REACTIVE AND PROACTIVE AGGRESSION IN 13 TO 15 YEAR-OLD SINGAPORE ADOLESCENTS – DIFFERENTIAL PSYCHOSOCIAL CORRELATES, PERSON-ENVIRONMENT DYNAMICS AND ADJUSTMENT OUTCOMES

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ABSTRACT

This study is a multi-dimensional and longitudinal study set within the dynamic 13 to 15 year-old developmental window and in the Asian context. It sought to clarify the much-debated reactive-proactive aggression construct, from the angle of differential antecedents and adjustment outcomes, as well as to elucidate the risk and protective effects of dispositional factors (such as effortful control and psychopathic traits), parenting styles and peer social support in the manifestation of aggression. It also examined reactive and proactive aggressions' unique predictive associations with empirically determined internalizing / externalizing syndromes. Additionally, gender effect was investigated to determine if any gender difference exists for these associations.

An adolescent sample (M = 13.26 years, SD = 0.92), comprising 634 male and 559 female students, from four secondary schools was used for this study. This was a self-report, questionnaire-based study with a longitudinal design, with two points of data collection about one year apart.

The findings from this study indicated that a two-factor structure model, comprising reactive aggression and proactive aggression as distinct components, fit the data better than a single-factor solution. In terms of differential associations with dispositional variables, reactive aggression was negatively associated with effortful control and positively associated with psychopathy, whereas proactive aggression was not significantly associated with effortful control but positively

associated with psychopathy. Where social environmental influences were concerned, reactive aggression was uniquely and positively associated with authoritarian parenting, whereas proactive aggression was uniquely and positively associated with permissive parenting. Authoritative parenting, the 'Guan' parenting style (which reflect the unique aspects of Asian parental practices) and peer social support did not show any significant association with either reactive or proactive aggression. For gender effects, girls were found to be more susceptible to the differential in effortful control where manifestation of reactive aggression was concerned, whereas the boys seemed to be more susceptible to effortful control differential in the manifestation of proactive aggression. Boys were also found to be more susceptible than girls to the differential in psychopathy and permissive parenting in their manifestation of proactive aggression. Finally, for outcome predictions, there was no gender difference in both the concurrent as well as prospective predictions. Reactive aggression significantly predicted internalizing and externalizing syndromes, as well as delinquency, whereas proactive aggression significantly predicted externalizing syndromes and delinquency, but not internalizing syndromes. The pattern for prospective predictions was different, whereby reactive aggression significantly predicted externalizing syndromes and delinquent behaviors (positive associations), whereas none of proactive aggression's predictions was significant. In terms of person-environment interaction effects on reactive and proactive aggression, only one mediation model

(permissive parenting mediating the psychopathy - proactive aggression relationship) met all the conditions for significant mediation effect.

The results of this study have provided a comprehensive description of how certain salient dispositional and social environmental factors influence the manifestation of reactive and proactive aggression for a group of 13 to 15 year old Asian adolescents, including gender differences. It has also investigated the predictive validity of the functions of aggression on subsequent adjustment and behavioral outcomes. Some of the findings replicated results from prior studies, whereas others are new findings that help to extend current understanding of reactive and proactive aggression. Implications from the findings as well as possible future research were also discussed. Overall, this study adds further support to the notion of reactive aggression and proactive aggression as distinct facets of aggression that have practical implications for intervention and treatment, particularly for adolescents from the Asian context.

CHAPTER ONE

INTRODUCTION

1.1 Problem Statement and Rationale of Study

Aggression is defined as any behavior directed toward another individual that is carried out with the intent to cause harm, and violence is an extreme form of aggressive behavior (Anderson & Bushman, 2002). Aggression is a form of antisocial behavior, which disadvantage others and violate basic norms and values (Kempes, Matthys, de Vries, & van Engeland, 2005). Weinshenker and Siegel (2002) described violence and rage as a major public health and social problem in the United States as well as elsewhere around the world. Empirical findings have also indicated that aggression is both frequent and problematic among children in elementary as well as middle and high school (Boxer, Terranova, Savoy & Goldstein, 2008; Centers for Disease Control & Prevention, 2006; Nansel et al., 2001).

In addition, there is strong evidence that aggressive behavior in childhood and adolescence is a significant predictor of criminal and delinquent behavior later in life. Data from six longitudinal studies from Canada, New Zealand, and the United States have shown that chronic physical aggression during the elementary school years is the best behavioral predictor of violent behavior during adolescence (Broidy, Nagin, & Tremblay, 1999; Nagin & Tremblay, 1999). It is estimated that

one in five aggressive two-year-olds are likely to become aggressive adolescents and one in ten may become delinquent, eventually going on to lead adult lives characterized by heavy drinking, polydrug use, sexual promiscuity, reckless driving, marital violence, and occupational marginality (Broidy et al., 2003; Elliot, 1994; Farrington et al., 1993). While this is a small percentage of the total population, research has found that they account for a disproportionately large number of violent and related offences. For example, in a Stockholm study that tracked a cohort of 7101 male adolescents through 30 years of age, Tremblay (1999) found that 71% of all violent offences were committed by only 6.2% of this sample. Nevertheless, the majority of children with high early levels of aggression or conduct problems improve by adolescence and only a small percentage go on to have major problems (Bennett, Lipman, Racine, & Offord, 1998; Fergusson, Lynskey, & Horwood, 1996; Moffitt, Caspi, Dickson, Silva, & Stanton, 1996; Nagin & Tremblay, 1999; Patterson & Yoerger, 1997). Moffitt (1993) has distinguished between these two groups, describing the majority group, whose aggressive tendencies decline with the passing of adolescence, as the 'adolescent onset or adolescent-limited' variety. Most of these youths were previously not aggressive or antisocial, but they began to exhibit such behaviors as they entered the adolescent period, contributing to an almost ten-fold increase in the ranks of antisocial youths. However, most of them also desisted in such behaviors towards the end of adolescence. On the other hand, the smaller group, also known as the

'early onset or life-course-persistent' variety, is often characterized by inadequate parenting, neurocognitive problems, undercontrolled temperament, severe hyperactivity, and psychopathic personality traits in addition to their persistent violent behavior (Moffit, Caspi, Harrington, & Milne, 2002).

The dynamic trajectory of aggressive behavior, especially that of the 'adolescent onset or adolescent-limited' group, is not entirely unexpected if we understand adolescence as a critical developmental phase characterized by major transitions, which include biological changes brought about by the onset of puberty, cognitive changes with the emergence of more advanced thinking abilities, and social changes as adolescents take on new roles in society (Hill, 1983). While storm and stress of adolescence is neither universal nor inevitable, and most adolescents cope successfully with the developmental demands of this period and do not evidence extremes of maladaptation, adolescence typically still generate more turmoil than either childhood or adulthood (Resnick et al., 1997). As such, these challenges can be expected to have an influence on the manifestation of aggressive behavior. Given the concern over the negative impact of aggression as well as its dynamic course during the adolescent period, it is necessary to examine this behavioral phenomenon more closely within the adolescent developmental window. This examination is the first main aim of this study.

Aggression is a complex and heterogeneous construct, encompassing a wide range of behaviors, including verbal insults, bullying, physical fighting,

robbery, rape, and homicide. Although these behaviors can be carried out with the intent to harm, they clearly have different manifestations (i.e., *forms*) and originate from different underlying motivations (i.e., *functions*). To facilitate the investigation of this multifaceted phenomenon, researchers have, over time, come up with sub-types of aggression. Most typologies of aggressive behavior to date concern the different forms or ways of expressing aggression. Form-based subtypes in the literature include direct, physical, verbal, material, relational, indirect, and social aggression (Underwood, Galen, & Paquette, 2001). It is also essential, however, to distinguish between the functions of aggression, as it gives us crucial additional information about *why* individuals engage in aggressive behavior (Little, Brauner, Jones, Nock, & Hawley, 2003). The functions may also be independent from the actual forms of the behaviors (Little, Jones, Henrich, & Hawley, 2003). Knowing why people aggress sheds more light on ways to intervene. For instance, adolescent A, who roughed up a fellow student because he felt bored and decided to look for some excitement, will require a different treatment from adolescent B, who threw punches at his classmate because he was verbally provoked by the latter. Strategies aimed at reducing the positive contingency of aggressive behavior may be more suitable for helping adolescent A whereas strategies targeting the strengthening of emotional regulation may be more useful to adolescent B.

A distinction that touches on the underlying function of aggressive behavior is the distinction between *reactive* and *proactive* aggression (Dodge & Coie, 1987).

Reactive aggression occurs as a response to antecedent conditions of real or perceived threat, provocation or frustration, and is usually accompanied by the expression of anger. It is an impulsive act of retaliation against the source of anger–frustration. In contrast, proactive aggression is instrumental in nature, and is motivated by anticipated rewards, such as goods or interpersonal dominance resulting from aggressive acts.

While the reactive-proactive aggression dichotomy has been useful in helping researchers distinguish between aggressive behaviors, there has also been an ongoing debate regarding their distinctiveness. On one hand, opponents of the dichotomy paradigm cited the high statistical overlap ($r < .70$) between these two constructs (Dodge & Coie, 1987; Dodge, Coie, Pettit, & Price, 1990; Poulin & Boivin, 2000a) and the evidence that the majority of aggressive individuals are both reactively and proactively aggressive (Brendgen, Vitaro, Boivin, Dionne, & Pérusse, 2006) as their basis. On the other hand, exploratory and confirmatory factor analyses have consistently yielded two distinct factors in line with the reactive–proactive dichotomy (Crick & Dodge, 1996; Day, Bream, & Paul, 1992; Little, Jones, et al., 2003; Pellegrini, Bartini, & Brooks, 1999; Poulin & Boivin, 2000a; Salmivalli & Nieminen, 2002). In addition, Vitaro, Brendgen, and Tremblay (2002) have pointed out that reactive and proactive aggression seem to have different correlates at the personal, social, academic, behavioral, and physiological levels, giving support to the validity of the proactive–reactive

distinction. Hence, despite on-going debate, clarifying the reactive and proactive distinction along the line of differential correlates, person-environment dynamics, and adjustment outcomes has definite utility value for aggression prevention and intervention, and this clarification is the second main aim of this study.

Gender differences in aggressive behavior are well documented. However, the exploration of gender differences with respect to reactive and proactive aggression, especially with an adolescent population, is limited and inconclusive. Card and Little (2006), in their meta-analysis of studies on reactive and proactive aggression's relations with adjustment outcomes in childhood and adolescence, identified gender as one of the moderation effects that was understudied. Along a similar vein, Polman, de Castro, Koops, van Boxtel, and Merk's (2007) meta-analysis on reactive-proactive aggression distinction in children and adolescents also reported that girls were consistently underrepresented in the 51 studies they have reviewed. Therefore, the third main aim of this study is to examine if there is any gender effect in reactive and proactive aggression's associations with the various dispositional, environmental and outcome correlates.

Lastly, we recognize that most of the extant literature on the reactive-proactive aggression distinction comes from the West and studies on how this theoretical construct operates within the Asian context are still much needed (except, see Seah & Ang, 2008; Xu, Fraver & Zhang, 2009; Xu & Zhang, 2008). The examination of reactive and proactive aggression in Singapore adolescents

(comprising mainly youths of Asian ethnicities, including Chinese, Malays and Indians) will contribute to the cross-cultural perspective of reactive-proactive aggression, and generate findings that will be relevant for application in the local context.

1.2 Research Overview and Research Questions

The main research question of this study is: 'In what ways are reactive aggression and proactive aggression distinct from or similar to each other when examined from the 13- to 15-year-old developmental window and from a gender difference perspective?' To find the answers to this question, two approaches were adopted. The first approach used factor analytical methods to determine whether the data reflect a one-factor structure, thereby indicating a higher degree of overlap between reactive and proactive aggression and a more unitary construct, or a two-factor structure, thereby indicating a clear statistical distinction between reactive and proactive aggression. The second approach involved conducting regression analyses to distinguish between proactive and reactive aggression with regard to their differential emotional, cognitive, and behavioral antecedents and consequences (Merk, de Castro, Koops, & Matthys, 2005; Raine et al., 2006; Vitaro et al., 2002). In addition, gender was included in these regression models as a moderator to find out if gender effects exist.

According to Bronfenbrenner's Bio-Ecological Systems Theory (1979), human development occurs within multiple contexts and a person's biology, family, peers, school, and neighborhood form the microsystem, which is the social environment that has the most direct interactions with an individual. Pianta and Walsh (1996) also posited in their Contextual System Model that any behavioral outcome must be understood as a product multiply-determined by various factors interacting over time, and this model highlights the child/family system and the school system as the two major influences of outcomes. Taken together, these theories have identified the individual, parents, and peers (from both the neighborhood and school) as critical contexts that will interact with one another and multiply influence a person's behaviors over time. Hence, in this study, we set out to investigate, within a gender difference perspective, whether reactive aggression and proactive aggression have differential associations with

- dispositional characteristics of effortful control and psychopathy,
- social-environmental influences of parenting practices and peer social support, and
- adjustment outcomes of empirically derived internalizing and externalizing syndromes and delinquent behavior (both concurrently and prospectively).

As indicated by Bronfenbrenner, human behaviors need to be understood by simultaneously considering its internal and external contexts. As such, we will also

be examining person-environment dynamics (i.e., whether social-environment variables mediate dispositional influences on reactive / proactive aggression).

The following diagram (Figure 1.1) provides an overview of the different aspects of this study.

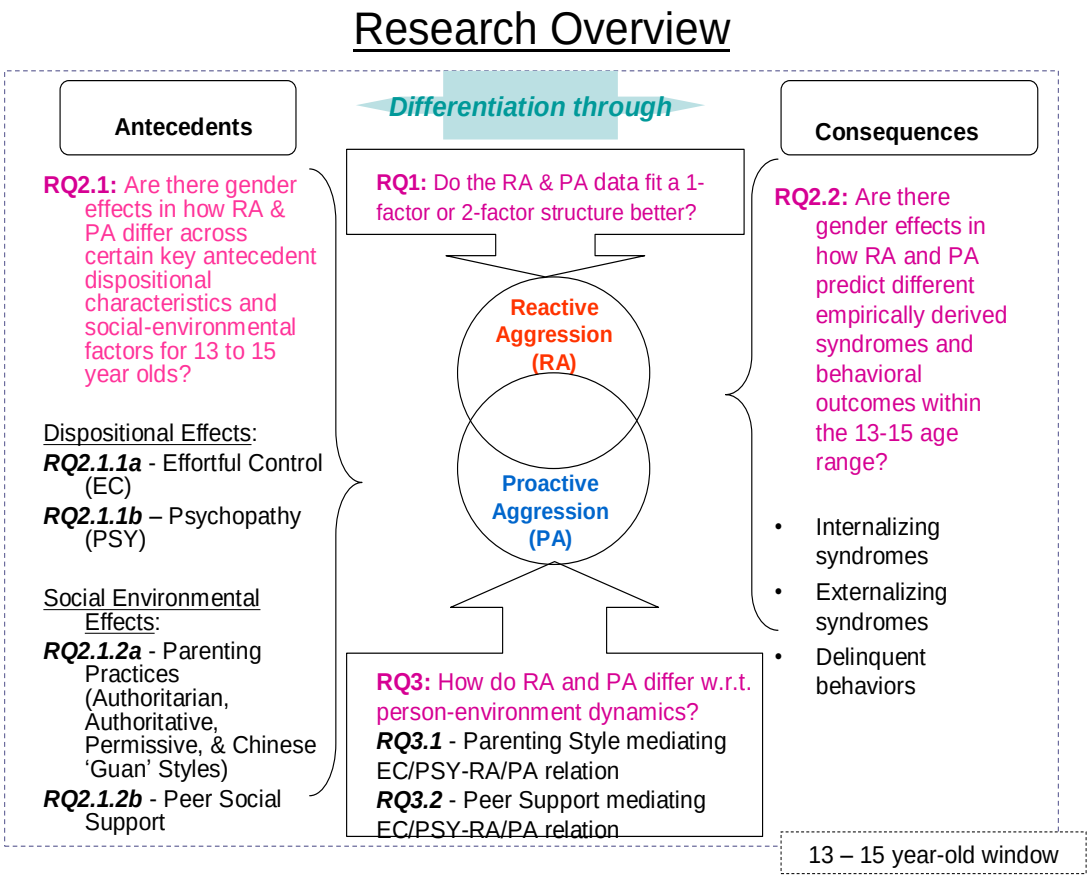


Figure 1.1: Graphical representation of the overview of research study

The specific research questions that this study aims to answer are:

RQ1) Do the reactive and proactive aggression data (from 13 – 15 year old Singapore adolescents) fit a one-factor or a two-factor structure better?

RQ2.1) Are there gender effects in how reactive aggression and proactive aggression differ across certain key antecedent dispositional characteristics and social-environmental factors for 13 to 15 year-olds?

RQ2.1.1a) How is effortful control (EC) related to the manifestation of reactive and proactive aggression?

RQ2.1.1b) How is psychopathy (PSY) related to the manifestation of reactive and proactive aggression?

RQ2.1.2a) How is the experience of different parenting styles associated with the manifestation of reactive and proactive aggression?

RQ2.1.2b) How is the perception of peer social support associated with the manifestation of reactive and proactive aggression?

RQ2.2) Are there gender effects in how reactive and proactive aggression predict different empirically derived syndromes (manifested as internalizing or externalizing problems) and behavioral outcomes (expressed in terms of delinquent behaviors) within the 13-15 year age range?

RQ3) How do reactive aggression and proactive aggression differ with respect to person-environment dynamics?

RQ3.1) How do parenting styles mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?

RQ3.2) Does peer social support mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?

