

PATERNAL BEHAVIOURS AND ADOLESCENT DEVELOPMENT:
EXAMINING FATHER-ADOLESCENT RELATIONSHIPS AND ACADEMIC
PERFORMANCE AMONG SINGAPOREAN CHINESE ADOLESCENTS

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Tower of strength,
Root of life,
Shining stars,
Everlasting love,
From beginning to the end.

..... My extraordinary parents

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	x
CHAPTER 1: INTRODUCTION	1
Model 1	4
Fathers' Parenting Behaviours	5
Fathers' Parenting Behaviours and the Father-Adolescent Relationship	10
Attachment	10
Satisfaction	12
Measurement Invariance and Age Differences	13
Model 2	17
Fathers' Parenting Behaviour and Adolescents' Academic Performance	18
Self-Efficacy as Mediating Variable	20
Measurement Issue	
Father's Report versus Adolescent's Report	22
CHAPTER 2: METHODOLOGY	24
Participants	24
Procedure	28
Measures	30
Measures of Paternal Behaviour	30
Measures of Father-Adolescent Relationship	32
Measures of School-Related Paternal Behaviour	34
Measures of Academic Performance	35

Measure of Self-Efficacy	35
CHAPTER 3: RESULTS	37
Model 1: Preliminary Analysis	39
Testing Measurement Invariance across Age Groups	39
Adolescent-reported data	39
Father-reported data	45
Summary of Invariance Testing	50
Testing Measurement Invariance across Source of Report	51
Younger adolescent group	51
Older adolescent group	55
Summary of Invariance Testing across Source of Report	60
Mean, Standard Deviation and Intercorrelations	61
The Structural Model	63
Summary	68
Model 2: Preliminary Analysis	69
Testing Measurement Invariance across Age Groups	69
Adolescent-reported data	69
Father-reported data	71
Summary of Invariance Testing	73
Testing Measurement Invariance across Source of Report	74
Younger adolescent group	74
Older adolescent group	75
Summary of Invariance Testing across Source of Report	77
Mean, Standard Deviation and Intercorrelations	77
The Structural Model	79
Summary	84
CHAPTER 4: DISCUSSIONS	85
Measurement Issues	85
Measurement Invariance Across Age Groups	85

Measurement Invariance Across Source of Report	89
Model 1	90
Model 2	95
Limitations and Direction for Future Study	97
Concluding Comments	98
REFERENCES	99
APPENDIX A	107
CRPBI: Warmth Scale	
APPENDIX B	108
CRPBI: Autonomy-granting Scale	
APPENDIX C	109
CRPBI: Behavioural Control Scale	
APPENDIX D	110
Parent Attachment Scale from the Inventory of Parent and Peer Attachment (IPPA)	
APPENDIX E	112
Satisfaction Scale	
APPENDIX F	113
Involvement Scale	
APPENDIX G	114
Strictness Scale	
APPENDIX H	115
Self-Efficacy Scale	
APPENDIX I	116
Chinese Version Questionnaire for Fathers	

LIST OF TABLES

Table 1: Demographic Characteristics of Adolescents	25
Table 2: Demographic Characteristics of Fathers	26
Table 3: Measurement Invariance of Warmth across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	40
Table 4: Measurement Invariance of Autonomy-Granting across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	42
Table 5: Measurement Invariance of Behavioural Control across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	42
Table 6: Measurement Invariance of Attachment across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	43
Table 7: Measurement Invariance of Satisfaction across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	45
Table 8: Measurement Invariance of Warmth across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	46
Table 9: Measurement Invariance of Autonomy-Granting across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	46
Table 10: Measurement Invariance of Behavioural Control across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	47
Table 11: Measurement Invariance of Attachment across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	48
Table 12: Measurement Invariance of Satisfaction across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	48
Table 13: Measurement Invariance of Warmth across Adolescents' Report and Fathers' Report (12 years old)	51
Table 14: Measurement Invariance of Autonomy-Granting across Adolescents' Report and Fathers' Report (12 years old)	52

Table 15: Measurement Invariance of Behavioural Control across Adolescents' Report and Fathers' Report (12 years old)	52
Table 16: Measurement Invariance of Attachment across Adolescents' Report and Fathers' Report (12 years old)	54
Table 17: Measurement Invariance of Satisfaction across Adolescents' Report and Fathers' Report (12 years old)	55
Table 18: Measurement Invariance of Warmth across Adolescents' Report and Fathers' Report (15 years old)	56
Table 19: Measurement Invariance of Autonomy-Granting across Adolescents' Report and Fathers' Report (15 years old)	57
Table 20: Measurement Invariance of Behavioural Control across Adolescents' Report and Fathers' Report (15 years old)	57
Table 21: Measurement Invariance of Attachment across Adolescents' Report and Fathers' Report (15 years old)	58
Table 22: Measurement Invariance of Satisfaction across Adolescent' Report and Fathers' Report (15 years old)	60
Table 23: Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Adolescent-reported Data for Model 1.	61
Table 24: Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Father-reported Data for Model 1.	62
Table 25: Testing Structural Model based on Adolescents' Reported Data	64
Table 26: Testing Structural Model based on Fathers' Reported Data	67
Table 27: Measurement Invariance of Involvement across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	69
Table 28: Measurement Invariance of Strictness across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)	70
Table 29: Measurement Invariance of Involvement Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	71
Table 30: Measurement Invariance of Strictness Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195)	72

Table 31: Measurement Invariance of Involvement across Adolescents' Report and Fathers' Report (12 years old)	74
Table 32: Measurement Invariance of Strictness across Adolescents' Report and Fathers' Report (12 years old)	75
Table 33: Measurement Invariance of Involvement across Adolescents' Report and Fathers' Report (15 years old)	75
Table 34: Measurement Invariance of Strictness across Adolescents' Report and Fathers' Report (15 years old)	76
Table 35: Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Adolescent-reported Data for Model 2	78
Table 36: Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Father-reported Data for Model 2	79
Table 37: Testing Mediation Model for Adolescents-Reported Data	80
Table 38: Testing Mediation Model for Fathers-Reported Data	82

LIST OF FIGURES

- Figure 1: Adolescent-reported data. Path coefficient for adolescent 12-year-olds appear and 15-year-olds for warmth and behavioural control to attachment and to satisfaction are the same while path coefficient for autonomy-granting-attachment and autonomy-granting-satisfaction for adolescent 12-year-olds appear inside parentheses and path coefficient for adolescent 15-year-olds appear outside parentheses; * $p < .05$ 66
- Figure 2: Father-reported data. Path coefficient for fathers of the 12-year-olds and path coefficient for fathers of the 15-year-olds are the same; * $p < .05$ 68
- Figure 3: Testing mediation-Adolescent-reported data. Path coefficient for adolescent 12-year-olds and path coefficient for adolescent 15-year-olds are the same 81
- Figure 4: Testing mediation. Path coefficient for father of the 12-year-olds and path coefficient for fathers of the 15-year-olds are the same 83

CHAPTER 1

INTRODUCTION

This report presents two models that were conducted to examine how father behaviours are related to particular adolescent characteristics. In the first model, I examined how father behaviours were related to aspects of the father-adolescent relationship, focusing on attachment to fathers and satisfaction with the father-adolescent relationship. In the second model, I examined how specific father behaviours were related to adolescents' academic performance.

While there is much research focusing on the mother-adolescent relationship, the study of the father-adolescent relationship has been underrepresented. A review of the literature by Phares and Compas (1992) noted that approximately 48% of the studies in eight leading journals of child and adolescent research between 1984 and 1991 were mainly exploring the mother-adolescent relationship, while only 1% of the studies examined the father-adolescent relationship. Hosley and Montemayor (1997) has therefore stated that the study of father-adolescent relationship is still in its infancy. Generally, what is known thus far is that the adolescent's relationship with the father is more distant compared to the relationship with the mother, which emphasizes closeness and affection (Hosley & Montemayor, 1997).

The Freudian psychodynamic perspective provides a useful basis to start understanding father-adolescent relationships. It is assumed in this perspective that the

bonding between father and adolescent occurs during the puberty stage, when fathers tend to exercise excessive control over the sexual instincts of their adolescents (Neven, 1996). According to Freud's theory, both boys and girls enter an Oedipal crisis during the phallic stage, whereby they begin to have fantasies towards their opposite-sex parent. A boy, for example, would somehow spin fantasies, react aggressively, and create intimacy towards his mother. However, over time, the boy is able to resolve the oedipal predicament through the internalizing superego—an inner voice that reprimands and restrains "bad" acts. Girls' oedipal experiences are somewhat more complicated than boys (Crain, 1992).

With the onset of puberty, boys and girls begin the task of freeing themselves from their parents (Crain, 1992). Because biological changes have social stimulus value, responses between parents and children become affected and therefore alter the parent-adolescent interaction pattern (Paikoff & Brooks-Gunn, 1991). Both Paikoff and Brooks-Gunn also state that adolescents' and parents' behaviours are affected by puberty status, especially when secondary sex characteristics appear. According to the model of how physical development affects the parent-adolescent relationship (Paikoff & Brooks-Gunn, 1991), the father-adolescent relationship changes with puberty development as the level of assertiveness on the part of fathers increases and sons decreases. On the other hand, girls' perception of their fathers' acceptance decreases when they are in or near menarche. During puberty, sexual desires that existed during the phallic stage reemerge, but this time the sexual desires are directed towards opposite sex peers. In this regard, boys would imitate fathers' behaviours while girls would imitate mothers' behaviours. Parents therefore become role models for their children.

Overall, Freud's theory suggests that the father-adolescent relationship takes on different forms and entails different processes depending on the age or developmental stage of the child.

Another framework useful for understanding the father-adolescent relationship is in terms of roles. Existing literature suggests that there are important differences between fathers' and mothers' parenting roles (Hosley & Montemayor, 1997). According to studies on the fathering role, fathers are expected to provide for their children and exert discipline (Atkinson & Blackwelder, 1993; Hosley & Montemayor, 1997). Mothers, on the other hand, are the primary caregiver to the child. Although there is agreement that fathers are expected to be involved as parents, Berk (1985) demonstrated that fathers still do relatively little child-care duties, are less emotionally involved, and enjoy child-care less than mothers. However, Atkinson and Blackwelder (1993) note that there is an increased interest in fatherhood; instead of filling an unidimensional role in their families, fathers now play a number of significant roles, such as being companions, care providers, models, teachers, in addition to being breadwinners and disciplinarians (Lamb, 1997).

Hosley and Montemayor's (1997) review of research on the father-adolescent relationship found that most researchers have mainly focused on five major characteristics: time spent together, communication and involvement, closeness, conflict, and power. These dimensions of the father-adolescent relationship reflect in some ways the instrumental but emotionally distant role that fathers play in the lives of their adolescents. From their review, Hosley and Montemayor (1997) concluded that fathers are not as influential as mothers in most aspects of the parent-adolescent

relationship because fathers spend less time, have fewer conversations with their adolescents, and are less intimate with and close to their adolescents.

Model 1

Hosley and Montemayor's (1997) review of the literature on the father-adolescent relationship reveal that few researchers have looked at the father-adolescent relationship in terms of attachment and satisfaction. This is somewhat surprising, given the emotionally distant characterization of the father-adolescent relationship and also given that the father-adolescent relationship, with its unremitting nature, is one of the strongest social ties (in that it is difficult to alter) available to individuals (Parsons & Bales, 1955). While dimensions such as time spent together, communication, and even power reveal some of the emotional content in the father-adolescent relationship, the affective quality of the father-adolescent relationship is itself seldom studied.

The two affective aspects of attachment and satisfaction can converge to provide a better understanding of the father-adolescent relationship. On the one hand, attachment concerns the overall quality of relationship based on the constellation of emotional experiences (Bowlby, 1982). On the other hand, satisfaction concerns the perception of the overall quality of relationship (Simons, Beaman, Conger & Chao, 1993). Given that Bowlby's (1982) attachment theory has offered much insight into the dynamic nature of parent-child relationships, it seems rather strange why the attachment aspect of the father-adolescent relationship has been largely neglected. According to

Bowlby's theory, parent-child relationships vary in terms of the security of the bond. Children who form secure attachment with their parents are better adjusted and are able to survive in times of distress as parents serve as attachment figures (even if not physically present) to help them overcome difficult times. In times of low distress, parents of such children provide a secure base to support exploration of the surrounding environment, which takes on an added significance during adolescence as the adolescent sets forth on a quest for identity (Erikson, 1963).

According to Erikson's psychosocial development, the quest for an identity is a developmental struggle for adolescence. Adolescents may feel that they are growing so quickly and changing in so many ways that they barely recognize themselves. Also, their rapid physical growth creates a sense of identity confusion. The challenge then is to work towards the establishment of an identity that can then guide their lives (Erikson, 1963). According to Steinberg and Silk (2002), this process of identity formation is healthiest when it occurs in the context of close parent-adolescent relationships. In this sense, to complement an examination of how attached the adolescent is to his or her father, it is useful for researchers to also get a glimpse of how satisfied the adolescent is with his or her relationship with the father.

Fathers' Parenting Behaviours

There is a long history of identifying dimensions of parenting which lead to positive outcomes in children. Baumrind (1967) provided a first elaborate attempt to classify and thus study parenting. In her typology of authoritative-authoritarian-permissive parenting, she described some of the family niches that may occur around

parents' belief systems. She also argued that high control characteristics of authoritative families should induce children to develop an independent and autonomous sense of self, which internalizes their parents' values. However, Baumrind's typology has been criticized for contradicting attribution theory, which states that strong external controls undermine internalization. Maccoby and Martin (1983) then merged Baumrind's typology with earlier attempts to define parenting along two dimensions: responsiveness and demandingness. Responsiveness has been equated with warmth by many researchers while demandingness refers to parents' expectations and demands for mature, responsible behaviour from the child. While responsiveness and warmth are sometimes used interchangeably, Maccoby and Martin (1983) make a distinction between them: *Whether parental responsiveness be viewed as contingent reinforcement (meaning, presumably, that the parents are "shaping" the child by responding differentially to desired and undesired behaviour), as providing control to the child, or merely as parental sensitivity and adaptation to the child's signals, states and needs, the concept differs importantly from that of warmth, which includes affection, praise when they are given contingently but also when they are given on the parent's impulse regardless of the concurrent state, signals and behaviour of the child (p.39).* Others also argue that responsiveness may be related to, but is not synonymous with warmth (Clark-Stewardt, 1973).

Besides distinguishing responsiveness and warmth, it is equally important to distinguish the types of demandingness or what others call control. Two forms of demandingness have been identified: behavioural control and psychological control (Barber, Olsen & Shagle, 1994). Behavioural control incorporates parents' supervision

and interest in children's activities as well as teaching children that society is governed by different rules and structures (Barber et al., 1994). Psychological control, on the other hand, involves parents' interference through psychological means (e.g., inducing guilt) to control their children's behaviour (Barber, 1996). Behavioural control is generally related to positive outcomes such as academic success (Dornbusch, Ritter, Leiderman, Roberts & Fraleigh, 1987; Melby & Conger, 1996) while psychological control is related to negative outcomes (e.g., decreased competence) (Barber et al., 1994).

Maccoby and Martin (1983) noted that authoritative parenting (responsiveness and behavioural control) contributes most positively to child development because it involves a two-way process (give and take) in which parents listen to children, accept and recognize their individual developmental characteristics, while at the same time making demands that are age-appropriate and reasonable. Youniss (1988) and Steinberg (1990) concluded that the effects of the combination of responsiveness and behavioural control (i.e., authoritative parenting) on adolescents are clear-cut and positive. Although most literature reports on authoritative parenting focused on responsiveness rather than warmth, there is also literature stating that authoritative parenting also includes warmth as one of the main component (Barber, 1994; Gray & Steinberg, 1999). Rather than looking at responsiveness, it may also be more interesting to examine warmth since it emphasizes more on positive treatment (being loved and accepted) and excludes controlling elements found in responsiveness. Furthermore, warmth has been found to be related to particular outcomes as well; for instance, Maccoby and Martin (1983)

noted that warmth is a factor that would lead children to restrain aggressiveness toward parents.

Baumrind's and Maccoby and Martin's style of authoritative parenting was derived with the child in mind. In 1990, Steinberg introduced another dimension of authoritative parenting specific to adolescence. He called this dimension 'psychological autonomy-granting'. Psychological autonomy-granting reflects the extent to which parents encourage their adolescents to have their own beliefs and opinions as they make the developmental shift from dependence on parents to independent adulthood. According to Chen, Liu and Li (2000) and Steinberg (2001), psychological autonomy-granting functions very much like warmth in that it provides a general protective factor. However, beyond warmth, psychological autonomy-granting seems to have special benefits, such as protection against depression, anxiety, and other form of behavioural difficulties.

Interestingly, in recent years, Chinese parenting—especially Chinese fathers' parenting--has become a topic of discussion. This trend is being powered, at least in part, by the comparison of child-rearing between Western fathers and Chinese fathers (Ho, 1987). For instance, Western fathers often interact with the child like a playmate but Chinese fathers are involved in little play activities with children. Unlike the different roles commonly seen in Western fathers and mothers, the different roles that Chinese fathers and mothers play in child-rearing seems different as well (Wolf, 1970). Chinese fathers' principal duties are to provide economic support, moral instruction, and a suitable inheritance for their children, while Chinese mothers provide a secure and loving environment in the home setting (Jankowiak, 1992). According to Lau, Lew,

Hau, Cheung and Berndt (1990), the Chinese proverb "strict father, kind mother" implies that fathers as disciplinarians tend to exert greater control while mothers as caregivers manifest greater warmth. Chao and Tseng (2002) noted that fathers are higher in control because they have to serve as an authority figure to ensure that children achieve academically and socially, whereas mothers are higher in warmth because they have to provide emotional support to their children.

The increase in research on Chinese parenting is also due to the different interpretations and implications of Chinese parents scoring higher in authoritarian parenting—specifically in controlling behaviour compared to European-American parents (Chao, 1994). Chao (1994) attributed her findings to the different cultural systems and values that may be at work among the Chinese. For example, Chinese fathers' expressions of sentiments towards their children may be constrained by their traditional role as a strict disciplinarian who should "not encourage or tolerate emotional indulgence" (Jankowiak, 1992, p.347). It should be noted that Chao's work mainly concentrated on the Chinese in the United States. Being a minority group in a country may affect parenting styles and behaviours. For example, the lineage process (carrying on the family name) is an important aspect of traditional Chinese parenting. This may take on added significance if the Chinese are a minority group. Chinese parents, and maybe fathers in particular, may thus be less warm and more controlling (e.g., in terms of adolescent issues such as friendship selection, peer networking, and romantic encounters). With issues such as the lineage process which may take on added salience for a minority group, whether Chao's findings hold true with a country where the Chinese are a majority (e.g., Singapore) has largely been unexplored.

Fathers' Parenting Behaviours and the Father-Adolescent Relationship

Parenting research has often examined parenting "effects" in terms of child and adolescent outcomes such as academic achievement (Dornbusch et al., 1987). Less has been done on how parenting behaviours are related to the parent-child relationship itself. In the following section, I focus on the link between the three specific father-parenting dimensions of warmth, autonomy-granting, and behavioural control, and the two facets of attachment and satisfaction within the father-adolescent relationship.

Attachment

Attachment theory indicates that warmth is a critical aspect of parenting that promotes secure attachment. Warmth therefore can be expected to be positively related to attachment. Indeed, a study conducted by Mikyung (1999) showed that paternal warmth positively predicted father-adolescent attachment: the more warmth fathers shared, the higher the attachment to fathers. Mikyung documented in the study that adolescents' attachment to fathers at the time of assessment was mainly due to fathers' warmth, over and above other factors such as paternal control and characteristics of the social support network. Similar findings that parental warmth is related to higher attachment between parents and children have been reported (Kerns, Tomich, Aspelmeier & Contreras, 2000).

Like warmth, parental autonomy-granting has also been found to be associated with greater attachment to parents. A study conducted on 713 Chinese 10th grade students in Hong Kong reported that these students are more attached to their parents when parents are more autonomy-granting (Lau & Cheung, 1987). Other studies on

parental autonomy-granting have also found positive effects on child outcomes such as academic achievement (Lin & Fu, 1990; Mattanah, 2001; Steinberg, 2002). The positive effects of psychological autonomy-granting, like warmth, can be understood in terms of attachment theory. In attachment theory, the child transits from a security derived from parents' physical presence to parents' "psychological" presence, exemplified in Bowlby's concept of the internal working model. As the child transits into adolescence, the need to explore increases, while maintaining an appropriate level of attachment to parents. Thus, psychological autonomy-granting can signal to the child that parents both recognize the need to individuate and, through psychological autonomy-granting, assure the child of a secure base in the event of distress.

