have made use of Baumrind's (1991) parenting categories. Smetana (1995) found that more adolescents viewed their parents as permissive or authoritarian than did parents themselves, whereas more parents viewed themselves authoritative than did their adolescents in a Western sample. McBride-Chang and Chang (1998) also found different parenting perspectives in Hong Kong adolescents and their parents, but Hong Kong adolescents rated their parents as more permissive and authoritative but less authoritarian than their parents rated themselves. Both suggested that differences in perceived parenting style might reflect potential disjunction between parents' attitudes and socialization goals and the way these are perceived by adolescents. However, the parenting styles of 16% of western parents in Smetana's (1995) study and nearly 50% of Hong Kong parents in McBride-Chang and Chang's (1998) study could not be classified into Baumrind's (1991) categories. Results based on a classification system that was not generally

applicable are hardly convincing. Therefore, it is of particular interest and importance to determine the extent that parents and children agree with each other on the control level that they exert and receive, respectively.

2.7 Parenting, Motivation, and School Achievement

There has been at least two possible ways to explain the link between parental control and school achievement. On the one hand, motivation (*e.g.*, self-concepts, Rogers *et al.*, 2009) was expected to indirectly influence the link between achievement-oriented control and pressure on academic success. That is, excessive parental control was perceived as parental distrust, criticism, and punishment, which tend to be detrimental to the children's perceptions about their own ability to learn or their beliefs of themselves to improve (Braungart-Rieker, Garwood, & Stifter, 1997; Gaylord-Harden, 2008; Grolnick & Pomerantz, 2009). As a consequence, decreased motivation affects academic performance. On the other hand, parents may be more likely to assert intrusive control as a response of their children's previous academic failure, or when the children have trouble learning and performing in school. Thus, the direction of the link between intrusive parental control to the child's academic achievement may instead be the other way around (Karchach *et al.*, 2013; Levpuscek & Zupancic, 2009; Silinskas *et al.*, 2010).

Even though some researchers have found a relation between parenting and achievement, the direction of this relation is not clear from contemporaneous

measures, and some researchers (*e.g.*, Shumow & Miller, 2001), when examining longitudinal data, have found that previous achievement predicts parental involvement rather than the converse. Other researchers have reported mixed results (Deslandes, Royer, Turcotte, & Bertrand, 1997; Singh-Manoux *et al.*, 1995), including no evidence of a direct effect of parental involvement on children's academic achievement (Keith, Reimers, Fehrmann, Pottebaum, & Aubey, 1986; Okpala, Okpala, & Smith, 2001), and even negative relations between these two variables (Deslandes *et al.*, 1997).

The impact of motivation on the network of parenting and achievement yet remains unclear. Students may inherit their motivational attitudes and beliefs from their parents' practices and family atmosphere (Pomerantz, Ng, & Wang, 2008; Gonzalez & Wolters, 2006). Hoang (2007) has found moderate relationships between various parenting styles and motivational patterns of adolescents, *e.g.*, positive correlations between authoritative parenting and mastery orientation and autonomy learning, and between authoritarian parenting and performance approach orientation. Turner *et al.* (2009) have found weak correlation between authoritative parenting and colleague students' self-efficacy beliefs despite no interactions between them. It seems likely that when parents are encouraging the development of communication skills and autonomy while providing a set of boundaries to work within (*i.e.*, authoritative parenting style), children tend to have higher academic achievement.

It is unclear how parental intrusive control as a unidimensional construct is correlated with the motivational concept. Hoang (2007) simplifies motivation as a single

component construct, limiting the scope of such a variable. Nevertheless, confounding of variant individual capability has not been controlled in the previous studies. For example, the participants of Turner *et al.* (2007) were to some extent selective in terms of having highly educated parents. Considering the high dependence of school achievement and motivation on individual's cognitive ability, controlling individuals' general intelligence in future research is thus necessary. From the longitudinal perspective, mixed results were found, indicating the possible reciprocal link between parental control and school achievement. Likewise, future investigation can benefit from including measured intelligence as covariate variable, while parental intrusive control remains a unidimensional construct.

2.8 Cross-Cultural Perspectives

The vast majority of the motivational constructs and theories discussed, and most of the studies exploring evidence for motivational theories have been proposed and conducted in Western societies. Asian students have repeatedly been observed to achieve higher, work harder and more persistently than western students (Stevenson *et al.*, 1990; Chen & Stevenson, 1995). It is yet to be demonstrated whether motivational constructs and theories are different with Asian students and could, for example, be used to explain and narrow the achievement gap between Eastern and Western societies (Eccles *et al.*, 2002; Bandura, 1986).

The Western tradition as introduced in this Chapter has emphasized Bandura's (1978) "self-efficacy" and Dweck's (1998, 1999) "belief in intelligence", which tend to be intelligence-centred motivations. By comparison, previous motivational studies in the East have shown the consistent popularity of effort-related concepts and beliefs (Goodman *et al.*, 2011; Yeo & Neal, 2004). Chen and Uttal (1988) point out that Chinese philosophy has traditionally been concerned human malleability, the value of self-improvement and diligent working manner. In another words, North Americans tend to be motivated by their ability and confidence to perform, whilst willingness to exert effort is a primary motive behind East Asian (*e.g.*, Chinese students' high achievement; Heine, *et al.*, 2001; Lau & Chan, 2001, 2003). The bridge between the student motivation of the West and East motivation beliefs in explaining the East-West achievement gap, therefore, corresponds to the Western belief in intelligence translate to the Eastern belief in effort. The present study accordingly aims at allowing greater cultural adaptation to students' achievement beliefs and ability self-perceptions.

Cultural diversity has also been found in the explanation of parental control on students' achievement. Chinese parents seems to be more controlling (Chiu, 1987). Chinese parents traditionally stress their authority over their children, expect unquestioning obedience and maintain close supervision over children's activities (Chiu, 1987). For schooling, they set higher standards and work more often with their children on homework than American parents (Chen & Uttal, 1988). Parental intrusive control on children as discussed previously, however, predicts children's academic performance problems in the Western studies (*e.g.*, Halgunseth, Ispa, & Rudy, 2006;

Carper, Fisher, & Birch, 2005). Could this be because parental intrusive control undermining children's academic performance cannot be generalized across different cultural groups? A study in Dornbusch *et al.* (1987) tested a large group of American adolescence from different ethnic backgrounds. Dornbusch *et al.* (1987) has found that authoritative parenting style was correlated with higher grades when authoritarian and permissive parenting correlated with lower grades, across Asian, African American, and Hispanic ethnic groups. It seems likely that the influence of parenting style is cohesive across different cultural backgrounds to some extent. Another explanation that has been put forward is that the concept of Chinese parents' control behavior on children may not be equivalent to parental intrusive control, as have discussed earlier. Control in the Chinese language literally means "to govern", which inclines to a positive connotation as "to care for" or even "to love" (Grolnick, 2002). Typical Chinese "control" behaviors include continuously monitoring and correcting children's behaviors by appraising whether children were meeting expectations or standards, and comparing children to each other in these appraisals (Tobin, Wu, & Davidson, 1989). Chao (1994) thus argues that the concept of "training", rather than "controlling", better capturing the important features of Chinese child rearing, especially for explaining their school success. As an attempt to examine this argument, the present study closely focuses on the correlation between parental intrusive control as a unidimensional construct and school success in a Chinese sample. Parental intrusive control as a unidimensional construct enables cross-cultural comparison by clear definition.

2.9 Overview

The present piece of work aimed at integrating cognitive and non-cognitive perspectives, exploring their joint and specific predictive power on individual's early school achievement, comparing the outcome from motivational beliefs and parenting style under devised cultural framework, in order to lift the utility of educational source for students' to achieve better in school. Four studies were designed with separate focuses.

Motivation constructs are of subtle importance to students' school success. The issue of the associations between motivational theories of Bandura's ability self-perceptions and Dweck's achievement beliefs, and their dependence on measured intelligence is even subtler. In the first study, a preliminary model of integrating achievement beliefs and ability perceptions to predict school achievement domains independent of measured intelligence in a Chinese sample were proposed. It is hypothesized that achievement beliefs and ability self-perceptions would be highly correlated. Motivational constructs would also significantly correlate with measured intelligence. Independent of measured intelligence, furthermore, motivational constructs would have predictive power to school achievement indicators.

Parental intrusive control behavior on children generally negatively correlates with children's school achievement, yet nothing has been done to examine the validity of this relation independent of intelligence and parental education. Child report has mainly been used as the parental control indicator, and parental report has rarely been

explored. This leads to ambiguity in the representativeness of both perspectives. Study 2 applied the assessments of both child- and parent-perceived parental intrusive control, to explore their interrelationships with each other, and their predictive effect independent of children's measured intelligence and parental education in a German sample. Significant correlation was expected between child-perceived parental intrusive control and parent-perceived control. Parental control indicators would have independent predictive effect on school achievement when measured intelligence and parental education were controlled.

Parents' influence on children's learning motivation is assumed to be important in understanding parental influence on children's school success, but few study have directly investigated this correlation, or the mediating role of motivation between parenting and achievement. The correlation between parental intrusive control and students' school achievement remains mysterious for the Eastern sample. Study 3 was designed to explore associations between motivation constructs with parental control and whether motivation constructs mediates the correlation between parental control and students' school achievement when measured intelligence was controlled in a Chinese student sample. A mediating role of motivation on the association between parental control and school achievement was expected.

The fourth study was conducted to discover the developmental link of students' achievement and parental control independent of measured intelligence in a longitudinal data setting. Previous academic achievement negatively predicts later

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parental intrusive control level and vice versa independent of students' measured intelligence were expected.

Chapter III

Study 1

The purpose of study 1 was to integrate measured intelligence, ability self-perceptions, and achievement beliefs in a single model to clarify and further our understanding of their relationships, and to address measured intelligence in relation with achievement beliefs, ability self-perceptions and students' school achievement. A preliminary model was proposed in a Chinese cultural setting. Shown in Fig. 1, "Achievement Beliefs" was defined as a higher-order factor loading on students' belief in effort and achievement expectations. "Ability Self-perceptions" loaded on domain-specific self-perceived ability and self-perceived intelligence. Positive associations were expected among latent general intelligence, "Achievement Beliefs" and "Ability Self-perceptions". It is hypothesized that measured intelligence and the two motivational factors would positively predict two school achievement indicators, specifically students' Chinese language and math scores. Although school grades in language and math are positively correlated, students' ability self-perceptions are often domain-specific (Spinath *et al.*, 2006). Therefore, models were tested in these two domains separately.