1.3 Definition of Key Concepts

Dispositional Characteristics

Dispositional characteristics such as temperament and personality traits are persistent patterns of behavior, thought, and emotion that are characteristic of individuals. Traits are relatively stable over time, differ across individuals (e.g. some people are outgoing, whereas others are shy), and influence behavior (Kassin, 2003). *Psychopathy,* which we examine in this study, is an example of a trait. Temperament is reflected in individual differences in self-regulation and reactivity in domains such as affect, attention, and activity. It is considered to be biologically based (i.e. constitutional) and influenced by experience (e.g., interactions with the family and broader environment), development, and heredity (Rothbart & Bates, 2006). In this study, the temperament dimension identified for examination is *effortful control*. Many researchers consider temperament to be the set of traits that are the most influenced by genetics and biology, since temperament differences are discernable in new born infants, non-human primates, and other animals (Larsen & Buss, 2008). However, there are others (e.g. Cicchetti & Cohen, 1995) who adopt a more transactional understanding of temperament, and view temperament as shaped by ongoing interactions among intrinsic child characteristics (e.g.

temperament, health status and cognitive capacities) and aspects of the environment (e.g. parenting, family circumstances and the wider sociocultural context).

Effortful Control

Effortful control refers to ‘‘the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors’’ (Rothbart & Bates, 2006, p.129). It is also related to the capacity to modulate emotions and behavior by delaying actions, shifting attention, or suppressing or initiating inappropriate or appropriate behavior (Kochanska, Murray, & Harlan, 2000).

Psychopathy

Psychopathy refers to a constellation of traits that characterize antisocial individuals, which include the following aspects: affective (e.g., poverty of emotions, lack of empathy and guilt), interpersonal (e.g., callous use of others for one’s own gain), self-referential (e.g., inflated sense of one’s own importance), and behavioral (e.g., impulsivity, irresponsibility). Research has quite consistently shown that such individuals show a more severe and violent pattern of antisocial behavior, and engage in more misconduct and aggressive behaviors (Munoz & Frick, 2007).

Social Environmental Factors

Family and peer groups are two vital contexts in the social experience of almost all children and adolescents, and will have an effect on their development and behaviors (Steinberg, 2005). This study focused on the effects of different *parenting practices* or *styles* and *peer social support* on manifestation of aggressive behaviors.

Parenting Practices / Styles

Parenting styles reflect the "constellation of attitudes toward the child that are communicated to the child and create an emotional climate in which parents' behaviors are expressed" (Darling & Steinberg, 1993, p.493). In this study, we used Baumrind's (1971) tripartite model of parental socialization styles, which includes *authoritarian parenting* (characterized by demanding and unresponsive style), *permissive parenting* (characterized by responsive but non-demanding style) as well as *authoritative parenting* (characterized by warm and responsive style that provide firm control and maturity demands at the same time). Research from the West has generally identified authoritative parents as the optimal parenting style as it has been consistently associated with optimum outcomes of children and adolescents (Garcia & Gracia, 2009). To account for unique aspects of parenting in the Asian context, we have also adopted the concept of '*Guan*' *parenting* proposed by Chao (1994), which encapsulates the set of values and beliefs deemed essential

by Asian parents in general, and is expressed in terms of greater supervision of the child, together with a supportive, highly involved and physically-close parent-child relationship.

Peer Social Support

Peer social support refers to the existence of positive psychosocial interactions with companions of similar age, with whom there is mutual trust and concern (Sarason, Levine, Basham, & Sarason, 1983). Such positive relationships contribute to positive adjustment and buffer against stressors and adversities by offering emotional support (esteem, attachment, and reassurance), instrumental support (material goods and services), and information support (advice, guidance, and feedback; Solomon, 2004).

Internalizing and Externalizing Syndromes

Children and youths who are at risk of psychopathology tend to show multiple behavioral problems (Mash & Terdal, 1997). In general, researchers have found that such individuals have problems that cluster into at least two general groups, namely *internalizing syndromes* and *externalizing syndromes* (Achenbach, 1991; Mash & Barkley, 2007). *Internalizing syndromes* are related to problems 'within the self', such as fears, physical complaints, worrying, shyness, and have also been called 'overcontrolled', 'overinhibited' and 'shy-anxious' problems. Children with

these types of disorder seem to deal with problems internally, rather than acting them out in the environment. The other cluster of problem behaviors, *externalizing syndromes*, is characterized by behaviors directed outward, typically toward other people. Examples include aggression, delinquency, temper tantrums, and overactivity. This group of behaviors typically involves conflict with other people, and has also been called 'conduct problem', 'undercontrolled', and or 'aggressive' (Achenbach, 1982).

1.4 Research Hypotheses

The hypotheses for the respective research questions are given in Table 1.1 below. The rationale for each of the hypotheses will be given in the literature review in Chapter 2.

Table 1.1

Research Questions and their corresponding Hypotheses

Research Questions	Hypotheses
RQ1) Do the reactive and proactive aggression data (from 13 – 15 year old Singapore adolescents) fit a one-factor or two-factor structure better?	▪ H1: There will be a substantial overlap between reactive aggression and proactive aggression, but a two-factor structure will fit the sample data better than a one-factor structure.

Table continues

Research Questions	Hypotheses
RQ2.1.1a) How is effortful control (EC) related to manifestation of reactive and proactive aggression? Will there be any gender effect?	• H2: Effortful control will be negatively associated with both proactive and reactive aggression; the association between effortful control and reactive aggression will be stronger compared to that between effortful control and proactive aggression; and gender moderation is expected.
RQ2.1.1b) How is psychopathy (PSY) related to manifestation of reactive and proactive aggression? Will there be any gender effect?	▪ H3: Psychopathy will be positively associated to both proactive and reactive aggression; the association between psychopathy and proactive aggression will be stronger compared to that between psychopathy and reactive aggression; and gender moderation is expected.
RQ2.1.2a) How do the experience of different parenting styles associate with manifestation of reactive and proactive aggression? Will there be any gender effect?	▪ H4: Reactive aggression will be positively associated with the experience of authoritarian parenting but NOT associated with other parenting styles, and gender moderation is expected.

Table continues

Research Questions	Hypotheses
	▪ H5: Proactive aggression will be positively associated with the experience of permissive parenting but NOT associated with other parenting styles, and gender moderation is expected. ▪ H6: Both reactive and proactive aggression will show either no significant association or a negative association with an authoritative parenting style, and gender moderation is expected. ▪ H7: For the Chinese adolescents, both reactive and proactive aggression will show either no significant association or a negative association with Asian 'Guan' parenting, and gender moderation is expected.

Table continues

Research Questions	Hypotheses
RQ2.1.2b) How is the perception of peer social support associated with manifestation of reactive and proactive aggression? Will there be any gender effect?	▪ H8: Both reactive and proactive aggression will show either no significant association or a negative association with peer social support, and gender moderation is expected.
RQ2.2) Are there gender effects in how reactive and proactive aggression predict different empirically derived syndromes (as manifested in terms of internalizing or externalizing problems) and behavioral outcomes (expressed in terms of delinquent behaviors) within the 13-15 age range?	▪ H9: Reactive aggression at 13 or 14 years old will be more predictive of internalizing syndromes compared to externalizing syndromes and delinquent behaviors concurrently; and no gender moderation is expected. ▪ H10: Proactive aggression at 13 or 14 years old will be more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes concurrently, and gender moderation is expected.

Table continues

Research Questions	Hypotheses
	▪ H11: Reactive aggression at 13 or 14 years old will be more predictive of internalizing syndromes compared to externalizing syndromes and delinquent behaviors prospectively (about a year later); and no gender moderation is expected. ▪ H12: Proactive aggression at 13 or 14 years old will be more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes prospectively (about a year later), and gender moderation is expected.
RQ3.1) How do parenting styles mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?	▪ H13: Given H2, H3 and H4, authoritarian parenting is expected to mediate the association of EC and reactive aggression and also to mediate the association of PSY and reactive aggression, but will NOT mediate associations of EC or PSY and proactive aggression.

Table continues

Research Questions	Hypotheses
	▪ H14: Given, H2, H3 and H5, permissive parenting is expected to mediate the association of EC and proactive aggression and also to mediate the associations of PSY and proactive aggression, but will NOT mediate the associations of EC or PSY and reactive aggression. ▪ H15: Given H2, H3 and H6, authoritative parenting is expected to mediate the associations of EC with both reactive and proactive aggression and also to mediate the associations of PSY with both reactive and proactive aggression. ▪ H16: Given H2, H3 and H7, Asian 'Guan' parenting is expected to mediate the associations of EC with both reactive and proactive aggression and also to mediate the associations of PSY with both reactive and proactive aggression in the Chinese adolescents.

Table continues

Research Questions	Hypotheses
RQ3.2) Does peer social support mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?	• H17: Given H2, H3 and H8, peer social support is expected to mediate the associations of EC with both reactive and proactive aggressions and also to mediate the associations of PSY with both reactive and proactive aggression.

1.5 Significance of Study

As aggression is multiply determined, this study adopts a comprehensive and integrated approach to examine the reactive-proactive distinction, involving the simultaneous examination of a range of salient variables in the various key domains of the ecology of the adolescents. Such a research design will help to provide a more complete understanding of the dynamic and multifaceted phenomenon of aggression.

Specifically, effortful control and psychopathy are the two dispositional trait and temperament dimensions identified for examination as they relate closely to the defining features of reactive aggression and proactive aggression, respectively. Effortful control is related to emotional regulation (Kochanska et al., 2000; Rothbart & Bates, 2006) and emotional reactivity or dysregulation is a distinguishing dispositional feature of reactive aggression (Marsee & Frick, 2007). Similarly, the psychopathic personality is predominantly characterized by proactive

aggression (Cima & Raine, 2009). Hence, knowing how effortful control and psychopathy each differentially relates to reactive aggression compared to proactive aggression, especially when they are operating in relation to other social environmental influences such as parental and peer effects, will provide valuable insight about the mechanism underlying these aggression subtypes.

Turning to social environmental effects, literature has indicated that parenting practices and behaviors as well as peer groups are key influences on the manifestation of antisocial behaviors, including aggression (Dekovic, Wissink & Meijer, 2004; Dishion, Patterson & Kavanagh, 1992; Patterson, DeBaryshe & Ramsey, 1989). Despite the important influence that parenting dimensions are postulated to have on the manifestation of reactive and proactive aggression, surprisingly little research has examined how they differentially relate to proactive and reactive aggression (Arsenio, 2004), and the few studies available on this topic have concentrated on the effects of negative parenting practices. This study intends to extend the current understanding of parenting effects by examining not just the negative / risk aspect of parenting but also the positive / protective aspect on reactive and proactive aggression. For this purpose, we have applied Baumrind's (1971) parenting styles in our study, which comprises not only authoritarian parenting and permissive parenting (generally considered less than ideal parenting style), but also authoritative parenting (generally considered a more ideal parenting style). However, what is considered optimal parenting in an Asian context may

differ from that in Western cultures (Chao, 1994; Stewart et al., 1998). Hence, our study has also included the concept of '*Guan*' (管) parenting proposed by Chao (1994). When used with the Chinese in our sample (which is also predominantly Chinese), we hope to capture the unique aspects of parenting in our local context that are beyond what Baumrind's conceptualization of parenting can reflect due to cultural limitation.

Where peer effects are concerned, previous research indicates that proactive aggression seems to be more tolerated and even reinforced by peers and the proactively aggressive children have more friends than reactively aggressive children (Poulin & Boivin, 2000b). Reactively aggressive children experience lower friendship quality than their non-aggressive counterparts, whereas this is not the case for proactively aggressive children (Poulin & Boivin, 1999). Nevertheless, aggressive behavior is incompatible with the Asian value system because it disrupts the social order and interferes with group functioning (e.g. Bond & Wang, 1982). It is prohibited in school settings, and aggressive children are generally viewed as "problem kids" who are severely punished and closely monitored by the authorities (Chen, 2000). Such strong cultural sanctions raise the question of whether the discernible distinction between proactive and reactive aggression in terms of their associations with peers will still hold in a society where aggression is generally viewed negatively, regardless of subtype. This study intends to find an

answer to this question by investigating how reactive and proactive aggression is related to peer social support in our Asian adolescent sample.

In addition, this study intends to build on current knowledge of the reactive and proactive aggression's distinction in relation to relevant adjustment outcomes by investigating their predictive validity of internalizing and externalizing problems and delinquent behaviors within a specific developmental window (13 to 15 years old). As discussed earlier, the early to middle adolescent period of between 13 to 15 years old can be a tumultuous developmental phase for many individuals. Due to the multiple challenges faced by these adolescents, we expect stress and anxiety, depression as well as anger and other "acting out" behaviors to be rather common features during this period. Hence, any finding that is consistent with the distinctive predictive pattern of reactive and proactive aggression during this dynamic period will lend support to the robustness and stability of the reactive-proactive aggression construct.

Finally, another contribution this study hopes to make to understanding of reactive and proactive aggression is in the area of gender effects, as many prior studies either did not investigate the gender aspect or used a male-only sample. For example, a number of studies have found consistent predictive patterns of reactive and proactive aggression on internalizing and externalizing problems in children and adolescents, with proactive aggression more related to externalizing behaviors and delinquency and reactive aggression more related to internalizing problems

(Card & Little, 2006; Fite, Colder, Lochman, & Wells, 2008; Raine et al., 2006; Tremblay, Pihl, Vitaro, & Dobkin, 1994; Vitaro, Gendreau, Tremblay, & Oligny, 1998). However, due to the paucity of studies which looks at the predictive validity of reactive and proactive aggression from the gender difference perspective, substantive evidence is lacking to enable making a firm prediction about whether the currently established predictive pattern also holds for the female population, particularly for the 13 to 15 year-old age range in which data are even scarcer.

Taken together, findings from this study will bring both theoretical and application benefits. The study results will help provide theoretical clarification to the reactive-proactive aggression construct, particularly from the angle of differential antecedents and adjustment outcomes of reactive aggression vis-à-vis proactive aggression. In terms of application, the study will also help elucidate the risk or protective effects of dispositional factors and social environmental effects in the manifestation of aggression, thereby providing important cues for designing more effective early identification strategies and prevention programs. The outcomes from examining reactive and proactive aggressions' unique predictive association with internalizing / externalizing problems, as well as the investigation of all the relevant associations from a gender difference perspective will add further to the research literature. Finally, the setting of this study within the dynamic 13- to 15-year-old developmental window of adolescents and in the Asian context will contribute further insight to the knowledge of reactive-proactive

aggression and extend the understanding of this domain established by prior studies.

1.6 Outline of Chapters

This chapter provides the rationale and describes the focus of this research. It also lists the research questions and the corresponding hypotheses to be tested, defines the key concepts examined in this study as well as highlights the significance of the study. The relevant literature review follows in Chapter Two, and Chapter Three outlines the research design and methodology employed for this study. Findings from the study will be presented in Chapter Four and Chapter Five contains a discussion of the results and their implications. Limitations of the study will also be discussed in the concluding chapter.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter examines the literature pertaining to the reactive and proactive aggression distinction, as well as the relevant correlates of these aggression subtypes. It also provides the rationale for the research questions and their corresponding hypotheses. The presentation of the materials will broadly follow the order of the research questions (c.f. Section 1.2), whereby the following topics will be discussed:

- theoretical distinction between reactive and proactive aggression
- developmental theory of reactive and proactive aggression
- gender effects on reactive and proactive aggression
- dispositional differences between reactive and proactive aggression
- differences in social environmental effects on reactive and proactive aggression
- differences in adjustment and behavioral outcome predictions
- effects of person-environment dynamics on reactive and proactive aggression

2.2 Theoretical Distinction between Reactive and Proactive Aggression

Many recent studies on aggressive behaviors in children and adolescents have differentiated between subtypes of aggression, and the *reactive and proactive aggression paradigm* is a commonly adopted distinction. First proposed by Dodge and Coie (1987), it emphasizes the difference in intrinsic motivation as the key distinguishing feature in aggressive behaviors, with reactive aggression and proactive aggression having distinct theoretical roots. The concept of reactive aggression, premised on the frustration–anger theory of aggression, posits that aggression results when a person feels frustrated that he or she is being blocked from achieving a goal (e.g., Berkowitz, 1962, 1993; Dollard, Doob, Miller, Mowrer, & Sears, 1939). Blocked goal causes discomfort, raises arousal levels and increases one's sensitivity to cues which are associated with anger and aggression (Coon, 2006). As its name suggests, reactive aggression occurs as a response to antecedent conditions of real or perceived threat, provocation or frustration and is usually accompanied by the expression of anger. It entails retaliation against the source of anger–frustration, with the goal of hitting back at the perpetrator. As such, it is normally impulsive in nature. Conceptually, reactive aggression is synonymous with aggression that has been described as "defensive", "angry", "hot-blooded", "emotional", and "retaliatory" (Vitaro, Brendgen, & Barker, 2006). On the other hand, proactive aggression is rooted in the social learning model of aggression (Bandura, 1973, 1983), which postulates that aggression is an acquired behavior

governed by reinforcement contingencies. Children learn aggressive behavior not only by imitating adult model(s), but their use of aggression is validated and continued when they observe that such behaviors can be rewarding (positive reinforcement). Based on this paradigm, proactive aggression is instrumental in nature, motivated by anticipated rewards resulting from aggressive acts. It is viewed as a means to secure goods from others or to dominate others, and is synonymous with aggression that has been described as "offensive", "instrumental", "predatory", and "coldblooded" (Vitaro, Brendgen, & Barker, 2006).

In general, the literature has painted a different profile of reactively aggressive adolescents in comparison to their proactively aggressive counterparts. Reactively aggressive adolescents are more impulsive and anxious. They are easily irritated and angered by provocation, competition, or denigration (Holmes & Will, 1985). Individuals with reactive aggression have also been depicted as possessing social information processing deficits, and tend to interpret others' ambiguous provocations as hostile more readily than other children (Vitaro et al., 1998). In addition, they display more problem-solving deficits in difficult social situations (Day et al., 1992; Dodge & Coie, 1987; Dodge, Lochman, Harnish, Bates, & Pettit, 1997). As a result, reactively aggressive children usually have poor peer relations and are likely to be rejected by their peers. The overall picture of a reactively aggressive adolescent is that of a socially maladjusted individual with features of anxiety and a schizotypal personality, with characteristics such as fear-induced,

irritable, and hostile affect-laden defensive responses to provocation, lack of inhibitory functions, reduced self-control, and increased impulsivity (Raine et al., 2006). In contrast, the proactively aggressive adolescent can be seriously violent and has the profile of one who is psychopathy-prone. Such individuals would be characterized by sensation-seeking tendencies, being manipulative, parasitic, autonomically under-aroused, and emotionally blunted (with callous-unemotional traits) (Hare, Cooke, & Hart, 1999; Newman, 1997; Patrick & Zempolich, 1998). In general, findings on proactively aggressive adolescents portray them as narcissistic and unempathic individuals who engage in aggressive behavior by exploiting others in a callous unemotional manner for self-gain. While they have superficial charm, they establish only superficial and poor interpersonal relationships, and tend to have negative peer social status in the long run (Brown, Atkins, Osborne, & Milnamow, 1996).