Behavioural control has been known to convey care. It exemplifies the positive aspects of parenting, in that the parent inculcates in the child various behaviours that are acceptable, both to the family and often to society as well. Chao and Tseng (2002) argued that this is how Asian adolescents perceive paternal control; that is, it reflects care and concern. In 1987, Lau and Cheung found that behavioural control was positively associated with parent-child attachment because of its functional nature (i.e., the control functions to teach children to be socially competent individuals). Such a functional nature of behavioural control is more acceptable to children, compared to the restrictive and dominating type of control. The restrictive and dominating form of control (or psychological control) which does not allow the child to develop as an individual, has been found to be dysfunctional and negative (Lau & Cheung, 1987). Differentiation between behavioural control and psychological control may explain why there are inconsistent results in studies of the effects of control (e.g., Shek, 2000). Thus,

the literature suggests that paternal warmth, autonomy-granting and behavioural control should all be positively related to how attached adolescents are to their fathers.

Satisfaction

Recently, Domitrovich and Bierman (2001) summarized that parental warmth is an important source of influence on satisfaction with parent-adolescent relationship. Shek's (2001) study involving a Chinese sample provides support that this applies to father behaviours: when fathers show warmth to their children, children are more likely to report a satisfactory father-adolescent relationship. One reason provided by Shek (2001) is that Chinese fathers are perceived as "yi jia zhi zhu" (master of the family), who do not express their emotions as much as mothers do. Therefore, when fathers express warmth, children perceive such warmth as special, which contributes to greater satisfaction with the father-adolescent relationship.

Psychological autonomy-granting has also been found to be related to satisfaction. A study conducted on 150 preadolescents and adolescents reported a link between increased paternal autonomy-granting and satisfaction with the relationship with fathers (Feldman & Gehring, 1988). In other words, adolescents who were given more autonomy tended to feel more satisfied with the relationship with their fathers. Demo's (1992) study provides more general evidence that parental autonomy-granting is related to adolescents reporting satisfaction with their relationship with parents. Such a sense of satisfaction that is linked to psychological autonomy-granting can be understood in terms of the individuation process. The granting of autonomy by fathers may indicate to the child a sensitivity on the part of fathers to the adolescent's

developmental need to become his or her own person. Such recognition may minimize conflict, but more importantly facilitates the child becoming a person in his or her own right. This in turn links to greater satisfaction with the father-adolescent relationship.

According to a longitudinal study conducted in Hong Kong by Shek (2000), the father-adolescent relationship was described to be less satisfactory when father's control was high. However, Rohner and Pettengill (1985) found that Korean youth were more satisfied with their relationship with fathers when the latter exercised control. One possible reason for these inconsistent results is the conceptualization of control in these studies. In Shek's study, control was operationalized in terms of punishment. On the other hand, in Rohner and Pettengill's study, control was presented as a form of conveying care and love. Thus, when control is a means of conveying care and concern (i.e., behavioural control), there is a positive link to adolescents' satisfaction with the relationship with their fathers.

In sum, like attachment, the literature suggests that paternal warmth, autonomy-granting, and behavioural control would be positively related to satisfaction with the father-adolescent relationship.

Measurement Invariance and Age Differences

Research on parenting behaviour usually assumes that the behaviours being rated are the same for adolescents of different age groups. On the other hand, there are reasons to expect that these behaviours may not mean the same thing to adolescents of different ages; that is, there may be a lack of equivalence of the construct across different ages.

Firstly, the recognition of adolescence as a transition stage from childhood to adulthood provides a logical assumption that the adolescents are consistently evolving biologically, cognitively, and even socially. The individuation process probably stands up as a good illustration of how such changes may result in parenting behaviour being viewed differently by the adolescents differently at different age. Steinberg and Silk (2002) noted that the process of individuation across adolescence involves a gradual and progressive sharpening of one's sense of autonomy, competence, and separation from parents. At the same time, more individuated adolescents are able to express their own opinions, even if there is disagreement. Unlike younger adolescents (10-13 years old), older adolescents (14-18 years old) (Steinberg, 2002) may realize that their parents are real people rather than omniscient and omnipotent figures. Thus, they are able to have a more accurate view of parents (Youniss & Smollar, 1985) and likely to point out their parents' weaknesses (Feldman & Gehringer, 1988).

As adolescents develop their sense of self, they also want to have greater involvement in discussing family affairs and making decisions (Steinberg & Silk, 2002). In terms of cognitive changes, adolescents are more likely than children to think about what is possible, to become multidimensional in thinking, and to see things as relative (Keating, 1990). Therefore, with changes in cognitive ability, adolescents are able to think for themselves why their parents behave in particular ways when socializing them. If they think that their parents' parenting objective is positive and for their own good, they would feel more attached and satisfied with their relationship with parents. On the other hand, parents will find that adolescents are thinking more like adults and thus will begin to respect the jurisdiction (give authority to exercise power)

of their maturing child. In view of this, parents are expected to grant more autonomy to their adolescents who are now more likely to follow social conventions (Steinberg & Silk, 2002).

Adolescents' developmental transitions within the social realm may also provide further argument on why paternal behaviour and relationship may be viewed differently across adolescence. With the increasing opportunities in school activities and recreation outside the family setting as the adolescents grow older, adolescents interact less with parents and peers begin to influence their lives more (Savin-Williams & Berndt, 1990). Although peers can influence adolescents in positive ways (Mounts & Steinberg, 1995), the influence of peers may also lead adolescents to forgo parenting advice and family activities. These adolescents may thus have different views of their parents' parenting practices compared to the younger adolescents who have yet to negotiate these social changes.

The linkages between fathers' parenting behaviours and aspects of the father-adolescent relationship may thus differ for adolescents in different stages of development. As illustrated above, one parenting behaviour that may be particularly sensitive to the phase the adolescent is in autonomy-granting. As Steinberg indicates, the issue of granting autonomy is particularly important for adolescence and even then, may require different levels (e.g., more autonomy being granted as the adolescent grows older) or possibly even different forms at the different phases of adolescence. Some indication of this provided by several studies documenting that across adolescence, paternal practices are perceived to be less positive (i.e., less warm and less controlling) (Paulson & Sputa, 1996; Shek, 2000). Helsen, Vollebergh and Meeus (2000) also noted

that father-adolescent attachment becomes less positive in the transition from early adolescence to mid-adolescence, suggesting that older adolescents may view the relationship differently from younger adolescents. Feldman and Gehringer (1988) also reported that father-adolescent attachment deteriorated from 9th grade to 12th grade.

As there may be differences among adolescents across different ages, the present study examined two age groups, aged 12 and aged 15. The reasons for choosing the 12-year-olds and the 15-year-olds were mainly due to the fact that they were involved in different stages of cognitive and social development (Steinberg, 2002). Therefore, a comparison between these two age groups would provide a clearer understanding of the similarities or dissimilarities that may occur between them.

Thus for model 1, there were two main hypotheses.

- Hypothesis 1a states that paternal warmth, autonomy-granting and behavioural control would be positively related to attachment to fathers.
- Hypothesis 1b states that paternal warmth, autonomy-granting and behavioural control would be positively related to satisfaction with the father-adolescent relationship.

As adolescents grow older, there is an expectation that the links between paternal warmth, behavioural control, and autonomy-granting in particular, with attachment and satisfaction are to be different for the different age groups. These differing links are expected as adolescents of different age groups may perceive and view things differently from one another. Therefore, in addition to the two main hypotheses, a third hypothesis was proposed for model 1:-

- Hypothesis 1c states that the links between paternal warmth, behavioural control, and autonomy-granting in particular, with attachment and satisfaction would differ in such a way that the relationships differ in strength across the two adolescent age groups.

Model 2

The inclusion of academic performance as an outcome variable in the second model is also particularly important in the study of adolescence in contemporary society because young people usually form their educational and occupational plans during adolescence (Steinberg, 2002). It is also known that good educational attainment provides a basis for an individual's self-conceptions as well as other people's perception of the individual (Featherman, 1980). For the Chinese, academic performance is very highly regarded and serves as a tool to bring honour to the family, as reflected in a statement by one of the parents in Chao's (1996, p.412) study:

In Chinese families, the child's personal academic achievement is the value and honour of the whole family. If you fail school, you bring embarrassment to the family. If you do good, you bring honour to the family and do not lose face. A lot of value is placed on the child to do well for the family.

Research documenting the above issues was mostly found in the Western literature.

However, such research is virtually rare in Singapore, especially the study on Chinese society.

Fathers' Parenting Behaviour and Adolescents' Academic Performance

Chinese parents are rated as more authoritarian (reflecting unquestioning obedience from children) and this style of parenting has been found to be associated with good school performance among Chinese adolescents (Chao, 1996; Dornbusch et al., 1987; Leung, Lau & Lam, 1998; Marsiglio, Amato & Day, 2000). In contrast, European-American adolescents demonstrate greater school achievement when parents show more warmth, democracy and encouragement (i.e., authoritative parenting) (Steinberg, Elmen & Mounts, 1989). According to Chao (1994), the different parenting practices that predict academic performance for Chinese parents and European-American parents is due to the fact that European-American do not share the same sociocultural traditions and values that have shaped the Chinese child-rearing concepts of chiao shun or "training". For the European-American parents, the word "training" often evoked associations such as "militaristic" or "regimented" that were interpreted as negative. But, for the Chinese, training contains the idea of teaching and educating their children in the appropriate behaviours.

It has been documented that father's involvement with adolescents in general are mainly restricted to instrumental and problem solving discussions about topics such as academic performance and future educational plans (Youniss & Smollar, 1985).

Cooksey and Fondell (1996) examined the frequency with which fathers spend time with their children (e.g., how often they spent time with their children at home working on a project or helping with reading and homework). The results showed that fathers who were involved with their children had children with better academic performance. Lamb (1987) and Dubois, Eitel and Felner (1994) also report that paternal involvement

(such as having regular time together, giving emotional support, and school-related involvement) are very important to facilitate academic performance during the transition from childhood to adolescence.

Steinberg, Lamborn, Donbusch and Darling (1992) suggested that paternal strictness serve as one of the specific components of authoritativeness that contributes to academic success. They also added that paternal strictness was conceptually similar to assertive control, a dimension of parental control discussed by Baumrind (1991b). In, Lamborn, Mounts, Steinberg and Dornbusch's (1991) study, they defined strictness as parental supervision and monitoring of the adolescent. Interestingly, parental strictness in Chinese families involves the notion of '*chiao shun*' (training) and it is focused on the child's ability to perform well in school (Chao, 1994). During training, parents are highly involved and supportive. The idea of training their children and being a supportive parents have therefore created the concept of '*guan*' means 'to govern' (Chao, 1994). Back in 1973, Baumrind found that control strategies and discipline appeared to influence school achievement. In recent years, paternal strictness has been found to be positively related to academic competence (Chen, Liu & Li, 2000).

Cultural comparison may also provide additional insights into understanding adolescents' academic performance. Several studies have documented that Chinese parents value education more strongly compared to Western parents (Pang, 1991; Schneider & Lee, 1990). In addition, Chao's (2000) study reported that 80% of her Chinese parents were involved with their children's schoolwork, including tutoring them, assigning additional work, structuring and monitoring their time, while only 13% of the Western parents reported doing the same. The differentiation between Chinese

and Western parents' involvement in adolescents' academic activities may reflect the importance of adolescents' academic performance to Chinese society.

Self-Efficacy as Mediating Variable

Previous studies have identified self-efficacy as a key mediator in determining performance (Phillips & Gully, 1997). Because self-efficacy is '*concerned with judgements of how well an individual can execute courses of action required to deal with prospective situations*' (Bandura, 1982, p.122) and is thus construed as a more proximal (i.e., task-and situation-specific) construct (Chen, Casper & Cortina, 2001), it can be expected to be an important mechanism through which paternal behaviours relate to academic performance.

In the study conducted by Feldmann, Martinenz-Pons and Shaham (1995), adolescents' perceived self-efficacy was related to their academic outcomes. In addition, Lindley and Borgen (2002) also documented a similar finding that self-efficacy positively predicted academic performance. On the other hand, a study conducted by Erford (1995) on 386 volunteer students showed that students with fathers who are highly involved in their children's school matters are significantly more self-efficacious. In the same study conducted by Erford, students with fathers who are strict tend to display lower self-efficacy. Thus, it seems that paternal involvement is positively related to self-efficacy while paternal strictness is negatively related to self-efficacy, which in turn is positively related to academic performance.

The relation between paternal involvement and paternal strictness and the academic performance mediated by self-efficacy can be expected to differ for

adolescents of different ages. In 1996, Paulson and Sputa found that the effect of paternal practices on adolescent academic achievement was different between younger adolescents and older adolescents. The study conducted on fathers and adolescents reported that fathers' involvement in schoolwork/homework decreases from 9th grade to 12th grade. The changes of paternal practices across adolescence that may influence adolescents' academic performance can be explained by the rationale of individuation process, cognitive and social changes as well. As adolescents grow older, they have stronger work orientation, greater engagement in classroom activities, higher educational aspirations, more positive feelings about school and more positive academic self-conceptions (Steinberg et al., 1989; Lamborn et al., 1991). Therefore, it is not surprising that parents are less involved or less strict to the older adolescents compared to the younger ones. Also, when parents understand the nature of cognitive change across adolescence, more opportunities are gradually given to them to make their own decision and thus reduce their own involvement in child-rearing, particularly in adolescents' school work and activities (Steinberg & Silk, 2002). Across adolescence, parents may also find that adolescents tend to seek advice from their peers regarding schoolwork more than with parents, in the sense that peers are more able to help (Steinberg & Silk, 2002). In view of the different developmental changes that occur across the two age groups, it gives rise to different links for the different age groups. Thus for Model 2, there were two hypotheses.

- Hypothesis 2a states that paternal involvement and strictness would be positively related to academic performance and these relationships would be mediated by adolescents' perceived self-efficacy.

- Hypothesis 2b states that the links between paternal involvement and strictness and academic performance mediated by self-efficacy would change in strength across the two adolescents' age groups.

Measurement Issue

Father's Report versus Adolescent's Report

Much of the existing literature on the father-adolescent relationship relies on the adolescent reporting on all the variables of interest. Such a single-source approach is susceptible to the problem of shared method variance (Tein, Roosa & Michaels, 1994). The present study sought to incorporate both adolescents' and fathers' report of fathers' parenting behaviour. Such would enable an examination of how adolescents' and fathers' reports converge or diverge and how the parenting variables, as reported by adolescents and fathers, may be similarly or differently related to aspects of the father-adolescent relationship. Improving our understanding on the consistency between fathers' and adolescents' reports is essential. As noted by Tein, Roosa and Michaels (1994), parental behaviours are most likely to produce intended consequences only if they are perceived or defined similarly by the child and the parent. There are indications, however, that adolescents' and fathers' report are more likely to diverge than converge, that is the reports by adolescents and fathers tend to differ (Larson & Richards, 1994; Marcos & Draper, 1990).

In a study conducted by Schwarz, Barton-Henry and Pruzinsky (1985) to assess child-rearing behaviour, a comparison was made between parents' and children's reports. The result revealed a low level of agreement between the two reports of

parental behaviour. Such finding may imply that parents and children simply did not share the same definitions, or the same experience of parenting behaviour. If so, the question then is whether "paternal warmth", for example, means the same thing for fathers and adolescents and whether a distorted picture is obtained if only one party does the reporting. On the other hand, it should be noted that adolescents are often influenced by their own perceptions on paternal behaviours rather than those behaviours reported by fathers (Demo, Small & Savin-Williams, 1987).

Thus, across Model 1 and Model 2, a third hypothesis was proposed that the models would be dissimilar depending on whether adolescents' or fathers' reports were used.

CHAPTER 2

METHODOLOGY

Participants

The sample of the current investigation consisted of 501 students. More specifically, 250 (135 males and 115 females) Primary Six students aged 12 and 251 (122 males and 129 females) Secondary Three students aged 15 participated in this study. For comparability in terms of academic ability, we selected Primary Six EM1 (English and Mother-Tongue as first language) / EM2 (English as first language and Mother-Tongue as second language) stream students and Secondary Three Express (taking O Level the following year) stream students. All participants were Singaporean Chinese. Other nationalities as well as races were not included to avoid cross-cultural and racial differences. We also ensured that participants were only from intact families so as not to introduce complication due to different family dynamics.

Participants of the two age groups (12 & 15) were compared on demographic characteristics (see Table 1). Generally, the two age groups have quite a similar personal background. In terms of percentage distribution for all the characteristics, the differences between the two age groups were small. Similar numbers of the 12-year-old adolescents (41.2%) and 15-year-old adolescents (40.6%) were first-born children. On the other hand, the majority of the younger adolescents (54.4%) had less than two siblings, whereas the majority to the older adolescents (53.8%) had 2 to 4 siblings. For both age groups, a highly majority (83.2% of the younger adolescents, 91.6% of the

Table 1

Demographic Characteristics of Adolescents

Characteristics	Adolescents aged 12		Adolescents aged 15	
	Frequency	%	Frequency	%
Gender				
Male	135	54.0	122	48.6
Female	115	46.0	129	51.4
Birth order				
1 st	103	41.2	102	40.6
2 nd	101	40.4	117	46.6
3 rd	41	16.4	23	9.2
4 th	5	2.0	7	2.8
5 th	-	-	1	0.4
6 th	-	-	1	0.4
Number of siblings				
<2	136	54.4	114	45.4
2-4	113	45.2	135	53.8
>4	1	0.4	2	0.8
Father's employment status				
Working full-time	208	83.2	230	91.6
Working part-time	26	10.4	7	2.8
Not working	16	6.4	14	5.6
Mother's employment status				
Working full-time	79	31.6	94	37.5
Working part-time	38	15.2	36	14.3
Not working	133	53.2	121	48.2
Primary caregiver				
Father	16	6.4	19	7.6
Mother	192	76.8	197	78.4
Grandparent	17	6.8	19	7.6
Nanny	1	0.4	4	1.6
Maid	18	7.2	5	2.0
Others	6	2.4	7	2.8

older adolescents) reported that their fathers were employed full-time. About half (53.2% of the younger adolescents, 48.2% of the older adolescents) reported that their mothers were not working at all. About a third, 37.5% of the older adolescents, 31.6%

Table 2

Demographic Characteristics of Fathers

Characteristics	Adolescents aged 12		Adolescents aged 15	
	Frequency	%	Frequency	%
Age				
<40	28	13.4	12	6.2
40-49	149	71.3	136	69.7
≥50	32	15.3	47	24.1
Highest educational qualification				
<PSLE	23	11.0	28	14.4
PSLE	60	28.7	50	25.6
O Level/ N Level	87	41.7	70	35.9
A Level	7	3.3	8	4.1
Diploma	18	8.6	14	7.2
Degree	5	2.4	9	4.6
Master	-	-	2	1.0
Others	9	4.3	14	7.2
Number of children				
<2	12	5.7	11	5.6
2-3	175	83.8	160	82.1
4-5	22	10.5	23	11.8
>5	-	-	1	0.5
Number of children in school (Pri-JC)				
<2	29	13.9	33	16.9
2-3	170	81.3	157	80.5
≥4	10	4.8	5	2.6
Total household income				
<\$1000	7	3.3	9	4.6
\$1000-\$1499	41	19.7	30	15.4
\$1500-\$1999	34	16.3	32	16.4
\$2000-\$2499	30	14.4	33	16.9
\$2500-\$2999	32	15.3	33	16.9
\$3000-\$3499	23	11.0	19	9.8
\$3500-\$3999	8	3.8	14	7.2
\$4000-\$4499	4	1.9	5	2.6
\$4500-\$4999	7	3.3	3	1.5
\$5000-\$5499	7	3.3	3	1.5
>\$5500	16	7.7	14	7.2

Characteristics	Adolescents aged 12		Adolescents aged 15	
	Frequency	%	Frequency	%
Wife's employment status				
Working full-time	66	31.6	71	36.4
Working part-time	33	15.8	26	13.3
Not working	110	52.6	98	50.3
Primary caregiver of children				
Father	35	16.7	43	22.1
Mother	140	67.0	127	65.1
Grandparent	12	5.7	16	8.2
Nanny	2	1.0	2	1.0
Maid	16	7.7	4	2.1
Others	4	1.9	3	1.5

of the younger adolescents had mothers who were employed full-time. Mothers were the primary caregiver in three-quarters of the two age groups: 76.8% of the younger adolescents, 78.4% of the older adolescents.

Fathers of the participants were also involved in this study. Altogether, the sample consisted of 404 fathers, yielding a response rate of 80.6%. Fathers of the respective adolescent age groups were compared on their personal backgrounds (see Table 2). In general, fathers of the two age groups also have quite a similar personal background. Firstly, it was found that majority of the fathers in both groups were aged between 40 to 49 years old (71.3% in the younger adolescent group, 69.7% in the older adolescent group). In terms of educational qualification, most of the younger adolescents' fathers (41.7%) and older adolescents' fathers (35.9%) reported that they had completed secondary school with O Level or N Level qualification. Most of the fathers also reported that they had 2 to 3 children (83.8% of the younger adolescents' fathers, 82.1% of the older adolescents' fathers). The majority (81.3% of the younger adolescents' fathers, 80.5% of older adolescents' fathers) also reported that they had 2 to

3 children who were still schooling. The total household income reported by fathers in this study ranged from less than S\$1000 to more than S\$5500 with most (19.7%) of the younger adolescents' fathers reported earning between S\$1000-S\$1499 whereas similar numbers of older adolescents' fathers (16.9%) reported earning between S\$2000-S\$2499 and S\$2500-S\$2999. Younger adolescents' fathers reported that 31.6% of their wives were working full-time and 52.6% of them were not working, while older adolescent's fathers' reported that 36.4% of their wives were working full-time and 50.3% of them were not working. Also, 67.0% of the younger adolescents' fathers and 65.1% of the older adolescents' fathers reported that mothers were the primary caregiver of their children. Only 16.7% and 22.1% of the younger and older adolescents' fathers respectively reported themselves as the primary caregiver of their children.