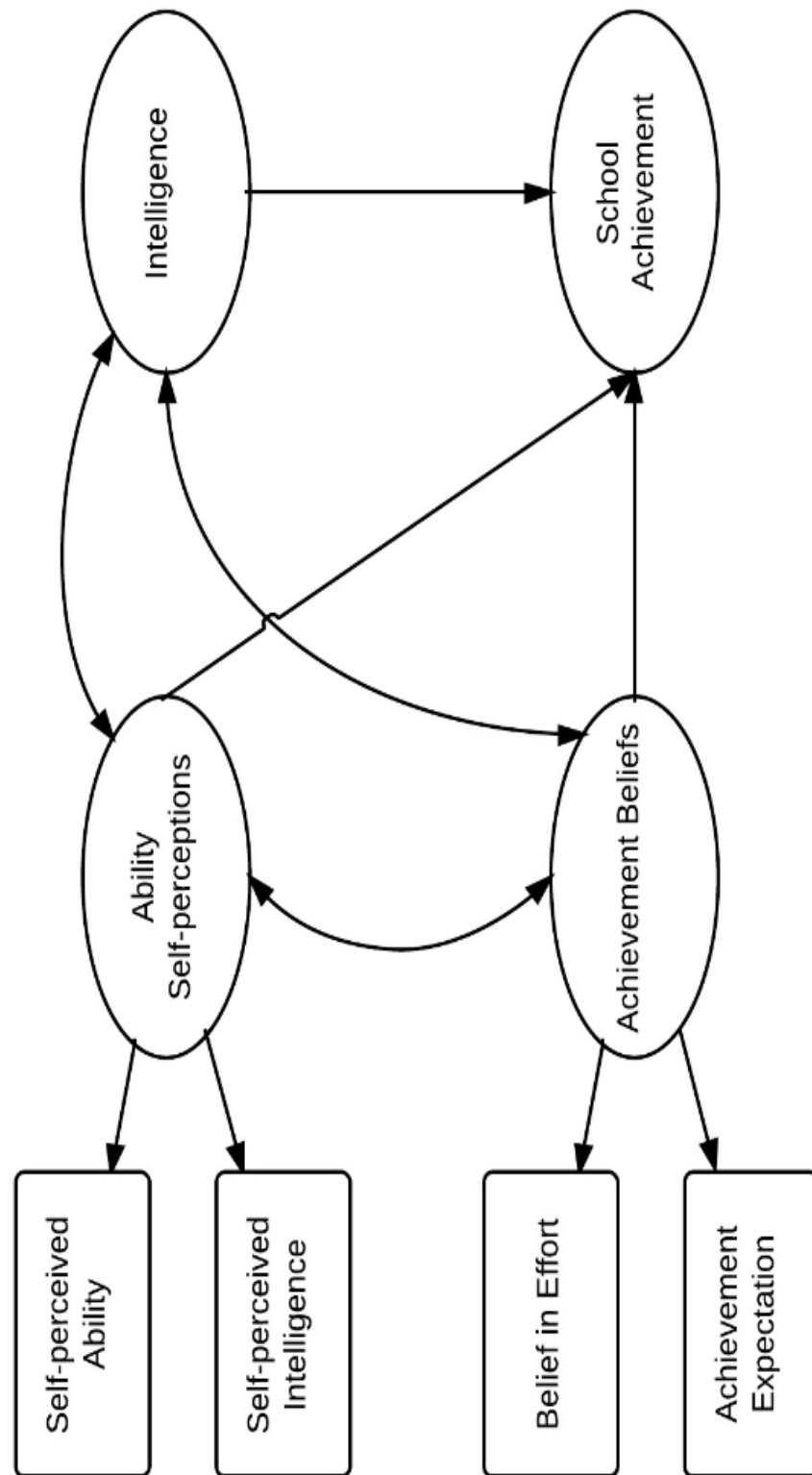


Figure 1. Proposed Preliminary Model of Ability Self-perceptions, Achievement Beliefs and Intelligence Predicting School Achievement Indicators.

3.1 Method

Participants in this study were recruited from a junior middle school in Beijing. Our assessment administered to 199 students at the end of their first year (Grade 7). The students were assigned to this school by residence location. There were 80 females and 119 males, aged between 11 and 14 (mean age = 12.6, SD = .58). The sex ratio in the sample rather heavily favored toward males (1.49:1). The ratio for the school (1.16:1) was consistent with the Chinese population ratio for ages 0 – 14 (Central Intelligence Agency, 2014). Participants' parents (from parental report) have a median 14 years of education, with mode to be Undergraduate. The median of parental reported family income annually falls between 100,000 to 150,000 Chinese Yuan, which consistent with the annual average income in Beijing (62,677 Chinese Yuan per person, Beijing Municipal Bureau of Statistics, 2012). Parental education and family income were not skewed (skewness < [1]). The reason for the high sex ratio in the sample was not able to be determined.

3.2 Instruments

3.2.1 Intelligence

A short version of Cattell's Culture-Fair Test (CFT 20-R; Cattell, 1973) was administered in the classroom setting. The CFT 20-R is a well-established measure of intelligence, which shows excellent predictive validity for school achievement (Williams, McCallum, & Reed, 1996). This test includes four paper-and-pencil subscales with 11 to 15 nonverbal items each (a total of 56 items). In the classroom, before each subscale, the experimenter explained the practice items to ensure that children understood the tasks. Children were given 4 or 5 minutes for each subtest, according to manual instructions. When the time was up, they were asked to stop. There was only one correct answer for each item. Each subtest score was recorded as the number of correct items. The general intelligence score was the factor score based on the first factor extracted from the four subscales. Cronbach's alpha for the four subtests was .65.

3.2.2 School achievement

Teachers provided students' most recent end-term and mid-term Chinese language and math exam scores. The exams were taken by students 4 months and 2 months respectively, before the other tests took place. The exam system in China normally uses a score range of 0 – 100 for all subjects. Higher scores reflect more correct answers. The Chinese language test for junior middle school usually consists of writing correct characters or choosing proper characters or wording from multiple options to fit given contexts, reading and analyzing short articles, and writing a short essay expressing an opinion in a given amount of time.

3.2.3 Belief in effort

Student's belief in effort was measured by one item: "How much do you agree: with constant effort, I can have better scores at school". Responses were chosen from a 5-point-likert scale, ranging answers from "1 = strongly disagree" to "5 = strongly agree".

3.2.4 Achievement expectation

Students' achievement expectation was also assessed by one item: What is your expectation of your scores in school compared to those of your peers? A 5-point Likert response scale was presented to be chosen from (*e.g.*, "1 = better than almost all of them" to "5 = worse than almost all of them").

3.2.5 Self-perceived intelligence

Self-perceived intelligence was also assessed by one item: "What do you think of your intelligence level relative to those of your peers?" Responses were chosen from a 5-point-likert scale from "1 = I'm smarter than almost all of them" to "5 = almost all of them are smarter".

3.2.6 Self-perceived ability

Students' domain-specific self-perceived abilities were assessed by three-item measurements, separately for Chinese and math (Eccles *et al.*, 1983). The items were closely related to typical curricular content for Chinese and math, such as reading for Chinese and calculation for math (*e.g.*, How good do you think you are at reading comprehension? How good do you think you are at mental arithmetic?). Children were required to respond on a 5-point Likert scale. The items showed acceptable reliabilities (Cronbach's alpha for self-perceived math ability = .76; for self-perceived Chinese ability = .67). The means of three items for further analyses were calculated.

3.3 Data Analysis

Missing values analyses revealed relatively low missing value rates across all variables of less than 2%. The Expectation-Maximization (EM) algorithm was applied to impute missing values prior to data analysis (Allison, 2002). The distribution of belief in effort scores, however, was negatively skewed (skewness = -1.51). The variable was transformed using $1 / (K - X)$, where K = the largest original score $X + 1$, as recommended by Tabachnick & Fidell (2007, *p.* 89). Regressions were conducted to test the independent associations of ability self-perceptions and achievement beliefs with Chinese and math respectively. After, the proposed models of the predictive

powers of ability self-perceptions, achievement beliefs and intelligence on students' math and Chinese scores were tested using structural equation modeling (SEM).

3.4 Results

Descriptive information and zero-order correlations for intelligence (CFT 20-R factor scores), belief in effort (transformed), self-perceived intelligence, self-expectations, self-perceived Chinese and math abilities (mean scores of three items), and Chinese and math (mean scores of the two exam scores) are presented in Table 1. Intelligence was moderately correlated with math ($r = .45$) and Chinese ($r = .42$) scores, but not significantly correlated with self-perceived intelligence or belief in effort. Belief in effort, self-expectations, domain-specific self-perceived abilities, and self-perceived intelligence were all moderately correlated with math and Chinese scores and with each other, except for the correlations between self-perceived intelligence and Chinese score and belief in effort.

Results of the regression analyses are shown in Table 2. Achievement beliefs was the principle components extraction of belief in effort and self-expectation. Ability self-perceptions was the principal components extraction of self-perceived ability in Chinese and math and self-perceived intelligence. Achievement beliefs explained significant portions of the variance in students' Chinese and math scores, after controlling for measured intelligence, and so did ability self-perceptions.

Table 1. Descriptive information and zero-order correlations

Descriptive			Correlations						
	Mean	SD	1	2	3	4	5	6	7
1. Intelligence	-2.3	0.97							
2. Belief in Effort	4.31	1.01	0.10						
3. Self-perceived intelligence	3.44	0.71	0.08	0.11					
4. Self-expectation	4.05	0.78	0.22	0.24	0.30				
5. Self-perceived ability Chinese	10.8	2.38	0.06	0.17	0.24	0.16			
6. Self-perceived ability Math	11	2.69	0.20	0.21	0.43	0.31	0.24		
7. Chinese	76.1	8.19	0.42	0.18	0.04	0.31	0.33	0.13	
8. Math	74.3	14.39	0.45	0.18	0.14	0.37	0.09	0.35	0.73

Note. Correlations in excess of .13 in absolute value were significant at $p < .05$ without correction for multiple testing.

The hypothesized preliminary models were tested separately for the two school subjects. For both domains, the full model provided good fits to the data (Chinese: $\chi^2 = 46.15$, $df = 29$, CFI = .952, RMSEA = .055; math: $\chi^2 = 30.17$, $df = 29$, CFI = .998, RMSEA = .014). The most parsimonious models that did not fit significantly worse than the full model were taken as the final models depicted in Figure 2 and 3.

Figure 2 presents the parameter estimates for the students' Chinese scores. In the full model, all parameters were significant ($p < .05$) except for the path from achievement beliefs to Chinese. Constraining the path from achievement beliefs to Chinese to 0 did not significantly deteriorate model fit, and offered a more parsimonious model ($\chi^2 = 47.121$, $df = 30$, CFI = .952, FMIN = .238, RMSEA = .054). The association between achievement beliefs and ability self-perceptions were high ($r = .65$). The distinction between those two constructs, however, was apparent from different strengths of their correlations with intelligence. The intelligence factor significantly ($\Delta\chi^2 = 32.447$, $\Delta df = 1$, $p < .05$) associated higher with achievement beliefs ($r = .47$, $p < .05$) than ability self-perceptions ($r = .24$, $p = .009$). This distinction was evidenced likewise in the selected Math model ($\Delta\chi^2 = 19.361$, $\Delta df = 1$, $p < .05$): intelligence had higher covariance with achievement beliefs ($r = .41$, $p < .05$) than with ability self-perceptions ($r = .28$, $p < .05$). Furthermore, ability self-perceptions had substantial predictive association with Chinese ($r = .44$) independent of intelligence. In total, this model explained 54% of the variance in Chinese scores.