Although two rather different profiles can be established for these two aggression subtypes, they may co-occur in the same individuals, and this is the most common situation observed among the studied samples. For example, person-centered studies show that around half of the children who engage in some form of aggressive behavior are both proactively and reactively aggressive, whereas around one third are only reactively but not proactively aggressive, and relatively fewer children (around 15%) seem to engage in only proactive but not in reactive aggression (Brendgen et al., 2006). Similarly, Day et al. (1992) and Dodge et al.

(1997) observed that proactive-reactive subjects represent the majority of aggressive individuals. Vitaro et al. (1998) also reported that the number of children who are characterized by reactive *and* proactive aggressiveness in their study outnumbered reactive-only and proactive-only children combined. These findings are indicative of a strong conceptual overlap of reactive and proactive aggression and lend weight to the argument for the lack of distinctiveness between reactive and proactive aggression (Dodge, 1991). Correlational studies have also often found these two constructs to be highly inter-correlated, with correlations such as $r = .76$ (Dodge & Coie, 1987), $r = .87$ (Dodge et al., 1990), $r = .82$ (Poulin & Boivin, 2000a). As such, there has been an ongoing debate regarding the usefulness of the distinction between these two aggression subtypes (e.g. Bushman & Anderson, 2001; Miller & Lynam, 2006). On the other hand, exploratory and confirmatory factor analyses have consistently yielded two distinct factors in line with the reactive–proactive dichotomy (Crick & Dodge, 1996; Day et al., 1992; Little, Brauner, et al., 2003; Pellegrini et al., 1999; Poulin & Boivin, 2000a; Salmivalli & Nieminen, 2002). In addition, Vitaro et al. (2002) note that reactive and proactive aggression did not seem to share the same pattern of correlates at the personal, social, academic, behavioral and physiological levels, hence adding support to the validity of reactive-proactive distinction.

Studies that investigated the application of the reactive-proactive aggression construct outside of the Western cultural contexts, especially with Asian

populations, are rare. However, the few existing ones seem to suggest that there is a difference in how children and adolescents from different ethnic or cultural backgrounds manifest reactive and proactive aggression. For example, Baker, Raine, Liu and Jaconson (2008) who studied the differential genetic and environmental influences on reactive and proactive aggression in children (M = 9.60 years, SD = 0.60), found Asian-American children scoring significantly lower on reactive aggression than all other ethnic groups, but having comparable scores on proactive aggression with the Caucasians and Hispanics. Fung, Raine and Gao (2009), who studied the cross-cultural generalizability of the Reactive-Proactive Questionnaire (RPQ), reported observing the two-factor reactive-proactive structure replicated (and having a better fit compared to a one-factor structure) in a large sample (n = 5615) of East Asian adolescents (11 to 15 years old). In addition, Xu and Zhang (2008) observed a lower degree of overlap between the two aggression functions in their Chinese samples compared to Western ones. Seah and Ang (2008) have also found a moderate correlation (r = .53) and demonstrated the existence of a two-factor structure for reactive-proactive aggression in a Singaporean adolescent sample (aged 13 to 15 years old). However, studies of reactive and proactive aggression in other major Asian ethnic groups, such as the Malays and Indians, cannot be found. Nevertheless, a comparison of the levels of reactive aggression and proactive aggression across the three Asian ethnic groups

in our study sample (Table 2.1) can provide some initial understanding of the similarities and difference:

Table 2.1

Comparison of the levels of Reactive Aggression and Proactive Aggression of Chinese, Malays and Indians

	Chinese (n=721)		Malay (n=222)		Indian (n=89)	
	M	SD	M	SD	M	SD
Reactive Aggression	7.11	3.77	7.54	3.91	6.82	3.76
Proactive Aggression	1.35	2.22	1.61	2.41	0.84	1.09

The ANOVA comparison of difference in the levels of reactive aggression between the Chinese, Malay and Indian groups in our sample is not statistically significant, while the ANOVA comparison of the levels of proactive aggression of the different ethnic groups is significant, $F(2, 1029) = 3.98$, $p<.02$. Specifically, the Malay adolescents have statistically higher level of proactive aggression compared to the Indians, while all other difference in proactive aggression levels are non-significant. Given the unique associations that reactive and proactive aggressions are each expected to have with effortful control, psychopathy, authoritarian and permissive parenting, as well as internalizing and externalizing syndromes (key variables to be explored in the present study), we may find stronger distinction between reactive aggression (which remains stable across ethnicities) and proactive aggression

(which differs across ethnicities) in their differential associations with these variables when compared across these different ethnic groups. Taking together all the available cross cultural evidences, it seems that the reactive-proactive distinction does extend across different ethnic groups or cultures, but will show a variation compared to what has been found in the extant and mainly Western literature.

To help clarify the distinction between reactive and proactive aggression in a primarily Asian setting, our first research question (RQ1) examines this theoretical distinction within the Singapore context by asking whether the scores on reactive and proactive aggression measures from a large sample of 13 – 15 year old Singapore adolescents fit a one-factor or two-factor structure better. From the currently available evidence, it seems that reactive aggression and proactive aggression are two different, yet related, psychological constructs. As pointed out by Raine et al. (2006), the distinctions between these two aggression subtypes might exist "more in degree than in absolute kind" (p. 169). Results from confirmatory factor analyses conducted in prior studies also seem to reflect a two-factor model (comprising a reactive and a proactive component). Despite failing to reach the conventional model fit acceptance limit (e.g. CFI close to .95 or RMSEA below .05 according to Byrne, 2001) in some cases, the two-factor model generally produced a better fit than that of the one-factor model (e.g. Ang & Seah, 2008; Poulin & Boivin, 2000a). In particular, Raine et al. (2006), who examined the

factor structure underlying the Reactive-Proactive Aggression Questionnaire (RPQ) that was also used for this study, reported better fit indices for the two-factor model in various samples (e.g. CFI between .86 to .91; RMSEA between .037 to .041) compared to those of the one-factor model (CFI between .77 to .82; RMSEA between .072 to .080). As such, a replication of these earlier findings can be expected with our sample, and our Hypothesis H1 postulates that there will be a substantial overlap between reactive and proactive aggression in terms of inter-correlation, but the two-factor structure will fit the data better than the one-factor structure.

2.3 Developmental Theory of Reactive and Proactive Aggression

This study examines the reactive and proactive aggression phenomenon not just in terms of their distinction, but also from a developmental perspective. In this respect, Vitaro and Brendgen (2005) have developed a tentative model of the developmental pathways associated with reactive and proactive aggression in an attempt to integrate the existing knowledge into a theoretical framework. The model is based on Dodge's (1991) explanation of the differential etiologies of reactive and proactive aggression whereby each originates from different socialization experiences and develops independently. According to Dodge's model, reactive aggression develops in response to a harsh, threatening, and

unpredictable environment or abusive and cold parenting, whereas proactive aggression thrives in supportive environments that foster the use of aggression as a means to achieve one's goals. Individuals who are high in both types of aggressive behaviors likely experience both types of environment. Vitaro and Brendgen (2005) termed this first theoretical model the *parallel development model*, because it views the two aggression subtypes as having different etiology and developing in a parallel and independent manner. In addition, there is another possible model in which temperamental factors operate as main (i.e. initial) effects and the different psychosocial factors serve as moderators. They called this second model the *sequential development model*, which is based on the findings that temperamental and neurophysiological elements seem to play a more prominent role in influencing reactive aggression but not proactive aggression, whereas environmental factors seem to play a greater role in shaping proactive aggression relative to reactive aggression. According to this alternative model, children with certain temperamental or neurophysiological characteristics are initially disposed to display aggressive behavior as a means of interacting with their environment. Initially, this tendency may be expressed mainly in a reactive manner, such as in high irritability and a difficult temperament in early infancy. If early outbursts of anger (screaming, kicking) lead to the desired outcome (food, toys, etc.), these children may learn that such behavior is a successful means not only of alleviating a stressful situation but also of obtaining a desired goal in a non-stressful situation.

Gradually, aggression may be used in a proactive manner more often to achieve goals, particularly in a permissive familial or peer environment, which may not only fail to inhibit but even foster this type of behavior. These personal and environmental contingencies related to proactive aggression may eventually open the way to other externalizing behavior problems, in particular delinquency. The authors have notably qualified that such oversimplifications do not imply that proactive aggression has no neurophysiological or genetic correlates or that reactive aggression is not partly dependent on environmental contingencies and learning experiences. However, the sequential development model does account for findings indicating that reactive aggression may precede and open the way to proactive aggression. For example, studies have shown that elements of reactive aggression such as anger and irritability seemed to appear already in early infancy, whereas dominating and instrumental proactive aggression directed toward peers did not emerge until about 12 months of age, when conflicts become extremely frequent, characterizing as much as half of peer exchanges between 12 and 18 months (Caplan, Vespo, Peterson, & Hay, 1991). Furthermore, longitudinal data from Lansford, Dodge, Pettit, and Bates (2002) showed that reactive aggression in one year was predictive of proactive aggression in the next over a period of several years (i.e., from kindergarten through grade 7), whereas proactive aggression did not predict subsequent reactive aggression.

Drawing on environmental moderation effects, Vitaro and Brendgen (2005) went further to provide an explanation for why not all children with an initial disposition for aggressive behavior display both reactive and proactive aggression later on. They also sought to account for the observation of the existence of individuals who became mainly reactively but not proactively aggressive and the very few who seemed to use aggression in a predominantly proactive manner. They postulated that some aggressive children may be less successful than others in controlling resources and dominating through aggression, perhaps because they are more frequently and severely punished for aggressive acts or because they are more anxious and sensitive to punishment. To avoid negative consequences, these aggressive children may stop using or never start using (physically) aggressive behavior in a proactive fashion and adopt alternative strategies for goal achievement instead. Nevertheless, because of their high sensitivity to stressful stimuli and their lack of impulse control, these children may remain reactively aggressive and use aggression when provoked or threatened and would therefore be called the "reactive-only" group. Because of their high reactivity to stress, these children may eventually also develop internalizing problems, which might be exacerbated by other problems associated with reactive aggression, such as peer rejection, victimization, or academic underachievement. To explain why some children become proactive only if aggressive behavior was initially used mainly in a reactive manner, Vitaro and Brendgen offered that these children may have

experienced very few provocations from others, perhaps because of their greater physical strength or because they possess other personal characteristics that make them an unlikely target of attacks from others. In such cases, there may not be much need to use aggression in a reactive manner. As a consequence, outside observers such as teachers, parents, or peers, may hardly ever observe reactive aggression in these children. The use of proactive aggression in these children is shaped through reinforcement contingencies and maintained through beliefs in its power and deference of its effects on the victims. This is not to say that these children will not use aggression in a reactive manner if they are provoked. However, given that their proactive aggression has been a very successful strategy of goal achievement, it is highly likely that these children would have averted a provocation or threat from another child with easy success through aggressive means. Based on this argument, Vitaro and Brendgen suggested that there may in fact not really be a group of "proactive-only" children, a notion that is fostered by the extremely small number of children identified as such in empirical studies (e.g., Dodge et al., 1997; Pulkkinen, 1996; Vitaro et al., 1998).

Besides the moderating effects of personal temperament and the environment, Vitaro, Brendgen, and Barker (2006) also highlighted the possible moderating effects of age or maturation. They postulated that with the increase in age in children comes an increase in their self-regulatory capabilities and a parallel increase in social pressure to inhibit emotional outbursts and public expression of

anger. This social pressure in turn may foster a general decline in reactive aggression by the end of childhood and throughout adolescence. In contrast, high levels of proactive aggression can remain stable and even increase during adolescence, at least for a small group of individuals, because of support from family and peers for its use to solve conflicts and to gain access to resources. In consequence, reactive and proactive aggression may become more and more differentiated over time, and it is possible that reactive aggression played a major part in driving the downward trend in physical aggression by the end of the preschool period and beyond. In contrast, the development of proactive aggression may more closely follow that of social aggression, which increases with age, since its more covert, circuitous (and therefore more sophisticated) strategies often involve careful planning and require more mature mental capacity.

This review on the development of reactive and proactive aggression highlights the operation of multiple forces, both innate to the individual as well as from the environment, acting over different periods in time to influence their manifestation. In addition, these various forces do not just operate independently but influence one another to multiply affect the individuals. Such a complex and dynamic nature of reactive and proactive aggression has made it necessary to adopt a comprehensive and longitudinal approach to examining reactive and proactive aggression. As such, our research framework (c.f. Figure 1.1) encompasses the examination of effects of salient variables in both dispositional and social

environmental domains, as well as their person-environmental dynamics. The framework also includes examining reactive and proactive aggression as predictors of adjustment outcomes and behaviors both concurrently and prospectively to understand their dynamics over time. With such a research design, we hope to capture a more accurate picture of how reactive and proactive aggression operates.

2.4 Gender Effects on Reactive and Proactive Aggression

Although gender differences in the incidence and development of aggressive behavior in general is well established, the exploration of gender differences with respect to reactive aggression and proactive aggression, especially with the adolescent population, has been limited. To the best of our knowledge, the only study that focused on gender difference in reactive and proactive aggression was done by Connor, Steingard, Anderson, and Melloni (2003). They found no gender difference in the rates of reactive aggression or proactive aggression in their 12- to 14-year-old clinical sample. In the few other studies that touched on gender effects, but using non-referred samples, they reported higher levels of both reactive aggression and proactive aggression for boys compared with girls (e.g. Baker et al., 2008; Lansford et al., 2002; Salmivalli & Nieminen, 2002). Further, Fung, Raine and Gao (2009) examined the developmental trajectory of reactive and proactive aggression (from 11 to 15 year old), and observed that proactive aggression

increased significantly with age in boys but not girls, whereas reactive aggression showed no gender difference and only a minimal age increase. In terms of correlates, Connor et al. (2003) found some gender differences, whereby hyperactive / impulsive behaviors were correlated with male reactive aggression while an early experience of traumatic stress and low verbal IQ were correlated with female proactive aggression. Polman et al.'s (2007) meta-analysis of 51 studies that focused on reactive and proactive aggression distinction in children and adolescents reported no evidence that gender was a moderator of the effect size in the studies. However, they highlighted that this finding must be taken with caution because girls were underrepresented in the analyzed samples. Hence, our study, which examined gender effects on reactive and proactive aggression, will help to clarify some of these inconclusive findings.

2.5 Dispositional Differences Between Reactive and Proactive Aggression

The profile of individuals who are reactively aggressive is one that is associated with an impulsive personality that lacks inhibitory ability, has reduced self-control, is highly irritable, and has underlying higher levels of social anxiety (Raine et al., 2006). They are characterized by behaviors displayed by 'Type A' personalities, who are easily angered by provocation, competition, or denigration (Holmes & Will, 1985). In studying the correlation of the Five-Factor Model

(Costa & McCrae, 1992) to reactive and proactive aggression, Miller and Lynam (2006) found a much stronger relation to *Neuroticism* for reactive aggression than proactive aggression. Neuroticism reflects an individual's degree of emotional stability and negative affectivity, and this finding is in line with the postulation that reactive aggression has been associated with higher levels of anger, anxiety, and depression (e.g., Vitaro et al., 2002). It also supports the assertion that reactive aggression may be associated with emotion dysregulation (Dodge et al., 1997). Miller and Lynam (2006) even went as far as postulating that *Neuroticism* may be the primary personality feature that distinguishes between reactive and proactive aggression.

Such a profile of individuals who are reactively aggressive seems to suggest that emotional reactivity or dysregulation is a major distinguishing dispositional feature of reactive aggression (Marsee & Frick, 2007). A psychological concept that is related to emotional regulation is *Effortful Control*. It refers to ''the efficiency of executive attention, including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors'' (Rothbart & Bates, 2006, p.129), and is also related to the capacity to modulate emotions and behaviors by delaying actions, shifting attention, or suppressing or initiating inappropriate or appropriate behavior (Kochanska et al., 2000). The ability to sustain attention and the ability to inhibit behavior effortfully have been associated with higher levels of psychosocial adjustment (Calkins & Dedmon,

2000; Eisenberg et al., 2001; Eisenberg, Fabes, Guthrie, & Reiser, 2000; Kochanska & Knaack, 2003). Effortful control has been linked to children's low problem behaviors and high social competence and conscience development (e.g., Eisenberg et al., 2001; Eisenberg et al., 2000; Kochanska, Murray, & Coy, 1997; Murray & Kochanska, 2002). Children with low effortful control are expected to have difficulty in regulating their emotional and behavioral responses in challenging situations and may engage in reactively aggressive behavior when facing peer provocation (Calkins & Fox, 2002; Eisenberg et al., 2001). Low levels of effortful control may also undermine children's ability to behave in ways that are compatible with broader values of the society and lead to a lack of guilt or moral conscience (Kochanska, 1993), qualities that seem to characterize proactively aggressive children who tend to outweigh reward or social status over social norms (Frick, Cornell, Barry, Bodin, & Dane, 2003; Frick & White, 2008). Given these findings, both reactive and proactive aggression should be significantly influenced by effortful control. Nevertheless, studies that examined directly the association of effortful control and reactive and proactive aggression are scarce, and we can only find two such studies. The first study by Xu et al. (2009) investigated the relations between temperament (with effortful control as one of the aspects), parenting style, and reactive and proactive aggression in a sample of Chinese elementary school children (*M* age = 9.29 years). This study found that effortful control was negatively associated with both reactive and

proactive aggression. The second was a recent study by Rathert, Fite, and Gaertner (2011) that examined relations between effortful control, psychological control, and proactive and reactive aggression in a group of 9- to 12-year-old community-recruited children. They found effortful control was negatively associated with reactive aggression, whereas the association with proactive aggression only approached significance ($p < .08$). No study that specifically examine this effortful control-aggression relation among an adolescent population were found. Therefore, in this study, we want to find out how effortful control is related to reactive aggression and proactive aggression in a sample of adolescents, reflected in research question RQ2.1.1(a). Specifically, we want to test the hypothesis that effortful control is negatively associated with both proactive and reactive aggression; and the association between effortful control and reactive aggression is stronger compared to that between effortful control and proactive aggression (Hypothesis H2). We expect the association between effortful control and reactive aggression to be stronger compared to that between effortful control and proactive aggression because effortful control is thought to involve the willful control of attention and behavior and to modulate or regulate emotional reactivity (Eisenberg et al., 2007), which is a more prominent feature in reactive aggression.