Procedure

Permission to conduct the research in the schools was sought by first submitting an application to the Ministry of Education (MOE). Questionnaires were submitted together for evaluation. Once approved, a letter of Ministry consent was sent to the researcher. Schools were then contacted and meetings were held to explain the nature of the study to the school principals. Assurance was given that all information would be kept confidential.

Approximately 20 primary and secondary schools were sent a letter requesting for their participation in this study. However, only 3 secondary schools and 3 primary schools agreed to participate.

For actual conduct of the study, arrangements were made in a way that class lessons were not disrupted. Therefore, the classes selected by the school principals were either exempted from assembly or participated in the study after school hours. Verbal and written instructions on how to complete the questionnaire were given to all student participants before the start of each session. It took approximately 30 minutes for the students to complete the questionnaire, with younger students given an extra 10 minutes to complete the questionnaire. Everyone from the selected classes completed the questionnaire including students of other races and nationality so as to avoid the issue of discrimination. For data analysis however, only data from participants who were Singaporean Chinese were used.

Each participant was also asked to bring home the father's questionnaire for his or her father to complete. A cover letter explaining the purpose of the study as well as the instructions were attached together. Fathers were given a week to complete the questionnaires, which were then returned to the teachers-in-charge through their children. A Chinese version of the questionnaire (Appendix I) was prepared and provided for fathers who were not English-educated. The English version was first examined and translated carefully by a team of research students and a qualified Chinese teacher; all of them were fluent in both English and Chinese. The Chinese version was then back translated to ensure comparability with the English version. About 10% of the fathers who participated requested for the Chinese version. The questionnaires for both father and adolescent were given identification numbers so that their respective questionnaires could be later tallied with each other. Students'

examination results (for English, Mathematics and Science) were obtained from teachers.

Measures

In this study, the measures used were all based on established ones. However, there were some minor modifications made to facilitate better conceptual understanding and applicability to Singapore context. Example of items being modified are "When I make plans, I am certain I can make them work" to "*When I really study, I am certain I can do well*", and "One of my problem is that I cannot get down to work when I should" to "*One of my problems is that I cannot sit down to do my schoolwork when I should*".

Measures of Paternal Behaviour

Paternal behaviour was measured using the Child Report of Parental Behaviour Inventory (CRPBI) adapted from Schludermann and Schludermann (1970). Three dimensions of paternal behaviour were assessed in this study: Warmth, autonomy-granting, and behavioural control.

Warmth. The measure of warmth consisted of 8 items from the Acceptance subscale of the CRPBI. Two versions were created; one for adolescents to report their fathers' warmth, the other for fathers to report their own warmth. Items for both versions were kept conceptually equivalent although the phrasing was modified for the different sources of report. Examples of items from the adolescent's version are "He smiles at me very often", "He enjoys doing things with me", and "He often speaks of the good things I do", whereas examples of the corresponding items from the father's version are "I

smile at this child very often" ("this child" necessary to specify the targeted child), "I enjoy doing things with this child", and "I often speak of the good things he/she does" (see Appendix A). Both fathers and adolescents were asked to respond on a 5-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Higher scores indicated higher paternal warmth. The Cronbach alpha levels for this measure reported by fathers and adolescents were .86 and .89 respectively.

Autonomy-granting. The 8 items of the Acceptance of Individuation sub-scale of the CRPBI were used to assess autonomy-granting. Two versions were created; one for adolescents to report their fathers' autonomy-granting, the other for fathers to report their own autonomy-granting. As with warmth, items for both versions were kept conceptually equivalent although the phrasing was modified for the different sources of report. Examples of items from the adolescent's version are "He allows me to tell him if I think my ideas are better than his", "He lets me help to decide how to do things we're working on", "He really wants me to tell him just how I feel about things" and "He gives me the choice of what to do whenever possible", whereas examples of the corresponding items from the father's version are "I allow this child to tell me if he/she thinks his/her ideas are better than mine", "I let this child help to decide how to do things we're working on", "I really wants this child to tell me just how he/she feels about things" and "I give this child the choice of what to do whenever possible"(see Appendix B). Fathers and adolescents were asked to respond on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). Higher scores indicated higher paternal autonomy-granting. Reliability assessments for adolescents' and fathers' reports on this scale yielded a Cronbach alpha coefficient of .83 each.

Behavioural control. Paternal behavioural control was measured using 4 items of the Control sub-scale from the CRPBI. As before, two conceptually equivalent but source-specific versions were created. Examples of items from the adolescent's version are "He believes in having a lot of rules for me and sticking to them" and "I have certain jobs to do and he doesn't allow me to do anything else until they are done", whereas examples of the corresponding items from the father's version are "I believe in having a lot of rules for this child and sticking to them" and "This child has certain jobs to do and he/she is not allowed to do anything else until they are done" (see Appendix C). Response categories for these items ranged from strongly disagree (1) to strongly agree (5). Higher scores indicated higher paternal behavioural control. Reliability assessments for fathers' and adolescents' scales yielded alpha coefficients of .72 and .74 respectively.

Measures of the Father-Adolescent Relationship

Attachment. The attachment between fathers and adolescents was measured using the 28 items of the Parent Attachment Scale from the Inventory of Parent and Peer Attachment (IPPA) (Armsden & Greenberg, 1987). In keeping with Bowlby's theory (1982), these items evaluated an overall quality of attachment based on a constellation of the emotional experiences of trust, communication, and alienation. Two versions were created; one for adolescents to report their attachment to fathers, the other for fathers to report their adolescents' attachment to them. Items for both versions were kept conceptually equivalent although the phrasing was modified for the different sources of report. Examples of statements from the adolescent's version are "He respects my feelings", "He can sense when I'm upset about something", "When we

discuss things, he considers my point of view" and " I trust him", whereas examples of corresponding statements from the father's version are "I respect my child's feelings", "I can sense when he/she is upset about something", "When we discuss things, I consider his/she point of view" and "My child trusts me" (see Appendix D). Response categories ranged from strongly disagree (1) to strongly agree (5) with higher scores indicating higher father-adolescent attachment. The reliability and construct validity of the IPPA are well established (Armsden & Greenberg, 1987; De Jong, 1992). In the present study, Cronbach alphas for the father and adolescent versions were .92 and .94 respectively.

Satisfaction. Satisfaction with the father-adolescent relationship was assessed using 5 items adapted from Simon, Beaman, Conger and Chao's (1993) 4-item Relationship Satisfaction Scale and the last item of Umberson's (1989) Parent Child Rational Quality Scale. Such combination was adapted because only these items measured the overall perception and quality of the relationship between fathers and adolescents. As with attachment, two conceptually equivalent but source-specific versions were created. Examples of items from the adolescent's version are "Being a child to him has been an enjoyable experience", "I am satisfied with my relationship with him" and "All in all, I can say I get along well with him", whereas example items of father's version are "My child feels that being a child to me has been an enjoyable experience", "My child is satisfied with his/her relationship with me" and "All in all, I think my child can say he/she gets along well with me" (see Appendix E). Responses given ranged from strongly disagree (1) to strongly agree (5), with higher scores indicating higher satisfaction with father-adolescent relationship. Reliability

assessments for the father scale yielded a Cronbach alpha coefficient of .91 while the adolescent scale yielded a Cronbach alpha coefficient of .92.

Measures of School-Related Paternal Behaviour

School-related paternal behaviour was measured using the scale by Lamborn, Mounts, Steinberg, and Dornbusch (1991) which is based on Maccoby and Martin's (1983) parenting framework. Two dimensions (paternal involvement and paternal strictness) were used in this present study.

Involvement. A total of 6 items from the Lamborn et al. (1991) scale was used to assess paternal involvement. As before, an adolescent and a father version were created. Examples of items from the adolescent's version are "I can count on him to help me out, if I have some kind of problem with school matters", "When I get a good grade in school, he praises me" and "He spends time talking with me about my schoolwork", whereas examples of the corresponding items from the father's version are "This child can count on me to help out, if he/she has some kind of problem with school matters", "When this child gets a good grade in school, I praise him" and "I spend time talking with this child about his/her schoolwork" (see Appendix F). Items were responded to a 5-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5), with higher scores indicating higher paternal involvement. The reliability of the measures, indexed by Cronbach's alpha, was .79 for the father version and also .79 for the adolescent version.

Strictness. Paternal strictness was also assessed using 6 items of the Lamborn et al. (1991) scale. An adolescent and a father version were created. Examples of items

from the adolescent's version are "He tries to know where I go at night" and "He really knows where I am after school", whereas examples of items from the father's version are "I try to know where this child goes at night" and "I really know where this child goes after school" (see Appendix G). These items were considered as indicators of strictness because they involved close supervision and monitoring of what adolescents were doing at various times of the day. Fathers and adolescents were asked to respond on a 5-point Likert-type scale ranging from strongly disagree (1) to strongly agree (5). Higher scores indicated higher paternal strictness. The Cronbach alphas were .86 and .79 for the father and adolescent versions respectively.

Measures of Academic Performance

I obtained information concerning adolescents' academic performance for the subjects of English, Mathematics, and Science for all adolescent participants from their school records. These subjects were chosen to provide comparability of academic performance across a common set of subjects for the Primary Six and Secondary Three students. In addition, English, Mathematics, and Science are core subjects in the Singapore education system. Maximum score for each subject was 100.

Measure of Self-Efficacy

Self-efficacy. Adolescents' level of self-efficacy was assessed using the general self-efficacy sub-scale from Sherer et. al's., (1982) Self-Efficacy Scale. This scale comprises 17 items, which were reworded to get the adolescents' view on their own self-efficacy related to school matters. Examples of items are "When I really study, I am

certain I can do well", "If I can't solve a schoolwork problem, I keep trying until I can" and "I avoid facing difficulties" (see Appendix H). Responses ranged from strongly disagree (1) to strongly agree (5). Items that are negatively worded were recoded so that higher scores indicated higher self-efficacy. Only adolescents completed this measure. Cronbach alpha for the general self-efficacy sub-scale obtained by Sherer et al. (1982) was .86. In the present study, Cronbach alpha was .80.

CHAPTER 3

RESULTS

Data in the present study were analyzed step by step separately for both models. For each model, two sets of preliminary analyses to examine measurement aspects of the model were conducted: (a) measurement invariance across the two age groups, and (b) measurement invariance across source of report (adolescents' report vs. fathers' report). Finally, structural equation modeling (SEM) was done to examine the models and test the hypotheses stipulated in the study.

One central principle of measurement invariance highlighted by Reise, Widaman and Pugh (1993) is that psychological measurements are on the same scale (i.e., comparable) when the empirical relations between the trait indicators (e.g., test items) and the trait of interest are invariant across groups. To apply this principle into the present study, if the measurement items used were invariant across the two adolescent age groups, then the two groups could be compared. The same applies to the testing of invariance across sources of report (fathers' report versus adolescents' report). Although seldom examined, the basis for comparing whether the measures have differential correlates across any two or more groups rests on the assumption that the items in the measures show measurement invariance across the groups. Measurement invariance is therefore necessary before one proceeds with any substantive comparison.

As mentioned by Poortinga (1989), without measurement invariance, a comparison between a group of people can be misleading for two reasons. Firstly, the trait of interest for a group for which a comparison is being made may not be the same as the trait for the other group. Secondly, the scale units for a common trait may not be the same for both groups. Hence, it is essential to establish invariant scale properties for the groups to be compared before any actual comparison is made.

To demonstrate invariance statistically, a more constrained model is usually compared with an unconstrained model and change in chi-square statistic is used to indicate whether invariance can be established. Measurement invariance is indicated when the change in chi-square from a less constrained (freely estimated) to a more constrained (equal factor loadings) model is not significant.

For each model tested, it is also necessary to establish its own fit with the data. To assess such fit, the chi-square statistic can be used. However, there is a disadvantage of the chi-square, as large sample sizes will produce a significant chi-square value resulting in the rejection of the model even though the model may be correct. Therefore, a variety of practical fit indices was used to complement the chi-square statistic. In this present study, a number of indices were used: Joreskog and Sorbom's (1989) goodness-of fit index (GFI), Bentler and Bonett's (1980) non-normed fit index (NNFI), Bentler's (1990) comparative fit index (CFI), Joreskog and Sorbom's (1986) standardized root mean square residual (SRMR) and Steiger's (1990) root mean square error of approximation (RMSEA).

For GFI, NNFI, and CFI, values greater than .90 are usually considered satisfactory. In contrast, RMSEA, a measure of discrepancy per degree of freedom,

indicates close fit if the value is .05 or less. Values between .05 to .10 indicate moderate fit, while values greater than .10 indicate poor fit. For SRMR, which measures the average standardized residuals of the predicted covariance matrix from the observed covariance matrix, values less than .10 are considered a good fit.

MODEL 1

Preliminary Analysis

Testing Measurement Invariance Across Age Groups

Adolescent-reported Data

I first tested for invariance of each variable in the study (e.g., warmth, satisfaction) separately across the two adolescent age groups using the adolescent-reported data. These analyses were done at the item level. The first step in these analyses was to freely estimate the model. An unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated (called the 'baseline model' as it serves as a benchmark against which to compare the more constrained models) was first estimated. Because of its benchmark nature, it is important for a well-fitting baseline model to be established before further invariance analyses are conducted. The second step in the analyses involved imposing constraints to the freely estimated model. Specifically, a more constrained model whereby factor loadings were constrained to be equal across groups was estimated and then compared with the baseline model. As indicated previously, invariance is established when the

Table 3

Measurement Invariance of Warmth across 12-year-old Adolescents (N= 250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MA1: Freely Estimated	194.28	40				.90	.92	.88	.05	.09
MB1: Factor Loading Invariant	212.61	47	MA1 vs MB1	18.32*	7	.90	.91	.89	.07	.08
MB2: Factor Loading Invariant (with 1 item excluded)	205.67	46	MA1 vs MB2	11.38	6	.90	.91	.90	.06	.08

* $p < .05$

difference in the chi-square statistics for the two models (freely estimated and equal factor loading) is not significant.

Results for these analyses are presented from Table 3 to Table 7. For warmth (see Table 3), the freely estimated model (MA1) provided a reasonably good fit to the data, $\chi^2 = 194.28$, $df = 40$, $p < .05$, $GFI = .90$, $CFI = .92$, $NNFI = .88$, $SRMR = .05$ and $RMSEA = .09$. The equal factor loading model (MB1) also provided a reasonably good fit, $\chi^2 = 212.61$, $df = 47$, $p < .05$, $GFI = .90$, $CFI = .91$, $NNFI = .89$, $SRMR = .07$ and $RMSEA = .08$. However, MB1 was a poorer fit than MA1; $\Delta\chi^2 = 18.32$, $\Delta df = 7$, $p < .05$. Hence, there was no equality of factor loadings across the two groups, which indicates that there was no measurement invariance across the two age groups.

On the other hand, as the practical fit indices were very similar between the constrained and unconstrained models, the lack of invariance may be trivial and due to one or a few items that may be the source of the lack of invariance. In this case, there may be partial measurement invariance; that is, some items may have factor loadings

which differ substantially by group but the loadings for other items may not (Kline, 1998), such that when those items which load differently by group are freely estimated or removed, some form of invariance is established. Therefore, the next step I took was to determine which items were invariant and which items were not by examining the modification indices in the constrained equal factor loading model. For the present analyses, the item with the largest MI was freed for estimation and the model was re-tested as well as compared to the freely estimated one. If invariance was still not found, this procedure of eliminating the next item with the highest MI was repeated, until invariance was finally established.

The analysis for testing partial invariance for warmth across the two adolescent age groups was done by excluding the item with the largest MI ("He smiles at me very often"). The equal factor loading model with this item eliminated, (MB2) was then compared with the unconstrained model (MA1) in which factor loadings, factor correlations, and error variances were all freely estimated. This equal factor loading model (MB2) provided a reasonably good fit; $\chi^2 = 205.67$, $df = 46$, $p < .05$, $GFI = .90$, $CFI = .91$, $NNFI = .90$, $SRMR = .06$ and $RMSEA = .08$ (refer Table 3). More importantly, the change in model fit from the completely unconstrained model to this equal factor loading model was non-significant, $\Delta\chi^2 = 11.38$, $\Delta df = 6$, ns. Therefore, partial measurement invariance was established for the warmth variable across the two adolescent groups, which enabled further testing of the structural model.

Table 4 presents the result of invariance testing for the autonomy-granting variable across the two age groups. MC1 is the baseline unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated.

Table 4

Measurement Invariance of Autonomy-Granting across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MC1: Freely Estimated	190.03	40				.92	.88	.84	.05	.09
MD1: Factor Loading Invariant	195.06	47	MC1 vs MD1	5.03	7	.92	.89	.86	.06	.08

This model provided a fit of $\chi^2 = 190.03$, $df = 40$, $p < .05$, $GFI = .92$, $CFI = .88$, $NNFI = .84$, $SRMR = .05$, and $RMSEA = .09$. The alternative model with equal factor loadings (MD1) provided a reasonable fit to the data, $\chi^2 = 195.06$, $df = 47$, $p < .05$, $GFI = .92$, $CFI = .89$, $NNFI = .89$, $SRMR = .06$, and $RMSEA = .08$, and the change in model fit from the freely estimated model was non-significant, $\Delta\chi^2 = 5.03$, $\Delta df = 7$, ns. Hence, measurement invariance across the two age groups for autonomy-granting was established.

The results for measurement invariance for behavioural control are presented in Table 5. The unconstrained model (ME1) in which factor loadings, factor correlations

Table 5

Measurement Invariance of Behavioural Control across 12-year-old Adolescents (N=250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
ME1: Freely Estimated	5.38	4				1.00	1.00	.99	.00	.03
MF1: Factor Loading Invariant	5.84	7	ME1 vs MF1	0.46	3	1.00	1.00	1.00	.01	.00

Table 6

Measurement Invariance of Attachment across 12-year-old Adolescents (N= 250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MG1: Freely Estimated	1821.77	700				.74	.83	.81	.07	.06
MH1: Factor Loading Invariant	1895.69	727	MG1 vs MH1	73.92*	27	.73	.82	.81	.08	.06
MH2: Factor Loading Invariant	1853.89	723	MG1 vs MH2	32.12	23	.74	.82	.82	.08	.06

* $p < .05$

and error variances were freely estimated provided an excellent fit to the data, $\chi^2 = 5.38$, $df = 4$, $p < .05$, $GFI = 1.00$, $CFI = 1.00$, $NNFI = .99$, $SRMR = .00$, and $RMSEA = .03$. The more constrained model (MF1), with equal factor loadings, was next fit to the data. This equal factor loadings model (MF1) also provided an excellent fit to the data, $\chi^2 = 5.84$, $df = 7$, $p < .05$, $GFI = 1.00$, $CFI = 1.00$, $NNFI = 1.00$, $SRMR = .01$, and $RMSEA = .00$. Moreover, the change in model fit from the freely estimated model to the equal factor loadings model was non-significant, $\Delta\chi^2 = 0.46$, $\Delta df = 3$, ns. Hence, measurement invariance across the two age groups for behavioural control was established.

Table 6 presents the result of invariance testing for the attachment variable across the two age groups. MG1 is the unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated. This model, which served as a baseline model, provided a fit of $\chi^2 = 1821.77$, $df = 700$, $p < .05$, $GFI = .74$, $CFI = .83$, $NNFI = .81$, $SRMR = .07$, and $RMSEA = .06$. These less-than-satisfactory fit indices for this model are most likely due to the large number of items in the analysis (28) and the analysis being conducted at the item-level. The next model with equal factor loadings

(MH1) was estimated and compared with the baseline model. MH1 was a poorer model compared to MG1, $\Delta\chi^2= 73.92$ $\Delta df= 27$, $p<.05$. Hence, there was no equality of factor loadings across the two groups, which indicates that there was no measurement invariance across the two age groups for the attachment variable.

However, as the practical fit indices were again very similar between the constrained and unconstrained models, I tested for partial measurement invariance. The attachment item with the largest MI ("I wish I had a different father") was thus first eliminated. However, invariance was not established with this item eliminated. Next, the item with the next largest MI ("I trust him") was eliminated but again, invariance was not found. The model was then re-tested by eliminating the item with the next largest MI ("When I am angry about something, he tries to understand"). Invariance was still not found. Lastly, when a fourth item with the next largest MI ("I get upset easily with him") was eliminated, invariance was established. The unconstrained model (MG1) was then compared with the equal factor loadings model with four items eliminated (MH2). MH2 provided a fit of $\chi^2= 1853.89$, $df=723$, $p<.05$, $GFI= .74$, $CFI= .82$, $NNFI=.82$, $SRMR= .08$, and $RMSEA=.06$; these indices again possibly reflecting the large number of items in the analysis. More importantly, the change in model fit from the completely unconstrained model to the equal factor loadings model was not significant, $\Delta\chi^2=32.12$, $\Delta df= 23$, ns. Therefore, partial measurement invariance for attachment across the two age groups was established.