The selected math model is presented in Figure 3. In the full model all the parameters were significant ($p < .05$) except paths from ability self-perceptions and achievement beliefs to math score. The intelligence factor score had moderate to strong correlations with achievement beliefs ($r = .40, p < .05$) and ability self-perceptions ($r = .28, p < .05$). Constraining the path from ability self-perceptions to math to 0 provided us the most parsimonious without significantly deteriorating model fit ($\chi^2 = 30.451, df = 30, CFI = .999, FMIN = .152, RMSEA = .009$). After constraining the path from ability self-perceptions to math to zero, the path from achievement beliefs to math score was significant ($r = .45, p < .05$). Overall, the model explained 52% of the total variance of students' math scores.

	Beta	t	p	R	R ²	ΔR^2	F (df)	Δp
Chinese								
Model1 Intelligence	.414	6.363	.000	.414	.171	.167	40.483 (1, 196)	
Model2 Intelligence	.375	5.751	.000					
Achievement Beliefs	.190	2.917	.004	.454	.206	.198	25.272 (2, 195)	.000
Model3 Intelligence	.399	6.211	.000					
Ability Self-perception	.176	2.735	.007	.449	.202	.194	24.649 (2, 195)	.000
Math								
Model1 Intelligence	.477	7.569	.000	.477	.227	.223	57.284 (1, 195)	
Model2 Intelligence	.429	6.900	.000					
Achievement Beliefs	.237	3.809	.000	.530	.281	.273	37.879 (2, 194)	.000
Model3 Intelligence	.442	7.139	.000					
Ability Self-perception	.219	3.542	.000	.523	.274	.267	36.609 (2, 194)	.000
Note. Chinese: mean scores of two Chinese examination; Math: mean scores of two Math examinations. Intelligence: CFT 20-R test factor scores. Achievement Beliefs: achievement beliefs factor scores. Ability Self-perceptions: ability self-perception factor scores.								

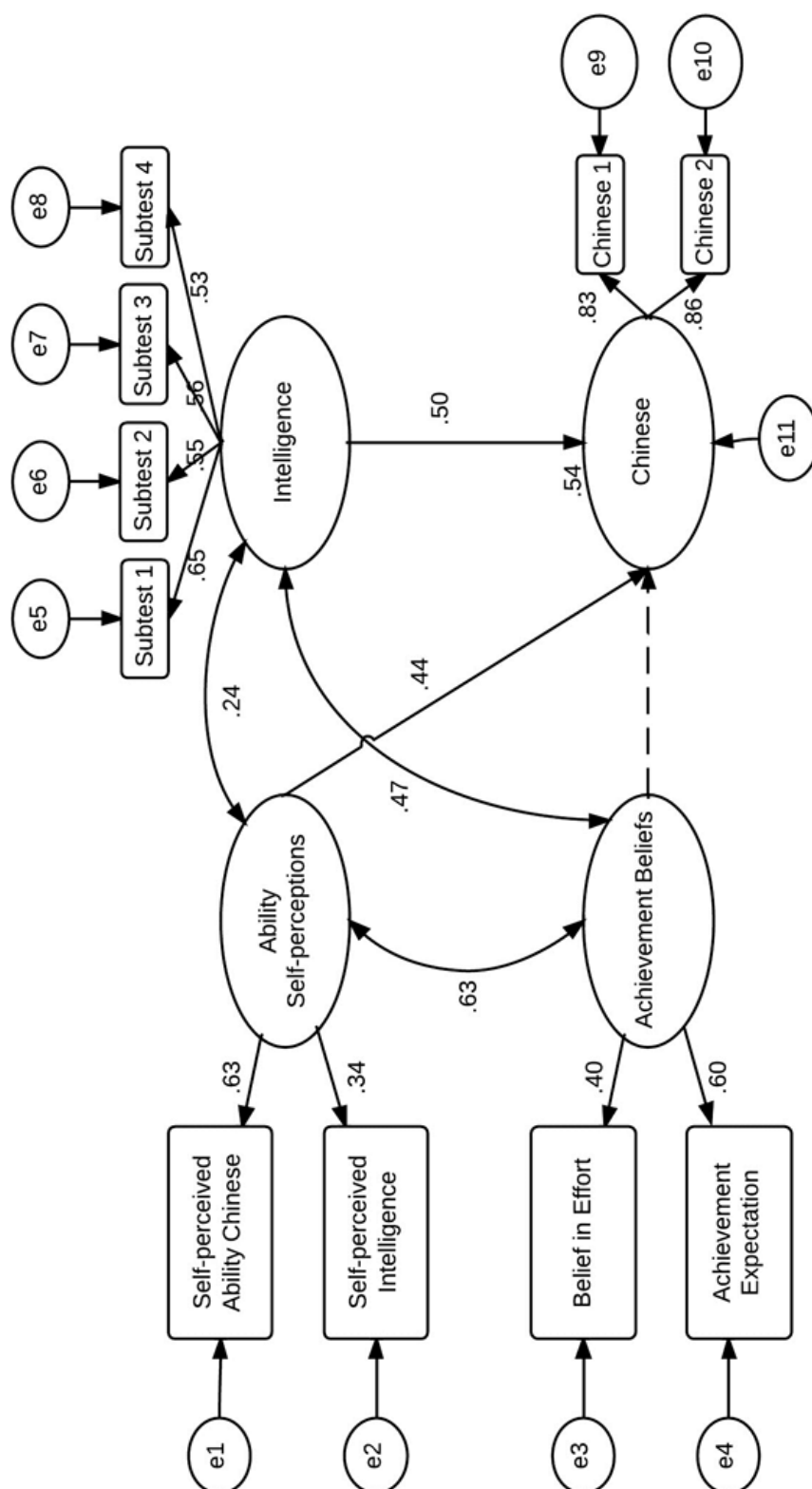


Figure 2. Selected latent variable model for the prediction of Chinese score. e1 to e11: error terms. Subtest1 to Subtest4: CFT subtests scores. Chinese1 and Chinese2: end-term and mid-term Chinese exam scores.

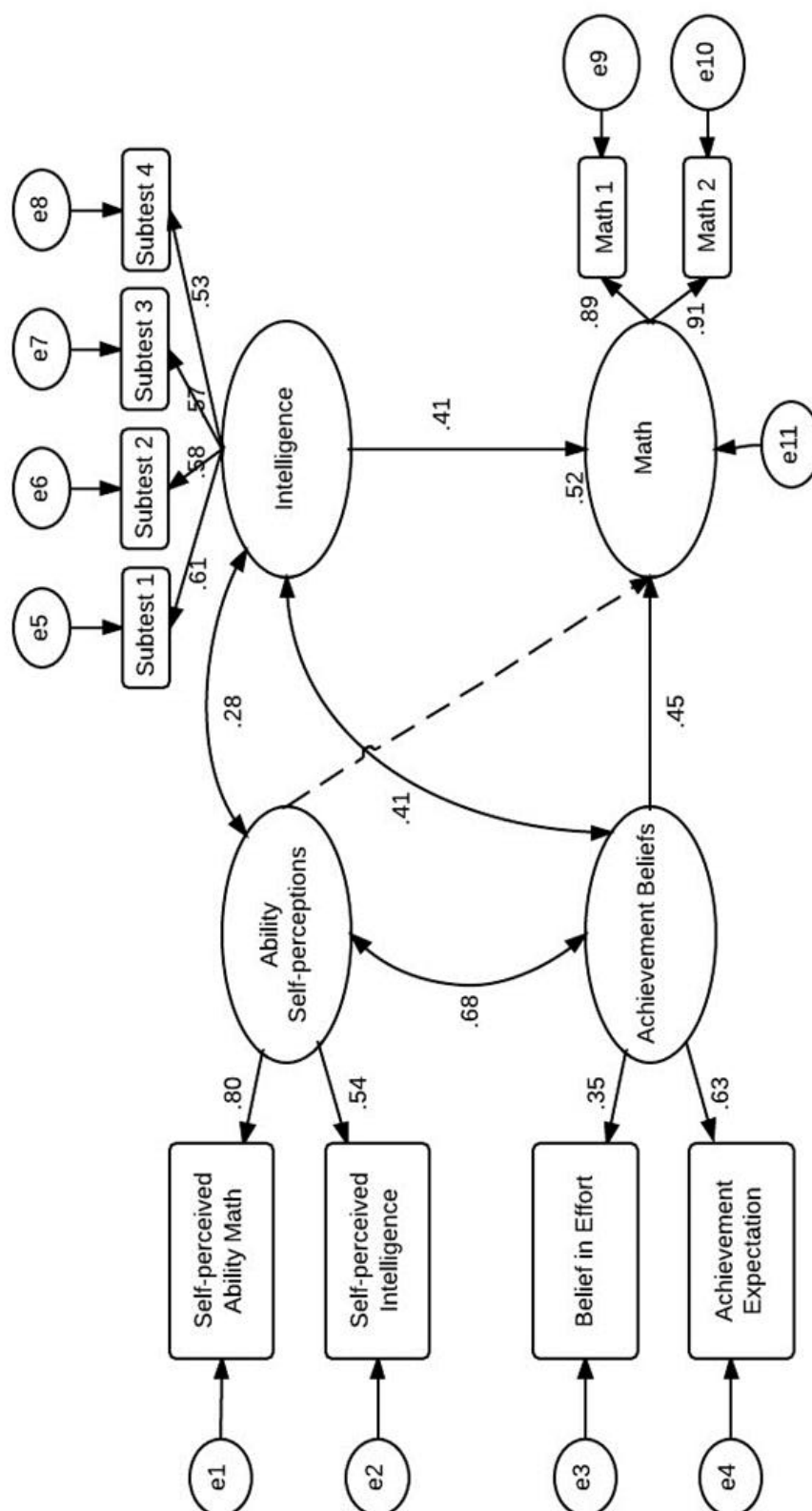


Figure 3. Selected latent variable model for the prediction of Math score. e1 to e11: error terms. Subtest1 to Subtest4: CFT subtests scores. Math1 and Math2: end-term and mid-term Math exam scores.

Chapter IV

Study 2

Study 2 investigated the strength of the association between parental control and school achievement, and the incremental validity of parental control indicators beyond general cognitive ability. In a German sample, both parents' and children's reports of parental control and their correlation, rendering possible comparison of the two indicators were assessed. It is hypothesized that the two measures of control would be moderately to highly correlated, and that both would negatively predict children's school achievement. In addition, this study explored whether either or both had explanatory power beyond general cognitive ability in a German sample. School achievement was reflected on a latent factor of both students' German and Math grades.