In addition, we expected gender effects in effortful control's associations with both reactive and proactive aggression, given the generally lower level of effortful control (Else-Quest, Hyde, Goldsmith, & VanHulle, 2006) and higher

level of aggression (Coie & Dodge, 1997; Maccoby & Jacklin, 1974; Buss, 2005) observed in boys compared to girls. While no studies that directly examined the gender effect on effortful control's associations with reactive and proactive aggression were found, there were similar studies done with children which did not find gender differences in the prediction of externalizing problems from effortful control (e.g. Else-Quest et al., 2006; Leve, Kim, & Pears, 2005). However, Karreman, van Tuijl, van Aken, and Dekovic (2009) reported clear gender effect in effortful control's associations with externalizing problems in children aged 3- to 4-year-olds. Our investigation with an adolescent sample will help to clarify and extend the understanding of gender effect on this aspect.

Turning now to the proactively aggressive adolescents, findings on this group have portrayed them as narcissistic and unempathic individuals who engage in aggressive behavior by exploiting others in a callous and unemotional manner for self-gain (Seah & Ang, 2008). In addition, proactive aggression has been found to be strongly associated with initiation of fights and the use of strong-arm tactics in childhood, disruptive behaviors and juvenile delinquency, as well as perpetration of serious and violent criminal acts in adulthood (Raine et al., 2006). These depictions fit well with the description of psychopathy (Munoz & Frick, 2007), which refers to it as a constellation of traits that characterize antisocial individuals, manifesting through aspects that include the affective (e.g., poverty of emotions, lack of empathy and guilt), interpersonal (e.g., callous use of others for one's own

gain), self-referential (e.g., inflated sense of one's own importance), and behavioral (e.g., impulsivity, irresponsibility). A number of studies have also established the association between psychopathy and proactive aggression. For example, Nouvion, Cherek, Lane, Tcheremissine, and Lieving (2007) found higher level of psychopathy in individuals who are proactively aggressors relative to individuals who are reactively aggressive in a group of community-recruited adults. On the other hand, Fite, Stoppelbein, and Greening (2009a) studied a group of 6- to 12-year-old children, and examined the associations between child-reported proactive and reactive aggression and psychopathic characteristics (which they defined to include callous/unemotional traits, narcissism, and impulsivity) as part of their study. Their results revealed that proactive aggression, but not reactive aggression, were associated with all three psychopathic characteristics. In a separate study investigating the stability of self-reported psychopathic traits and their prospective association with reactive and proactive aggression with another group of 9- to 12-year-old children, Van Baardewijk, Vermeiren, Stegge and Doreleijers (2011) reported that psychopathy scores were positively related to residual proactive aggression, but not to residual reactive aggression. Taken together, the psychopathic traits seem to be a key distinguishing dispositional feature of individuals who are proactively aggressive. In fact, Cima and Raine (2009) described the psychopathic personality as "predominantly characterized by proactive aggression" (p.839).

Nevertheless, the picture of psychopathy to proactive aggression association is not so clear-cut, especially when its association with reactive aggression is also considered. For example, in their study investigating the relationships between reactive and proactive aggression and the various characteristics of psychopathy using a sample of adult male prison inmates, Cima and Raine (2009) found some psychopathic components (e.g. fearlessness and alienation) were more related to reactive aggression in comparison to proactive aggression, despite their claim that the psychopathic personality is predominantly characterized by proactive aggression. In addition, Barry et al. (2007) also reported a less clear-cut finding from a sample of children who were moderately to highly aggressive (*M* age = 10 years 9 months), which is a contrast to Fite et al.'s (2009a) pattern of findings. They found that proactive aggression was only associated with narcissism and reactive aggression was associated with both narcissism and impulsivity, but they found no evidence that both aggression subtypes were associated with the callous-unemotional trait. This lack of a consistent association pattern therefore warrants further investigation of the relations among psychopathy and reactive and proactive aggression. Furthermore, there seems to be a gap in the knowledge base in terms of age, given there are few studies using the adolescent samples. To our knowledge, only one such study conducted by Kerig and Stellwagen (2010) has been reported. Using a sample of 6th to 8th graders, they reported significant associations between proactive aggression with all three

psychopathic traits of narcissism, impulsivity, and callous-unemotional traits, whereas reactive aggression was associated with narcissism and impulsivity, but not callous-unemotional traits. To help clarify how psychopathy is related to reactive and proactive aggression (RQ2.1.1b), we test the hypothesis that psychopathy will be positively associated with both proactive and reactive aggression; and the association between psychopathy and proactive aggression will be stronger compared to that between psychopathy and reactive aggression (Hypothesis H3). The use of an Asian adolescent sample will further contribute a cross-cultural perspective to existing knowledge in this area.

Furthermore, gender differences have been clearly observed in the prevalence, severity, and behavioral expression of psychopathy (Hazelwood, 2006). For example, there are significantly less females than males classified as psychopaths (Salekin, Rogers, & Sewell, 1997; Warren et al., 2003). Numerous studies have also reported significantly lower levels of psychopathy in females than in males (e.g. Hare, 2003; Rutherford, Cacciola, Alterman, & McKay, 1996). In addition, several studies have found differences in the behavioral expression of psychopathy in females as compared to males, including fewer early behavior problems (Grann, 2000; Hare 2003), less aggression (Cruise, Colwell, Lyons, & Baker, 2003; Salekin, Rogers, & Machin, 2001), and more sexual promiscuity (Cruise, Colwell, Lyons, & Baker, 2003; Grann, 2000; Salekin, Rogers, & Machin, 2001). As in the case of effortful control, we could not find any study which

investigates directly the gender effect on psychopathy-reactive and proactive aggression associations. However, a similar study that looked at association between psychopathy and indirect aggression by Warren (2009) found that indirect aggression use by males with high scores on psychopathic traits appeared to be related to their affective empathy deficits and was fully mediated by scores on affective empathy scales. This suggests a more proactive use of aggression. In contrast, female indirect aggression use was entirely related to the impulsive antisociality factor and appeared more reactive in nature. Putting together all these available evidences, we therefore expected a gender effect in our hypothesis on psychopathy's associations with reactive and proactive aggression.

2.6 Differences in Social Environmental Effects on Reactive and Proactive Aggression

Family and peer groups are two vital contexts in the social experience of almost all children and adolescents (Steinberg, 2005), and literature has indicated that parenting practices and peers are key influences on the manifestation of antisocial behaviors, including aggression (Loeber & Hay, 1997; Patterson & Bank, 1989; Patterson, Capaldi, & Bank, 1991; Patterson, Reid, & Dishion, 1992).

Where parenting dimensions are concerned, inconsistent or harsh discipline, poor parental monitoring, and low levels of positive parenting, have been related to

child externalizing problems, including aggression (e.g., Rothbaum & Weisz, 1994; Shelton, Frick, & Wootton, 1996). Inconsistent discipline is considered an important component of coercive family processes, and poor parental monitoring is thought to expose children to delinquent peers who serve as aggressive and delinquent models (Fite, Colder, & Pelham, 2006). Despite the important influence that parenting dimensions are postulated to have on the manifestation of reactive and proactive aggression, surprisingly little research has examined how they differentially relate to proactive and reactive aggression (Arsenio, 2004), and only two related studies have surfaced. These include Vitaro, Barker, Boivin, Brendgen, and Tremblay (2006), who reported that harsh parenting predicted proactive as well as reactive aggression in kindergarten children. Similarly, Xu et al. (2009) found significant associations between harsh parenting and both proactive and reactive aggression in a sample of Chinese children. Both studies have focused on the effects of negative parenting. The present study intends to extend the current understanding of parenting effects on reactive and proactive aggression by examining not just the negative / risk aspects of parenting but also the positive / protective aspects. For this purpose, we applied Baumrind's (1971) tripartite model of parental socialization styles, which comprises not only authoritarian parenting (characterized by demanding and unresponsive style) and permissive parenting (characterized by responsive but non-demanding style), but also authoritative parenting. Research conducted mainly in European-American samples has

traditionally identified authoritative parents (i.e., warm and responsive parents that provide at the same time firm control and maturity demands) as the optimal parenting style because it has been consistently associated with positive outcomes in children and adolescents (Garcia & Gracia, 2009). Exploring the relations among authoritative parenting and reactive and proactive aggression will enable understanding of how positive parenting affects these two subtypes of aggression.

Although authoritative child rearing is broadly advantageous in the European-American context, other ethnic groups have their own distinct parenting beliefs and practices that reflect their cultural values and promote optimal development within their own context. For example, in Hispanic families, insistence on respect for parental authority is often paired with high parental warmth, and this combination has been found to promote competence and family loyalty (Harrison, Wilson, Pine, Chan, & Buriel, 1994). Similarly, in low-SES African-American families, parents tend to expect immediate obedience, regarding strictness as fostering self-control and a watchful attitude in risky surroundings. Consistent with these beliefs, African-Americans parents who use more controlling strategies tend to have more cognitively and socially competent children (Brody & Flor, 1998). In the same vein, what is considered optimal parenting styles in an Asian context may differ from that perceived to be optimal in Western society (Chao, 1994; Stewart et al., 1998). A study on the effects of parenting style on personal and social variables in Singapore among three ethnic groups (Indian,

Chinese and Malay) demonstrated that Malay adolescents with authoritarian mothers tend to have better adjustment in attitude towards school compared to those who perceived their mothers to be authoritative (Ang, 2006). Another study found that authoritarian parenting style was positively associated with academic achievement in Hong Kong Chinese students while authoritative style was not significantly related to their academic achievement (Leung, Lau, & Lam, 1998).

While studies on parenting styles have been conducted with various non-Caucasian samples to understand parental practices in different cultural contexts, most of these studies still relied on Baumrind's conceptualization of parenting styles, which was developed out of parenting beliefs and behaviors from a Western context, and may fail to capture culturally unique aspects of parenting in other cultures. As our study was conducted with a sample which is predominantly Chinese (see Section 3.3 for the ethnic composition of study sample), we wanted to take into account unique aspects of parenting in the Chinese context that are beyond that captured by Baumrind's parenting styles. In this respect, the '*Guan*' (管) parenting approach proposed by Chao (1994) is useful. According to Chao, '*Guan*' represents a parenting style that encapsulates the set of values and beliefs deemed essential by Chinese parents in general, and is expressed in terms of greater supervision of the child, together with a supportive, highly involved, and physically close parent-child relationship. Chao believes that some aspects of strictness that are normally experienced as domination, hostility, and mistrust by

Western children may be equated with concern and care by the Asian child. Hence, the '*Guan*' parenting scale enables us to capture these culturally unique aspects of the Asian adolescents' perception of parenting style, and provides an alternative to Baumrind's authoritarian parenting scale that does not separate the '*Guan*' element from dominating control used by parents in its measure. In this study, the effect of 'Guan' parenting style on reactive and proactive aggression was tested with only the Chinese adolescents in the study sample (who form 66.8% of the sample, N = 716), as the concept was developed from a Chinese context and may not represent the culturally distinct parenting styles of the Malays or the Indians, who form the rest of the sample. No culture-specific instruments for describing the parenting styles of the Malays and the Indians could be found among the existing parenting styles measures.

Dodge (1991) postulated an etiological model to account for the distinctiveness of reactive and proactive aggression through different parent/home socialization experiences. According to this model, reactive aggression develops in response to a harsh, threatening, and unpredictable environment or abusive and cold parenting. Parents of reactive children try to control their children through aversive means, and form relationships that lack intimacy. Baumrind (1971) would describe such parenting as authoritarian. As a result, children of authoritarian parents learn to react negatively to harm and threat. In contrast, proactive aggression is an acquired behavior (Bandura, 1973, 1983) and thrives in enabling

environments that foster the use of aggression as a means to achieve one's goals (Crick & Dodge, 1996; Dodge & Coie, 1987; Dodge et al., 1997; Smithmyer, Hubbard, & Simons, 2000). These children learn aggression through positive reinforcement of their use of aggression. In addition, adolescents who are proactively aggressive enjoy more positive family relations when compared with those who are proactively–reactively aggressive or reactively aggressive. The adolescents who are proactively aggressive also reported that they have experienced less parental monitoring and fewer household rules (Poulin & Dishion, 2000). Baumrind would term such parenting as permissive parenting. Based on Dodge's (1991) postulation, we would expect authoritarian parenting to be uniquely associated with reactive aggression, while permissive parenting to be uniquely associated with proactive aggression. However, in the case of the girls, given the generally greater socialization pressure to restrain their anger and aggressive behavior (Zahn-Waxler and Polanichka, 2004), it is possible that they would demonstrate lower levels of aggression, both reactive or proactive, regardless of whether they experience high or low levels of authoritarian parenting. On the other hand, Zahn-Waxler and Polanichka (2004), in their review of relevant literature, have also observed that "girls are over-socialized and boys are under-socialized regarding appropriate prosocial behaviors". As such, we envisage that the girls will tend to keep aggressive behaviors out of the way, whether in a high or low permissive parenting environment. Overall, these anticipated gender

differences in the manifestation of reactive aggression and proactive aggression lead to the expectation of gender effect in their associations with authoritarian parenting and permissive parenting respectively.

Authoritative parenting involves characteristics such as a high degree of warmth and acceptance, respect for and encouragement of the child's autonomy, disciplining by setting reasonable limits on the child's behavior and using reasoning and induction (Baumrind, 1996; Maccoby & Martin, 1983). Authoritative parents will most likely engage the child when he or she manifests aggression, apply appropriate discipline and help the child understand what are acceptable behaviors through reasoning and communication. Such parental response is likely to restrain the manifestation of both reactive and proactive aggression. Hence, while Dodge's model did not specify any significant relation between authoritative parenting and reactive and proactive aggression, we expect both proactive and reactive aggression to show either no significant relation or even a negative relation with an authoritative parenting style, based on the understanding of authoritative parenting as the optimal parenting style that predicts positive adjustment outcomes. Nevertheless, Zahn-Waxler and Polanichka (2004) have highlighted that girls, on average, are more receptive to their socialization messages than are boys. Given such, the effect of authoritative parenting on reactive and proactive aggression may be different for the girls compared to the boys, and a gender effect can be expected for this association.

Overall, this study investigated how the different parenting styles are associated with reactive and proactive aggression (RQ2.1.2a) by testing the following hypotheses:

- Reactive aggression will be positively associated with the experience of authoritarian parenting but NOT associated with other parenting styles, and gender moderation is expected (Hypothesis H4).
- Proactive aggression will be positively associated with the experience of permissive parenting but NOT associated with other parenting styles, and gender moderation is expected (Hypothesis H5).
- Both reactive and proactive aggression will show either no significant association or a negative association with an authoritative parenting style, and gender moderation is expected (Hypothesis H6).

As there are no known studies examining '*Guan*' parenting's relation with reactive and proactive aggression, it would be difficult to make any firm prediction. However, given that this construct was developed to capture the positive aspects of parenting practices in the Chinese context, the hypothesis regarding '*Guan*' parenting's relationship with reactive and proactive aggression will be:

- For the Chinese adolescents, both reactive and proactive aggression will show either no significant association or a negative association with Asian 'Guan' parenting, and gender moderation is expected (Hypothesis H7).

In addition to different family experiences, proactive and reactive aggression also seems to entail different experiences with peers. Existing data indicate that reactive aggression seems to be less tolerated by other children than proactive aggression. For example, reactive but not proactive aggression has been linked to low social preference during the preschool years as well as in late childhood and adolescence (Alvarez & Olson, 1999; Dodge et al., 1997; Price & Dodge, 1989; Prinstein & Cillessen, 2003, Poulin & Boivin, 2000b). Moreover, children who are reactively aggressive reported experiencing lower friendship quality than their non-aggressive counterparts, whereas this is not the case for children who are proactively aggressive (Poulin & Boivin, 1999). Reactive children are also more victimized than proactive children (Poulin & Boivin, 2000a) and are also at high risk for maltreatment by peers (Dodge et al., 1997). In turn, maltreatment by peers may aggravate their reactive tendencies and their propensity for hostile attributions. Overall, boys who are reactively aggressive are more isolated than boys who proactively aggressive, mainly because they are often rejected by peers (Dodge et al., 1990) and might have trouble making or keeping friends. However, such boys who are aggressive and have no friends have been shown to be less at risk for later delinquency than boys who are aggressive and have disruptive friends (Vitaro, Tremblay, Kerr, Pagani, & Bukowski, 1997). In contrast, proactive aggression seems to be more tolerated and even reinforced by peers. As such, the children who are proactively aggressive have more friends than

children who are reactively aggressive, and they also have a greater tendency to have friends who are similarly aggressive than the children who are of the reactive variety (Poulin & Boivin, 2000b). Vitaro et al. (1998) also observed that boys who were high on proactive aggression might tend to associate with more deviant friends than boys who were high on reactive aggression. These results suggest a tendency in boys who are proactively aggressive to affiliate, but not the boys who are reactively aggressive (Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988), and this affiliation provides the necessary social support for the individuals who are proactively aggressive.