Table 7

Measurement Invariance of Satisfaction across 12-year-old Adolescents (N= 250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MI1: Freely Estimated	28.68	10				.99	.99	.98	.01	.06
MJ1: Factor Loading Invariant	34.11	14	MI1 vs MJ1	5.43	4	.98	.99	.98	.03	.05

Table 7 presents the result of invariance testing for the satisfaction variable across the two age groups. MI1, an unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated, was fit to the data. This model, which served as the baseline model, provided a fit of $\chi^2= 28.68$, $df= 10$, $p<.05$, $GFI=.99$, $CFI=.99$, $NNFI=.98$, $SRMR=.01$, and $RMSEA=.06$. The next model (MJ1) with equal factor loadings provided a good fit to the data, $\chi^2= 34.11$, $df= 14$, $p<.05$, $GFI=.98$, $CFI=.99$, $NNFI=.98$, $SRMR=.03$, and $RMSEA=.05$ and the change in model fit compared to the freely estimated model was non-significant, $\Delta\chi^2= 5.43$, $\Delta df= 4$, ns. Hence, measurement invariance across the two age groups for satisfaction was established.

Father-reported data

Invariance across the two age groups for warmth, autonomy-granting, behavioural control, attachment, and satisfaction were next tested using the father-reported data. Table 8 to Table 12 present the results of these analyses.

Table 8

Measurement Invariance of Warmth across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MA3: Freely Estimated	108.21	40				.92	.94	.91	.06	.07
MB3: Factor Loading Invariant	120.85	47	MA3 vs MB3	12.64	7	.91	.93	.92	.08	.06

For the warmth variable, the freely estimated model (MA3) fit the data well, $\chi^2=108.21$, $df=40$, $p<.05$, $GFI=.92$, $CFI=.94$, $NNFI=.91$, $SRMR=.06$ and $RMSEA=.07$ (refer Table 8). Factor loadings were next constrained to be equal across groups and this model (MB3) was compared with MA3. The fit for MB3 was reasonably good $\chi^2=120.85$, $df=47$, $p<.05$, $GFI=.91$, $CFI=.93$, $NNFI=.92$, $SRMR=.08$ and $RMSEA=.06$ and there was a non-significant change in model fit, $\Delta\chi^2=12.64$, $\Delta df=7$, ns, when compared to MA3. Hence, measurement invariance for warmth across fathers of the 12-year-olds and fathers of the 15-year-olds was established.

Table 9 presents the results of invariance testing for the autonomy-granting

Table 9

Measurement Invariance of Autonomy-Granting across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MC3: Freely Estimated	130.96	40				.92	.91	.88	.06	.08
MD3: Factor Loading Invariant	143.62	47	MC3 vs MD3	12.66	7	.91	.91	.89	.08	.07

variable. The unconstrained model (MC3) provided a reasonable fit to the data, $\chi^2=130.96$, $df= 40$, $p<.05$, $GFI=.92$, $CFI=.91$, $NNFI=.88$, $SRMR= .06$ and $RMSEA=.08$, while the more constrained model (MD3)with equal factor loadings provided a fit of $\chi^2= 143.62$, $df= 47$, $p<.05$, $GFI=.91$, $CFI=.91$, $NNFI=.89$, $SRMR= .08$ and $RMSEA=.07$. The change in model fit between the two models was non-significant, $\Delta\chi^2= 12.66$, $\Delta df= 7$, ns. Hence, measurement invariance across the fathers of the two adolescent age groups for autonomy-granting was established.

The results of the analysis of measurement invariance for behavioural control are presented in Table 10. An unconstrained model (ME3) in which factor loadings, factor correlations, and error variances were freely estimated was fit to the data. This model, which served as the baseline model, provided a good fit to the data, $\chi^2= 12.89$, $df= 4$, $p<.05$, $GFI= .99$, $CFI= .97$, $NNFI=.91$, $SRMR= .03$, and $RMSEA=.07$. The more constrained model (MF3), in which factor loadings were constrained to be equal, was next fit to the data. This equal factor loadings model (MF3) also provided a good fit to the data, $\chi^2= 17.27$ $df= 7$, $p<.05$, $GFI= .98$, $CFI= .97$, $NNFI=.94$, $SRMR= .05$, and $RMSEA=.06$. More importantly, the change in model fit from the freely estimated

Table 10

Measurement Invariance of Behavioural Control across Fathers of 12-year-old Adolescents (N= 209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
ME3: Freely Estimated	12.89	4				.99	.97	.91	.03	.07
MF3: Factor Loading Invariant	17.27	7	ME3 vs MF3	4.38	3	.98	.97	.94	.05	.06

Table 11

Measurement Invariance of Attachment across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MG3: Freely Estimated	2153.59	700				.64	.69	.67	.09	.07
MH3: Factor Loading Invariant	2184.13	727	MG3 vs MH3	30.54	27	.64	.69	.68	.10	.07

model to the equal factor loadings model was non-significant, $\Delta\chi^2= 4.38$, $\Delta df= 3$, ns.

Hence, measurement invariance across fathers of the two adolescents' age groups for behavioural control was established.

For the attachment variable, the unconstrained model (MG3) in which factor loadings, factor correlations, and error variances were freely estimated provided a poor fit; $\chi^2= 2153.59$, $df= 700$, $p<.05$, $GFI=.64$, $CFI=.69$, $NNFI=.67$, $SRMR= .09$ and

Table 12

Measurement Invariance of Satisfaction across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MI3: Freely Estimated	7.67	10				.99	1.00	1.00	.01	.00
MJ3: Factor Loading Invariant	18.28	14	MI3 vs MJ3	10.61*	4	.98	1.00	1.00	.05	.03
MJ4: Factor Loading Invariant	12.77	13	MI3 vs MJ4	5.10	3	.99	1.00	1.00	.03	.00

* $p<.05$

RMSEA=.07 (refer Table 11). As with the adolescent-reported data, these poor fit indices for the attachment variable are most likely due to the large number of items (28) being used. The next model (MH3) with equal factor loadings was then tested and compared with the unconstrained model (MG3). The fit, not surprisingly given the large number of items, was not good, $\chi^2 = 2184.13$, $df = 727$, $p < .05$, GFI=.64, CFI=.69, NNFI=.68, SRMR= .10 and RMSEA=.07. However, the change in model fit due to this constrained model was found not to be significant, $\Delta\chi^2 = 30.54$, $\Delta df = 27$, ns. Therefore, measurement invariance across fathers of the two adolescent age groups for attachment was established.

Table 12 presents the results of invariance testing for the satisfaction variable across fathers of the two adolescent age groups. MI3 is the unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated. This model provided a good fit of $\chi^2 = 7.67$, $df = 10$, $p < .05$, GFI= .99, CFI= 1.00, NNFI=1.00, SRMR= .01, and RMSEA=.00. The next model (MJ3), with equal factor loadings, also provided a good fit; $\chi^2 = 18.28$, $df = 14$, $p < .05$, GFI=.98, CFI=1.00, NNFI=1.00, SRMR= .05 and RMSEA=.03 , but there was a significant change in model fit when the two models were compared , $\Delta\chi^2 = 10.61$, $\Delta df = 4$, $p < .05$. Hence, there was no equality of factor loadings across the two groups, which indicates that there was no measurement invariance across fathers of the two adolescent age groups for the satisfaction variable.

From the very similar practical fit indices between the constrained and unconstrained models, I proceeded to test for partial measurement invariance. The item with the largest MI ("My child feels that being a child to me has been an enjoyable

experience") was first eliminated: However, even with this item eliminated, invariance was not found. The item with the next largest MI ("All in all, I think my child can say he/she gets along well with me") was then eliminated. After this item was dropped, invariance was established. Model MJ4, in which factor loadings were constrained to be equal (but with two items eliminated), provided a good fit; $\chi^2 = 12.77$, $df = 13$, $p < .05$, GFI=.99, CFI=1.00, NNFI= 1.00, SRMR= .03 and RMSEA=.00 (refer Table 12) and the change in model fit from the unconstrained model to this equal factor loadings model was non-significant, $\Delta\chi^2 = 5.10$, $\Delta df = 3$, ns. Therefore, partial measurement invariance for satisfaction across fathers of the two adolescent age groups was established.

Summary of invariance testing. Overall, the results on testing invariance across two age groups using adolescents' self-reported data at the initial stage showed that there was measurement invariance for all the variables except warmth and attachment. However, after eliminating items from their respective measures as determined by the modification indices, invariance for these two variables was found. This latter step of establishing at least partial invariance is particularly important to enable further analyses to test the structural hypotheses. For the father-reported data, warmth, autonomy-granting, behavioural control and attachment were found to be invariant across the age groups. For satisfaction, there was partial measurement invariance.

Testing Measurement Invariance across Source of Report

The following analyses tested invariance across source of report, i.e., adolescents' report versus fathers' report.

Younger adolescent group

Table 13 to Table 17 present the invariance findings for adolescents aged 12 and their fathers. For warmth (see Table 13), the unconstrained model (MA5) in which factor loadings, factor correlations, and error variances were freely estimated across source of report, was first fit to the data. This model provided a reasonably good fit to the data, $\chi^2 = 128.32$, $df = 40$, $p < .05$, GFI = .95, CFI = .93, NNFI = .91, SRMR = .04 and RMSEA = .07 (see Table 13). The more constrained model (MB5), in which factor loadings were constrained to be equal, was next fit to the data. This equal factor loadings model (MB5) also provided a reasonably good fit to the data, $\chi^2 = 130.46$, $df = 47$, $p < .05$, GFI = .95, CFI = .94, NNFI = .92, SRMR = .05 and RMSEA = .06, and the change in model fit compared to the freely estimated model was non-significant, $\Delta\chi^2 = 2.14$, $\Delta df = 7$, ns. Hence, measurement invariance across the two sources of report for

Table 13

Measurement Invariance of Warmth across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MA5: Freely Estimated	128.32	40				.95	.93	.91	.04	.07
MB5: Factor Loading Invariant	130.46	47	MA5 vs MB5	2.14	7	.95	.94	.92	.05	.06

Table 14

Measurement Invariance of Autonomy-Granting across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MC5: Freely Estimated	162.62	40				.93	.88	.84	.06	.08
MD5: Factor Loading Invariant	167.33	47	MC5 vs MD5	4.71	7	.93	.89	.86	.07	.08

warmth was established.

For autonomy-granting, the freely estimated model (MC5) provided a moderate fit to the data, $\chi^2=162.62$, $df=40$, $p<.05$, $GFI=.93$, $CFI=.88$, $NNFI=.84$, $SRMR=.06$ and $RMSEA=.08$ (see Table 14). The next model (MD5) with equal factor loadings provided a satisfactory fit; $\chi^2=167.33$, $df=47$, $p<.05$, $GFI=.93$, $CFI=.89$, $NNFI=.86$, $SRMR=.07$ and $RMSEA=.08$. More importantly, the chi-square difference between MC5 and MD5 was non-significant, $\Delta\chi^2=4.83$, $\Delta df=3$, ns. Therefore, measurement invariance across the two different sources of report for autonomy-granting was established.

The results of the measurement invariance analyses for behavioural control are

Table 15

Measurement Invariance of Behavioural Control across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
ME5: Freely Estimated	13.21	4				.98	.97	.91	.04	.07
MF5: Factor Loading Invariant	18.04	7	ME5 vs MF5	4.83	3	.97	.97	.94	.06	.06

presented in Table 15. The unconstrained model (ME5) in which factor loadings, factor correlations and error variances were freely estimated provided a good fit to the data, $\chi^2 = 13.21$, $df = 4$, $p < .05$, $GFI = .98$, $CFI = .98$, $NNFI = .91$, $SRMR = .04$, and $RMSEA = .07$. The more constrained model (MF5), in which factor loadings were constrained to be equal, was next fit to the data. This equal factor loadings model (MF5) also provided a good fit to the data, $\chi^2 = 18.04$, $df = 7$, $p < .05$, $GFI = .97$, $CFI = .97$, $NNFI = .94$, $SRMR = .06$, and $RMSEA = .06$. Moreover, the change in model fit from the equal factor loadings model to the freely estimated model was non-significant, $\Delta\chi^2 = 4.83$, $\Delta df = 3$, ns. Hence, measurement invariance across the two sources of report for behavioural control was established.

Table 16 presents the results of invariance testing for the attachment variable across the two sources of report. MG5, the unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated, provided a fit of $\chi^2 = 1977.64$, $df = 700$, $p < .05$, $GFI = .62$, $CFI = .74$, $NNFI = .72$, $SRMR = .11$, and $RMSEA = .06$. Once again, the large number of items examined (28) may have contributed to the less-than-satisfactory fit indices. The next model (MH5) with equal factor loadings was estimated and compared with the baseline model. This equal loadings model MH5 also did not provide a good fit to the data; $\chi^2 = 2035.83$, $df = 727$, $p < .05$, $GFI = .62$, $CFI = .74$, $NNFI = .73$, $SRMR = .13$, and $RMSEA = .06$ and it also showed a significant change in model fit compared to MG5, $\Delta\chi^2 = 58.19$, $\Delta df = 27$, $p < .05$. Hence, there was a lack of invariance across the two sources of report for the attachment variable.

Table 16

Measurement Invariance of Attachment across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MG5: Freely Estimated	1977.64	700				.62	.74	.72	.11	.06
MH5: Factor Loading Invariant	2035.83	727	MG5 vs MH5	58.19*	27	.62	.74	.73	.13	.06
MH6: Factor Loading Invariant	2015.72	726	MG5 vs MH6	38.08	26	.62	.74	.73	.12	.06

* $p < .05$

I followed up on the similar practical fit indices to see if the lack of invariance may be trivial and due to one or a few items.

The item with the largest MI ("I don't know whether I can depend on him") was thus eliminated in the first round of re-testing. However, invariance was not established. Next, the item with the next largest MI ("When I am angry about something, he tries to understand") was eliminated and finally invariance was established. The unconstrained model (MG5) was compared with the equal factor loadings model with these two items eliminated (MH6). The fit of model MH6 was not satisfactory: $\chi^2 = 2015.72$, $df = 726$, $p < .05$, $GFI = .62$, $CFI = .74$, $NNFI = .73$, $SRMR = .12$ and $RMSEA = .06$ (refer Table 16).

This however may be due to the large number of items still in the analyses (26). More importantly for present purposes, the change in model fit from the unconstrained model to the equal factor loadings model was non-significant, $\Delta\chi^2 = 38.08$, $\Delta df = 26$, ns.

Therefore, partial measurement invariance for attachment across the two sources of report was established.

Table 17

Measurement Invariance of Satisfaction across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MI5: Freely Estimated	23.96	10				.99	.99	.98	.01	.06
MJ5: Factor Loading Invariant	27.56	14	MI5 vs MJ5	3.60	4	.99	.99	.99	.04	.05

Table 17 presents the result of invariance testing for the satisfaction variable across the two sources of report. In MI5, an unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated was fit to the data. This model, which served as a baseline model, provided a good fit; $\chi^2= 23.96$, $df= 10$, $p<.05$, $GFI= .99$, $CFI= .99$, $NNFI=.98$, $SRMR= .01$, and $RMSEA=.06$. The next model (MJ5) with factor loadings constrained to be equal also provided a good fit to the data, $\chi^2= 27.56$, $df= 14$, $p<.05$, $GFI= .99$, $CFI= .99$, $NNFI=.99$, $SRMR= .04$, and $RMSEA=.05$ and the change in model fit from the freely estimated model was non-significant, $\Delta\chi^2= 3.60$, $\Delta df= 4$, ns. Hence, measurement invariance across the two sources of report for satisfaction was established.

Older adolescent group

The next set of analyses, results of which are presented in Table 18 to Table 22, tested measurement invariance across adolescents' report and fathers' report for the 15-year-olds. For warmth, the unconstrained model (MA7) provided a reasonable fit to the

Table 18

Measurement Invariance of Warmth across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MA7: Freely Estimated	174.18	40				.92	.92	.89	.06	.09
MB7: Factor Loading Invariant	177.53	47	MA7 vs MB7	3.35	7	.92	.92	.91	.07	.08

data, $\chi^2 = 174.18$, $df = 40$, $p < .05$, $GFI = .92$, $CFI = .92$, $NNFI = .89$, $SRMR = .06$ and $RMSEA = .09$ (see Table 18). The more constrained equal factor loadings model (MB7) also provided a reasonable fit to the data, $\chi^2 = 177.53$, $df = 47$, $p < .05$, $GFI = .92$, $CFI = .92$, $NNFI = .91$, $SRMR = .07$ and $RMSEA = .08$. However, the change in model fit from the unconstrained model to a more constrained model was non-significant, $\Delta\chi^2 = 3.35$, $\Delta df = 7$, ns. Hence, measurement invariance across the two reports for warmth was established.

For autonomy-granting, the unconstrained model (MC7) provided a fit of $\chi^2 = 158.37$, $df = 40$, $p < .05$, $GFI = .92$, $CFI = .91$, $NNFI = .87$, $SRMR = .06$ and $RMSEA = .08$ (see Table 19). A more parsimonious model in which factor loadings was constrained to be equal (MD7) was then estimated and compared with the freely estimated model. The fit of this model was acceptable, $\chi^2 = 175.61$, $df = 47$, $p < .05$, $GFI = .90$, $CFI = .90$, $NNFI = .88$, $SRMR = .09$ and $RMSEA = .08$. However, the change in model fit across the two models was significant, $\Delta\chi^2 = 17.24$, $\Delta df = 7$, $p < .05$. Hence, measurement invariance across the two sources of report for autonomy-granting was not established.

Table 19

Measurement Invariance of Autonomy-Granting across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MC7: Freely Estimated	158.37	40				.92	.91	.87	.06	.08
MD7: Factor Loading Invariant	175.61	47	MC7 vs MD7	17.24*	7	.90	.90	.88	.09	.08
MD8: Factor Loading Invariant	170.05	46	MC7 vs MD8	11.68	6	.91	.90	.88	.08	.08

*p<.05

Following up on the possibility of partial measurement invariance, the item with the largest MI ("He likes to choose my own way of doing things") was eliminated.

Invariance was established once this item was eliminated. The equal factor loadings

model with this one item eliminated (MD8) provided a moderate fit; $\chi^2=170.05$, df=

46, p<.05, GFI=.91, CFI=.90, NNFI=.88, SRMR=.08 and RMSEA=.08 (refer Table 19)

and the change in model fit from the unconstrained model was non-significant,

$\Delta\chi^2=11.68$, Δ df= 6, ns. Therefore, partial measurement invariance for autonomy-

granting across the two sources of report was established.

Table 20

Measurement Invariance of Behavioural Control across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
ME7: Freely Estimated	5.06	4				.99	1.00	.99	.03	.02
MF7: Factor Loading Invariant	5.49	7	ME7 vs MF7	0.43	3	.99	1.00	1.00	.03	.00

The results for measurement invariance for behavioural control are presented in Table 20. The unconstrained model (ME7) provided a good fit to the data, $\chi^2 = 5.06$, $df = 4$, $p < .05$, GFI = .99, CFI = 1.00, NNFI = .99, SRMR = .03, and RMSEA = .02. The equal factor loadings model (MF7) also provided a good fit to the data, $\chi^2 = 5.49$, $df = 7$, $p < .05$, GFI = .99, CFI = 1.00, NNFI = 1.00, SRMR = .03, and RMSEA = .00. Importantly, the difference in model fit between the equal factor loadings model and the freely estimated model was non-significant, $\Delta\chi^2 = 0.43$, $\Delta df = 3$, ns. Hence, measurement invariance across the two sources of report for behavioural control was established.

Table 21 presents the result of invariance testing for the attachment variable across the two sources of report. In MG7, an unconstrained model in which factor loadings, factor correlations, and error variances were freely estimated was fit to the data. This model, which served as a baseline model, provided a fit of $\chi^2 = 1997.73$, $df = 700$, $p < .05$, GFI = .64, CFI = .79, NNFI = .77, SRMR = .09, and RMSEA = .07. These

Table 21

Measurement Invariance of Attachment across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MG7: Freely Estimated	1997.73	700				.64	.79	.77	.09	.07
MH7: Factor Loading Invariant	2065.79	727	MG7 vs MH7	68.06*	27	.63	.78	.77	.12	.06
MH8: Factor Loading Invariant	2029.41	722	MG7 vs MH8	31.68	22	.64	.79	.78	.11	.06

* $p < .05$

poor fit indices, as previously suggested, are most likely due to the large number of items (28) in the analysis. The next model (MH7) with equal factor loadings was estimated and compared with the baseline model. MH7, not surprisingly given its large number of items, did not provide a satisfactory fit; $\chi^2 = 2065.79$, $df = 727$, $p < .05$, $GFI = .63$, $CFI = .78$, $NNFI = .77$, $SRMR = .12$, and $RMSEA = .06$ and also showed a significant decrease in model fit compared to MG7, $\Delta\chi^2 = 68.06$, $\Delta df = 27$, $p < .05$. Hence, there was a lack of invariance across the two sources of report for the attachment variable.