4.1 Method

Permission for the study was obtained from the German Educational Ministry before any data collection. Primary schools around Saarland, Germany were invited to take part in the study; participation was based on schools' and individuals' willingness to take part, with parents providing informed consent. About 50 per cent of schools agreed to participate ($N = 10$), and about half of the parents in those 10 schools agreed to participate, providing a sample of 320 children and their parents.

Data collection consisted of three steps. At school, students' intelligence was measured in groups averaging 20 children. Questionnaires regarding parental control were answered by children and their parents at home. The questionnaire instructed children to answer the items without help from parents. As the criteria for children's school achievement, teachers provided children's latest two grades on German and Math. School grades for 10 children were not provided by their teacher. Since school achievement was a crucial criterion in our study, those 10 children were excluded from data analyses. Therefore, our investigation was based on the data from 310 children (mean age = 9.7, $SD = 0.56$, 12% without specification) who had completed at least the intelligence test and provided school grades. Girls comprised 48% of the sample (11% did not specify sex).

4.2 Instruments

4.2.1 Intelligence.

Children completed a short version of Cattell's Culture-Fair Test (CFT 20 R; Cattell, 1973), a well-established measure of intelligence which shows excellent predictive validity for school achievement (Williams, McCallum, & Reed, 1996). The CFT short version includes four paper-and-pencil subscales with 11 to 15 nonverbal items each (a total of 56 items). In the classroom, before each testing, the experimenter explained the practice items to ensure that children understood the tasks. Children were given 4 or 5 minutes for each subtest, according to the different requirements for each subtest. When the time was up, the children were asked to move on to the next subtest.

4.2.2 School achievement.

Teachers provided students' most recent end-term and midterm German Language and Math grades from end-term of 3rd-year and the midterm of 4th-year. These grades reflected overall evaluation of students' performance at class and oral and written exercise. The German grading system varies from 1 (excellent) to 6 (failed). For better interpretation, the raw grades were reverse-coded so that higher values reflected better school achievement. For German, the reverse-coded mean grade from two grades was 4.4 ($N = 310$, $SD = 0.8$, $Skew = -.40$), while for Math, the reverse-coded mean grade was 4.4 ($N = 310$, $SD = 0.9$, $Skew = -.50$). A second-order factor score representing school achievement was generated from the grades for German and Math.

4.2.3 Child-perceived control and parent-perceived control.

In order to compare child-perceived control and parent-perceived control, children and one or both of their parents were provided the same items tapping parental control. When both parents participated, they provided joint responses. The achievement-oriented control subscale from child-perceived parental involvement questionnaire (Karbach, Gottschling, Spengler, Hegewald, & Spinath, 2013) was used. The subscale contains three items modified from Wild and colleagues (*e.g.*, Lorenz & Wild, 2007), which were originally based on the Children's Perceptions of Parents Scale (Grolnick, Ryan, & Deci, 1991). These items served as proximal indicators for parental involvement, focused on the children's learning context at home. For example, children responded to "When I get a bad grade, my parents threaten serious consequences if I do not work harder and improve my grades", whereas parents were asked slightly rephrased items such as "When my child gets a bad grade, I threaten serious consequences if s/he does not work harder and improve his/her grades. The answer to each item was a 4-point Likert scale option ranging from 1 (strongly disagree) to 4 (strongly agree). The higher the score, the more control children/parents indicated they received/exerted. Children reported a mean of 1.85 ($N = 277$, $SD = 0.8$, $Skew = -.88$), while parents reported a mean of 1.67 ($N = 283$, $SD = 0.7$, $Skew = -.97$) for the composites of the three items. Cronbach's alpha for the three parent-perceived control items was .80, whereas for child-perceived control items, the alpha was .77.

4.2.4 Parental education.

Parental educational level was assessed based on two questions: "What was the highest level of education you attained (mother's)?" and "What was the highest level

of education you attained (father's)?" Responses according to the German educational system were arranged from 0 (unknown), 1 (without graduation), 2 (secondary school), 3 (junior high school), 4 (high school without graduation), 5 (vocational-track high school, graduated), 6 (high school graduation), 7 (vocational-track university, not yet finished studies), 8 (university-track diploma, not yet finished studies), 9 (vocational-track diploma, post-graduate), 10 (university-track, post-graduate). The higher the score on the parental education item, the higher the level of education obtained. The mean maternal education level was 5.03 ($N = 280$, $SD = 2.6$, $Skew = 1.34$), while the mean paternal education level was 5.4 ($N = 265$, $SD = 3.2$, $Skew = .89$). One higher-order factor of parental education was generated based on maternal and paternal educational ranking score. Cronbach's alpha for the integration of the two parental educational ranking scores was .69.

4.3 Data Analysis

The predictive power of child-perceived control and parent-perceived control independent of children's intelligence and parental education was tested using structural equation modeling (SEM). Prior to model fitting, the missing data patterns were carefully analyzed. After eliminating the 10 children without school grades, Little's Missing Completely at Random test (Little & Rubin, 2002) indicated that the missing data in this study occurred completely at random ($p > .05$). Nonetheless, the Expectation-Maximization (EM) algorithm -- an approach which constructed a likelihood function taking all available information into account (Allison, 2002) -- was applied. In the SEM model, since parent-perceived control and child-perceived

control were assessed by the same items, the measurement errors of those were allowed to covary in pairs.

4.4 Results

Zero-order inter-correlations of all factor scores are presented in Table 1. All correlations were statistically significant ($p < .05$ before adjustment for multiple testing). Intelligence was moderately correlated with both German ($r = .36$) and Math ($r = .47$) scores, but negatively correlated with child-perceived control ($r = -.27$) and parent-perceived control ($r = -.22$). Child-perceived control and parent-perceived control strongly correlated with each other ($r = .57$). Moreover, parental education showed moderate correlations with all the other factors ($r = .22 - .33$).

SEM was used to test the predictive ability of parental control indicators independent of child intelligence and parental education. Figure 4 presents the results for the selected model. All the parameters in the full model were significant ($p < .05$) except for the paths from child-perceived control to grades. Constraining those three paths to 0 brought us the selected model, which offered the most parsimonious model without significantly deteriorate model fit ($\chi^2 = 83.51$, $df = 66$, $p > .05$, CFI = .987, RMSEA = .029). Child-perceived control was highly correlated with parent-perceived control ($r = .67$). Intelligence substantially predicted grades. Moreover, parent-perceived control moderately negatively predicted grades after accounting for intelligence, explaining an additional 7% of the variance. However, the path from child-perceived

control to grades was no longer significant. Parental education showed moderate to strong correlations with the other predictors as well as grades. The parameters predicting parental education and child- and parent-perceived control were $-.32$ and $-.29$, respectively. Parental education, moreover, predicted grades ($r = .19$). Overall 45% of the variance of the latent grades factor was explained by the model.

Table3
Correlations between the Main Constructs in Study 2 (N = 310)

	Intelligence	Parental education	Control (Child)	Control (Parent)	German
Intelligence					
Parental education	.275				
Child-perceived control	-.274	-.222			
Parent-perceived control	-.215	-.219	.566		
German	.360	.329	-.382	-.390	
Math	.467	.330	-.293	-.318	.738

Note. All correlations were significant ($p < .05$), without adjustment for multiple testing.

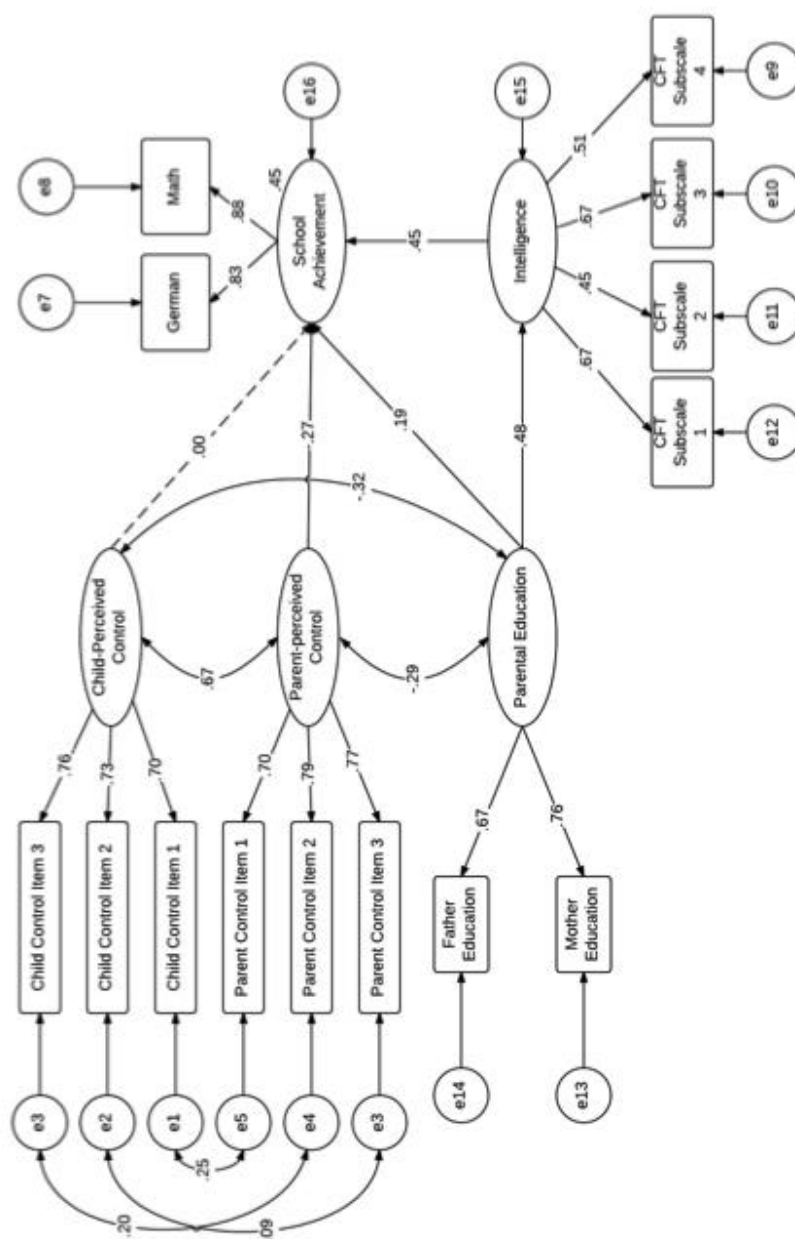


Figure 4. Standardized parameter estimates from the latent factors for intelligence, child-perceived control, parent-perceived control, parental education predicting children's school achievement. e1 to e16: error terms, Subtest1 to Subtest4: CFT subtests scores. Math: mean Math grade, German: mean German grade.