This study investigated the association of the perception of peer social support with reactive and proactive aggression. Peer social support refers to the experience of positive psychosocial interactions with companions of similar age characterized by emotional, material, or informational support (Sarason et al., 1983; Solomon, 2004). Based on the indication from previous research that children or adolescents who are reactively aggressive generally faced social rejection, whereas their counterparts who are proactively aggressive find friendships (though usually of the deviant kind), we would logically expect the individuals who are reactive to report a lower level of peer social support compared to the individuals who are proactive. Nevertheless, given that Asian societies generally have a more collectivistic culture where group norms and social harmony are highly regarded (Bond & Wang, 1982; Chen, 2000, Ho, 1986; Oyserman, Coon, & Kemmelmeier,

2002), the perception towards aggressive behaviors may be less favorable. A study involving fourth and fifth grade Chinese elementary school students showed that children who were proactively aggressive were generally viewed by their Chinese peers as being non-prosocial and unhelpful in social interactions (Xu & Zhang, 2008). Hence, the present study seeks to investigate if the association pattern of reactive and proactive aggression with peer relationship predominantly found in the Western literature is still valid in our Singapore adolescent sample. Following Xu and Zhang (2008), we expect the Asian context to mitigate the generally positive association between proactive aggression and peer social support and find either no significant association or a negative association between these two variables in our sample. Therefore, the research question (RQ2.1.2b) in this respect is, "How is the perception of peer social support associated with reactive and proactive aggression?", and the hypothesis that both reactive and proactive aggression will show either no significant association or a negative association with peer social support (Hypothesis H8) was tested.

Furthermore, girls and boys can experience the peer world differently in numerous ways, including expectations for relationships, qualities of friendships, group norms, goals in social interactions, seeking out different peer contexts that likely elicit different peer behaviors, and engaging in different types of aggression and bullying (Underwood & Rosen, 2009). Concerning gender difference in perception of peer support, Colarossi (2001), in a study on 15- to 18-year-old

adolescents, found that girls reported a greater number of supportive friends and received more frequent support from their friends than do boys, but the boys indicated same level of satisfaction with friend's support as girls. However, in another study with 11- to 15-year-olds, Colarossi and Eccles (2000) found girls reporting significantly higher satisfaction with support from peers than do boys. With regard to gender difference in the association of peer relation with aggression, Crick and Grotpeter (1995) reported finding girls to be significantly more relationally aggressive than were boys, and that relationally aggressive children were at risk for serious adjustment difficulties, including experiencing more rejections, higher levels of loneliness, depression, and isolation relative to their non-relationally aggressive peers. While a study that directly examines gender effect on peer social support's association with reactive and proactive aggression could not be found, the above findings on gender differences in related literature support the existence of a significant gender effect in this association.

2.7 Differences in Adjustment and Behavioral Outcome Predictions

Besides considering their different concurrent correlates, another way to distinguish between proactive and reactive aggression is by considering their different longitudinal correlates (c.f., Campbell & Fiske, 1959). The association of reactive and proactive aggression with externalizing behaviors and internalizing

problems have been partially discussed earlier (c.f. Section 2.3), and the findings point quite consistently to the existence of unique relations between reactive aggression and internalizing problems on one hand and between proactive aggression and externalizing behaviors on the other hand. For example, reactive and not proactive aggression has been uniquely linked with increased levels of sadness, unhappiness, depression, and suicidal behaviors (e.g., Card & Little, 2006; Day et al., 1992; Fite, Stoppelbein, & Greening, 2009b; Miller & Lynam, 2006; Raine et al., 2006; Vitaro et al., 2002). In contrast, the literature suggests that proactive aggression is associated with severe forms of antisocial behavior in childhood and adolescence, including delinquency (e.g., Coralijn, Orobio de Castro, & Koops, 2005; Fite et al., 2008; Raine et al., 2006; Vitaro, Brendgen, & Barker, 2006). This study intends to build on the current understanding of the unique differential associations between these two functions of aggression and the relevant adjustment outcomes by investigating their prediction of these outcomes within a specific developmental window (13 to 15 years old) and from a gender difference perspective.

As mentioned earlier, the 13- to 15-year-old early to middle adolescent period can be a tumultuous developmental phase in the lives of many individuals (c.f. Section 1.1). In the Singapore context, adolescents experience at least two major transitions during this age window, namely the transition from primary school to secondary school (from 12 to 13 years old) and from lower secondary to

upper secondary school (from 14 to 15 years old). These transitions bring with them, among other experiences, a change in the adolescents' social environment, a quantum jump in academic demands, a difference in the autonomy accorded to these growing individuals, and an accompanying increase in expectations of independence, initiative, and responsibilities. Due to the multiple challenges faced by these adolescents, we can expect stress, anxiety, depression as well as anger and other "acting out" behaviors to be rather common features during this period (see Cicchetti & Rogosch, 2002). Vitaro et al. (2002) found that children rated as reactively aggressive between the ages 10 and 12 years reported more depressive feelings (reflecting internalizing problems) at age 13 compared to proactive-only and reactively-proactively aggressive individuals, whereas proactively aggressive children (whether also reactively aggressive or not) were found to be more at risk of delinquency (reflecting externalizing problems) at age 13. Another study by Fite, Raine, Stouthamer-Loeber, Loeber, and Pardini (2010) which prospectively examined the associations of adolescent reactive and proactive aggression at age 16 with antisocial behaviors (including externalizing behaviors such as delinquency and violence) and negative emotionality (including internalizing problems such as depression, anxiety, and perceived stress) measured ten years later, found that reactive aggression was uniquely associated with negative emotionality and proactive aggression was uniquely associated with antisocial behaviors. Based on the predictive patterns established by these prior studies that cover the age ranges

both before as well as after the 13- to 15-year-old period, it is likely that the internalizing / externalizing problems and reactive / proactive aggression association pattern during the 13- to 15-year-old period will also be similar.

Another aspect requiring further investigation is the effect of gender on predictions, and prior research on this aspect is very limited (see Section 2.4). When we consider studies looking at gender effects on reactive and proactive aggression within the 13- to 15-year-old age range, they are even scarcer. For example, Fite et al., (2008) reported on the developmental trajectories of proactive and reactive aggression from fifth to ninth grade, which covers an age range similar to that examined in our study, but they included a male-only sample. In terms of prediction, because girls, in comparison to boys, tend to be higher in internalizing problems and lower in externalizing problems (Eisenberg et al., 2001), it is necessary to examine gender as a moderator of any of the relation patterns described earlier between reactive and proactive aggression and subsequent adjustment problems. As many of the prior predictive studies either did not investigate the gender difference aspect or used a male-only sample, substantive evidence is lacking to enable making a firm prediction about whether the currently established predictive pattern also holds for the female population. Thus far, only two reports were found. The first was by Pulkkinen (1996), who reported that while males who were proactive (but not reactive) were more prone to externalizing behaviors, females who were proactive were more prone to

internalizing problems and neuroticism. Given that girls, in comparison to boys, tend to be higher in manifesting internalizing problems and lower in externalizing problems (Eisenberg et al., 2001), it is possible that the maladjusted females manifest internalizing problems so predominantly that even the proactively aggressive females demonstrate internalizing problems prominently, hence Pulkkinen's observation. The second was a study by Vitaro et al. (2002) that investigated antecedents and subsequent characteristics of children who were reactively and proactively aggressive (aggression measured when they were 10 to 12 years old and outcomes of delinquency and depression measured when they were 13). They had similarly hypothesized that children who were reactively aggressive should report more depressive symptoms than the other children and given the differential rise in depressive feelings in boys and girls by early adolescence, this link would be visible more for girls than for boys. They found no evidence, however, that gender significantly moderated reactive and proactive aggression's prediction of delinquent (an aspect of externalizing problems) or depressive (an aspect of internalizing problems) outcomes. The results from these two available studies provided an inconsistent picture regarding the gender effects on the predictive pattern of reactive and proactive aggression and further research work is therefore necessary to clarify the discrepancy.

Overall, taking into consideration both the age-range and gender factors, the last part of this study will attempt to find an answer to the question of whether

there are gender differences in how reactive and proactive aggression predict different empirically derived syndromes (as manifested in terms of internalizing or externalizing problems) and behavioral outcomes (expressed in terms of delinquent behaviors) within the 13-15 year age range (RQ2.2). Given Pulkkinen's (1996) findings of the tendency of females to manifest internalizing rather than externalizing behaviours, boys were expected to exhibit the unique association pattern of reactive aggression with internalizing syndromes and proactive aggression with externalizing syndromes / delinquency; whereas for the girls, both reactive and proactive aggression will be related to internalizing syndromes. Consequently, gender effects are expected only for proactive aggression's association with externalizing syndromes / delinquency, but not for reactive aggressions' association with internalizing syndromes. The corresponding hypotheses to be tested for the concurrent predictions are as follows:

- Reactive aggression at 13 or 14 years old will be more predictive of internalizing syndromes compared to externalizing syndromes and delinquent behaviors concurrently; and no gender moderation is expected (Hypothesis H9).
- Proactive aggression at 13 or 14 years old will be more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes concurrently, and gender moderation is expected (Hypothesis H10).

The corresponding hypotheses to be tested for the prospective predictions are as follows:

- Reactive aggression at 13 or 14 years old will be more predictive of internalizing syndromes compared to externalizing syndromes and delinquent behaviors prospectively (about a year later); and no gender moderation is expected (Hypothesis H11).
- Proactive aggression at 13 or 14 years old will be more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes prospectively (about a year later), and gender moderation is expected (Hypothesis H12).

2.8 Effects of Person-Environment Dynamics on Reactive and Proactive Aggression

Cohen, Hsueh, Russell, and Ray (2006) have described aggression as a context-sensitive behavior and have strongly advocated a systemic approach to the analysis of children's aggression, using multilayered social context frameworks such as Hinde's (1992) scheme. Hinde's scheme analyzes behaviors in terms of individual, interaction, relationship (a history of successive interactions with another individual), group effects, and the simultaneous influences from these multiple contexts. Echoing this perspective, Rubin, Bukowski, and Parker (1998)

reported that childhood aggression results from complex interplay between biologically based temperament characteristics and social experiences with parents and peers (represented diagrammatically in Figure 2.1).

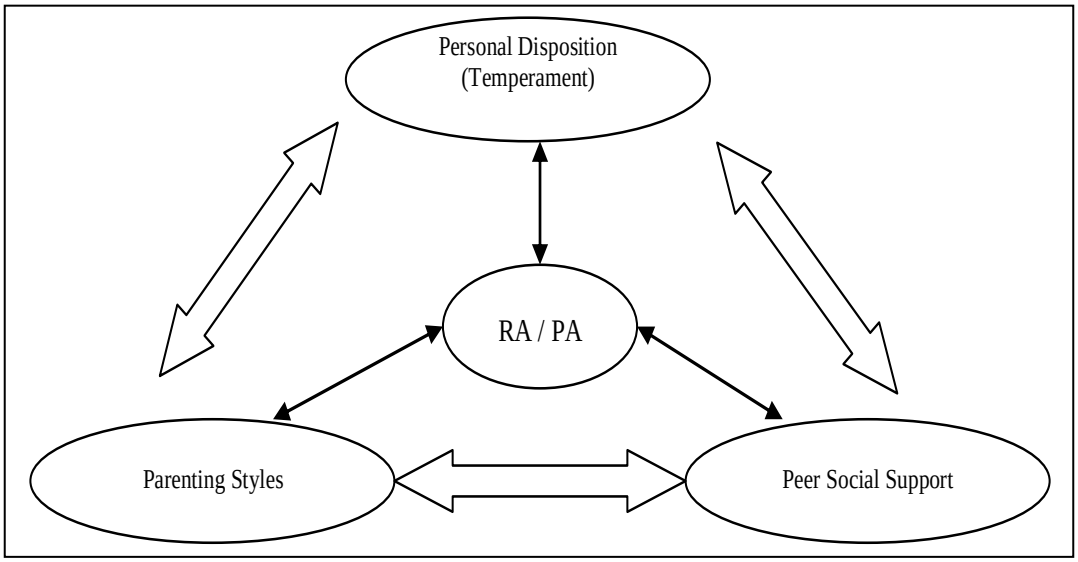


Figure 2.1: Interplay of influences between dispositional characteristics, parenting and peer effects on reactive and proactive aggression

Rothbart and Bates (2006) have argued that temperamental risks such as anger / frustration may exacerbate the effects of negative parenting, whereas temperamental protective factors such as effortful control may buffer against parental risk factors, such as harsh parenting. There are a few published studies that follow this line of investigation. These include Vitaro, Barker et al.'s (2006) work, which investigated whether early difficult temperament and harsh parenting

differentially predict reactive and proactive aggression as part of a larger longitudinal study that followed children from 17 to 72 months of age. They found both temperament and parenting made unique contributions in predicting later reactive aggression using an additive model, and harsh parenting exacerbated the link between negative emotionality and reactive aggression using an interactive model. Likewise, Xu et al. (2009) examined the additive and interactive effects of temperament and harsh and indulgent parenting on a sample of Chinese elementary school children (*M* age = 9.29 years). They reported three significant parenting and temperament interactions, namely indulgent parenting x effortful control, indulgent parenting x sensation seeking, and harsh parenting x sensation seeking. Specifically, indulgent parenting was positively associated with proactive aggression for the conditions in which children have low / moderate effortful control or children with moderate / high sensation seeking, whereas harsh parenting was positively associated with proactive aggression for the conditions in which children have moderate / high sensation seeking.

Taken together, these studies provide evidence for the existence of the theoretically predicted interactive effects of various combinations of dispositional and social environmental variables on aggressive behavior. Nevertheless, several gaps still need to be addressed in this area of research. First, the number of studies concerning person-environment dynamics on reactive and proactive aggression remains limited (Rathert et al., 2011), and most of the extant literature on this topic

has focused on children. In particular, whether and how the disposition of effortful control / psychopathy and the environmental effects of parenting / peer mutually affect each other and multiply influence reactive and proactive aggression in an Asian adolescent population remains to be investigated. Second, the majority of these prior studies have investigated the person-environment dynamics by studying the interactive effects, and only one study using the mediation approach was found. Zhou, Eisenberg, Wang, and Reier (2004) investigated the relation of Chinese children's (7 to 10 years old) effortful control and dispositional anger / frustration to parenting styles and children's social functioning. They found effortful control and dispositional anger / frustration mediated the negative relation between authoritarian parenting and children's social functioning, and effortful control weakly mediated the positive relation of authoritative parenting to social functioning. This approach of studying the indirect or mediated relation between salient dispositional and environmental variables with reactive and proactive aggression is valuable as it sheds light on the processes underlying the associations. In general, mediation tells us *how* an effect occurs, and provides information on the process whereby an independent variable of interest influences the mediator, which in turn influences the dependent or outcome variable (Holmbeck, 1997). Applied to the person-environmental dynamics on reactive and proactive aggression, any mediation patterns that surface would allow us to identify the different unique disposition-environment-aggression-effect pathways and understand their

underlying mechanism, thereby providing insight for developing better interventions.

In the present study, the related research questions are as follows:

- How do parenting styles mediate the relations between disposition (effortful, psychopathy) and reactive and proactive aggression (RQ3.1)?
- Does peer social support mediate the relations between disposition (effortful control, psychopathy) and reactive and proactive aggression (RQ3.2)?

Given that effortful control is expected to be negatively associated with both reactive and proactive aggression (Hypothesis 2) and psychopathy is expected to be positively associated with both reactive and proactive aggression (Hypothesis 3), as well as Dodge's (1991) postulation that reactive aggression is uniquely associated with the experience of growing up under authoritarian parenting (Hypothesis 4), it is expected that authoritarian parenting will significantly mediate the association of effortful control with reactive aggression (by weakening effortful control's restraining effect on reactive aggression) and also mediate the association of psychopathy with reactive aggression (by strengthening psychopathy's exacerbating effect on reactive aggression), but will not mediate effects of effortful control or psychopathy on proactive aggression (Hypothesis 13). Similarly, given Hypothesis 2 and Hypothesis 3, as well as Dodge's (1991) postulation that proactive aggression is uniquely associated with the experience of growing up

under permissive parenting (Hypothesis 5), it is expected that permissive parenting will significantly mediate association of effortful control with proactive aggression (by weakening effortful control's restraining effect on proactive aggression) and also mediates the association of psychopathy with proactive aggression (by strengthening psychopathy's exacerbating effect on proactive aggression), but will not mediate effects of effortful control or psychopathy on reactive aggression (Hypothesis 14).

In contrast, given that authoritative and 'Guan" parenting are considered positive parenting practices and are expected to be negatively associated with both reactive and proactive aggression (Hypotheses 6 and 7), it can be expected that authoritative and 'Guan" parenting will significantly mediate the associations of effortful control with both reactive and proactive aggression (by strengthening effortful control's restraining effect on both aggression subtypes) and also mediate the associations of psychopathy with both reactive and proactive aggression (by weakening psychopathy's exacerbating effect on both aggression subtypes). These are reflected in Hypothesis 15 and Hypothesis 16.

Similarly, given that reactive and proactive aggression are expected to be negatively related to perception of peer social support (Hypothesis 8), we expect peer social support to significantly mediate the association of effortful control with both reactive and proactive aggression (by strengthening effortful control's restraining effect on both reaction subtypes) and also to mediate the association of

psychopathy with both reactive and proactive aggression (by weakening psychopathy's exacerbating effect on both aggression subtypes). This is reflected in our Hypothesis 17.

2.9 Summary

This chapter provides a survey of the literature pertaining to the distinction of reactive aggression and proactive aggression. It summarizes the theories and research findings regarding the subject, especially in terms of gender difference and adolescent development, and covered such aspects as the factor structure of reactive and proactive aggression, as well as their differential dispositional and social environmental correlates. In addition, the predictive validity of these two aggression subtypes was reviewed. Literature relating to the effects of person-environmental dynamics on the manifestation of reactive and proactive aggression was also examined. The rationale for the respective hypotheses to be tested in this study was also provided.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the methodology used in this study. It includes the research design, sample, instruments, data collection procedures and process as well as statistical analyses employed.

3.2 Research Design

This is a self-report questionnaire-based study. As this study investigated the associations of reactive and proactive aggression with various variables concurrently (i.e. with effortful control, psychopathy, perceptions of parenting styles and peer social support, internalizing and externalizing syndromes, and delinquent behaviors) as well as prospectively (i.e. internalizing and externalizing syndromes and delinquent behaviors about a year later), a longitudinal design was used. The diagram below (Figure 3.1) provides an overview of the research design.