To test for partial measurement invariance, the item with the largest MI ("He trusts my judgement") was first eliminated. However, invariance was not found with just this item eliminated. The item with the next largest MI ("I feel that he does not understand me") was then eliminated but, invariance was again not found. I then eliminated the item with next largest MI ("I don't get much attention from him") but there was still no invariance. It was only with the elimination of two more items ("If he knows something is bothering me, he asks me about it" and "He respects my feelings") that invariance was finally established. The factor loadings invariant model less the eliminated items (MH8) was then compared with the unconstrained model (MG7). Model MH8, provided a poor fit, $\chi^2 = 2029.41$, $df = 722$, $p < .05$, $GFI = .64$, $CFI = .79$, $NNFI = .78$, $SRMR = .11$, and $RMSEA = .06$, probably due to the large number of items, but it did not yield a significant change in model fit when compared to the unconstrained model, $\Delta\chi^2 = 31.68$, $\Delta df = 22$, ns. Therefore, partial measurement invariance for attachment across the two sources of report was established.

Table 22

Measurement Invariance of Satisfaction across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MI7: Freely Estimated	12.39	10				.99	1.00	1.00	.01	.02
MJ7: Factor Loading Invariant	16.93	14	MI7 vs MJ7	4.54	4	.99	1.00	1.00	.04	.02

Table 22 presents the result of invariance testing for the satisfaction variable across the two sources of report. The unconstrained model (MI7) provided a good fit; $\chi^2 = 12.39$, $df = 10$, $p < .05$, $GFI = .99$, $CFI = 1.00$, $NNFI = 1.00$, $SRMR = .01$, and $RMSEA = .02$. Likewise, the next model (MJ7) with equal factor loadings also provided a good fit, $\chi^2 = 16.93$, $df = 14$, $p < .05$, $GFI = .99$, $CFI = 1.00$, $NNFI = 1.00$, $SRMR = .04$, and $RMSEA = .02$ and the change in model fit over the freely estimated model was non-significant, $\Delta\chi^2 = 4.54$, $\Delta df = 4$, ns. Hence, measurement invariance across the two sources of report for satisfaction was established.

Summary of invariance testing across source of report. For the 12-year-olds, tests of invariance showed that there was measurement invariance across adolescents' report and fathers' report on warmth, autonomy-granting, behavioural control, and satisfaction. However, only partial measurement invariance was established for the attachment variable across the sources of report. As for the 15-year-olds, the initial analyses showed that all the variables except autonomy-granting and attachment showed invariance across sources of report. With the elimination of one or more items from

their respective measures, partial measurement invariance was established for these two variables.

Mean, Standard Deviation and Intercorrelations

Table 23 presents the means, standard deviations, and intercorrelations of all the variables in Model 1 as reported by adolescents using only items that were invariant across the two adolescent groups. Table 23 shows that all the variables were positively correlated for the 15-year-old adolescents. The 12-year-olds provide a similar finding (see upper triangle of the table) except that behavioural control was not correlated with any other variable. Looking at the means, father warmth, father autonomy-granting, attachment to father, and satisfaction with the father-adolescent relationship appear

Table 23

Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Adolescent-reported Data for Model 1.

Variables	M	SD	1	2	3	4	5
12 years old^a							
1. Warmth	2.43	.78	1.00				
2. Autonomy granting	2.48	.76	.69**	1.00			
3. Behavioural control	3.38	.91	-.07	.05	1.00		
4. Attachment	2.51	.70	.73**	.69**	.03	1.00	
5. Satisfaction	1.88	.85	.62**	.58**	.01	.76**	1.00
15 years old^b							
1. Warmth	2.73	.74	1.00				
2. Autonomy granting	2.64	.74	.78**	1.00			
3. Behavioural control	3.16	.85	.15*	.28**	1.00		
4. Attachment	2.82	.65	.79**	.76**	.28**	1.00	
5. Satisfaction	2.26	.89	.70**	.71**	.19**	.78**	1.00

Note: ^an = 250, ^bn = 251

*p<0.05, **p<0.01

higher for the 15-year-olds than the 12-year-olds, while behavioural control showed the opposite result. The pattern of correlations and means is consistent with existing literature, providing some evidence of the validity of applying the measures to the Singapore context.

Table 24 presents the means, standard deviations, and intercorrelations of the same variables, but reported by fathers of the 12-year-old and 15-year-old adolescents. Interestingly, behavioural control was again not correlated with warmth, autonomy-granting, attachment, or satisfaction, but this time for 15-year-olds. For both age groups, behavioural control was not related to attachment and satisfaction. Moreover, behavioural control was not related to warmth for fathers of the 15-year-olds. As with the adolescent reports, fathers of the 15-year-olds appear to be higher in warmth

Table 24

Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Father-reported Data for Model 1.

Variables	M	SD	1	2	3	4	5
12 years old^a							
1. Warmth	2.15	.57	1.00				
2. Autonomy granting	2.11	.53	.68**	1.00			
3. Behavioural control	3.40	.74	-.15*	-.16*	1.00		
4. Attachment	2.25	.46	.50**	.53**	.02	1.00	
5. Satisfaction	1.91	.58	.54**	.49**	-.09	.62**	1.00
15 years old^b							
1. Warmth	2.20	.53	1.00				
2. Autonomy granting	2.18	.53	.74**	1.00			
3. Behavioural control	3.26	.70	-.07	-.09	1.00		
4. Attachment	2.41	.50	.69**	.66**	.09	1.00	
5. Satisfaction	2.13	.65	.59**	.60**	-.01	.73**	1.00

Note: ^an = 209, ^bn = 195

*p<0.05, **p<0.01

and autonomy-granting but lower behavioural control, as well as to report greater father-adolescent attachment and satisfaction with the father-adolescent relationship than fathers of the 12-year-olds.

The Structural Model

In this part of the analysis, the model that linked warmth, autonomy-granting, and behavioural control with attachment and satisfaction was examined. Analyses were conducted for the adolescents' reports as well as for the fathers' reports. Instead of using an item-level approach, analyses were conducted at the parcel level for 2 reasons: First, invariance (or partial invariance for some variables) had already been established for all the variables across the age groups, which indicate that the measurement items were equivalent across age groups and thus can be grouped in a similar fashion. Second, fit indices at the item-level analysis would not be tenable, basically due to the large number of items in the entire model.

I conducted multiple-group SEM analyses to test if the structural paths would be the same or different for the two adolescent age groups as well as their fathers. The model in which factor loadings were held invariant (since such had been found previously) but structural paths freely estimated (M1) for the 12-year-olds and the 15-year-olds reasonably accounted for the data, $\chi^2 = 530.65$, $df = 267$, $p < .05$, GFI = .89, CFI = .96, NNFI = .95, SRMR = .06 and RMSEA = .04 (refer Table 25). I followed up with a model in which both the factor loadings and structural paths were held to be invariant (M2). A comparison of models M1 and M2 found a significant change in model fit, $\Delta\chi^2 = 14.07$, $\Delta df = 6$, $p < .05$. I then tested a “partially invariant” model,

Table 25

Testing Structural Model based on Adolescents' Reported Data

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
M1: Factor loadings invariant; structural paths freely estimated	530.65	267				.89	.96	.95	.06	.04
M2: Factor loadings and structural paths invariant	544.72	273	M1 vs M2	14.07*	6	.89	.96	.95	.06	.05
M3: Factor loadings invariant; structural paths for warmth and control invariant; structural path for autonomy-granting freely estimated	539.00	271	M1 vs M3	8.35	4	.89	.96	.95	.06	.05

*p<.05

in which all the factor loadings but only the structural paths involving warmth and control were held invariant, while the structural path for autonomy-granting was freely estimated (M3). This model derives from existing theory and findings that autonomy-related behaviors (compared to warmth and control behaviors) are especially susceptible to change during adolescence, since there is common recognition that the adolescent's developmental task is to form an autonomous identity. This partially invariant model (M3) provided a fit of $\chi^2 = 539.00$, $df = 271$, $p < .05$, $GFI = .89$, $CFI = .96$, $NNFI = .95$, $SRMR = .06$ and $RMSEA = .05$. A comparison between M1 and M3 showed that the change in model fit was non-significant, $\Delta\chi^2 = 8.35$, $\Delta df = 4$, ns. Thus, on the basis of parsimony, M3 was selected as the model that best fit the data. Based on the results

from model M3, warmth was directly linked to attachment ($\beta = .88, p < .05$) and satisfaction ($\beta = .84, p < .05$) for both age groups (see Figure 1). The path coefficients for warmth on the two aspects of relationship are large in size, indicating the importance of warmth to these two aspects of the father-adolescent relationship. Similarly, behavioural control was positively related to attachment, ($\beta = .18, p < .05$) and satisfaction ($\beta = .13, p < .05$), but unlike for warmth, the effects here were rather small in size. On the other hand, autonomy-granting was not related to attachment ($\beta = .02, ns$) or satisfaction ($\beta = .14, ns$) for the 12-year-olds and to attachment ($\beta = .05, ns$) or satisfaction ($\beta = .04, ns$) for the 15-year-olds. Warmth, autonomy-granting, and behavioural control accounted for 75% and 84% of the variance in attachment for the 12-year-olds and the 15-year-olds respectively, and 56% and 67% of the variance in satisfaction for the same age groups respectively.

Based on these results, hypotheses 1a and 1b were only supported for warmth and behavioural control, in that these variables were positively related to attachment and satisfaction. While the paths for warmth and behavioural control to attachment and satisfaction were equal across the two groups, the paths for autonomy-granting to attachment and satisfaction differed for the two age groups, although they did not reach statistical significance. Therefore, hypothesis 1c was only partially supported as the links involving autonomy-granting with attachment and satisfaction for the two age groups differed in strength across the two age groups, although they did not reach statistical significance.

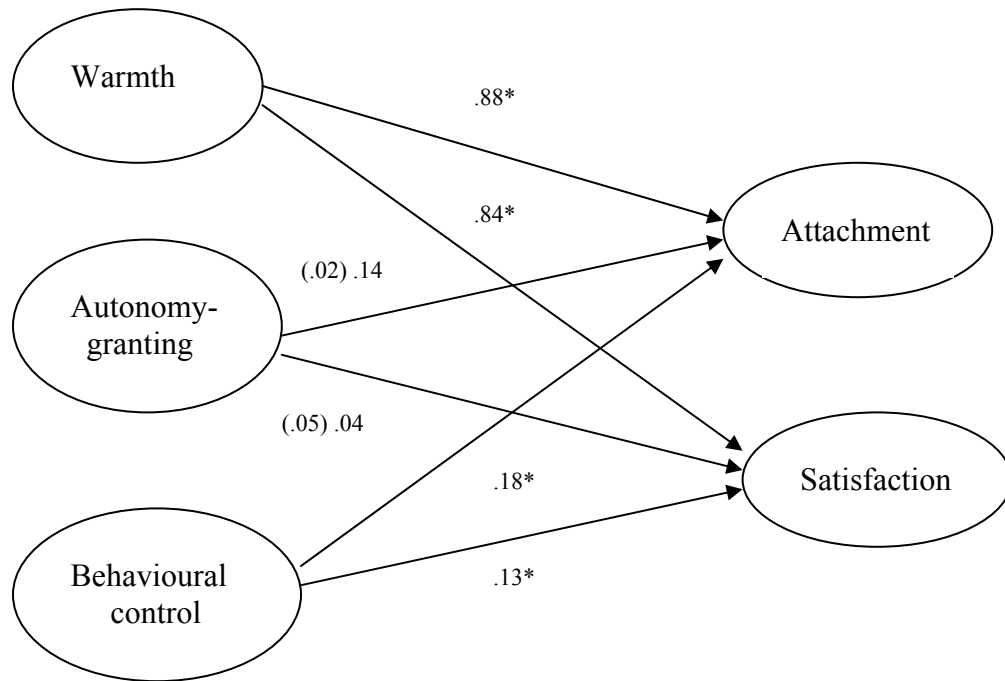


Figure 1 : Adolescent-reported data. Path coefficient for adolescent 12-year-olds and 15-year-olds for warmth and behavioural control to attachment and to satisfaction are the same while path coefficient for autonomy-granting-attachment and autonomy-granting-satisfaction for adolescent 12-year-olds appear inside parentheses and path coefficient for adolescent 15-year-olds appear outside parentheses; * $p < .05$

As for the father-reported data (see Figure 2), multiple group SEM analysis for fathers of the 12-year-olds and fathers of the 15-year-olds showed that the model in which factor loadings were held invariant and structural paths were freely estimated (M4) moderately accounted for the data, $\chi^2 = 525.06$, $df = 234$, $p < .05$, GFI = .88, CFI = .93, NNFI = .92, SRMR = .07 and RMSEA = .06 (refer Table 26). The alternative model, in which factor loadings and structural paths were both held to be invariant (M5), also provided a moderate fit, $\chi^2 = 533.20$, $df = 240$, $p < .05$, GFI = .88, CFI = .93, NNFI = .92, SRMR = .09 and RMSEA = .06. M5, however, did not yield any significant change in

Table 26

Testing Structural Model based on Fathers' Reported Data

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
M4: Factor loadings invariant; structural model freely estimated	525.06	234				.88	.93	.92	.07	.06
M5: Factor loadings and structural model invariant	533.20	240	M4 vs M5	8.14	6	.88	.93	.92	.09	.06

model fit compared with model M4, $\Delta\chi^2 = 8.14$, $\Delta df = 6$, ns. On the basis of parsimony, the model with both factor loadings and structural paths invariant was thus chosen to be the best-fitting model. Path coefficients from this model showed that warmth was significantly related to attachment ($\beta = .40$, $p < .05$) and satisfaction ($\beta = .39$, $p < .05$), as was autonomy-granting to attachment ($\beta = .39$, $p < .05$) and satisfaction ($\beta = .34$, $p < .05$). The effects of both warmth and autonomy-granting on attachment and satisfaction are rather modest in size.

Behavioural control on the other hand was related to attachment ($\beta = .18$, $p < .05$) but not satisfaction ($\beta = .05$, ns). Warmth, autonomy-granting, and behavioural control accounted for 53% and 58% of the variance in attachment for the 12-year-olds and the 15-year-olds respectively. The three same variables accounted for 51% and 45% of the variance in satisfaction for the two age groups respectively. Based on the results, hypotheses 1a was fully supported while hypothesis 1b was partially supported as only warmth and autonomy-granting (but not behavioural control) were related to

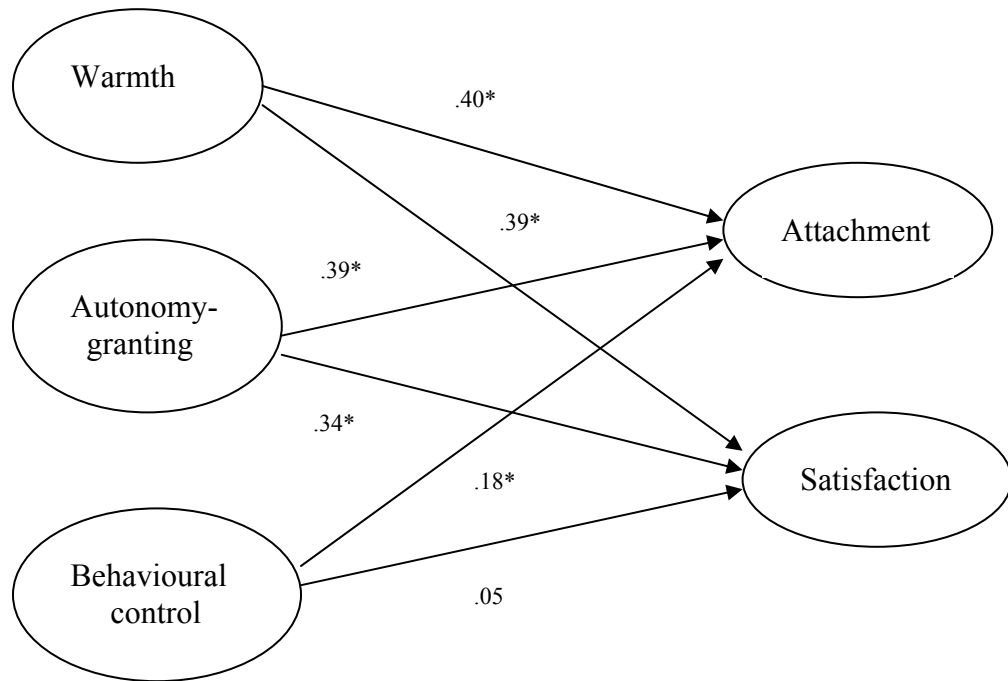


Figure 2 : Father-reported data. Path coefficient for fathers of the 12-year-olds and path coefficient for fathers of the 15-year-olds are the same; * $p < .05$

satisfaction. As all the paths were found to be the same for fathers of the two age groups, hypothesis 1c was therefore not supported.

Summary. In summary, for the adolescent-reported data, warmth and behavioural control were found to be positively related to attachment and satisfaction. These paths were found to be invariant across the two age groups. However, the paths from autonomy-granting to attachment and to satisfaction tended to differ for the two age groups, although they did not reach statistical significance. For the father-reported data, all the paths were found to be the same (invariant). Warmth, autonomy-granting, and behavioural control were found to be positively related to attachment, but only warmth and autonomy-granting were positively related to satisfaction.

MODEL 2

Preliminary Analysis

Testing Measurement Invariance across Age Groups

Adolescent-reported data

Following the procedures and sequence of analyses adopted for the preliminary analyses in Model 1, I first tested for invariance across the two adolescent age groups for involvement and strictness using the adolescent-reported data. Results for the involvement variable are presented in Table 27.

The freely estimated model (MK1) provided a fit of, $\chi^2 = 87.35$, $df = 18$, $p < .05$, $GFI = .95$, $CFI = .91$, $NNFI = .84$, $SRMR = .05$ and $RMSEA = .09$. The alternative model whereby factor loadings were constrained to be equal across groups (ML1) provided a fit of $\chi^2 = 103.62$, $df = 23$, $p < .05$, $GFI = .94$, $CFI = .89$, $NNFI = .86$, $SRMR = .08$ and $RMSEA = .08$. However, the change in model fit here was significant, $\Delta\chi^2 = 16.27$,

Table 27

Measurement Invariance of Involvement across 12-year-old Adolescents (N= 250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MK1: Freely Estimated	87.35	18				.95	.91	.84	.05	.09
ML1: Factor Loading Invariant	103.62	23	MK1 vs ML1	16.27*	5	.94	.89	.86	.08	.08
ML2: Factor Loading Invariant	87.89	21	MK1 vs ML2	0.54	3	.95	.91	.87	.05	.08

* $p < .05$

$\Delta df = 5$, $p < .05$. Hence, measurement invariance across two age groups for involvement was not established.

To test for partial measurement invariance, I dropped the item with the largest MI ("When I get a poor grade in school, he encourages me to try harder"). However, invariance was still not found. The item with the next largest MI ("When I get a good grade in school, he praises me") was then eliminated. Finally, measurement invariance was established. The equal loadings model (less the two eliminated items) (ML2) was then compared to the unconstrained model (MK1). ML2 provided a fit of $\chi^2 = 87.89$, $df = 21$, $p < .05$, $GFI = .95$, $CFI = .91$, $NNFI = .87$, $SRMR = .05$ and $RMSEA = .08$ (refer Table 27) and the change in model fit from the completely unconstrained model to the equal factor loadings model was non-significant, $\Delta\chi^2 = 0.54$, $\Delta df = 3$, ns. Therefore, partial measurement invariance for involvement across the two age groups was established.

Table 28 presents the result of invariance testing for the strictness variable across two age groups. The unconstrained model (MM1) provided a fit of $\chi^2 = 253.16$, $df = 18$, $p < .05$, $GFI = .82$, $CFI = .76$, $NNFI = .60$, $SRMR = .10$, and $RMSEA = .16$. The next model (MN1) with equal factor loadings provided a fit of $\chi^2 = 256.22$, $df = 23$, $p < .05$,

Table 28

Measurement Invariance of Strictness across 12-year-old Adolescents (N= 250) and 15-year-old Adolescents (N=251)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MM1: Freely Estimated	253.16	18				.82	.76	.60	.10	.16
MN1: Factor Loading Invariant	256.22	23	MM1 vs MN1	3.06	5	.83	.76	.69	.11	.14

GFI= .83, CFI= .76, NNFI=.69, SRMR= .11, and RMSEA=.14. Although these fit indices were less than satisfactory, the change in model fit for this model from the freely estimated model was non-significant, $\Delta\chi^2= 3.06$, $\Delta df= 5$, ns. Hence, measurement invariance across the two age groups for strictness was established.