Chapter V

Study 3

Study 3 explored the link between parental intrusive control and motivation constructs, and their associations with school achievement, independent of intelligence in a Chinese sample. A model measuring correlations among measured general intelligence, child-perceived parental intrusive control, and motivation constructs including achievement beliefs and ability self-perceptions, and their association with children's academic achievement was conducted. Math and Chinese scores were assessed separately. It is hypothesized that achievement beliefs and ability self-perceptions mediates the association between child-perceived parental control and students' school achievement. A negative correlation was expected between child-perceived parental intrusive control and motivational constructs. Child-perceived parental control was expected not to correlate with students' achievement when students' motivation constructs were controlled. Measured general intelligence and motivational constructs were hypothesized to predict school achievement independent of parental control.

5.1 Method

This study was conducted on the Chinese sample, as described in Study 1. Intelligence, achievement beliefs, ability self-perceptions, child-perceived parental control and students' Chinese and Math scores were tested in this study. Instruments for intelligence, achievement beliefs, ability self-perceptions and students' Chinese and Math scores have been presented in detail in Study 1 (Section 3.2). Child-perceived parental control for the Chinese sample was assessed by three items modified from Children's Perceptions of Parents Scale (*e.g.*, Lorenz & Wild, 2007). Details of items have been presented in Study 2 (Section 4.2). Cronbach alpha for child-perceived parental intrusive control was .77 in this Chinese sample. Missing values were imputed using Expectation-Maximization (EM) (Allison, 2002). The proposed models were tested by structural equation modeling (SEM).

5.2 Results

Descriptive statistics are shown in Table 4. Child-perceived parental control was significantly correlated with belief in effort ($r = -.23$), self-perceived ability Chinese ($r = -.16$), students' Chinese ($r = -.28$) and math ($r = -.22$) scores. Intelligence was moderately correlated with Chinese ($r = .42$) and math ($r = .46$) scores, but not significantly correlated with the parental control factor score.

The most parsimonious SEM models for testing the associations between parental control and motivation constructs and their relations with students' achievement are depicted in Figures 5 and 6.

Figure 5 presents the parameter estimates for the students' Chinese scores. Constraining the non-significant paths (achievement beliefs to Chinese scores, parental control with intelligence and achievement beliefs, intelligence with ability self-perceptions) to 0 did not significantly deteriorate model fit ($p > .05$), and offered a more parsimonious model (full model: $\chi^2 = 86.678$, $df = 55$, CFI = .951, RMSEA = .054; parsimonious model: $\chi^2 = 91.359$, $df = 59$, CFI = .950, RMSEA = .053). Achievement beliefs and ability self-perceptions were moderately correlated ($r = .57$). Measured intelligence was moderately associated with ability self-perceptions ($r = .39$, $p < .05$) but not achievement beliefs. Parental control marginally significantly correlated with ability self-perceptions ($r = -.22$, $p = .05$), but not achievement beliefs and intelligence. Ability self-perceptions were moderately associated with Chinese scores ($r = .44$, $p < .05$) independent of intelligence and parental control. More importantly, parental control was still negatively associated with Chinese scores independent of ability self-perceptions and measured intelligence ($r = -.18$, $p < .05$).

The selected math model is presented in Figure 6. Constraining the non-significant paths (from parental control to achievement beliefs, ability self-perceptions, and measured intelligence, and ability self-perceptions to Math) to 0 provided the most parsimonious model without significantly deteriorating fit (full model: $\chi^2 = 71.700$, $df = 55$, CFI = .978, RMSEA = .039; $\chi^2 = 75.360$, $df = 59$, CFI = .978, RMSEA = .037;

model comparison: $p > .05$). The correlations between parental control and motivation constructs were insignificant. Intelligence moderately correlated with both ability self-perceptions and achievement beliefs. Similarly to the Chinese model, the path from parental control to math score was negative and significant ($r = -.20$, $p < .05$), independent of intelligence and motivation constructs.

Table 4. Descriptive information and zero-order correlations

	Descriptive		Correlations							
	Mean	SD	1	2	3	4	5	6	7	8
1. Intelligence	0	1.00								
2. Belief in Effort	.75	.30	.10							
3. Self-perceived intelligence	3.44	.71	.08	.11						
4. Self-expectation	4.06	.73	.22	.24	.30					
5. Self-perceived ability Chinese	3.61	.78	.05	.17	.24	.16				
6. Self-perceived ability Math	3.70	.87	.20	.21	.43	.31	.24			
7. Parental Control	0	1.00	-.12	-.23	-.05	.00	-.16	-.03		
8. Chinese	76.15	8.19	.42	.18	.04	.31	.33	.14	-.28	
9. Math	74.64	13.84	.46	.18	.14	.37	.09	.35	-.22	.73

Note. Correlations in excess of .13 in absolute value were significant at $p < .05$ without correction for multiple testing. Intelligence: CFT 20-R test factor scores. Belief in Effort: transfer score for Belief in Effort item score. Self-perceived intelligence/Self-expectation: Self-perceived intelligence/Self-expectation item scores. Parental Control: factor scores for Parental Control items. Chinese/Math: mean scores of two Chinese/Math exams.

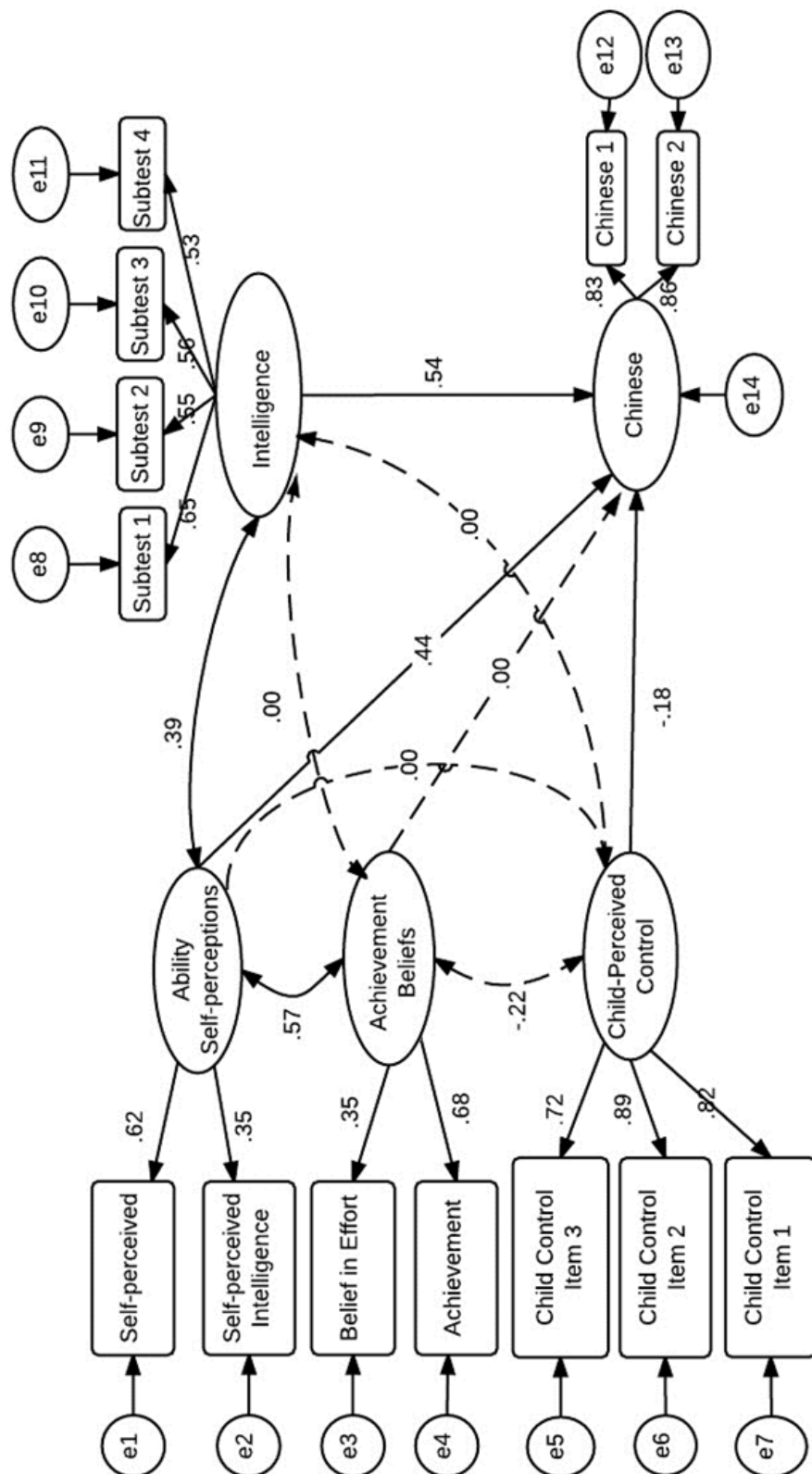


Figure 5. Selected latent variable model for the prediction of Chinese score. e1 to e14: error terms. Subtest1 to Subtest4: CFT subtests scores. Chinese1 and Chinese2: end-term and mid-term Chinese exam scores.