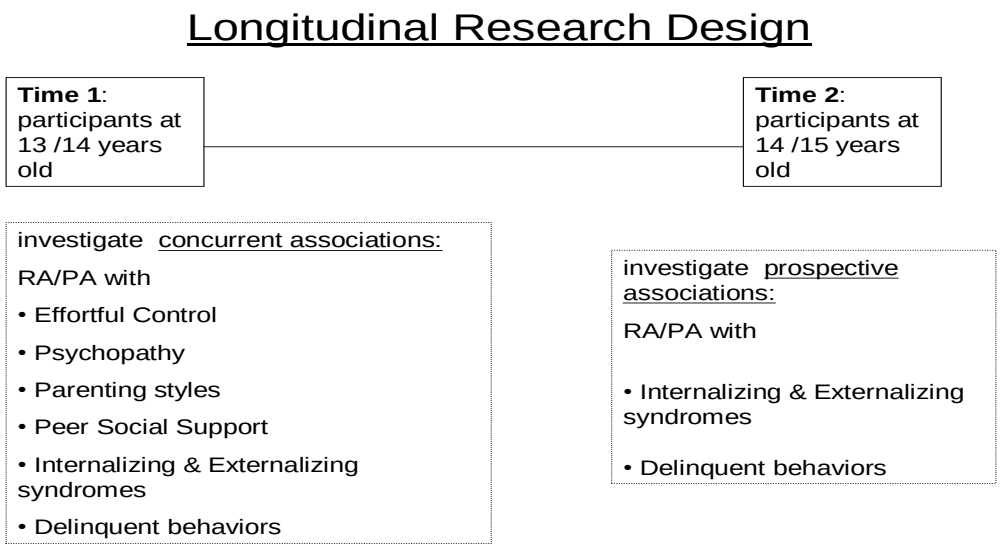


Figure 3.1 An Overview of the Research Design

3.3 Research Sample

An adolescent sample (N = 1193) comprising students from the secondary-one level and secondary-two level was used for this study. The mean age of the participants was 13.26 years (SD = 0.92). There were 634 males and 559 females in this sample, and the substantial sample size for each gender facilitated the investigation of gender effects in our study. We formed the sample from four secondary schools – each randomly selected from each of the four geographical school zones in Singapore. About 300 students were randomly drawn from each of these schools. As secondary school students in Singapore are placed in three

different academic streams (i.e. the Express, Normal Academic and Normal Technical streams) based on their academic competency evaluated at the end of their primary school career (when they are 12 years old), we ensured that each of these academic streams was adequately represented in the sample. Our sample comprised 42.5% Express, 34.1% Normal Academic and 23.4% Normal Technical stream students, compared to the 61.3% Express, 25.5% Normal Academic and 13.2% Normal Technical of student in the respective academic streams in our national school system (Singapore Department of Statistics, 2010). With regard to ethnicity, there were 66.8% Chinese, 20.5% Malays, 8.4% Indians, and 4.0% Eurasians in the sample. Such a proportion is not significantly different from the national ethnic distribution of Singapore's population aged between 10 and 19, with the ethnic breakdown of 69.7% Chinese, 18.2% Malays, 9.2% Indians, and 2.9% Eurasians (Singapore Department of Statistics, 2010). Taken together, this sample is reasonably representative of the current cohort of 13 to 14-year-old adolescents in Singapore.

3.4 Instruments

The demographic information of participants was obtained via a two-page questionnaire. Items in this questionnaire included age, gender, ethnicity, academic level, academic stream and residential house-type (used as a proxy for social-

economic status). Students were also requested to provide their ID number to facilitate the matching of their data across time in the prospective study. They were, however, given assurance that access to the data would be strictly limited to only the principal investigator and his research team, and all subsequent use of data would not involve any association with participants' personal particulars in any way.

In addition, a total of eight different scales were used for measuring reactive-proactive aggression and the respective dispositional, social-environmental, and adjustment outcome variables under examination in this study. All of them were derived from instruments that have been used in previous studies, and have reported adequate psychometric properties. To fit the requirements of this study, some of the lengthier scales were pre-tested on a pilot sample (n = 119) and subjected to factor analyses. All shortened versions of the scales reached at least 48% of variance explained in the scale scores and these results were comparable to that of the full versions. The wording of certain items was also modified to better suit the cultural context and verbal competence of the sample. The following paragraphs provide individual descriptions for each of the scales.

3.4.1 Measure of Aggression

Reactive–Proactive Aggression Measure

The reactive-proactive aggression measure used in this study is the 23-item, self-report Reactive and Proactive Aggression Questionnaire or RPQ (Raine et al., 2006). It provides scores based on two dimensions of aggression: *reactive aggression* (11 items) and *proactive aggression* (12 items). Items in the questionnaire reflect conceptual relevance to reactive and proactive aggression (e.g., ‘‘I get angry when others annoy me’’ vs. ‘‘I use force to get others to do what I want’’), as well as motivational and situational contexts for the aggression (e.g., ‘‘I get angry when others threaten me’’). Raine et al. (2006) have reported Cronbach’s alphas of .90 for overall scale, .84 for the reactive aggression subscale, and .86 for the proactive aggression subscale. In our study, the participants were asked to rate the items on a 3-point Likert-type scale regarding how often they acted in a certain way — 0 (*never*), 1 (*sometimes*), 2 (*often*). The Cronbach’s alpha was .72 for the reactive aggression scale and .71 for the proactive aggression scale for this sample. The split sample reliability test did not find significant difference in the reactive aggression nor the proactive aggression scale scores (Raine et al., 2006), while two month test–retest reliability for the reactive aggression and proactive aggression scales were .72 and .75 respectively (all *p*s < .001) (Fossati et al., 2009). In addition, Raine et al. (2006) reported RPQ’s convergent validity with the Aggression and Delinquency scales of the Child Behavior Checklist or CBCL (Achenbach, 1978), as well as with the Hostility-Aggression scale of the Zuckerman–Kuhlman Personality Questionnaire (Zuckerman, Kuhlman, Joireman,

Teta, & Kraft, 1993); whereas the RPQ showed discriminant validity with the non-aggression related CBCL scales of withdrawal, somatic complaints, thought problems, and social problems. The RPQ has been further shown by Fung, Raine and Gao (2009) to be generalizable to the East Asian adolescent population, with the two-factor RA-PA construct observed in both the males and females.

3.4.2 Measures of Dispositional Variables

Effortful Control Measure

The effortful control measure used in this study is a 12-item scale. It was derived from the effortful control scale of the self-report Early Adolescent Temperament Questionnaire - Revised Short Form (EATQ – R) developed by Ellis and Rothbart (2001) to assess temperament and self-regulation. In the original EATQ–R, effortful control is identified as one of the four clear factors, and is measured by three subscales, namely *attention* (the capacity to focus attention as well as to shift attention where desired) with 6 items; *activation control* (the capacity to perform an action when there is a strong tendency to avoid it) with 5 items; and *inhibitory control* (the capacity to plan and to suppress inappropriate responses) with 5 items. Eillis and Rothbart (2001) have provided evidence for the validity of the effortful control scale, which included low effortful control being predictive of aggressive behaviors and depressive moods. The EATQ – R exists in the self-report format as

well as the parent report format, and our effortful control scale is based on the self-report format. Previous use of the effortful control scale of the EATQ-R has achieved reasonable internal consistency of .78 (Baetens, Claes, Willem, Muehlenkamp & Bijttebier, 2011) and .71 (Willem, Bijttebier & Claes, 2010). In this study, respondents were asked to rate each item on a 5-point Likert-like scale to indicate the extent to which they agree with the statement (1= *Almost always untrue of you*; 3 = *Sometimes true, sometimes untrue of you*; 5 = *Almost always true of you*). The effortful control score was obtained by summing the ratings of the respondents over the 12 items. The Cronbach's alpha of the effortful control scale in our sample is .62. Muris and Meesters (2008) reported that none of the nine subscale scores of the EATQ – R showed significant test-retest differences over a 8 week period, and the test-retest score correlations for the effortful control constituent subscales were .70 for *attention* subscale, .76 for *activation control* subscale and .78 for *inhibitory control* subscale. In terms of convergent validity, Muris and Meesters (2008) also found that *attention*, *activation control* and *inhibitory control* scores were found to be positively associated with children's prosocial behavior, which supports the idea that high level of regulation is often accompanied by high level of positive social behavior. For discriminant validity, they found the effortful control-based subscales scores negatively related to internalizing and externalizing symptoms.

Psychopathy Measure

The psychopathy measure used in this study is based on the self-report format of the Antisocial Processes Screening Device (APSD), which was developed by Frick and Hare (2001) to assess traits associated with the construct of psychopathy in youth. The APSD assesses three aspects of the psychopathic profile, namely *Narcissism*, *Impulsivity* and *Callous-Unemotional* nature. The *Callous-Unemotional* subscale is made up of 6 items, which describe characteristics reflecting this trait (e.g., lack of care or concern for others, weak sense of remorse or guilt over wrong-doing). The *Narcissism* subscale has 7 items reflecting narcissistic tendencies (e.g., perceiving oneself as better or more important than others and manipulating others to achieve gain for oneself). The *Impulsivity* subscale comprises 5 items describing impulsive behaviors, which include acting without thinking, lack of planning and doing risky things. Munoz and Frick (2007), who studied the psychometric properties of the self-report version of APSD, found its internal consistency to be adequate (.78 to .81), and that this psychopathy measure showed significant correlations with measures of antisocial behaviors both concurrently and prospectively. In the present study, respondents were asked to rate each statement according to a 3-point Likert-type scale (0 = *Not at all true*; 1 = *Sometimes true*; 2 = *Definitely true*). The psychopathy score was obtained by summing the ratings of the respondents over the 18 items from the three subscales. The Cronbach's alpha of the psychopathy scale for our sample is .73. Munoz and

Frick (2007) also reported that APSD has relatively high test-retest stability, with one-year stability estimate at about .70, and its two-year stability estimates at .64. In addition, the self-report scores on the APSD also showed moderate correlations with parent ratings of psychopathic traits and significant correlations with measures of antisocial behavior both concurrently and predictively, thereby demonstrating its convergent validity.

3.4.3 Measures of Social-Environment Variables

Parenting Styles Measure

The parenting styles measure used in this study has three separate scales measuring the three different parenting styles according to Baumrind's (1971) categorization, namely *authoritarian parenting* (9 items), *authoritative parenting* (8 items) and *permissive parenting* (6 items). The items were derived from the Parental Authority Questionnaire (PAQ), a self-report questionnaire developed by Buri (1991) to measure parenting styles from the viewpoint of the child. The PAQ has three 10-item scales, each reflecting the different disciplinary practices of the *authoritative* style (e.g., 'My mother always tells me to discuss with her whenever I feel that family rules are too strict'), the *authoritarian* style (e.g., 'My mother feels that parents must use more force to get children to act the way they are supposed to') and the *permissive* style (e.g., 'My mother feels that children can do whatever they

like'). The PAQ also has a different version for maternal and paternal assessments, but the items are identical except for references to gender. For each item, the respondent was asked to rate the degree to which the statement best described the prevailing parenting style in the household (i.e. as exhibited by the primary caregiver) by choosing a number from the 5-point Likert-type scale (1 = *strongly disagree*; 5 = *strongly agree*). Responses could apply to either the father / father figure or the mother / mother figure, depending on who was considered the main caregiver in relation to the respondent. The scores for the respective parenting style were obtained by summing the rating of the individual items which comprise a particular parenting style scale. The Cronbach's alphas for the PAQ scales ranged from 0.74 to 0.87 (Buri, 1991). For our study sample, the Cronbach's alphas are .79 for *authoritarian* parenting, .85 for *authoritative* parenting, and .74 for *permissive* parenting. Buri also reported the test-retest reliability of the six sub-scales (both father's and mother's authoritativeness, authoritarianism and permissiveness) ranged from 0.77 to 0.92**.** In addition, parental nurturance scores (Buri, Misukanis & Mueller, 1988) were found to be most highly correlated to authoritative parenting scores, inversely related to authoritarian parenting scores and not significantly related to permissive parenting scores, thereby providing evidence for criterion-related validity for the various PAQ scales. Furthermore, Buri (1991) cited the generally divergent response to the three different parenting scales (authoritarian parenting being inversely related to both authoritative and

permissive parenting, and no significant association between authoritative and permissive parenting) as evidence of divergent validity.

Measuring '*Guan*' Parenting Style

To measure the perception of the *'Guan'* parenting style, we employed the 8-item '*Guan*' parenting scale. These items are behavioral measures adapted by Stewart et al. (1998) from a list of statements of parental belief first developed by Chao (1994) regarding Chinese parenting style. They include items reflecting parental emphasis on self-discipline, neatness and organization, hard work, as well as acts of physical punishment for misbehavior and support for academic endeavors. Stewart et al. (1998) found this '*Guan*' measure to be significantly correlated with a measure of perception of parental warmth, and it predicted the sense of well-being in children, indicating criterion validity. They also reported Cronbach's alphas ranging from .59 to .70 for the various groups of respondents using this scale in their study. In the present study, respondents were asked to indicate on a 6-point Likert-type scale (1 = *strongly disagree* to 6 = *strongly agree*) the extent of their agreement for each item. The Cronbach's alpha of the '*Guan*' parenting scale of our sample is .74.

Peer Social Support Measure

To measure the perceived level of *peer social support* experienced by the adolescents, we used the 4-item Closeness to Friends measure by Valkenburg and

Peter (2007). These items were adapted from the peer relationship scale of the Inventory of Parent and Peer Attachment developed by Armsden and Greenberg (1987), which was designed to assess the cognitive and affective dimension of adolescents' relationship with their peers. The items include "When my friends know that something is bothering me, they ask me about it," "I tell my friends about my problems and troubles," "My friends help me to understand myself better," and "When I am angry about something, my friends try to be understanding." These items fit well with the definition of social support (c.f. definition of Peer Social Support in Section 1.3). Furthermore, these items have also produced the highest factor loadings in a previous study based on the inventory (e.g., Van Ammers et al., 1998), explaining 70% of the variance of the factor (Cronbach's alpha = .86). The Cronbach's alpha of the peer social support measure of our sample is .79.

3.4.4 Measures of Adjustment Outcomes

Internalizing and Externalizing Syndromes Measure

Our measure of the levels of internalizing and externalizing problems comprises a 19-item *internalizing syndrome* scale and a 12-item *externalizing syndrome* scale adapted from the empirically derived Youth Self Report or YSR (Achenbach & Rescorla, 2001). The YSR was developed to measure the behavioral

and emotional functioning of adolescents between the ages of 12 and 18. It is the parallel adolescent self-report measure of the Child Behavior Check List 6-18 (Achenbach & Rescorla, 2001). The YSR measures eight syndrome scales: withdrawn-depressed, somatic complaints, anxious-depressed, aggressive behavior, rule breaking behavior, social problems, thought problems and attention problems. Sample items include: "I am unhappy, sad, or depressed" (from Anxious-Depressed scale) and "I have a hot temper" (from Aggressive Behavior scale). An adolescent is to select his or her response from 0 (not true) to 2 (very true or often true) for each item. This study used only the *internalizing syndrome* score (obtained by summing the scores of items from the first three scales, namely Withdrawn-Depressed, Somatic Complaints, and Anxious-Depressed) and the *externalizing syndrome* score (obtained by summing the scores of items from the next two scales, namely Rule Breaking Behavior and Aggressive Behavior). Achenbach and Rescorla (2001) have reported the internal consistencies as .89 for the externalizing syndrome scale and .91 for the internalizing syndrome scale. For our study sample, the Cronbach's alpha is 0.88 for the internalizing scale and 0.81 for the externalizing scale. Achenbach and Rescorla (2001) also reported the test-retest correlations to be .80 for the internalizing syndrome and .89 for the externalizing syndrome scale. The YSR has demonstrated strong psychometric properties (see Achenbach, 1991; Achenbach & Rescorla, 2001). These include criterion-related validity (e.g. correlations of .75 to .83 between the internalizing

scales of YSR and the Behavior Assessment System for Children / BASC; and also correlations of .74 to .88 between externalizing scales of the two instruments). The use of the internalizing and externalizing syndromes measure allowed us to assess a diverse range of adolescent adjustment and behavioral outcomes shown by research to be related to maladjustment (Achenbach & Rescorla, 2001), which included the affective aspect (anxious-depressed and withdrawn-depressed scales), physical symptoms (somatic complaints scale), and behavioral expressions (aggressive and rule-breaking behaviors scales).

Measure for Delinquent Behaviors

As a measure of delinquent behaviors, we used a 19-item delinquency measure adapted from the Self Report Delinquency Scale or SRDS (Elliott, Huizinga, & Ageton, 1985). The SRDS assesses the child's self-report of involvement in illegal juvenile acts. It captures the number of times the respondent committed each of the different offenses on a list that was developed by considering all offenses (with a juvenile base rate of greater than 1%) reported in the Uniform Crime Report (Elliott & Huizinga, 1984). The offenses range from stealing and running away from school or home to lying and actions that cause hurt to another person. Respondents were asked to respond on whether they have ever committed the offence listed in each of the items (Yes = 1; No = 0). The delinquency score was calculated by summing the total number of affirmative (i.e. Yes) responses to the

19 items, and has a possible range of 0 to 19. Earlier use of the SRDS had achieved Cronbach alphas above .80 (Elliott & Ageton, 1980), and the Cronbach's alpha for the delinquency measure used in our study is .86. Huizinga and Elliott (1984), in their review of reliability and validity of SRD measures, observed that test-retest reliabilities of 0.85 to 0.99 were reported by several studies employing various scoring schemes and numbers of items and using test-retest intervals of from less than one hour to over two months. With regard to validity of SRD measures, the same authors reported that record check showed that the majority of arrested individuals will self-report officially known offenses, including their serious offenses.

3.5 Procedure and Consent

Before the data collection process, the necessary ethics clearance for use of human subjects in research was sought from and granted by the Institutional Review Board of the Nanyang Technological University. Following the routine practice for ethical clearance and data collection from schools in Singapore, permission was also sought from the Ministry of Education, Singapore, and the respective school principals. Participation for the students was on a voluntary basis, and students were informed that they could refuse or discontinue the study at any

time without penalty. Assurance was also given to the participants regarding the protection of their identity when using the data for research.