Father-reported data

Invariance across the two age groups for involvement and strictness was next tested using the father-reported data. Results are presented in Table 29 and Table 30. For involvement, the freely estimated model (MK3) fit the data reasonably well, $\chi^2= 76.97$, $df= 18$, $p<.05$, GFI= .94, CFI= .90, NNFI=.84, SRMR= .06 and RMSEA=.09 (see Table 29). Factor loadings were next constrained to be equal across groups and this model (ML3) was compared with MK3. ML3 only fit the data moderately well, $\chi^2= 90.74$, $df= 23$, $p<.05$, GFI= .93, CFI= .89, NNFI=.86, SRMR= .08 and RMSEA=.09 and there was a significant change in model fit between MK3 and ML3, $\Delta\chi^2= 13.77$,

Table 29

Measurement Invariance of Involvement across Fathers of 12-year-old Adolescents (N= 209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MK3: Freely Estimated	76.97	18				.94	.90	.84	.06	.09
ML3: Factor Loading Invariant	90.74	23	MK3 vs ML3	13.77*	5	.93	.89	.86	.08	.09
ML4: Factor Loading Invariant	85.13	22	MK3 vs ML4	8.16	4	.94	.90	.86	.07	.08

* $p<.05$

Table 30

Measurement Invariance of Strictness across Fathers of 12-year-old Adolescents (N=209) and Fathers of 15-year-old Adolescents (N=195).

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MM3: Freely Estimated	390.16	18				.69	.72	.53	.18	.23
MN3: Factor Loading Invariant	415.87	23	MM3 vs MN3	25.71*	5	.66	.70	.61	.15	.21
MN4: Factor Loading Invariant	398.85	22	MM3 vs MN4	8.69	4	.69	.71	.61	.16	.21

*p<.05

Δ df= 5, p<.05. Hence, there was a lack of invariance across the fathers' report on involvement. The data was reanalyzed by eliminating the item with the largest MI, ("I help this child with his/her schoolwork if there is something he/she doesn't understand"). Measurement invariance was established after this item was eliminated, $\Delta\chi^2=1.82$, Δ df= 3, ns. This final model ML4 provided a moderate fit to the data; $\chi^2=85.13$, df= 22, p<.05, GFI=.94, CFI=.90, NNFI=.86, SRMR= .07 and RMSEA=.08 (refer Table 29). Therefore, partial measurement invariance for involvement across the fathers' report was established.

Table 30 presents the result of invariance testing for strictness across the two fathers' reports. The unconstrained model (MM3) provided a poor fit to the data; $\chi^2=390.16$, df=18, p<.05, GFI= .69, CFI= .72, NNFI=.53, SRMR= .18, and RMSEA=.23. The next model (MN3) with equal factor loadings showed a significant decrease in model fit compared to MM3, $\Delta\chi^2= 25.71$, Δ df= 5, p<.05. Hence, there was a lack of invariance across the fathers' reports on strictness variable.

Testing for partial invariance, the item with the largest MI ("I try to know where this child is after school") was first eliminated. However, invariance was still not found. The item with the next largest MI ("I try to know what this child does with his/her free time") was then eliminated. Finally, measurement invariance was established. This reduced-item model (MN4) was then tested against the unconstrained model (MM3). Model MN4 provided a fit of $\chi^2 = 39.85$, $df = 22$, $p < .05$, $GFI = .69$, $CFI = .71$, $NNFI = .61$, $SRMR = .16$ and $RMSEA = .21$ (refer Table 30). Although these fit indices are less than satisfactory, the change in model fit from the unconstrained model to this equal factor loadings model was non-significant, $\Delta\chi^2 = 8.69$, $\Delta df = 4$, ns. Therefore, partial measurement invariance for strictness across fathers' reports was established.

Summary of invariance testing. Overall, the results on testing invariance across two age groups using adolescents' report showed that only involvement showed a lack of measurement invariance. Partial measurement invariance was, however, established for this variable after excluding a few items. As for the father-reported data, there was a lack of invariance for both involvement and strictness. Once again however partial measurement invariance was established for both variables when some items were eliminated. Consistently through various analyses, the strictness variable did not provide for fit indices that were acceptable, even though there were not that many items in this measure. Although this may indicate that this particular variable should be excluded from subsequent analyses, I decided to keep it on the basis of its conceptual importance.

Testing Measurement Invariance across Source of Report

The following analyses tested invariance across source of report, i.e., adolescents' report versus fathers' report. Separate analyses were done for involvement and strictness across the reports.

Younger adolescent group

An unconstrained model (MK5) in which factor loadings, factor correlations, and error variances were freely estimated for involvement across source of report was first tested. This model provided a fit of $\chi^2 = 81.55$, $df = 18$, $p < .05$, GFI = .94, CFI = .90, NNFI = .83, SRMR = .06 and RMSEA = .09 (see Table 31). The more constrained model (ML5), in which factor loadings were constrained to be equal, was next fit to the data. This model provided for a moderate fit, $\chi^2 = 83.94$, $df = 23$, $p < .05$, GFI = .94, CFI = .90, NNFI = .87, SRMR = .07 and RMSEA = .08. Moreover, the change in model fit from the freely estimated model was non-significant, $\Delta\chi^2 = 2.39$, $\Delta df = 5$, ns. Hence, measurement invariance across the two sources of report for involvement was established.

Table 31

Measurement Invariance of Involvement across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MK5: Freely Estimated	81.55	18				.94	.90	.83	.06	.09
ML5: Factor Loading Invariant	83.94	23	MK5 vs ML5	2.39	5	.94	.90	.87	.07	.08

Table 32

Measurement Invariance of Strictness across Adolescents' Report and Fathers' Report (12 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MM5: Freely Estimated	246.63	18				.84	.76	.60	.08	.17
MN5: Factor Loading Invariant	250.39	23	MM5 vs MN5	3.76	5	.84	.76	.69	.09	.15

For strictness (see Table 32), the unconstrained model (MM5) provided a fit of $\chi^2 = 246.63$, $df = 18$, $p < .05$, $GFI = .84$, $CFI = .76$, $NNFI = .60$, $SRMR = .08$ and $RMSEA = .17$ (refer Table 32). The equal loadings constrained model (MN5) did not provide for better fit indices, $\chi^2 = 250.39$, $df = 23$, $p < .05$, $GFI = .84$, $CFI = .76$, $NNFI = .69$, $SRMR = .09$ and $RMSEA = .15$ but it did result in no change in model fit compared to the freely estimated model, $\Delta\chi^2 = 3.76$, $\Delta df = 5$, ns. Hence, measurement invariance across the two sources of report for strictness was also established.

Older adolescent group

The next set of analyses presented in Table 33 tested the measurement

Table 33

Measurement Invariance of Involvement across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
MK7: Freely Estimated	82.77	18				.94	.91	.86	.06	.09
ML7: Factor Loading Invariant	90.41	23	MK7 vs ML7	7.64	5	.94	.91	.88	.07	.08

Table 34

Measurement Invariance of Strictness across Adolescents' Report and Fathers' Report (15 years old)

Model specification	χ^2	df	Model comparison	$\Delta\chi^2$	Δ df	GFI	CFI	NNFI	SRMR	RMSEA
MM7: Freely Estimated	396.68	18				.69	.72	.53	.18	.22
MN7: Factor Loading Invariant	423.59	23	MM7 vs MN7	26.91*	5	.67	.70	.61	.15	.20
MN8: Factor Loading Invariant	405.37	22	MM7 vs MN8	8.69	4	.69	.71	.61	.16	.20

*p<.05

invariance across adolescents' report and fathers' report for the 15-year-olds. For involvement, the unconstrained model (MK7) provided a moderate fit to the data, $\chi^2= 82.77$, $df= 18$, $p<.05$, $GFI= .94$, $CFI= .91$, $NNFI=.86$, $SRMR= .06$ and $RMSEA=.09$ (see Table 33). The more constrained model (ML7) in which factor loadings was constrained to be equal also provided a moderate fit, $\chi^2= 90.41$, $df= 23$, $p<.05$, $GFI= .94$, $CFI= .91$, $NNFI=.88$, $SRMR= .07$ and $RMSEA=.08$, but more importantly, yielded no change in model fit compared to MK7, $\Delta\chi^2=7.64$, $\Delta df=5$, ns. Hence, measurement invariance for involvement across the two reports was established.

Table 34 presents the results of invariance testing for strictness across the two sources reports. Model MM7, where the factor loadings, factor correlations, and error variances were freely estimated, provided a poor fit to the data; $\chi^2= 396.68$, $df=18$, $p<.05$, $GFI= .69$, $CFI= .72$, $NNFI=.53$, $SRMR= .18$, and $RMSEA=.22$. The next model (MN7), with equal factor loadings, also provided for a poor fit, $\chi^2= 423.59$, $df=23$, $p<.05$, $GFI= .67$, $CFI= .70$, $NNFI=.61$, $SRMR= .15$, and $RMSEA=.20$ and showed a

significant decrease in model fit compared to MM7, $\Delta\chi^2= 26.91$, $\Delta df= 5$, $p<.05$. Hence, there was a lack of invariance across sources of report on strictness.

Testing for partial invariance, the item with the largest MI ("I try to know where this child is after school") was first eliminated. However, invariance was still not found. The item with the next largest MI ("I try to know what this child does with his/her free time") was then eliminated. Finally, measurement invariance was established. The equal loadings model with two fewer items (MN8) provided for no better fit, $\chi^2= 405.37$, $df=22$, $p<.05$, GFI= .69, CFI= .71, NNFI=.61, SRMR= .16, and RMSEA=.20 but more importantly, was similar in model fit to the completely unconstrained model, $\Delta\chi^2=8.69$, $\Delta df= 4$, ns (refer Table 34). Therefore, partial measurement invariance for strictness across sources of report was established.

Summary of invariance testing across source of report. For the 12-year-olds, tests of invariance showed that there was measurement invariance across adolescents' report and fathers' report on involvement and strictness. The results for the 15-year-olds showed invariance for involvement but only partial invariance for strictness across adolescents' reports and fathers' reports. As with the invariance analyses across age groups, the analyses involving the strictness variables yielded less-than-satisfactory fit indices. However, as mentioned previously, I decided to keep it for its conceptual importance.

Mean, Standard Deviation and Intercorrelations

Table 35 shown below presents the means, standard deviations, and intercorrelations of the variables in Model 2 based on adolescents' reports. The 15-year-

old adolescents reported that involvement was correlated with strictness, self-efficacy and academic performance. However, for the 12-year-olds, involvement was not correlated with academic performance even though it was correlated with strictness and self-efficacy. The 15-year-olds reported generally higher involvement, strictness and self-efficacy.

Next, Table 36 presents the means, standard deviations, and intercorrelations of variables for model 2 reported by fathers. In general, fathers of the 12-year-olds reported higher involvement and strictness. Father-reported involvement was correlated with strictness and self-efficacy for the 12-year-olds and 15-year-olds. Father-reported strictness was correlated with self-efficacy ($r = .16, p < .05$) for the 12-year-olds but not for the 15-year-olds.

Table 35

Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Adolescent-reported Data for Model 2

Variables	M	SD	1	2	3	4
12 years old^a						
1. Involvement	2.69	.93	1.00			
2. Strictness	2.45	.87	.48**	1.00		
3. Self-efficacy	2.33	.52	.25**	.16*	1.00	
4. Academic Performance	67.16	10.53	.02	.05	.05	1.00
15 years old^b						
1. Involvement	2.98	.82	1.00			
2. Strictness	2.64	.81	.51**	1.00		
3. Self-efficacy	2.54	.45	.26**	.18**	1.00	
4. Academic Performance	66.21	7.44	.13*	.01	.19**	1.00

Note: ^an = 250, ^bn = 251

*p < 0.05, **p < 0.01

Table 36

Means, Standard Deviations, and Intercorrelations of Variables across Age Groups based on Father-reported Data for Model 2

Variables	M	SD	1	2	3	4
12 years old^a						
1. Involvement	2.14	.59	1.00			
2. Strictness	1.96	.66	.57**	1.00		
3. Self-efficacy	2.33	.51	.15*	.16*	1.00	
4. Academic Performance	67.65	9.89	.01	.08	.10	1.00
15 years old^b						
1. Involvement	2.35	.61	1.00			
2. Strictness	2.25	.79	.55**	1.00		
3. Self-efficacy	2.54	.43	.20**	.02	1.00	
4. Academic Performance	66.41	7.15	.02	.02	.12	1.00

Note: ^an = 209, ^bn = 195

*p<0.05, **p<0.01

The Structural Model

To test for mediation, two models were specified. One was a simpler model in which this was full mediation. The other was a more complex model, in which this was only partial mediation. In both models, paths were specified linking involvement and strictness to self-efficacy and from self-efficacy to academic performance. For the complex model, 2 additional direct paths were specified from involvement to academic performance and from strictness to academic performance. The analyses were conducted together for the 2 age groups using the adolescent-reported data as well as 2 age groups using the father-reported data given the invariance found during the preliminary analyses.

For the adolescents' reports, the results of the comparison between the simpler model (M6) and the complex model (M7) is shown in Table 37. For both models, the

factor loadings were constrained to be equal (given the invariance found earlier) but the paths were freely estimated. Both models fit the data very well, but the chi-square change was statistically non-significant, $\Delta\chi^2 = 2.52$, $\Delta df = 4$, ns. Thus, on the basis of parsimony (Loehlin, 1992), the simpler model was adopted. To test if the structural paths for the 2 groups were equal, I also tested another simple model (M7) in which both factor loadings and structural paths were constrained to be equal. This model was then compared with the simple model (M6) previously tested and the change in model fit was non-significant, $\Delta\chi^2 = 1.54$, $\Delta df = 3$, ns. Hence, the completely constrained model, which specified equality of factor loadings and structural paths across age groups, was selected as the most adequate model.

Table 37

Testing Mediation Model for Adolescents-Reported Data

Model	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
Simple (M6): factor loadings invariant; structural paths freely estimated	324.54	132				.92	.91	.90	.07	.05
Complex (M7): factor loadings invariant; structural paths freely estimated	322.02	128	M6 vs. M7	2.52	4	.92	.91	.89	.07	.06
Simple (M8): factor loadings and structural paths invariant	326.08	135	M6 vs. M8	1.54	3	.91	.91	.90	.07	.05

From the selected model, as shown in Figure 3, the path coefficient linking involvement to self-efficacy ($\beta=.34, p<.05$) was significant but the path linking from self-efficacy to academic performance ($\beta=.13, ns$) was not significant. There was also no link between strictness and self-efficacy. Involvement and strictness accounted for 8% and 10% of the variance in self-efficacy for the 12-year-olds and 15-year-olds respectively. Involvement, strictness and self-efficacy accounted for 1% and 6% of the variances in academic performance for the two age groups respectively.

Therefore, hypothesis 2a, in which the relationships between involvement and strictness and academic performance are mediated by adolescent self-efficacy was not supported. Since the structural paths are equal for the two age groups, hypothesis 2b was also not supported.

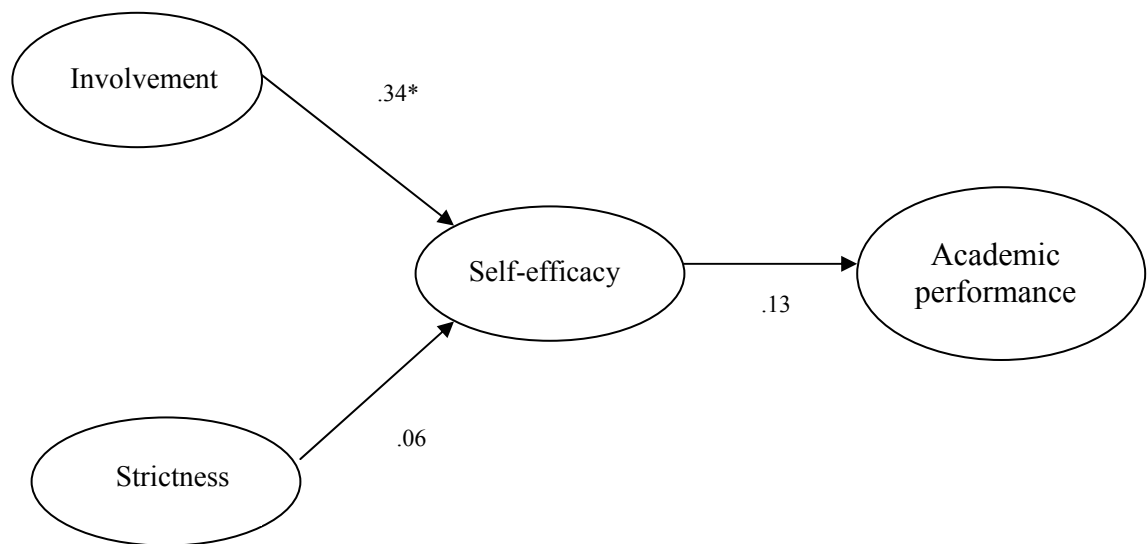


Figure 3 : Testing mediation - Adolescent reported data
Path coefficient for adolescents 12 years old and path coefficient for adolescents 15 years old are the same.

A comparison between the simple model (M9) and the complex model (M10) was also conducted for fathers' report (see Table 38). For both models, the factor loadings were constrained to be equal but the paths were freely estimated. The results showed that both models provided a close fit to the data, but the comparison between the two models showed that the difference in model fit was non-significant, $\Delta\chi^2 = 7.43$, $\Delta df = 4$, ns. Therefore, on the basis of parsimony, the simpler model was selected over the complex model. As previously, I also tested another simple model (M11) in which factor loadings and structural paths were constrained to be equal. This model was then compared with the simple model (M9) previously tested. The change in model fit was non-significant, $\Delta\chi^2 = 3.75$, $\Delta df = 3$, ns. Hence, the completely constrained model,

Table 38

Testing Mediation Model for Fathers-Reported Data

Model	χ^2	df	Model comparison	$\Delta\chi^2$	Δdf	GFI	CFI	NNFI	SRMR	RMSEA
Simple (M9): factor loadings invariant; structural paths freely estimated	426.95	184				.89	.89	.87	.09	.06
Complex (M10): factor loadings invariant; structural paths freely estimated	419.52	180	M9 vs M10	7.43	4	.89	.89	.87	.09	.06
Simple (M11): factor loadings and structural paths invariant	430.70	187	M9 vs M11	3.75	3	.89	.89	.88	.09	.06

which specified equality of factor loadings and structural paths across age groups, was selected as the most adequate model. From the selected model, as shown in Figure 4, the path coefficient linking involvement to self-efficacy ($\beta = .27, p < .05$) was significant but the path linking from self-efficacy to academic performance ($\beta = .14, ns$) was not significant. There was also no link between strictness and self-efficacy. Involvement and strictness accounted for 4% and 6% of the variance in self-efficacy for the 12-year-olds and 15-year-olds respectively. Involvement, strictness and self-efficacy accounted for 2% and 5% of the variance in academic performance for the same two age groups respectively. Therefore, hypothesis 2a, in which the relationships between involvement and strictness and academic performance are mediated by adolescent self-efficacy

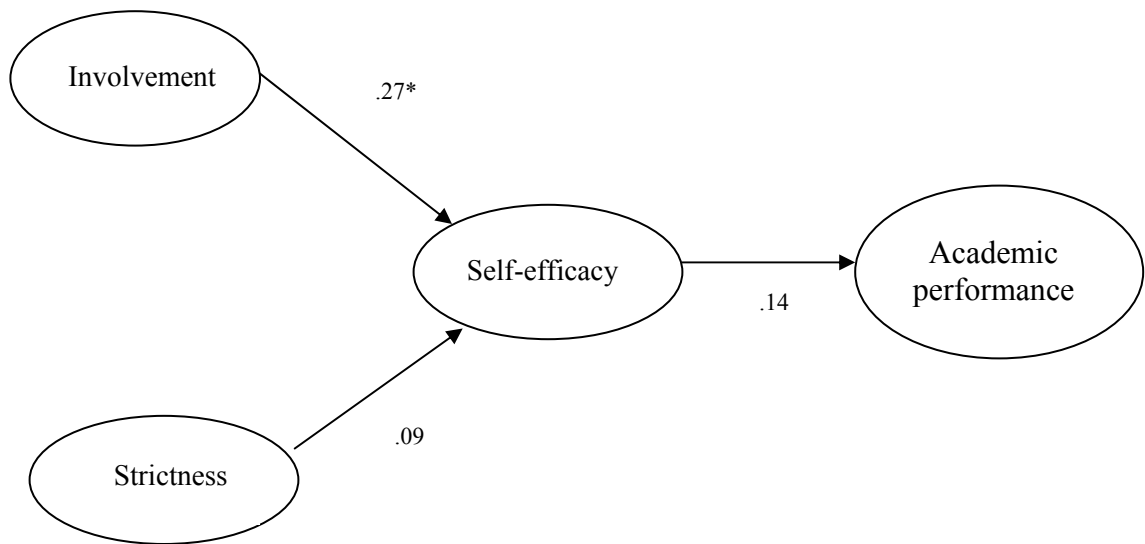


Figure 4 : Testing mediation
 Path coefficient for fathers of the 12-year-olds and path coefficient for fathers of the 15-year-olds are the same.

was also not supported from the father-reported data. Since the structural paths are equal for the two groups, hypothesis 2b was also not supported.