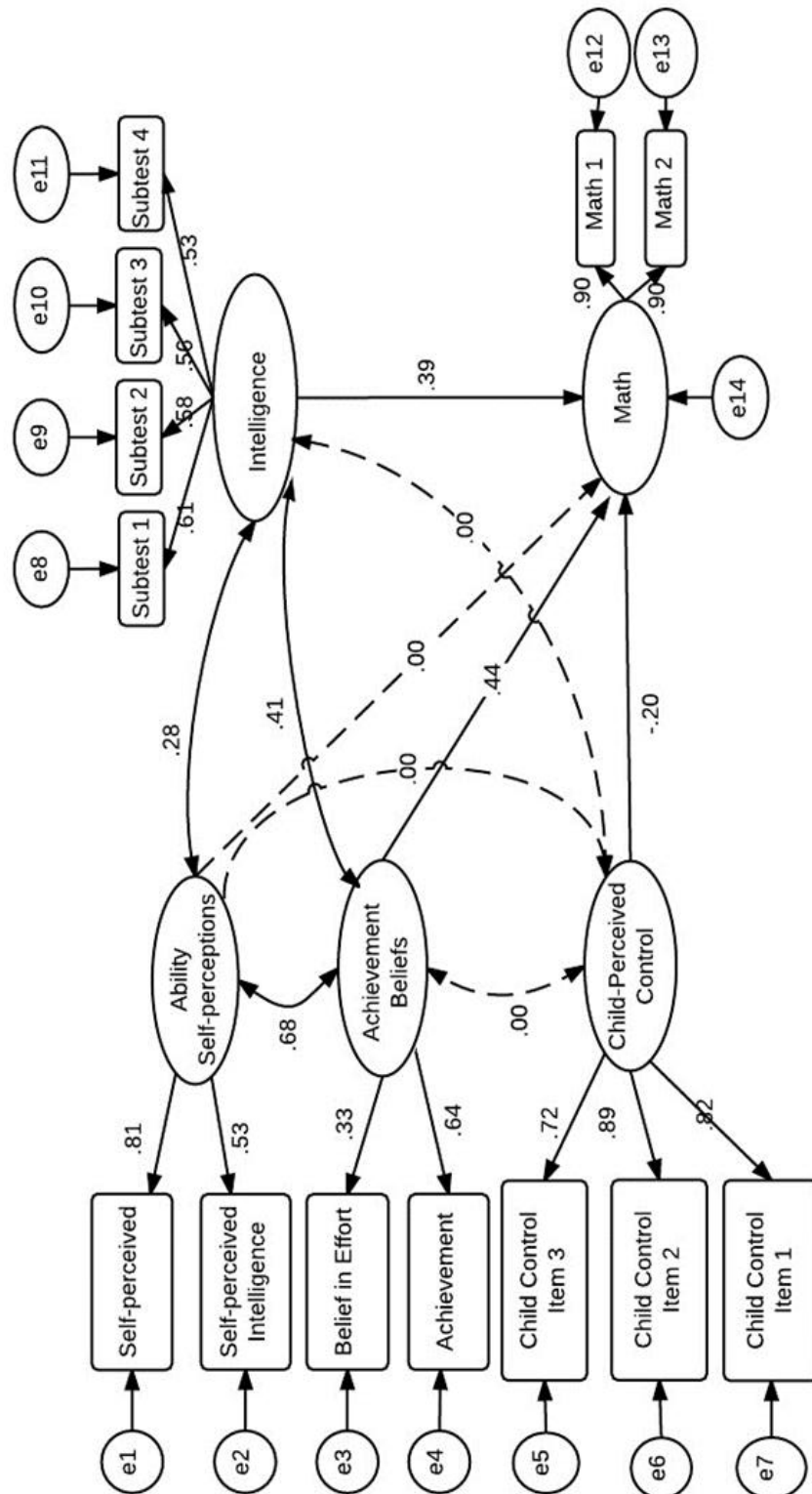


Figure 6. Selected latent variable model for the prediction of Math score. e1 to e14: error terms. Subtest1 to Subtest4: CFT subtests scores. Math1 and Math2: end-term and mid-term Math exam scores.

Chapter VI

Study 4

Evidence for the probe reciprocal process between academic achievement and parental behavior has been discussed (*i.e.*, Section 2.5 & 2.7). However, the association between students' achievement and parental intrusive control as a specific unidimensional construct needs to be further clarified. This link has not been investigated when controlling for children's measured intelligence. Study 4 explored the developmental links between child-perceived parental intrusive control and school achievement, independent of intelligence using longitudinal cross-lagged modeling in a Chinese sample. The present two-wave, small sampled data limited the selection of longitudinal data analysis with cross-lagged modeling. The cross-lagged modeling has been criticized for its technical deficiencies and ultimately its ability for causal inference (Rogosa, 1980). We discuss these technical deficiencies in later Chapter. In this model, it is hypothesized that for Chinese students, school achievement at time 1 would negatively predict parental control at time 2, and earlier parental intrusive control would negatively predict later school achievement.

6.1 Method

Our sample and measurements were that presented in Study 1 and 3, plus a follow-up assessment after a 17-month interval. We managed to recall 173 of the original (82%). Drop-outs were because of attrition. Logistic regressions indicated that gender, family income, school achievement outcomes and measured intelligence cannot predict likelihood of dropping at Time 2. In this longitudinal cross-lagged model, we applied time 1 measured intelligence scores, parental intrusive control and students' Chinese and Math scores, together with time 2 measurements of parental intrusive control and students' achievement scores. Cronbach's alpha for time 2 Chinese scores was .84, and for transformed two scores of Math was .90. For parental control, Cronbach's alpha was .87 at the second time point.

Multiple imputation (MI) was applied to impute missing values prior to data analysis (Little, 2013). Outlier and distribution properties were checked. Two Math scores at time 2 were found to be severe negatively skewed. We transformed these using $\text{NewX} = -\text{SQRT}(K - X)$, where K is the largest original score $X + 1$. Transformed Math scores at time 2 were highly correlated with original scores (as reported in Table 5). Confirmatory factor analysis (AMOS) was conducted to test for possible measurement invariance in factor loadings and intercepts at two time points for parental intrusive control and school achievement indicators. We did not find measurement differences at factor loadings ($p > .05$) and intercepts ($p > .05$) between the two parental intrusive control indicators at different time points. However, school achievement indicators at

time 2 assessment were significantly different from that of time 1 assessment at factor loadings ($p < .05$) (a discussion of this variance can be found in Section 7.3). The proposed models were tested using structural equation modeling (SEM). Measurement errors of the same items at two time points were allowed to covary in pairs.

6.2 Results

Descriptive statistics and zero-order correlations between all constructs are presented in Table 5. Intelligence was moderately correlated with both mean Chinese ($r = .42$) and math ($r = .46$) scores, but marginally negatively correlated with child-perceived parental control at both times. Child-perceived parental control had only small stability over time ($r = .27$). Child- and parent-perceived control were moderately correlated ($r = .57$). Moreover, parental education showed small to moderate correlations with all the other factors ($r = .22 - .33$).

The most parsimonious SEM models for testing the associations between parental control and motivation constructs, and parental control's relation with students' achievement domains over time are shown in Figure 7.

Constraining the non-significant paths (time 1 parental control to time 2 school achievement, time 1 parental control with intelligence) to 0 did not significantly deteriorate model fit (full model: $\chi^2 = 244.482$, $df = 120$, CFI = .941, RMSEA = .072; selected model: $\chi^2 = 247.884$, $df = 122$, CFI = .941, RMSEA = .072; model

comparison: $p > .05$). Measured intelligence did not correlate with time 1 parental control, but highly correlated with time 1 school achievement ($r = .59, p < .05$). Parental control at time 1 moderately negatively correlated with time 1 school achievement ($r = -.25, p < .05$). School achievement showed extremely high stability ($r = .83, p < .05$), while parental control showed relatively little stability over time ($r = .21, p < .05$). Residuals from time 2 parental control and school achievement were significantly related. Most importantly, when earlier parental control was controlled, earlier school achievement indicator significantly predicted later parental control ($r = -.19, p < .05$).

Table 5. Descriptive information and zero-order correlations

	Descriptive		Correlations						
	Mean	SD	1	2	3	4	5	6	7
1. Intelligence	0	1.00							
2. Parental Control T1	2.24	.95	-.12						
3. Parental Control T2	2.31	.84	-.14	.27					
4. Chinese T1	76.15	8.19	.42	-.20	-.20				
5. Chinese T2	87.26	9.45	.46	-.22	-.20	.73			
6. Math T1	74.64	13.84	.38	-.24	-.24	.74	.66		
7. Math T2	82.53	14.70	.39	-.24	-.25	.57	.72	.74	
8. Math T2 Transferred	-5.05	1.31	.39	-.25	-.26	.58	.73	.75	.98

Note . Correlations in excess of .14 in absolute value is significant at $p < .05$ level. Intelligence: Intelligence factor score. Parental Control T1/T2: mean scores of items at Time 1/Time 2. Chinese T1/T2: mean scores of Chinese exams at Time1/Time2. Math T1/T2/T2 Transferred: mean scores of Math exams at Time1/Time2/Time2 transferred scores.

Chapter VII

Discussion

Education is fundamental to the development and growth of both individuals and the society. As has been highlighted in the previous discussion: cognitive ability is one of the strongest predictors of school success; motivation is of critical importance for its determination of how much one could invest time, spare effort towards and persist on the learning process; and an adverse correlation has been generally agreed between parental intrusive control and school success. Yet it is not clear how those factors are interrelated, and so our findings comprise several attributes for providing critical tests on interrelationships of these important predictive factors.

Study 1 has investigated how abilities and motivations were related, and their joint and specific powers in predicting school achievement in a Chinese sample. A preliminary model of achievement beliefs, ability self-perceptions, and measured intelligence based on several empirical motivational theories and concepts was proposed, including adaptation to the Eastern cultural context. Substantial correlations

among measured intelligence, achievement beliefs and ability self-perceptions were found. Moreover, intelligence and achievement beliefs and ability self-perceptions all predicted Chinese students' Chinese and Math exam scores. Specific predictor variance was to some degree domain-specific, in that ability self-perceptions improved to the prediction of Chinese scores whereas achievement beliefs added to the prediction of Math scores.

Findings from Study 2 elucidated high correlation between parents' and children's perceptions of parents' control behavior, and the predictive effect of parent-perceived control behavior to school achievement independent of measured intelligence and parental education in a German sample. The high consensus of children and parents in perceiving parenting style and the importance of parental control alone to school achievement indicator were discussed.

Though a substantial body of research has documented on the association between parental intrusive control and academic achievement, surprisingly little attention has been given to the role of students' learning motivation in this association. Study 3 aimed to fill this gap by examining the correlation between parental intrusive control and students' motivational constructs, including their joint and specific predictive power to school achievement domains independent of measured intelligence. Furthermore, Study 3 partly replicated Study 2 on a Chinese sample. Similar pattern of parental intrusive indicator negatively correlated with school achievement on the Chinese sample has been found.

Study 4 furthers our evaluation on the developmental link between parental control and school achievement in a longitudinal setting. Despite the extremely high stability of latent achievement score across two time points, negative path from achievement scores at time 1 to parental control indicator at time 2 were found.

Cultural differences may interfere with the generalization of current findings in comparison with the majority that are based on Western samples. The present study has raised two specific questions on Chinese cultural influence mainly on: 1, the validity of “achievement beliefs” as learning motivation for Chinese students; and 2, parental intrusive control’s detrimental impact on school achievement. Results from the present studies can be evidence to answer the questions.

7.1 Ability and Motivations

7.1.1 Integrating Ability and Motivations in School Achievement

To begin, a series of current studies offered insights into the involvement of intelligence with motivational constructs, e.g., achievement beliefs and ability self-perceptions, in Chinese students’ school achievement.

First and foremost, a substantial correlation between achievement beliefs and ability self-perceptions, as well as their significant correlations with intelligence in both Chinese and Math models were observed. This result suggested an integration of Bandura's self-efficacy theory and Dweck's emphasis on the importance of belief that effort can contribute to building intelligence and thus achievement. The primary focus of motivation studies has been on examining its correlation with individual traits (*e.g.* self-esteem; Ackerman & Wolman, 2007; depression; Smith, 2013; personality; Busato, Prins, Elshout, & Hamaker, 2000) and school achievement; relatively few have focused on the correlations among different motivation constructs. Our observation of clear association between ability self-perceptions and achievement beliefs implies the possibility that students learn about their abilities and the extents to which their efforts pay off from each achievement task and then apply this learning to their expectations for future achievement, and/or vice-versa: experience with persisting to higher achievement may contribute to increasing confidence in one's abilities. Moderate positive associations between achievement beliefs and school achievement of Chinese students embedded that the belief of effort which root from the Eastern culture may be an important perspective of Chinese learning motivation.