The survey questionnaires were administered in the students' classrooms. All measures were administered in English as it is the primary language of instruction in Singapore schools. To investigate how reactive and proactive aggression at the beginning of adolescence (about 13 or 14 years old) predicts adjustment outcomes about a year later, data were collected longitudinally at two time points, once when they are at 13 or 14 years old and another about a year later when they were at 14 or 15 years old. The first wave of data collection elicited measures of reactive and proactive aggression, effortful control, psychopathy, perception of parenting styles, and peer social support, internalizing and externalizing syndromes, as well as delinquent behaviors to enable the study of concurrent associations. The second wave of data collection elicited measures of internalizing and externalizing syndromes, and delinquent behaviors to enable us to study prospectively the predictive associations of reactive and proactive aggression with these adjustment outcomes (c.f. Figure 3.1).

3.6 Analyses of Data

Relevant descriptive statistics was applied to summarize the demographic data obtained in this study. In addition, factor analytical methods were used to

elucidate the factor structure of the data. Finally, appropriate inferential statistical analyses, primarily hierarchical multiple regression, were used to analyze the various associations hypothesized under the respective research questions. Gender interaction terms were included in the relevant regression models to test for whether gender effects occurred. The Statistical Package for Social Sciences (SPSS) version 18.0 was used for conducting the analyses.

3.6.1 Analyses of Demographic Data

The mean and standard deviation of the participants' age, and the proportion of different genders, ethnicities, academic levels, academic streams, and residential house-types in the sample were calculated.

3.6.2 Factor Analyses

To answer the question of whether the reactive and proactive aggression data (from 13 – 15 year old Singapore adolescents) fit a one-factor or two-factor structure better, both exploratory factor analyses (EFA) and confirmatory factor analyses (CFA) were conducted. The sample was first randomly split into two, comprising a smaller one-third portion and bigger two-third portion. The EFA was carried out with the smaller sample and CFA was applied to the larger sample. This

split-sample cross validation strategy (c.f., Reiss & Judd, 2000) was employed to prevent a biased assessment of model fit, given that CFA results done on the same sample as an EFA will likely parallel the EFA finding.

In the EFA, principal component analysis (PCA) was conducted and scree plot output was analyzed to determine the likely number of components in the factor structure that should be extracted. In addition, parallel analysis and Velicer's minimum average partial test were also conducted to validate the judgments based on the scree plot. O'Connor (2000) has pointed out that there is increasing consensus among statisticians (e.g. Wood, Tataryn, & Gorsuch, 1996; Zwick & Velicer, 1982, 1986) that parallel analysis and Velicer's minimum average partial (MAP) test are superior to other procedures and typically yield optimal solutions to the number of components problem.

The CFA was conducted using the AMOS program found in SPSS 18.0. The one-factor model and two-factor model were drawn and fitted to the sample data. Each item was constrained to load only on one factor; correlated errors and other post hoc model respecification were not permitted. Fit indices, including the chi-square (χ^2), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) were examined to determine whether the models fit the data adequately and which factor structure model had a better fit with respect to the data. A good model fit is indicated by a nonsignificant chi-square value, a CFI value close to .95, a RMSEA

value less than .05 (Byrne, 2001) and a SRMR value of less than .08 (Hu and Bentler, 1998). However, it must be noted that the chi-square test often seriously underestimates the model fit in the case of larger samples (Byrne, 2001).

To deal with the possibility of skewness and kurtosis exceeding acceptable limits in our data, the reactive aggression and proactive aggression scores were square-root-transformed, and subjected to factor analyses again to check if the similar results were obtained.

3.6.3 Analyses of Associations

Dispositional Differences in Reactive-Proactive Aggression

To find out how the dispositional variables of effortful control and psychopathy are related to reactive aggression in comparison to proactive aggression, zero-order bivariate correlations between the dispositional variables and reactive and proactive aggression were first computed. A series of hierarchical multiple regressions were also performed, in which reactive aggression / proactive aggression was treated as the dependent variable (DV), whereas the dispositional variable (effortful control / psychopathy) was the predictor, and was entered into the regression model together with other relevant control variables in blocks. The relevant gender x dispositional variable term was also included in the model to

elucidate gender effects. Following Aiken and West's (1991) approach for calculating interaction effects, all the predictors were mean centered.

For example, to find out how effortful control (EC) was related to reactive aggression, the reactive aggression score was entered as the DV, and the following were entered as independent variables (IVs) in sequential blocks:

- first block: proactive aggression score (as a control for overlapping effect with reactive aggression) and psychopathy score (as a control for interaction effect with effortful control);
- second block: gender (as moderator of effortful control's effect on reactive aggression);
- third block: effortful control (as the main effect); and
- fourth block: gender x effortful control (interaction term).

Similarly, effortful control's association with proactive aggression, as well as psychopathy's associations with reactive aggression and with proactive aggression were calculated by entering the appropriate DVs and IVs into the respective regression models, as summarized by Figure 3.2 below.

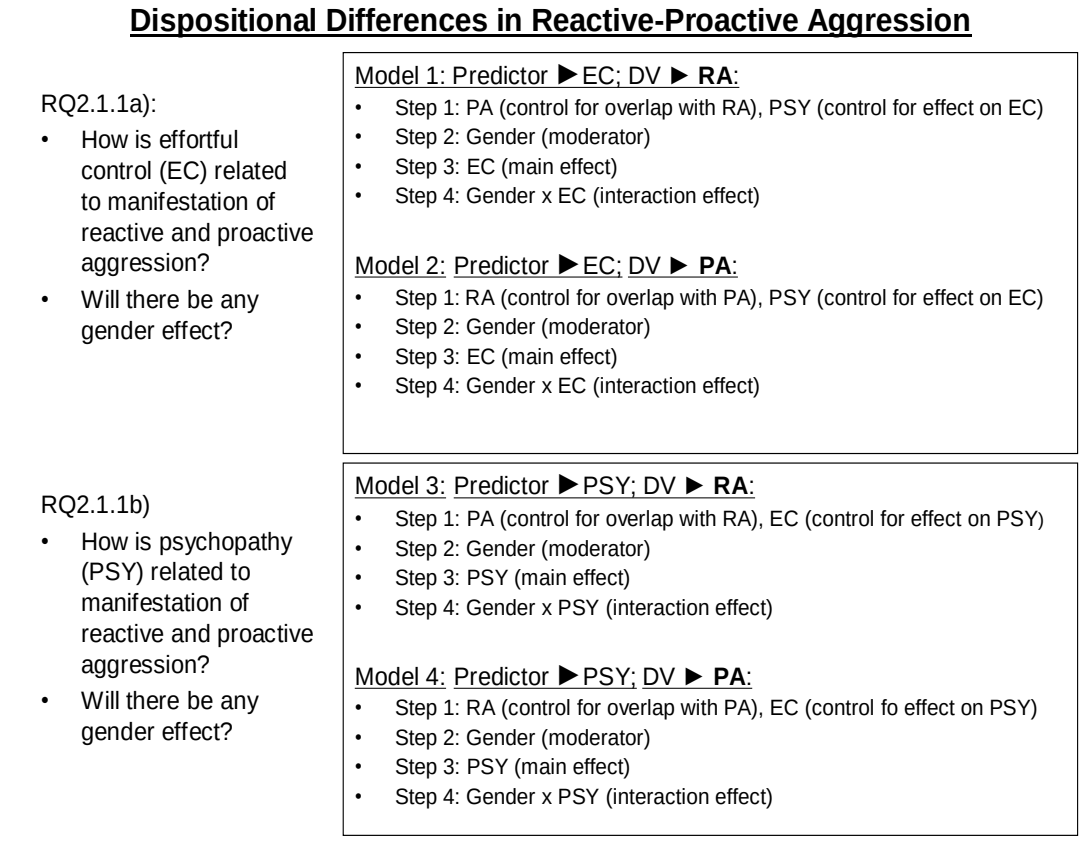


Figure 3.2: Regression Analyses of Dispositional Differences in Reactive-Proactive Aggression (with test for gender effect)

Given the substantial overlap between reactive and proactive aggression in our sample ($r = .497$, $p < .001$) it was necessary to include the alternate aggression subtype as a control variable in our regression model. By doing so, any significant association between reactive aggression or proactive aggression and the dispositional variable of interest would only emerge after accounting for the

variance attributable to the other subtype of aggression. A number of previous studies have used a similar analytical strategy to address this problem of substantial over lap between reactive and proactive aggression (Crick & Dodge, 1996; Dodge & Coie, 1987; Dodge et al. 1990; Hubbard et al., 2002; Poulin & Boivin, 1999; Smithmyer et al., 2000). In addition, temperament traits do not exert their effects in isolation, and multiple temperamental characteristics may influence one another, with one trait exacerbating or protecting against the risk consequences of another (Rothbart & Bates, 2006). Previous studies have found effortful control influencing other traits such as dispositional anger / frustration (Eisenberg et al., 2007; Zhou et al., 2004) and sensation-seeking (Xu et al., 2009). Furthermore, given the significant overlap between effortful control and psychopathy scores for our study sample (r = -.33, p < .001), the inclusion of effortful control as a control variable for examining the effect of psychopathy and vice-versa is crucial.

To examine the relative strength of the association of the dispositional variable (effortful control / psychopathy) with reactive aggression vis-à-vis that with proactive aggression, the Fisher z-test on correlations was conducted (see Cohen, Cohen, Aiken, and West, 2003).

Difference in Social-Environmental Effects on Reactive-Proactive Aggression

To understand how the social-environmental effects of parenting styles and peer social support are related to reactive aggression and proactive aggression, the

zero-order bivariate correlations between authoritarian parenting, permissive parenting, authoritative parenting, '*Guan*' parenting as well as peer social support scores and reactive and proactive aggression were worked out. This was followed by applying a series of hierarchical multiple regression analyses to investigate the extent to which reactive and proactive aggression are related to each of the parenting styles and peer social support. Again, reactive aggression / proactive aggression was treated as the dependent variable (DV), and the different parenting styles / peer social support was the predictor in the respective regression models. The relevant control variables were also entered into the regression models in blocks, together with the relevant gender x parenting / peer variable.

As the 'Guan' parenting scale was developed out of parenting beliefs and practices in a Chinese context, and may not be adequate to describe the Malay and Indian adolescents' perception of parenting styles, all hierarchical multiple regression analyses regarding 'Guan' parenting was conducted using only the scores from the Chinese adolescents within the study sample (N = 716). This is in contrast to the analyses involving authoritarian, authoritative, and permissive parenting styles, which involved the entire sample.

The procedure for carrying out the various regression models is summarized in Figure 3.3.

Differences in Social-Environmental Effects on Reactive-Proactive Aggression

RQ2.1.2a): How do the experience of different parenting styles associate with manifestation of reactive and proactive aggression? Will there be any gender effect?

Model 1: Predictor ► authoritarian, authoritative, permissive, or 'Guan' parenting; DV ► **RA**:

- Step 1: PA (control for overlap with RA), alternate parenting styles (control for mutual influences)
- Step 2: Gender (moderator)
- Step 3: authoritarian, authoritative, permissive, or 'Guan' parenting (main effect)
- Step 4: Gender x authoritarian, authoritative, permissive, or 'Guan' parenting (interaction effect)

Model 2: Predictor ► authoritarian, authoritative, permissive, or 'Guan' parenting; DV ► **PA**:

- Step 1: RA (control for overlap with PA), alternate parenting styles (control for mutual influences)
- Step 2: Gender (moderator)
- Step 3: authoritarian, authoritative, permissive, or 'Guan' parenting (main effect)
- Step 4: Gender x authoritarian, authoritative, permissive, or 'Guan' parenting (interaction effect)

RQ2.1.2b): How is the perception of peer social support associated with manifestation of reactive and proactive aggression? Will there be any gender effects?

Model 3: Predictor ► peer social support; DV ► **RA**:

- Step 1: PA (control for overlap with RA)
- Step 2: Gender (moderator)
- Step 3: Peer social support score (main effect)
- Step 4: Gender x Peer social support score (interaction effect)

Model 4: Predictor ►peer social support; DV ► **PA**:

- Step 1: RA (control for overlap with PA)
- Step 2: Gender (moderator)
- Step 3: Peer social support score (main effect)
- Step 4: Gender x Peer social support score (interaction effect)

Figure 3.3: Regression Analyses of Differences in Social-environmental effects on Reactive-Proactive Aggression (with test for gender effect)

As before, the alternate aggression subtype was entered as a control variable to account for the overlapping effect between reactive aggression and proactive aggression. For analyses of the effects of parenting styles (Models 1 and 2 in Figure 3.3), the alternate parenting styles were also entered as control variables in Step 1 of these models to account for mutual influences between the different

parenting styles. For example, in our study sample, there were significant correlations between permissive parenting and authoritative parenting ($r = .22$, $p < .001$), as well as between authoritative parenting and 'Guan' parenting ($r = .32$, $p < .001$). Chao (1994) applied a similar analytic strategy to manage the overlapping effects of alternate parenting styles in her study of unique parenting practices with her Chinese sample. Similar to earlier practice, all predictors were mean-centered to facilitate the calculation of gender moderation effects. Additionally, the Fisher z-test on correlations was conducted to examine the relative strength of the association of the respective parenting / peer variables with reactive aggression compared to that with proactive aggression.

Difference in Syndromes and Behavioral Outcomes Prediction

To discover how reactive and proactive aggression at 13 or 14 years old predicts adjustment outcomes about a year later, zero-order bivariate correlations between the scores of reactive and proactive aggression and the scores of adjustment outcome indicators (internalizing and externalizing syndromes and delinquent behaviors at both Time 1 and Time 2) were first calculated. Subsequently, two sets of hierarchical multiple regression were performed to ascertain the concurrent predictive patterns at Time 1 and the prospective predictive patterns at Time 2, respectively. Both sets of regression analyses had reactive aggression or proactive aggression as the predictor. For the concurrent

predictions, the relevant adjustment outcome variable obtained at Time 1 was taken as the dependent variable, whereas for the prospective predictions, the relevant adjustment outcome variable obtained at Time 2 was taken as the dependent variable. The relevant control variables and gender interaction terms were also entered in blocks into the respective regression models. The procedure for carrying out the various regression models for the concurrent and prospective prediction is summarized in Figure 3.4.

Difference in Syndromes and Behavioural Outcomes Prediction

RQ2.2): Are there gender effects in how reactive and proactive aggression predict different empirically derived syndromes (as manifested in terms of internalizing or externalizing problems) and behavioral outcomes (expressed in terms of delinquent behaviors) within the 13-15 age range?

INT = internalizing syndromes

EXT = externalizing syndromes

Delinq = delinquent behaviors

T1 = Time 1

T2 = Time 2 (about 1 year later from T1)

Concurrent prediction:

Model 1: Predictor ►**RA**; DVs ► INT, EXT or Delinq @ T1:
- Step 1: PA (control for overlap with RA)
- Step 2: Gender (moderator)
- Step 3: RA (main effect)
- Step 4: Gender x RA (interaction effect)

Model 2: Predictor ►**PA**; DVs ► INT, EXT or Delinq @ T1:
- Step 1: RA (control for overlap with PA)
- Step 2: Gender (moderator)
- Step 3: PA (main effect)
- Step 4: Gender x PA (interaction effect)

Prospective prediction:

Model 3: Predictor ►**RA**; DVs ► INT, EXT or Delinq @ T2:
- Step 1: PA (control for overlap with RA), INT, EXT or Delinq @ T1
- Step 2: Gender (moderator)
- Step 3: RA (main effect)
- Step 4: Gender x RA (interaction effect)

Model 4: Predictor ►**PA**; DVs ► INT, EXT or Delinq @ T2:
- Step 1: RA (control for overlap with PA), INT, EXT or Delinq @ T1
- Step 2: Gender (moderator)
- Step 3: PA (main effect)
- Step 4: Gender x PA (interaction effect)

Figure 3.4: Regression Analyses of Difference in Syndromes and Behavioral Outcomes Prediction (with test for gender effect)

As in previous regression models, the alternate aggression subtype was entered as a control variable to account for the overlapping effect between reactive aggression and proactive aggression. In addition, for the prospective prediction models (i.e. Models 3 and 4 in Figure 3.4), the corresponding adjustment outcome variable was entered into Step 1 (i.e., internalizing score at Time 1 was entered into Step 1 if the outcome to be predicted at Time 2 was internalizing problem, and a similar pairing was made in the prediction models for externalizing problem and delinquent behaviors). This process is to partial out the variance contributed by the particular adjustment problem score at Time 1 to its score at Time 2, so that the main effect obtained from the regression will show primarily the predictive association between reactive / proactive aggression and the adjustment outcome at Time 2. The predictors were also mean-centered to facilitate the calculation of interaction effect. The Fisher z-test on correlations was also conducted to determine the relative strength of prediction by the various adjustment outcome variables (internalizing syndromes / externalizing syndromes / delinquency) of reactive aggression compared to that of proactive aggression.

Difference in Person-Environmental Dynamics

To find out the manner in which the dispositional characteristic of effortful control / psychopathy interacted with salient forces in the social environment (parenting / peer effects) to multiply influence reactive and proactive aggression,

analyses were conducted to determine whether any mediation effects existed. Specifically, we examined whether any of the parenting styles or perceived peer social support played a mediating role in individuals' dispositional influence on reactive and proactive aggression. The data were analyzed according to Baron and Kenny's (1986) and Holmbeck's (1997) conceptual and statistical recommendations for assessing the presence of a mediation effect. Different social-environmental variables (authoritarian, authoritative, permissive, and 'Guan' parenting styles, as well as peer social support) were tested in turn as to whether they mediate the different pairs of effortful control-reactive / proactive aggression and psychopathy-reactive / proactive aggression associations. The mediation analysis model is summarized in Figure 3.5.

Difference in Person-Environmental Dynamics

RQ3.1) How do parenting styles mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?
RQ3.2) Does peer social support mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?