Surprisingly, the models reported by adolescents and fathers were similar in this study. Therefore, hypothesis 2c was also not supported.

Summary. In sum, the three hypotheses were not supported in this study. Self-efficacy was not found to mediate the relationship between involvement and academic performance and the relationship between strictness and academic performance for both adolescent-reported data and father-reported data. The structural paths tested were also similar rather than different across the two age groups. Therefore, in this study, whether adolescents' or fathers' reports were used, the models were similar.

CHAPTER 4

DISCUSSION

The objective of this research was to examine the relation between paternal behaviours and aspects of adolescent development. In Model 1, I tested hypotheses related to the association between paternal warmth, autonomy-granting, and behavioural control with attachment to father and satisfaction with the relationship with father. Model 2 tested a mediation model examining the mediating role of self-efficacy between paternal involvement and strictness with adolescents' academic performance.

Measurement Issues

Measurement invariance across age groups. The idea of testing invariance across different groups of people is to examine whether there is conceptual and measurement equivalence across the groups of people. If there are differences among these groups, it implies that the behaviours being examined are not similarly defined by the groups. Studies of measurement invariance are increasingly becoming common in the literature. For example, Pentz and Chou (1994) illustrated the study of measurement invariance across group and time in a study of adolescent drug abuse, while Chan and Schmitt (1997) have described measurement invariance of situational judgement scores across methods of testing. What is known to date is that establishing measurement invariance in a study allows confident comparisons to be made across groups of interest. Measurement invariance therefore provides a better and clearer understanding of the

similarities and dissimilarities between two or more groups being assessed (Windle, Iwawaki & Lerner, 1988).

Based on the testing of measurement invariance across the two adolescent age groups using adolescents' self-reported data for both models, the results showed that there was either full or partial measurement invariance for fathering behaviours and the attachment and satisfaction aspects of father-adolescent relationship. Several variables such as autonomy-granting, behavioural control, satisfaction, and strictness demonstrated full measurement invariance at the initial analysis but variables such as warmth, attachment, and involvement failed to do so. However, I did not reject the variables simply because full measurement invariance was not established. As the fit indices between the two models were rather similar, I further tested the same variables separately by subtracting particular items (one at a time) from the measures using the modification indices until partial measurement invariance was established. Of note from these analyses is that only a very small subset of items for each of these variables was not invariant across the two adolescent groups. There was thus at least partial measurement invariance for the variable. These findings of partial invariance indicate a need to be more discerning when applying measures across different age groups. Specifically, there may be peculiar items within a particular measure that apply differently to individuals of different ages. Take, for instance, the item "I wish I had a different father" assessing attachment, which was found to have a lack of invariance. It is possible that this particular attachment item differs for the two adolescent groups by virtue of the differences in autonomy characterizing these two groups. Older adolescents, being more autonomous, are more likely to see the weaknesses and flaws

in their fathers—as part of a process called the de-idealization of parents (Steinberg, 2002, p.293)—such that this wish for a different father may actually be actively entertained, especially when fathers fail to provide what adolescents want. Such a wish, on the other hand, may still not even enter the minds of younger adolescents. As a further example, consider the item "When I get a poor grade in school, he encourages me to try harder" assessing school involvement. Given that academic achievement becomes increasingly important as adolescents grow older, younger adolescents may view fathers' encouragement as being given a chance to perform again (positive) when they get a poor grade in school, while older adolescents may take it as a type of pressure for them to do better (negative).

As to why there may be a lack of invariance for adolescents of different ages, Smetana (1995) suggests that as adolescents mature (cognitively, socially, etc.), they are also given to different perceptions and approaches to decision making, which now begins to be based more on personal choice rather than following what parents desire. Therefore, what seems to be the same paternal behaviour may come across to a younger adolescent in one way but to the older adolescent, that same behaviour may come across as something totally different. These differences of interpreting a particular behaviour makes it unwise and misleading to make group comparisons of the behavior.

The sensitivity of particular items to the adolescents of different ages also applies to the fathers of these adolescents. Like their adolescents, there were instances in which particular items did not demonstrate invariance. For instance, the item "I help this child with his/her schoolwork if there is something he/she doesn't understand" assessing school involvement may take on different meanings for fathers of younger

and older adolescents. For younger adolescents, fathers may or may not agree to it more in terms of whether they want to help rather than whether they can help. On the other hand, fathers of the older adolescents may not help not because they do not want to but because they cannot help (given the greater complexity of schoolwork at this stage). Similarly, an item measuring satisfaction like "My child feels that being a child to me has been an enjoyable experience" may be interpreted differently by the different groups of parents. As adolescents mature, fathers of older compared to younger adolescents may begin to assess how they think their children view the father-child relationship more on an equal basis rather than on a unilateral perspective.

Much of the current literature (e.g., Young et al., 1995; Rohner & Pettengill, 1985), whether using adolescents' or parents' reports, is based on comparisons across age groups that are usually conducted without first establishing equivalence or invariance. The present results, especially those showing only partial invariance, show that such an approach needs to be revisited. In the absence of establishing invariance, there is a possibility that results obtained from the comparisons may not be accurate.

It must be acknowledged that not all the variables studied here showed good fit with the data. In particular, the variables of attachment and strictness were found to have less than satisfactory fit indices. For the attachment variable, one possible and immediate reason for the poor fit is that there were too many items in the measure, such that an item-level analysis would yield poor fit, even if the items were adequately constructed. On the other hand, the strictness variable yielded a poor fit even though there were very few items. One possibility for this poor fit may be the measure itself being poorly constructed. The finding that strictness was not linked to self-efficacy or

academic performance provides additional indication that the strictness variable in the present study may not have been adequately measured.

Measurement invariance across sources of report. Besides testing invariance across age groups, the present study also examined invariance across source of report. Tein et al. (1994) noted that in order to obtain a comprehensive understanding of parenting behaviours, multiple reports are needed. By doing so, differences as well as similarities in the information provided by the different sources can be identified. They added that it might be more appropriate to obtain similar results across the reports because these would provide strong argument for the theory being tested. However, researchers have documented that adolescents' and fathers' reports in general are more likely to diverge than to converge (e.g., Larson & Richards, 1994).

A comparison between the reports of adolescents aged 12 and their fathers showed full invariance on warmth, autonomy-granting, behavioural control, satisfaction, involvement, and strictness. However, only partial invariance was found for attachment, demonstrating that particular items within the attachment measure may take on different meanings depending on whether it is the adolescent or father who is reporting. Overall however, the results suggest more that at age 12, both adolescents and their fathers have similar perceptions on what the various paternal behaviours and the aspects of father-adolescent relationship mean. Perhaps, adolescents at this age are still quite dependent on their parents and therefore fathers are able to easily discern what their adolescents are thinking and how they see things. Cognitively, adolescents at this age may also not have attained the sophisticated thinking capabilities that allow them to see particular behaviours differently from how parents see those behaviours.

Consistent with the idea of dependence and lesser cognitive sophistication at age 12, 15-year-olds and their fathers showed full measurement invariance only in warmth, behavioural control, satisfaction and involvement. Attachment, autonomy-granting and strictness showed only partial invariance, demonstrating that for these older adolescents, more behaviours begin to take on divergent meanings depending whether it is the adolescent or the father who reports.

Model 1

From the multiple group SEM analyses conducted to test Model 1, hypothesis 1a and hypothesis 1b were supported depending on whether adolescents or fathers who were doing the reporting. Only paternal warmth reported by adolescents (aged 12 & 15) and fathers (of adolescents aged 12 & 15) provided a consistent finding in that it was significantly and positively related to attachment and satisfaction. This result complemented past research (e.g., Mikyung, 1999; Shek, 2001) showing positive relationships between warmth and attachment and satisfaction. Because warmth conveys to the recipient a sense of positivity (in terms of affect, acceptance, encouragement, etc.), it is not surprising that it is linked to closer relationships, which can be seen in terms of higher attachment and satisfaction. This finding further provides support that the examination of warmth (the degree to which the adolescent is loved and accepted) (Gray & Steinberg, 1999) in relation to attachment and satisfaction is a worthwhile endeavour.

The expectation that paternal autonomy-granting would relate to attachment and satisfaction was also supported but only when father reports were used. When father reports were used, there were moderate positive links to attachment ($\beta=.39$) and to satisfaction ($\beta=.34$). Thus, from fathers' point of view, if they see themselves as more granting of autonomy, they also tend to see their adolescents as more attached to them and more satisfaction with the father-adolescent relationship.

For the adolescents' reports, the paths linking from autonomy-granting to attachment as well as to satisfaction were found to differ for the two age groups, although these paths did not reach statistical significance. From a developmental point of view, the finding that the two groups differ on these paths should not come as surprising, given the increasing need for autonomy across the two groups as well as the different forms that such autonomy is likely to take for the two age groups. The failure for these paths to reach statistical significance is somewhat troubling, although it is possible that this link is weaker and subtler than the more obvious ones (such as warmth-attachment or warmth-satisfaction), such that the present sample size may not have been sufficient to detect it.

Behavioural control was also expected to relate to attachment and satisfaction. For the 12-year-olds, both adolescents' report and fathers' report provided support to the hypothesis that behavioural control was positively related to attachment. Probably, both groups may feel that father behavioural control is a means of showing care and concern rather than a form of punishment. Being controlled will probably show that fathers are involved with and not neglecting their children (Chao, 1994). Therefore, these 12-year-old adolescents tend to feel more attached to and satisfied with their fathers.

Interestingly, behavioural control was also related to attachment for the 15-year-olds, regardless of whether it was adolescent-reported or father-reported. Based on the Western literature, behavioural control is usually found to be positively related to aspects of relationships for the younger adolescents but not for the older groups. Younger adolescents tend to view father's behavioural control as positive (conveys love) but older adolescents tend to view behavioural control as a form of restriction. In this study however, a different pattern was found. The more behavioural control exercised by fathers for the older adolescents, the more these adolescents report feeling more attached to their fathers. Similarly, the fathers of these adolescents reported that their adolescents were more attached to them. One possible explanation is that fathers who usually are the breadwinner, seldom have time for parenting, and that when fathers exercise control, adolescents may view such control as a gesture of wanting to be involved in their lives, from which feelings of greater attachment may arise. As reiterated by many researchers who have called for cultural sensitivities, this finding for behavioural control lends support to the argument that Chinese parent-child relationships (e.g. Chao)—and perhaps especially the father-adolescent relationship—may have different psychological meanings compared to those same relationships in the West.

On the other hand, the positive relationship between behavioural control and satisfaction existed only when the 15-year-olds themselves reported and not when their fathers reported. Perhaps for the adolescents, the behavioural control exercised by parents may come across as care and concern, and is therefore related to a sense of satisfaction with the relationship with father. On the other hand, for fathers, there may

be some ambivalence in the sense that while they may see behavioural control as a form of care and concern, they may also be aware that their adolescents may or may not be happy with such control. Alternatively, it is possible that from the fathers' point of view, behavioural control may not be important, especially compared to other paternal behaviours, to how satisfied they think their adolescent is with the father-adolescent relationship.

In the present study, warmth emerged consistently (i.e., across adolescents' and fathers' reports) as related to attachment and satisfaction while the other paternal variables did not. For paternal warmth as reported by adolescents, it was found that the linkages had rather large path coefficients ($\beta = .88$ for attachment, $\beta = .84$ for satisfaction); as reported by fathers, the linkages remained, although the effects were more modest ($\beta = .40$ for attachment, $\beta = .39$ for satisfaction). Regardless, this pattern of source-independent findings for warmth and source-dependent findings for autonomy-granting and behavioural control may reflect the conceptual boundaries of these constructs. Specifically, warmth may be a "tightly bounded" construct, such that its manifested behaviours are more unambiguous and less subject to differing interpretations. On the other hand, autonomy granting and behavioural control may be more "loosely bounded", in the sense that the behaviours that manifest such constructs are less unambiguous and more likely open to being interpreted differently by different individuals. This may also account for why the paths linking behavioural control and autonomy-granting with attachment and satisfaction, when they exist, have more modest path coefficients.

Taken as a whole, the predictions that paternal warmth, autonomy-granting, and behavioural control are expected to positively relate to attachment and satisfaction were partially supported. Links emerged or did not merge depending on age groups and source of report. Comparing across the two age groups, contrary to what was expected, most of the links for this model were found to have the same rather than different structural paths. Thus at least for the ages of 12 and 15, in spite of the many developmental differences between the two ages, the links between paternal behaviors and aspects of the father-adolescent relationship are pretty similar. The one exception where the structural paths differed for the two age groups was adolescent-reported autonomy-granting. Although these paths did not reach significance, it is not surprising that the SEM model which allowed these paths to be freely estimated was a better fit compared to the model which allowed all paths to be freely estimated. As indicated previously, the key developmental task across adolescence is the attainment of an autonomous identity. For such to occur, parents need to grant more autonomy in order for their adolescents to do the things they want to do and to “find themselves”.

Consistent with this argument and using the adolescents’ perspective, autonomy granting was related to behavioural control for the older adolescents but not for the younger adolescents. On the other hand, it is interesting to note that for the older adolescents, autonomy granting and behavioural control do not act in an opposing manner. That is, rather than a negative relationship (more behavioural control, less autonomy granting), older adolescents actually reported a positive relationship. This may reflect the cultural interplay of “guan” and “chiao sun” in Chinese parents (Chao,

1994), such that the father both controls as well as grants autonomy in such a way that the two paternal practices can coexist.

Model 2

The second model tested a mediation model involving school-related paternal behaviours (i.e., involvement and strictness) and academic performance mediated by adolescents' self-efficacy. For both adolescent groups (12 & 15) using adolescent reports and father reports, the simpler model (paths linking involvement and strictness to self-efficacy and from self-efficacy to academic performance) was found to fit the data better compared to the complex model (with direct links from involvement and strictness to academic performance in addition to the paths in the simple model). This result suggests that for both adolescents as well as father data, the fully mediated model fit better than the partially mediated model. However, another alternative model in which the structural paths were constrained to be equal was also tested and it turned out that this alternative model was a better choice. Therefore, contrary again to expectation, all the paths in the model across adolescent-reported data and across father-reported data were the same. Similar to the findings for model 1, although ages 12 and 15 are characterized by many differences, how particular paternal variables relate to particular adolescent variables are similar across the two age groups. This is an interesting finding, since model 1 examined more of the father-adolescent relationship aspects while model 2 looked more at adolescents' academic performance. Thus, at least across the two models examined here, there seems to be a general pattern of more similarity

than difference in terms of how paternal variables relate to particular outcomes of interest. Looking at the paths in the model however, self-efficacy did not serve as a mediating variable for the relation between paternal involvement and academic performance for both sources of reports. Only fathers' involvement was found to be positively related to self-efficacy, while self-efficacy was not related to academic performance. Perhaps, with fathers' involvement, adolescents are more confident and have the belief that they can achieve better in school. Erford (1995) documented that fathers who are highly involved will have children that are significantly more self-efficacious. However, the results of Lindley and Borgen (2002) in which they found that adolescents who are high in self-efficacy tend to achieve better academic performance was not supported in the present study. Thus, although highly involved parents are linked to more self-efficacious adolescents, it would appear that academic performance is determined by other factors. One possible explanation here is the Singapore educational context, where there is a heavy emphasis on memory work rather than problem solving. It is fair to argue that self-efficacy may be more of a factor for problem solving and less so for memory work, since the latter can be improved by more and more “rehearsal-type” activities.

While paternal involvement was related to self-efficacy paternal strictness was not related to either self-efficacy or academic performance. This likely is due to the strictness measure used, which as discussed previously consistently showed poor fit, even though there were not that many items in it.

All in all, Model 2 in the present study did not work out as predicted. Self-efficacy was not a mediator; indeed, it was not even related to academic performance.

As speculated previously, it may be that academic performance in the Singapore context is dependent on attributes other than self-efficacy.

Limitations and Directions for Future Study

Several limitations of this study should be noted for further investigations.

Single ethnic group. The two models that I have tested were focused only on the Chinese. Although the study on Chinese is useful especially in Singapore where the Chinese stands up as the majority, future study should also include various racial groups, since Singapore is a multi-racial and multi-cultural country. This could produce a major advance in our knowledge of how the relationships tested will turn out across racial groups, especially when these racial groups may have different frameworks for the father-adolescent relationship

Lack of random sampling. There is a lack of random sampling in my study and thus the sample is not a representative sample of fathers and adolescents in Singapore. As it is now, the sample was only limited to classes within the 6 schools which participated in this study. This lack of random sampling is somewhat beyond the researcher's control, since approval and support by school principals are very much needed for any study that uses a school-based population.

Future research

Better data and more sophisticated conceptualizations are needed to advance our knowledge of father-adolescent relationships. The field is increasingly moving from simple linkages (e.g., warmth is related to parent-child bonding) towards more complex

linkages (e.g., mediation, moderation) that can help clarify the various processes at work within particular linkages. Model 2 in the present study, even though unsupported by the results, is one such attempt to move towards greater sophistication that helps improve our understanding of adolescent issues. Beyond the attachment and satisfaction aspects of the father-adolescent relationship studied in the Model 1 of the present study, future research can also examine other lesser-examined issues such as cognitive states pertinent to the relationship (e.g., conceptions of an ideal relationship or between perception of the relationships) or even interactions (e.g., content and frequency) (Collins & Russell, in press).

Concluding comments

Overall, there is some support for the two models tested in the present study, although results are qualified by the two age groups and by sources of report. Measurement analyses also showed that it is important to be aware that particular items may differ across age groups and across reports. The complexities of the results in this study will hopefully provide insight into how further research may advance in both conceptual and methodological development. For the present at least, there is some support that fathers' parenting practices are related to aspects of to the father-adolescent relationship.

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Appendix A

Instructions for adolescents:

Think of your own FATHER. For each statement below, please circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. He makes me feel better after talking over my worries with him. 1 2 3 4 5
2. He almost always speaks to me with a warm and friendly voice. 1 2 3 4 5
3. He smiles at me very often. 1 2 3 4 5
4. He is able to make me feel better when I am upset. 1 2 3 4 5
5. He enjoys doing things with me. 1 2 3 4 5
6. He cheers me up when I am sad. 1 2 3 4 5
7. He often speaks of the good things I do. 1 2 3 4 5
8. He seems proud of the things I do. 1 2 3 4 5

Instructions for fathers:

For each statement below, think of your relationship with your child who is in Primary 6/ Secondary 3 and circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. I make this child feel better after talking over his/her worries with me. 1 2 3 4 5
2. I almost always speak to this child with a warm and friendly voice. 1 2 3 4 5
3. I smile at this child very often. 1 2 3 4 5
4. I am able to make this child feel better when he/she is upset. 1 2 3 4 5
5. I enjoy doing things with this child. 1 2 3 4 5
6. I cheer up this child when he/she is sad. 1 2 3 4 5
7. I often speak of the good things he/she does. 1 2 3 4 5
8. I am proud of the things this child does. 1 2 3 4 5

Appendix B

Instructions for adolescents:

Think of your own FATHER. For each statement below, please circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. He allows me to tell him if I think my ideas are better than his. 1 2 3 4 5
2. He likes me to choose my own way of doing things. 1 2 3 4 5
3. He wants me to tell him about it if I don't like the way he treats me. 1 2 3 4 5
4. He lets me help to decide how to do things we're working on. 1 2 3 4 5
5. He really wants me to tell him just how I feel about things. 1 2 3 4 5
6. He tries to understand how I see things. 1 2 3 4 5
7. He gives me the choice of what to do whenever possible. 1 2 3 4 5
8. He is easy to talk to. 1 2 3 4 5

Instructions for fathers:

For each statement below, think of your relationship with your child who is in Primary 6/ Secondary 3 and circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. I allow this child to tell me if he/she thinks his/her ideas are better than mine. 1 2 3 4 5
2. I like this child to choose his/her own way of doing things. 1 2 3 4 5
3. I want this child to tell me about it if he/she doesn't like the way I treat him/her. 1 2 3 4 5
4. I want this child help to decide how to do things we're working on. 1 2 3 4 5
5. I really want this child to tell me just how he/she feels about things. 1 2 3 4 5
6. I try to understand how this child sees things. 1 2 3 4 5
7. I give this child the choice of what to do whenever possible. 1 2 3 4 5
8. I am easy for this child to talk to. 1 2 3 4 5

Appendix C

Instructions for adolescents:

Think of your own FATHER. For each statement below, please circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. He believes in having a lot of rules for me and sticking to them. 1 2 3 4 5
2. He believes that all my bad behaviour should be punished in some way. 1 2 3 4 5
3. He insists that I must do exactly as I'm told. 1 2 3 4 5
4. I have certain jobs to do and he doesn't allow me to do anything else until they are done. 1 2 3 4 5

Instructions for fathers:

For each statement below, think of your relationship with your child who is in Primary 6/ Secondary 3 and circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. I believe in having a lot of rules for this child and sticking to them. 1 2 3 4 5
2. I believe that all of this child's bad behaviour should be punished in some way. 1 2 3 4 5
3. I insist that this child must do exactly as I'm told. 1 2 3 4 5
4. This child has certain jobs to do and he/she is not allowed me to do anything else until they are done. 1 2 3 4 5