Significant associations between measured intelligence and ability self-perceptions and achievement beliefs were found. On one hand, the weak but significant association between measured intelligence and ability self-perceptions which has been found was generally consistent with previous studies (Spinath & Spinath, 2005; Spinath, Spinath, Harlaar, & Plomin, 2006). The association between measured intelligence and achievement beliefs, on the other hand, has been controversial.

Dweck and colleagues' (*e.g.*, Dweck, 1999; Dweck, Chiu, & Hong, 1995) studies of intelligence-related beliefs have not considered measured intelligence a relevant construct. Storek and Furnham (2013), however, found a negative, albeit weak, association between measured general intelligence and incremental intelligence belief in an undergraduate UK sample. In contrast, findings from the present study demonstrated a moderate positive association between measured intelligence and achievement beliefs. Because of measured intelligence's strong correlation with school achievement (Deary *et al.*, 2007), it is likely that students observed past school achievement as reflecting their intellectual capacity, and this shaped their ability self-perceptions and achievement beliefs. For instance, Marsh and colleagues (Nagengast, & Marsh, 2012; Marsh & Hau, 2003; Wouters, Fraine, Colpin, Van Damme, & Verschueren, 2012) observed in several cultures that placement of gifted students in academically selective settings resulted in lower academic ability self-perceptions, as did placement of academically disadvantaged children in regular classrooms.

Intelligence had higher association with achievement beliefs than with ability self-perceptions in both Chinese and math models. No previous study has compared the extent of dependency of motivational constructs on measured ability. The generalizability of this finding to Western student samples needs further investigation. For Chinese students, a possible explanation may be that they are generally taught to consider "hard working" more desirable than "being smart". Students were likely to rate themselves humbly on ability self-perceptions. Achievement beliefs may have been more socially neutral, because one's belief in effectiveness of effort may have

involved less self-judgment. Therefore, achievement beliefs may better reflect students' actual ability.

Motivation-related studies always face choice among an abundance of motivational construct measures. There is not yet a broad consensus either for a strong general factor of motivation or a clear domain-specific motivational system. Spinath *et al.* (2006) suggested that achievement-related motivation allocates resources to one set of demands to maximize achievement, so that these resources may not be available to tasks in other domains. The high correlation of achievement beliefs with ability self-perceptions which has been observed, however, did not support this. Ability self-perceptions were associated with beliefs in effort and higher achievement expectations. The integrated model of multiple motivational constructs implies the possibility of a general motivational factor in this Chinese sample. Further investigation is necessary to provide guidance on constructing motivation indicators.

7.1.2 The Roles of Achievement Beliefs and Ability Self-perceptions in School Achievement Independent of Intelligence

Evidence was found that achievement beliefs and ability self-perceptions predicted school achievement independent of measured intelligence. Specifically, achievement beliefs and ability self-perceptions both showed significant independent predictive association with Chinese and math scores in regression analyses. However, once the two motivational constructs and measured intelligence were included in the full structural equation models, achievement beliefs was no longer independently

associated with Chinese scores, nor ability self-perceptions with math. A reason for the diminishing correlations may be the substantial covariance between achievement beliefs and ability self-perceptions, which indicated a joint effect of the two constructs on school achievement. Nevertheless, achievement beliefs appeared more important to Math, and ability self-perceptions to Chinese.

There is general consensus that ability self-perceptions is associated with school achievement indicators, for instance, math and English language in a UK sample (Spinath *et al.*, 2006; Chamorro-Premuzic *et. al.*, 2010) and American college students' overall grades (Phillips & Gully, 1997), independently of intelligence. Consistent with this, the present study found that ability self-perceptions predicted Chinese scores independent of measured intelligence. However our result for math scores was not consistent.

For math, achievement beliefs may have been more important than ability self-perceptions because achievement beliefs did more to motivate practice and effort (Domina, Conley, & Farkas, 2011), and relevant practice may be more readily available in Math. Previous research has also indicated that Chinese students and their parents tend to put more emphasis and value on math than other subjects, and are likely to focus primarily on math practice (Huntsinger, Jose, Larson, Krieg, & Shaligram, 2000; Stigler, Lee, & Stevenson, 1986). The specific link between ability self-perceptions and Chinese scores is possibly because confidence of language ability enables persuasiveness in writing which contributes to exam scores.

A previous study of Chinese students' motivation did not find independent associations of self-perceived ability with Math and Chinese scores when controlling for intelligence (Lu, Weber, Spinath, & Shi, 2011). Possible reasons that our results differed may involve different measurement of motivation. Lu *et al.* (2011) applied traditional motivation measures from Eccles expectancy-value model, namely domain-specific self-perceived ability and intrinsic value. They suggested that their unexpected very small incremental predictive effects of motivational constructs on Chinese students' Math and Chinese scores was partly because these Western-developed motivation measures did not fully capture the "unique Chinese family and cultural values (*e.g.*, parental expectations and beliefs in effort)". In the present study, however, multiple measures allowed greater cultural adaptation to students' achievement beliefs and ability self-perceptions.

In general, the substantial correlations between ability and motivations found in our study raise concern that students of high measured intelligence tend to have high motivation whilst those of low measured intelligence may be especially vulnerable to weak achievement beliefs and low ability perceptions. This evokes the question of how to motivate low-achieving students as retaining their motivation is of high importance in the educational setting.

7.2 Parental Control

7.2.1 Parental Control from Children's and Parents' Perspective

An important finding from Study 2 is the high correlation between child-perceived control and parent-perceived control. This indicated that the parents and children showed consensus in perceiving parenting style. When children felt strictly controlled, the parents also reported that they exerted strict control. The high correlation in our study indicated the general trend of agreement between parents and children's perception of control. This finding is in line with the practice of using different reporters in personality or behavior studies, which usually show high but not complete correlation between self-reports and those of and personally close reporters such as parents or spouses (McCrae, Stone, Fagan, & Costa Jr., 1998; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996). The high agreement between children's and parents' report of parental intrusive control also indicated that, reports of parenting in children around age 10 are reliable to some extent. Surprisingly, parents also seemed to have no problem in acknowledging intrusive control.

Consistent with previous findings (Rogers *et al.*, 2009; Singh-Manoux *et al.*, 2006), the present study found children's and parents' reports of parental control showed moderate negative associations with children's school achievement. Even when child intelligence and parental education has been accounted, our results demonstrated the independent validity of both parental control indicators predicting children's school achievement when they were considered separately. However, once parent-perceived control was included in the model, child-perceived control did not add significantly to the prediction. This reflected primarily covariance in parent- and child-perceived

control and greater validity of parent reports rather than lack of validity in the child reports.

Consistent with previous research (*e.g.*, Deary et al., 2007; Humphreys & Stark, 2002), Study 2 also found that children's intelligence predicted overall school achievement in the core subjects of German and Math. The correlation between intelligence and school achievement factor score was .44. Parental education also played an important role in our predictive models. Consistent with prior evidence (Englund *et al.*, 2004), parental education was also positively correlated with children's intelligence. Parental education had marginally significant independent predictive power ($p = .05$) after accounting for children's intelligence. Apart from the beneficial effects of better provision of intellectual and socioeconomic resources (Bronstein & Bradley, 2003), this might be because more educated parents may tend to have greater educational aspirations for their children, and may tend to do more to motivate them constructively to academic success (Englund *et al.*, 2004). Moreover, more educated parents were found to exert less control. This might be because more educated parents had learned more constructive ways to motivate their children and thus exerted less negative controlling efforts, but it could also be because more educated parents tended to have higher-achieving children and thus did not feel as much need to do anything at all to alter their children's performance.

7.2.2 Parental Control and School Achievement

The present work conducted a series of studies to investigate the link between parental intrusive control and school achievement. There are several possible reasons for why parental intrusive control might undermine school achievement. One view proposes an indirect influence from parental control to children's school achievement despite its detrimental effect on children's psychological development, particularly on children's sense of autonomy (Barber *et al.*, 2005; Fei-Yin Ng, Kenney-Benson, & Pomerantz, 2004), study motivation (Boon, 2007), and achievement strategies (Aunola, Stattin, & Nurmi, 2000). When parents are intrusively controlling, children are denied the experience of solving challenges on their own, and the positive feeling of taking initiative, which in turn might deprive them of feelings of autonomy and intrinsic interest (Fei - Yin Ng, Kenney-Benson, & Pomerantz, 2004; Juang & Silbereisen, 2002). Grolnick (2002) suggests a possible direct influence because the controlling condition might have negative effects on children's learning by causing anxiety that undermines working memory.

Parents may be more likely to assert control when children experience difficulties performing well in school. Those children with low marks are more likely to be exposed by parents' strict supervision. Thus, the correlation between parental control and school achievement might result to some extent from a parental response to children's failure in school (Levpušček & Zupančič, 2009).

The findings from Study 3 and Study 4 contain several contributions in making this correlation clear. Firstly, no correlation was found between child-perceived parental

intrusive control and motivation constructs such as achievement beliefs and ability self-perceptions. Secondly, result from the longitudinal analysis revealed a negative path from previous achievement score to later parental intrusive control behavior. This result implied that either parental control was not correlated with children's school success through motivation, and to a certain extent parental intrusive control behavior tends to be a response to children's previous failure at school.

Nevertheless, the influence of previous parental behavior on later children's school achievement could not be fully neglected. For example, Keith *et al.* (1998) found parents' educational aspirations for their children and the amount of communication between parents and their children about school had significant positive effects on students' grade point average in high school after accounting for previous achievement. Parental behavior appears to be influential in children's performance. Additionally, both parental control behavior indicators were significantly correlated with parental education in Study 2. It seems likely that parental intrusive behavior were correlated with inherited traits of parents themselves. The extreme high stability of school achievement indicator over time might be another reason for the constrained explanation of the variance of school achievement indicator. Parental control thus may not simply be considered as parental response to children's poor performance at school.

7.2.3 Cultural Involvement in Parental Control in China

Previous studies from the West have reached general agreement that parental intrusive control is detrimental to children's behavior and psychological development, as well as school success (Fei - Yin Ng *et al.*, 2004; Grolnick & Pomerantz, 2009). It is well-documented that Chinese students enjoy outstanding school achievement and outperform their, e.g., White and African American peers (Steinberg, 1996). However, Chinese parents are seems to be more controlling. In terms of family, for example, the Chinese tradition, embedded in the correlation between parents and children, demands obedience of the child, with a strong emphasis on filial piety (Shek, 2007). Heine *et al.* (2001) observed high dependence among people, especially among family members in the Eastern countries. Discussion on the Chinese controlling parenting (*i.e.* Tiger Mother) tends to make it a Chinese exception (Guo, 2013). Detrimental effect of parental intrusive control on children's school achievement in the East, thus, was doubted. In an attempt to address this question, the present study has found clear negative correlation between parental intrusive control and children's school achievement, even after children's intelligence and parental education was controlled in a Chinese sample. Although no correlation was found between parental control and motivation constructs, parental intrusive control direct negatively correlates with school achievement. This negative correlation of parental excessive control with educational outcome of Chinese children did not differ from the general consensus in the West (Dwairy & Achoui, 2009; Pomerantz & Wang, 2009).