Appendix D

Instructions for adolescents:

Still thinking about your FATHER, for each statement below, circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

® -Reverse score

- | | | | | | |
|--|---|---|---|---|---|
| 1. He respects my feelings. | 1 | 2 | 3 | 4 | 5 |
| 2. I feel he is successful as a parent. | 1 | 2 | 3 | 4 | 5 |
| 3. I wish I had a different father. ® | 1 | 2 | 3 | 4 | 5 |
| 4. He accepts me as I am. | 1 | 2 | 3 | 4 | 5 |
| 5. I have to rely on myself rather than on him when I have a problem to solve. ® | 1 | 2 | 3 | 4 | 5 |
| 6. I like to get his point of view on things I'm concerned about. | 1 | 2 | 3 | 4 | 5 |
| 7. I feel it's no use letting my feelings show to him. ® | 1 | 2 | 3 | 4 | 5 |
| 8. He can sense when I'm upset about something. | 1 | 2 | 3 | 4 | 5 |
| 9. Talking over my problems with him makes me feel ashamed or foolish. ® | 1 | 2 | 3 | 4 | 5 |
| 10. He expects too much from me. ® | 1 | 2 | 3 | 4 | 5 |
| 11. I get upset easily with him. ® | 1 | 2 | 3 | 4 | 5 |
| 12. I get upset a lot more than he knows about. ® | 1 | 2 | 3 | 4 | 5 |
| 13. When we discuss things, he considers my point of views. | 1 | 2 | 3 | 4 | 5 |
| 14. He trusts my judgement. | 1 | 2 | 3 | 4 | 5 |
| 15. He has his own problems, so I don't bother him with mine. ® | 1 | 2 | 3 | 4 | 5 |
| 16. He helps me to understand myself better. | 1 | 2 | 3 | 4 | 5 |
| 17. I tell him about my problems and troubles. | 1 | 2 | 3 | 4 | 5 |
| 18. I feel angry with him. ® | 1 | 2 | 3 | 4 | 5 |
| 19. I don't get much attention from him. ® | 1 | 2 | 3 | 4 | 5 |
| 20. He encourages me to talk about my difficulties. | 1 | 2 | 3 | 4 | 5 |
| 21. He understands me. | 1 | 2 | 3 | 4 | 5 |
| 22. I don't know whether I can depend on him. ® | 1 | 2 | 3 | 4 | 5 |
| 23. When I am angry about something, he tries to understand. | 1 | 2 | 3 | 4 | 5 |
| 24. I trust him. | 1 | 2 | 3 | 4 | 5 |
| 25. He doesn't understand what I'm going through these days. ® | 1 | 2 | 3 | 4 | 5 |
| 26. I can count on him when I need to get something off my chest. | 1 | 2 | 3 | 4 | 5 |
| 27. I feel that he does not understand me. ® | 1 | 2 | 3 | 4 | 5 |
| 28. If he knows something is bothering me, he asks me about it. | 1 | 2 | 3 | 4 | 5 |

Appendix D (continued)

Instructions for fathers:

Still thinking about the same child, for each statement below, circle ONE number based on the scale given.

strongly disagree	=	1	
disagree	=	2	
neither agree nor disagree	=	3	
agree	=	4	
strongly agree	=	5	® - Reverse score

- | | | | | | |
|---|---|---|---|---|---|
| 1. I respect my child's feelings. | 1 | 2 | 3 | 4 | 5 |
| 2. My child feels I am successful as a parent. | 1 | 2 | 3 | 4 | 5 |
| 3. My child wishes he/she had a different father. ® | 1 | 2 | 3 | 4 | 5 |
| 4. I accept my child as he/she is. | 1 | 2 | 3 | 4 | 5 |
| 5. My child has to rely on him/herself than on me when he/she has a problem to solve. ® | 1 | 2 | 3 | 4 | 5 |
| 6. My child likes to get my point of view on things he/she is concerned about. | 1 | 2 | 3 | 4 | 5 |
| 7. My child feels it's no use letting his/her feelings show to me. ® | 1 | 2 | 3 | 4 | 5 |
| 8. I can sense when he/she is upset about something. | 1 | 2 | 3 | 4 | 5 |
| 9. Talking over his/her problems with me makes my child feels ashamed or foolish. ® | 1 | 2 | 3 | 4 | 5 |
| 10. I expect too much from him/her. ® | 1 | 2 | 3 | 4 | 5 |
| 11. My child gets upset easily with me. ® | 1 | 2 | 3 | 4 | 5 |
| 12. My child gets upset a lot more than I know about. ® | 1 | 2 | 3 | 4 | 5 |
| 13. When we discuss things, I consider his/her point of view. | 1 | 2 | 3 | 4 | 5 |
| 14. I trust his/her judgement. | 1 | 2 | 3 | 4 | 5 |
| 15. I have my own problems, so my child doesn't bother me with his/hers. ® | 1 | 2 | 3 | 4 | 5 |
| 16. I help him/her to understand him/herself better. | 1 | 2 | 3 | 4 | 5 |
| 17. My child tells me about my problems and troubles. | 1 | 2 | 3 | 4 | 5 |
| 18. My child feels angry with me. ® | 1 | 2 | 3 | 4 | 5 |
| 19. My child doesn't get much attention from me. ® | 1 | 2 | 3 | 4 | 5 |
| 20. I encourage him/her to talk about his/her difficulties. | 1 | 2 | 3 | 4 | 5 |
| 21. I understand him/her. | 1 | 2 | 3 | 4 | 5 |
| 22. My child doesn't know whether he/she can depend on me. ® | 1 | 2 | 3 | 4 | 5 |
| 23. When my child is angry about something, I try to understand. | 1 | 2 | 3 | 4 | 5 |
| 24. My child trusts me. | 1 | 2 | 3 | 4 | 5 |
| 25. I don't understand what he/she is going through these days. ® | 1 | 2 | 3 | 4 | 5 |
| 26. My child can count on me when he/she needs to get something off his/her chest | 1 | 2 | 3 | 4 | 5 |
| 27. My child feels that I don't understand him/her. ® | 1 | 2 | 3 | 4 | 5 |
| 28. If something is bothering him/her, I ask him/her about it. | 1 | 2 | 3 | 4 | 5 |

Appendix E

Instructions for adolescents:

Still thinking about your FATHER, for each statement below, circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. Being a child to him has been an enjoyable experience. 1 2 3 4 5
2. In all aspects, I am happy with him. 1 2 3 4 5
3. I am satisfied with my relationship with him. 1 2 3 4 5
4. I am happy with the way he behaves. 1 2 3 4 5
5. All in all, I can say I get along well with him. 1 2 3 4 5

Instructions for fathers:

Still thinking about the same child, for each statement below, circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. My child feels that being a child to me has been an enjoyable experience. 1 2 3 4 5
2. In all aspects, my child is happy with me. 1 2 3 4 5
3. My child is satisfied with his/her relationship with me. 1 2 3 4 5
4. My child is happy with the way I behave. 1 2 3 4 5
5. All in all, I think my child can say he/she gets along well with me. 1 2 3 4 5

Appendix F

Instructions for adolescents:

Think of your own FATHER. For each statement below, please circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. I can count on him to help me out, if I have some kind of problem with school matters. 1 2 3 4 5
2. He helps me with my schoolwork if there is something I don't understand. 1 2 3 4 5
3. When I get a poor grade in school, he encourages me to try harder. 1 2 3 4 5
4. When I get a good grade in school, he praises me. 1 2 3 4 5
5. He knows who my school friends are. 1 2 3 4 5
6. He spends time talking with me about my schoolwork. 1 2 3 4 5

Instructions for fathers:

For each statement below, think of your relationship with your child who is in Primary 6/ Secondary 3 and circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

1. This child can count on me to help out, if he/she has some kind of problem with school matters. 1 2 3 4 5
2. I help this child with his/her schoolwork if there is something he/she don't understand. 1 2 3 4 5
3. When this child gets a poor grade in school, I encourage him/her to try harder 1 2 3 4 5
4. When this child gets a good grade in school, I praise him/her. 1 2 3 4 5
5. I know who this child's school friends are. 1 2 3 4 5
6. I spend time talking with this child about his/her schoolwork. 1 2 3 4 5

Appendix G

Instructions for adolescents:

Think of your own FATHER. For each statement below, please circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

- | | | | | | |
|---|---|---|---|---|---|
| 1. He <u>tries</u> to know where I go at night. | 1 | 2 | 3 | 4 | 5 |
| 2. He <u>tries</u> to know what I do with my free time. | 1 | 2 | 3 | 4 | 5 |
| 3. He <u>tries</u> to know where I am after school. | 1 | 2 | 3 | 4 | 5 |
| 4. He <u>really</u> knows where I go at night. | 1 | 2 | 3 | 4 | 5 |
| 5. He <u>really</u> knows what I do with my free time. | 1 | 2 | 3 | 4 | 5 |
| 6. He <u>really</u> knows where I am after school. | 1 | 2 | 3 | 4 | 5 |

Instructions for fathers:

For each statement below, think of your relationship with your child who is in Primary 6/ Secondary 3 and circle ONE number based on the scale given.

strongly disagree = 1
disagree = 2
neither agree nor disagree = 3
agree = 4
strongly agree = 5

- | | | | | | |
|--|---|---|---|---|---|
| 1. I <u>try</u> to know where this child goes at night. | 1 | 2 | 3 | 4 | 5 |
| 2. I <u>try</u> to know what this child does with his/her free time. | 1 | 2 | 3 | 4 | 5 |
| 3. I <u>try</u> to know where this child is after school. | 1 | 2 | 3 | 4 | 5 |
| 4. I <u>really</u> know where this child goes at night. | 1 | 2 | 3 | 4 | 5 |
| 5. I <u>really</u> know what this child does with his/her free time. | 1 | 2 | 3 | 4 | 5 |
| 6. I <u>really</u> know where this child is after school. | 1 | 2 | 3 | 4 | 5 |

Appendix H

Instructions for adolescents only:

Think now of YOURSELF. For each statement below, circle ONE number based on the scale given.

strongly disagree	=	1	
disagree	=	2	
neither agree nor disagree	=	3	
agree	=	4	
strongly agree	=	5	® -Reverse score

- | | | | | | |
|--|---|---|---|---|---|
| 1. When I really study, I am certain I can do well. | 1 | 2 | 3 | 4 | 5 |
| 2. One of my problems is that I cannot sit down to do my schoolwork when I should. ® | 1 | 2 | 3 | 4 | 5 |
| 3. If I can't solve a schoolwork problem, I keep trying until I can. | 1 | 2 | 3 | 4 | 5 |
| 4. When I set school-related goals (e.g. score good grades) for myself, I usually achieve them. | 1 | 2 | 3 | 4 | 5 |
| 5. I never give up on things such as difficult maths sums or science questions. | 1 | 2 | 3 | 4 | 5 |
| 6. I avoid facing difficulties. ® | 1 | 2 | 3 | 4 | 5 |
| 7. If something (e.g. maths problem) looks too difficult, I will not even bother to try it. ® | 1 | 2 | 3 | 4 | 5 |
| 8. When I have something unpleasant to do, I stick to it until I finish it. | 1 | 2 | 3 | 4 | 5 |
| 9. When I decide to do something, I go right to work on it. | 1 | 2 | 3 | 4 | 5 |
| 10. When trying to learn something new in school, I soon give up if I am not initially successful. ® | 1 | 2 | 3 | 4 | 5 |
| 11. When unexpected problems occur, I don't handle them well. ® | 1 | 2 | 3 | 4 | 5 |
| 12. I avoid trying to learn new things in school when they look too difficult for me. ® | 1 | 2 | 3 | 4 | 5 |
| 13. Failure in school exams or tests just makes me try harder. | 1 | 2 | 3 | 4 | 5 |
| 14. I feel insecure about my ability to do things in school. ® | 1 | 2 | 3 | 4 | 5 |
| 15. I am a self-reliant (independent) person. | 1 | 2 | 3 | 4 | 5 |
| 16. I give up easily on schoolwork. ® | 1 | 2 | 3 | 4 | 5 |
| 17. I am capable of dealing with most problems that come up in school. | 1 | 2 | 3 | 4 | 5 |

Appendix I

号码: _____

请打个勾 (/) 或根据您个人的背景填入适合的答案。

1. 出生日期: _____/_____/_____ (日/月/年)

2. 孩子的人数: 1 2 3 4 5 6
其他: _____ (请详述)

3. 孩子上学的人数 (从小学至学院):

1 2 3 4 5 6
其他: _____ (请详述)

4. 您最高的学历:

少过 PSLE	<input type="checkbox"/>	PSLE	<input type="checkbox"/>	0 水平/ N 水平	<input type="checkbox"/>
A 水平	<input type="checkbox"/>	文凭	<input type="checkbox"/>	学士	<input type="checkbox"/>
硕士	<input type="checkbox"/>	博士	<input type="checkbox"/>		

其他: _____ (请详述)

5. 家庭总收入:

< \$1000 \$1000—\$1499 \$1500—\$1999 \$2000—\$2499
\$2500—\$2999 \$3000—\$3499 \$3500—\$3999 \$4000—\$4499
\$4500—\$4999 \$5000—\$5499 > \$5500

6. 妻子职业状况: 工作 (全职) 工作 (兼职)
没有工作
(如: 家庭主妇)

7. 孩子的监护人: 父亲 母亲 祖父母 保姆
女佣人
其他: _____ (请详述)

以下各题，请您仔细想清楚您与您中三孩子的关系，然后依照以下所示的等级，圈出您的答案。

- | 非常不同意 | 不同意 | 中立 | 同意 | 非常同意 | |
|---------------------------------|-----|----|----|------|---|
| 1 | 2 | 3 | 4 | 5 | |
| 1. 当我与孩子谈论他/她的忧虑后，我会使他/她的心情好一些。 | 1 | 2 | 3 | 4 | 5 |
| 2. 我几乎时常以温和和友善的声音与孩子交谈。 | 1 | 2 | 3 | 4 | 5 |
| 3. 我时常对着孩子微笑。 | 1 | 2 | 3 | 4 | 5 |
| 4. 当孩子心情烦乱的时候，我能够让他/她的心情感到好一些。 | 1 | 2 | 3 | 4 | 5 |
| 5. 我很享受与孩子一起做事。 | 1 | 2 | 3 | 4 | 5 |
| 6. 当孩子伤心的时候，我会令他/她开心起来。 | 1 | 2 | 3 | 4 | 5 |
| 7. 我时常谈起他/她所做的好事。 | 1 | 2 | 3 | 4 | 5 |
| 8. 我对孩子所做的事情感到光荣。 | 1 | 2 | 3 | 4 | 5 |
| 9. 我允许这孩子告诉我有关他/她认为他/她的意见比我的更好。 | 1 | 2 | 3 | 4 | 5 |
| 10. 我喜欢这孩子选择自己的方法实行某项事情。 | 1 | 2 | 3 | 4 | 5 |
| 11. 我要孩子告诉我如果他/她不喜欢我对他/她的方式。 | 1 | 2 | 3 | 4 | 5 |
| 12. 我让这孩子帮忙决定怎样进行我们的工作。 | 1 | 2 | 3 | 4 | 5 |
| 13. 我真的要这孩子告诉我他/她对事物的感受。 | 1 | 2 | 3 | 4 | 5 |

	非常不同意	不同意	中立	同意	非常同意
	1	2	3	4	5
14. 我尝试了解孩子对事物的看法。	1	2	3	4	5
15. 在适当的时候, 我给孩子机会去做他 / 她想做的事。	1	2	3	4	5
16. 我很容易与孩子交谈。	1	2	3	4	5
17. 我可以清楚地看到孩子了解自己所能或不能够做的事。	1	2	3	4	5
18. 我深信对孩子应该有很多的规则并忠于这些规则。	1	2	3	4	5
19. 我相信有一定的方法来处罚这孩子不良的行为。	1	2	3	4	5
20. 我坚持这孩子一定要遵从我的指示。	1	2	3	4	5
21. 当这孩子正实行某项事物时, 他 / 她不被允许做其他的事, 至到他 / 她把这件事做完为止。	1	2	3	4	5
22. 这孩子可寄望我帮他 / 她在学校所面对的问题。	1	2	3	4	5
23. 我时常催促这孩子尽力做好学校的功课。	1	2	3	4	5
24. 当孩子在学校功课上有不明白的地方时, 我会教导他 / 她。	1	2	3	4	5
25. 当这孩子考得太差时, 我会鼓励他 / 她更加用功读书。	1	2	3	4	5
26. 当这孩子考到优越的成绩时, 我会称赞他 / 她。	1	2	3	4	5
27. 我认识谁是孩子学校的朋友。	1	2	3	4	5

非常不同意	不同意	中立	同意	非常同意		
1	2	3	4	5		
28.	我会腾出时间与孩子谈论他 / 她的学校功课。	1	2	3	4	5
29.	我不允许孩子在有上课的夜晚（星期一至星期四）在外逗留太夜。（九点晚上）。	1	2	3	4	5
30.	我不允许孩子在星期五或星期六晚上在外逗留太夜（九点晚上）。	1	2	3	4	5
31.	我 <u>尝试</u> 了解孩子在晚上时去了哪里。	1	2	3	4	5
32.	我 <u>尝试</u> 了解孩子在空闲时做些什么。	1	2	3	4	5
33.	我 <u>尝试</u> 知道孩子在放学后去了哪里。	1	2	3	4	5
34.	我 <u>真的</u> 知道孩子在晚上去了哪里。	1	2	3	4	5
35.	我 <u>真的</u> 知道孩子在空闲时做了些什么。	1	2	3	4	5
36.	我 <u>真的</u> 知道孩子在放学后去了哪里。	1	2	3	4	5

想着同一个孩子，根据所示的等级，圈出以下各题的答案。

非常不同意	不同意	中立	同意	非常同意		
1	2	3	4	5		
1.	我尊重我孩子的感受。	1	2	3	4	5
2.	我的孩子觉得我成功扮演父母的角色。	1	2	3	4	5
3.	我的孩子希望他 / 她拥有不同的父亲。	1	2	3	4	5

非常不同意	不同意	中立	同意	非常同意
1	2	3	4	5
4. 我接收孩子的真我。				1 2 3 4 5
5. 我的孩子必须靠他 / 她自己解决自己所面对的问题。	1	2	3	4 5
6. 我的孩子喜欢听取我有关他 / 她所关心的事的意见。	1	2	3	4 5
7. 我的孩子认为没有必要向我露出他们的感受。	1	2	3	4 5
8. 我可以察觉他 / 她对某事情感到烦乱的时候。	1	2	3	4 5
9. 孩子与我谈论有关他她的问题时，会令他 / 她感到羞耻或愚笨。	1	2	3	4 5
10. 我对他 / 她的期望太高。				1 2 3 4 5
11. 我的孩子对我容易感到伤心。				1 2 3 4 5
12. 我的孩子心绪烦乱的时刻比我想象中的还多。	1	2	3	4 5
13. 当我们讨论某事情时，窝考虑他 / 她的意见。	1	2	3	4 5
14. 我相信他 / 她的判断能力。				1 2 3 4 5
15. 我有自己的问题，所以我的孩子不会以他 / 她的问题来烦扰我。	1	2	3	4 5
16. 我帮他 / 她更加了解他 / 她自己。				1 2 3 4 5
17. 我的孩子告诉我有关他 / 她所面对的问题和困难。	1	2	3	4 5

非常不同意	不同意	中立	同意	非常同意	
1	2	3	4	5	
18. 我的孩子对我感到非常生气。	1	2	3	4	5
19. 我的孩子没有得到我足够的注意力。	1	2	3	4	5
20. 我鼓励他 / 她说出他 / 她所面对的难题。	1	2	3	4	5
21. 我了解他 / 她。	1	2	3	4	5
22. 我的孩子不知道他 / 她是否可以依靠我。	1	2	3	4	5
23. 当我的孩子对某事物生气时，我尝试去了解他 / 她。	1	2	3	4	5
24. 我的孩子相信我。	1	2	3	4	5
25. 我不了解他 / 她最近怎样度过日子。	1	2	3	4	5
26. 当他 / 她需要说出他她的心事时，他 / 她可信任我。	1	2	3	4	5
27. 我的孩子觉得我不了解他 / 她。	1	2	3	4	5
28. 如某事物烦扰他她，我会问他 / 她有关那事物。	1	2	3	4	5
29. 我的孩子认为成为我的孩子是一个很欢乐的经历。	1	2	3	4	5
30. 在各方面，我的孩子很高兴与我在一起。	1	2	3	4	5
31. 我的孩子对于他 / 她和我的关系感到很满意。	1	2	3	4	5

非常不同意 不同意 中立 同意 非常同意
1 2 3 4 5

32. 我的孩子对于我的行为感到高兴。 1 2 3 4 5

33. 总而言之，我认为我的孩子可以和我 1 2 3 4 5
相处得很好。

请确定您已答了全部的问题。
感谢您的参与!