This finding follows our hypothesis that parental intrusive control as a unidimensional construct has negative impact on children's school success in Chinese culture. This finding coheres with the humanity need to feel autonomous, in contrast to being controlled (Deci *et al.*, 1994), made no exception for Chinese children. It seems the mysterious of "Tiger Mother" could not be easily generating to the general Chinese population. This corresponds to the concept of Chinese parents' controlling behavior on children may not be equivalent to parental intrusive control per se. The concept of "training" may better capture the feature of Chinese parenting style, such as high expectations or standards and close monitoring (Chao, 1994). Differences may also be found in how children and parents interpret motivation, parental control in its effects, and how parents exert control (Pomerantz & Wang, 2009). A future study may benefit from making a clear definition and enabling unidimensional categorized constructs as measurement on parental rearing behavior in the East, in order to facilitate cross-cultural comparisons.

Clear evidence of parental control and motivation constructs, namely the irrelevance of ability self-perceptions and achievement beliefs were found. Findings from the present study indicated that previous school achievement adversely predicts later parental intrusive control, whilst no correlation from previous parental intrusive control to later school achievement was revealed from our longitudinal cross-lagged model. Though there is the particular point of view that "the reciprocal nature of many social and developmental processes makes determination only of causal predominance an oversimplification of the research problem" (Rogosa, 1980, *p.* 246), longitudinal results still have a crucial application in identifying the strength and duration of the

developmental link among variables across time when being carefully interpreted. Further investigation could focus on how parental control impacts school achievement without the individual's motivational involvement. Supplemental evidence for the reciprocal influence of parental intrusive control and school performance will be required.

7.3 Limitations

The presented four studies share the same motivation and parental control theoretical background and measurements. Limitations therefore were combined for discussion. First, several of the motivational constructs were based on single-item assessments. Single-item assessments often receive criticism concerning reliability and validity. However, some simplified assessments perform similarly to lengthier measurements, e.g., socioeconomic status (Tajik & Majdzadeh, 2014), and self-rated health (Miilunpalo, Vuori, Oja, Pasanen, & Urponen, 1997). The substantive correlations and appropriately performing models apparent in our results suggested acceptable performance of our single-item assessments. Hayduk and Littvay (2012) argue that using the few best indicators — possibly even the single best indicator of each latent — encourages development of theoretically sophisticated models. Nevertheless there is still room to discuss the observed components of motivational constructs with cultural adaptation, as well as the items for each observed component, in these ways motivational measurements can be refined.

Secondly, some of our motivational construct measures were modified from previous Western measures (*e.g.*, belief in effort) for our specific research purposes and adaptation to Chinese culture. This limits the ability to compare and generalize our results to other cultures and measurement applications. However, cross-cultural studies have suggested that several fundamental motivation structures, profiles and associations with achievement do not differ substantially between at least Australian and Chinese students (Martin & Hau, 2010).

Thirdly, gender differences were not discussed in the presented models. The Chinese sample was heavily male. The reason cannot be determined from the socioeconomic background of this sample, since the family income and parental education status followed normal distribution in Beijing. For the Chinese sample, although gender differences have been found in intelligence, self-perceived intelligence and students' Chinese scores, the Chinese sample applied was considered not large or population-representative enough to address gender differences. For the German sample in Study 2, since the results showed non-significant differences between boys and girls in the mean differences on Math score, as well as on the two parental control perception scores, and only marginal differences were found on the German mean score, it seems unlikely that major differences could be observed. The German sample does not have enough power to run analyses with different gender groups, based on 148 girls and fewer boys.

The parental control items in our measure were closely linked to parental reaction to children's school success, thus possibly exaggerating the effect size of the association

between parental control and students' school achievement to some extent. There is the possibility that the fact that both children and parents completed the questionnaires at home may have contributed to the high correlation between their answers, though parents and children were carefully instructed to complete their questionnaires independently. Other subjective measurements, *e.g.*, family observation and recording, therefore could be applied to complement these measures in future research.

As mentioned, there have been concerns that when child intelligence has been controlled, part of the association between parental control and school achievement might be underestimated. Child intelligence may create less motivation for parents to attempt to exert control because it facilitates better achievement. Similarly control for parental education may also result in underestimation of the effect size of the association between parental control and school achievement because more educated parents might have better parenting strategies, *i.e.*, less intrusive controlling behavior. Instead, when parental education was dropped from the model, the associations between parental control indicators and outcome variables were very similar and the model fit indexes if anything indicated better fit. Moreover, analyses investigating the possibility of interaction between intelligence and parental control and between parental education and parental control indicated no significant effects.

Measurement variance at factor loadings in latent school achievement factor at two time points was found. Significant variance of students' achievement scores at two times may be attributed to the measurement of achievement scores. Exam scores tend to be sensitive to the difficulty of exam questions, students' handling of certain range

of study scope, and unique circumstance for each students at the exam period. To apply multi-domain indicators of school achievement may thus improve measurement stability.

The longitudinal data from the present study has been a merit to the examination of the developmental link of relationships. However, cross-lagged modeling has been criticized for its technical deficiencies and ultimately its ability for causal inference (Rogosa, 1980). Kenny and Harackiewicz (1979) think preconditions should be met to increase the probability of meaningful interpreting from cross-lagged modeling results, e.g., the longitudinal sample size should be large, and correlations between variables shall at least moderate. Specifically in the model presented in Study 4, extremely high stability of school achievement indicators over time, and fairly weak correlations between parental control and school achievement were found. Bearing these deficiencies in mind, the present study cautiously interpreted the causal links implied in study 4. A large multi-wave longitudinal data nevertheless would be desirable to compensate for investigating such developmental effect.

Finally, unmeasured variables such as the personality trait of conscientiousness, and students' learning behaviors, e.g., effort and persistence, may also contribute and/or respond to motivational constructs, parenting, and school achievement (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011; Hemmings & Kay, 2010; Chouinard, Karseni, & Roy, 2007). Although parental control is recognized as one of the most important domains in parenting (van der Bruggen, Stams, & Boegels, 2008; Dwairy & Achoui, 2010; Pomerantz & Wang, 2009), there are several other important

facets of parenting that were not included in the present study, such as parental warmth (Boon, 2007; Flouri, 2007) and parental expectations of children's test performance (Englund *et al.*, 2004; Okagaki & Frensch, 1998). Future studies could test for possible moderating roles of those additional non-cognitive constructs in the current framework of ability, motivation, parenting, and school achievement.

7.4 Interventions

The predictive validity of achievement beliefs and ability self-perceptions independent of intelligence in certain subject areas nonetheless offers the possibility of practical intervention. The importance of students' intelligence and personality traits to school achievement has been shown broadly in the literature, but little is known about the possibility of modifying them (Wigfield *et al.*, 1998). Interventions to strengthen achievement beliefs have seemed more likely to be effective. Dweck and colleagues (*e.g.*, Aronson, Fried, & Good, 2002; Blackwell, Trzesniewski, & Dweck, 2007; Rattan, Good, & Dweck, 2012) have offered considerable evidence that encouraging students' achievement beliefs can improve actual achievement. They have suggested increasing students' exposure to the idea that people have the potential to increase their intelligence (Rattan, Savam, Naidu, & Dweck, 2012), praising students for the effort they applied and the persistence they displayed rather than telling them they are "smart" when they succeed (Dweck, 2010), and conveying the joy of tackling and mastering challenging learning tasks (Dweck, 2010). Given the substantial covariance between achievement beliefs and measured intelligence in our study, these suggestions may be more effective if focus is kept on task mastery rather than

malleability of intelligence: it may be that achievement responds more to effort than intelligence, and so it may be easier to teach students to believe in the effectiveness of effort for task mastery than to believe in its ability to increase intelligence. This suggests distinguishing more clearly among confidence that task mastery is possible with sufficient effort, relative effort required for mastery compared to peers, and individual motivation to apply the effort required for mastery in studies of associations between motivation and achievement.

In the practical classroom setting there are several suggestions to strengthen students' task mastery. Firstly, students may benefit from being given individualized instruction and feedback on their work, encouraging them to focus on self-improvement rather than social comparison (Ames, 1992). Teachers' ability to structure the classroom clearly and positive involvement with students (being "caring") can foster students' autonomous learning and behavioral and emotional engagement with the topic of study (Newman, 1994). Cooperative learning can be encouraged by group goals and individual accountability (Wigfield, Eccles, & Rodriguez, 1998). Cooperative learning may facilitate students' own motivation to learn, as well as their motivation to encourage and help their peers to learn. Parents' higher involvement in school activities, higher expectations for children's performance, and parenting styles supportive of autonomy rather than intrusive control may also be helpful in maintaining children's motivation to learn (Englund *et al.*, 2004; Levpuscek & Zupancic, 2009; Spera, 2005).

Parenting is a skill that likely can be taught and learned. Understanding the influence of parental control on children's achievement in school is thus of much value. Pomerantz *et al.* (2007) suggested that interventions should be considered in thinking about how, among whom, and why parenting affects school achievement. Thus, moving from theoretical debate to formulating practical and effective interventions is an important area for future research.

Chapter VIII

Conclusion

In light of the presented four studies, the present research constituted additions to the educational literature, especially to Chinese literature, pertinent to the concurrent and longitudinal relationships of non-cognitive constructs, particularly motivations and parental control with children's school outcomes independent of children's measured intelligence.

The present study highlighted substantial intellectual capability influence on motivation constructs, and discussed its implication in enhancing children's school achievement in practical settings. The high correlation among motivational concepts provided a closer look at the nature of motivational constructs, which implies the possibility of one underlying general motivation factor. The study also yielded further investigation and measurement refinement for learning motivations which differed in the West and East. Involving parental control from the parents' view as well as from the children's view, the study yielded the comparable validity of both child-perceived

and parent-perceived parental control as parental control indicator. It also highlighted the importance of parental control for children's school achievement. Among the first, the present study investigated the direct correlations between child-perceived of parental control and multiple domain of children's motivation independent of measured intelligence, and found no relationship between parental control indicator and motivation constructs. Furthermore, a direct adverse link from a unidimensional parental intrusive control with students' achievement indicators in both German and Chinese adolescence samples were found. Parental intrusive control negatively correlated with children's school achievement despite of cultural differences. The present study also demonstrated that parental intrusive control and motivation constructs predicted students' achievement scores independently of each other. This finding yielded further insight into how specific parenting behaviors linked to children's learning motivation in Chinese culture. Finally, a moderate negative path from previous school achievement to later child-perceived parental control over 17 months interval independent of children's measured intelligence in a Chinese sample was found, which partly supported the hypothesis that parental control and school achievement have bidirectional influence. The present findings were in favor of enhancing students' school performance through improving students' motivation, as well as raising the awareness of the detrimental effect of parental intrusive control.

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