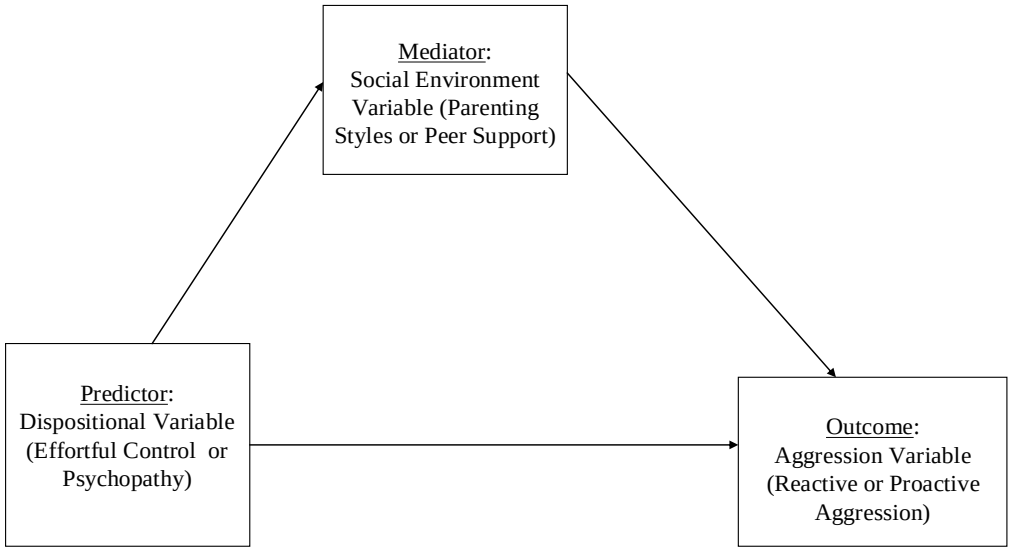


Figure 3.5: Mediation Analyses of Person-Environment Dynamics

As recommended by Baron and Kenny (1986), a series of multiple regressions and the Sobel test were performed to test for the four required conditions necessary for significant mediation effects, namely

- the dispositional variable (predictor) is significantly associated with the aggression variable (outcome),
- the dispositional variable (predictor) is significantly associated with the social environmental variable (mediator),

- social environmental variable (mediator) is significantly associated with aggression variable (outcome) after controlling for the dispositional variable (predictor) , and
- the magnitude of the association between the dispositional variable (predictor) and the aggression variable (outcome) is either eliminated (indicating a complete mediation) or significantly reduced (indicating a partial mediation) after controlling for the social environmental variable (mediator).

CHAPTER FOUR

RESULTS

4.1 Introduction

The central question investigated in this study was whether there were any distinctions between reactive aggression and proactive aggression in terms of their factor structure as well as their respective associations with selected dispositional characteristics, social environmental influences, person-environment dynamics, and adjustment outcome variables (both concurrently and prospectively). Demographic data of the research sample and the relevant descriptive statistics will first be presented here. Next, results of the factor analyses will be reported. Finally, the results of the various correlational analyses with reactive and proactive aggression will be presented. All inferential analysis results will be reported in the following sequence of variables:

- dispositional (effortful control, psychopathy);
- social environmental effects (parenting styles, peer social support);
- adjustment and behavioral outcomes predictions, and
- person-environment dynamics (parenting styles / peer social support mediating disposition – aggression association).

4.2 Descriptive Statistics

The sample comprised 1193 adolescents (*M* = 13.26 years, *SD* = 0.92). The demographics of the research sample at Time 1 of data collection in terms of gender, ethnicity, academic levels, academic streams, and residential house-types are presented in Table 4.1.

Table 4.1

Demographics of Research Sample at Time 1

	n	Percentage of Sample Population
Gender		
Male	634	53.10
Female	559	46.90
Ethnicity		
Chinese	797	66.80
Malay	244	20.50
Indian	100	8.40
Eurasian / Others	48	4.00
Missing data	4	0.30
Academic Level		
Secondary 1	600	50.30
Secondary 2	593	49.70

Tables continues

	n	Percentage of Sample Population
Academic Stream		
Express	507	42.50
Normal (Academic)	407	34.10
Normal (Technical)	279	23.40
Residential House-Type		
Public Housing 1-Room Flat	10	0.80
Public Housing 2-Room Flat	30	2.50
Public Housing 3-Room Flat	248	20.80
Public Housing 4-Room Flat	424	35.50
Public Housing 5-Room Flat	258	21.60
Public Housing Executive Flat	56	4.70
Executive / Private Condominium	77	6.50
Private Housing / Landed Property	41	3.40
Missing Data	49	4.20

The descriptive statistics of the variables examined in this study are given in Table 4.2.

Table 4.2

Descriptive Statistics of Variables examined in This Study

	M	*SD*	Min.	Max.	Cronbach's α	Skewness	Kurtosis
Reactive Aggression (Time 1)	7.11	3.80	0	21.00	0.72	0.43	0.07
Proactive Aggression (Time 1)	1.37	2.24	0	19.00	0.71	2.86	11.04
Effortful Control (Time 1)	39.56	6.00	14.00	60.00	0.62	0.24	0.83
Psychopathy (Time 1)	11.34	4.78	0	30.00	0.73	0.47	0.01
Authoritarian Parenting (Time 1)	26.01	6.34	9.00	45.00	0.79	0.23	0.14
Permissive Parenting (Time 1)	14.52	4.28	4.00	24.00	0.74	0.10	-0.19
Authoritative Parenting (Time 1)	25.44	6.79	8.00	40.00	0.85	-0.22	-0.15
"Guan' parenting (Time 1)	35.92	6.10	8.00	48.00	0.74	-0.94	2.05
Peer Social Support (Time 1)	13.46	3.58	4.00	20.00	0.79	-0.41	-0.07
Externalizing Syndromes (Time 1)	2.80	2.88	0	21.00	0.81	1.57	3.48

	M	*SD*	Min.	Max.	Cronbach's α	Skewness	Kurtosis
Internalizing Syndromes (Time 1)	10.16	6.61	0	35.00	0.88	0.48	-0.33
Delinquent Behaviors (Time 1)	2.15	3.12	0	17.00	0.86	1.89	3.59
Externalizing Syndromes (Time 2)	2.74	2.81	0	15.00	0.79	1.46	2.32
Internalizing Syndromes (Time 2)	10.38	6.84	0	35.00	0.90	0.42	-0.49
Delinquent Behaviors (Time 2)	2.36	3.35	0	19.00	0.87	1.94	3.97

Analyses of conformity of the variables examined in this study to normal distribution indicated that they were all within Kline's (1998) recommended limits (i.e., absolute value of the univariate skew index less than 3.0 and absolute value of the univariate kurtosis index less than 10.0). The only exception to this was that of proactive aggression, with a kurtosis index that exceeded slightly the stated limit. Nevertheless, Tabachnick and Fidell (2007) have provided evidence that underestimates of variance associated with positive kurtosis disappear with samples of 100 or more cases; with negative kurtosis, underestimation of variance disappears with samples of 200 or more. Given the large sample size of more than

1000 participants in this study, we expected that the departure from normality would not create substantive problems for our analyses. We have further conducted all our hierarchical regression analyses using the transformed (square root) proactive aggression scale scores, and they yielded the same pattern of results as the use of original scale scores. Hence, only the results based on the use of original proactive scale scores were reported.

4.3 Findings about Factor Structure

Table 4.3 below lists Research Question 1 and its corresponding hypothesis, which was tested using factor analysis methods:

Table 4.3

Research Question 1 and Corresponding Hypothesis

Research Question	***Hypotheses***
RQ1) Does the reactive and proactive aggression data (from 13 – 15 year old Singapore adolescents) fit a one-factor or two-factor structure better?	▪ H1: There will be a substantial overlap between reactive aggression and proactive aggression, but a two-factor structure will fit the sample data better than a one-factor structure.

Exploratory factor analysis using Principal Components Analysis on the randomly selected one-third portion of the total sample (n = 361) indicated two major components in the factor structure according to the scree-plot (see Figure 4.1). An examination of the distribution of test items with substantial factor loadings (> .4) between these two components revealed that one component had almost exclusively reactive aggression items (e.g. 'I get angry when others annoy me') loaded onto it, while the other had exclusively proactive aggression items (.e.g. 'I get others to gang up on other kids') loaded onto it (see Appendix 1). This result indicates the existence of a two-factor structure comprising a reactive aggression component and a proactive aggression component. Parallel analysis and Velicer's Minimum Average Partial test using the same one-third sample also indicated clearly the retention of two components. To counter the possibility that skewness and kurtosis are issues at the item level, data transformation (square root) was conducted, and exploratory factor analysis was applied on the transformed data. Similar results were obtained, with both Parallel Analysis and Velicer's Minimum Average Partial test indicating a two-factor solution.

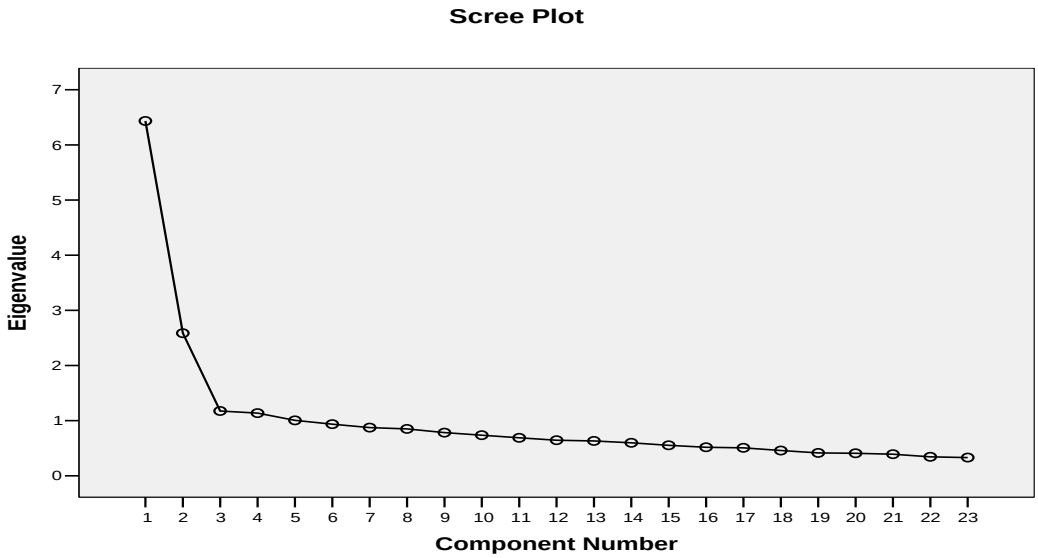


Figure 4.1. Scree plot from the Exploratory Factor Analysis (N=361)

For confirmatory factor analysis, the fit of both the one-factor and the two-factor structure models were explored using the remaining randomly selected two-third sample (n = 832). The indices used to assess the adequacy of model fit included chi-square (χ^2), comparative fit index (CFI), root mean square error of approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR). The model fit of the two-factor structure with the data was found to be χ^2 = 974.28, df = 229, p < .001; CFI = .812; RMSEA = .059; SRMR = .066; whereas the model-fit of the one-factor structure was found to be χ^2 = 1498.98, df = 230, p < .001;

CFI = .680; RMSEA = .076; SRMR = .080. The standardized coefficients for the one-factor and two-factor models are given in Appendix 2. Both the one-factor and two-factor structures achieved acceptable fit according to the SRMR criterion of less than .08 (Hu and Bentler, 1998), while failing to reach the recommended minimum cutoff criterion for the other fit indices (e.g. nonsignificant χ^2 value, RMSEA value less than .05, and CFI value close to .95 by Byrne, 2001). Nevertheless, the comparison result clearly indicated that that the two-factor structure (with reactive aggression distinct from proactive aggression) provided a better fit to the data than the one-factor structure (where reactive aggression and proactive aggression are not differentiated).

The zero-order correlation between reactive aggression score and proactive aggression score was $r(1126) = .497$, $p < .001$, indicating a moderate correlation between these two aggression subtypes.

In summary, the exploratory factor analysis indicated the extraction of two major components, with primarily reactive items loaded onto one and proactive items loaded onto the other. In addition, the confirmatory factor analysis showed that a two-factor solution, comprising reactive and proactive aggression, fit the data better than did a single-factor solution. Together with the moderate correlation of around .50 between reactive and proactive aggression, our results support Hypothesis H1.

4.4 Findings about Dispositional Differences in Reactive-Proactive Aggression

The research questions and corresponding hypotheses related to the dispositional differences in reactive-proactive aggression are given in Table 4.4.

Table 4.4

Research Questions 2.1.1 (a) and (b) and their Corresponding Hypotheses

Research Questions	***Hypotheses***
RQ2.1.1a) How is effortful control (EC) related to manifestation of reactive and proactive aggression? Will there be any gender effect?	• H2: Effortful control will be negatively associated with both proactive and reactive aggression; the association between effortful control and reactive aggression will be stronger compared to that between effortful control and proactive aggression; and gender moderation is expected.
RQ2.1.1b) How is psychopathy (PSY) related to manifestation of reactive and proactive aggression? Will there be any gender effect?	▪ H3: Psychopathy will be positively associated to both proactive and reactive aggression; the association between psychopathy and proactive aggression will be stronger compared to that between psychopathy and reactive aggression; and gender moderation is expected.

The zero-order correlations between reactive aggression, proactive aggression, effortful control and psychopathy are given in Table 4.5.

Table 4.5

Intercorrelations for Reactive Aggression, Proactive Aggression, Effortful Control, and Psychopathy

	1	2	3	4
1 Reactive Aggression	--			
2 Proactive Aggression	.497**	--		
3 Effortful Control	-.266**	-.211**	--	
4 Psychopathy	.442**	.477**	-.334**	--

Note: ** $p < .01$; $N = 1031$

Results from the hierarchical multiple regressions, where reactive aggression / proactive aggression was the dependent variable (DV) and effortful control was the predictor, are given in Table 4.6.

Table 4.6

Regressions of Reactive and Proactive Aggression on Effortful Control

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive Aggression	Step 1 (controlling for):				
	Proactive Aggression	.381**	.311	.311	242.621**
	Psychopathy	.249**			
	Step 2 (moderator):				
	Gender	-.093**	.320	.009	14.074**
	Step 3 (main effect):				
	Effortful Control	-.103**	.330	.010	15.087**
	Step 4 (gender moderation):				
	Effortful Control x Gender	.056*	.333	.003	5.047*
Proactive Aggression	Step 1 (controlling for):				
	Reactive Aggression	.370**	.331	.331	265.346**
	Psychopathy	.288**			
	Step 2 (moderator):				
	Gender	.120**	.344	.013	21.967**
	Step 3 (main effect):				
	Effortful Control	-.015	.344	0	.364
	Step 4 (gender moderation):				
	Effortful Control x Gender	-.087**	.352	.008	12.410**

Note: * $p < .05$, ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

Findings from the hierarchical multiple regression indicated that effortful control was negatively associated with reactive aggression [β = -.103, t(1027) = -3.88, p<.001] but not significantly associated with proactive aggression. The Fisher z-test on correlations indicated that the difference between the effortful control-reactive aggression correlation and the effortful control- proactive aggression correlation is significant, z = -2.00, p < .05. Effortful control uniquely accounted for a significant 1.0% of the variance in reactive aggression after controlling for the effects of psychopathy and proactive aggression.

Additionally, the gender x effortful control interactions were significant for both reactive aggression and proactive aggression. The two interactions are plotted in Figure 4.2 and Figure 4.3, which show the mean values of reactive aggression or proactive aggression (dependent variables) at -1*SD* and +1*SD* of effortful control (predictor), with gender as the moderator. The result showed that effortful control was negatively associated with reactive aggression for the girls, and there was no such significant association for the boys; whereas effortful control was negatively associated with proactive aggression for the boys, and there was no such significant association for the girls.

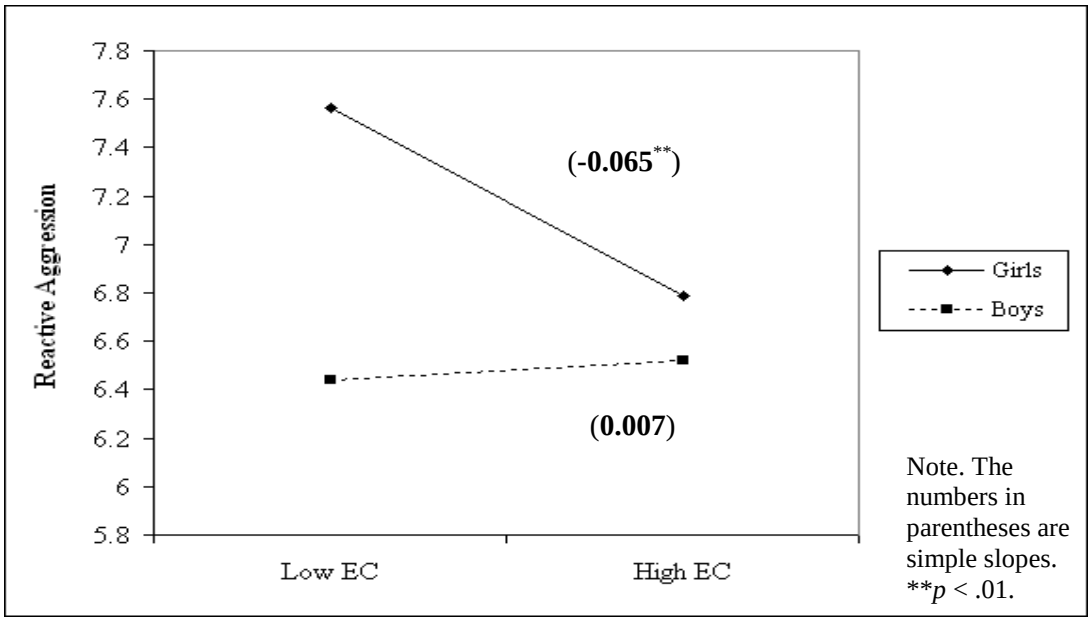


Figure 4.2. The Gender x Effortful Control interactive effects in relation to adolescents' Reactive Aggression.

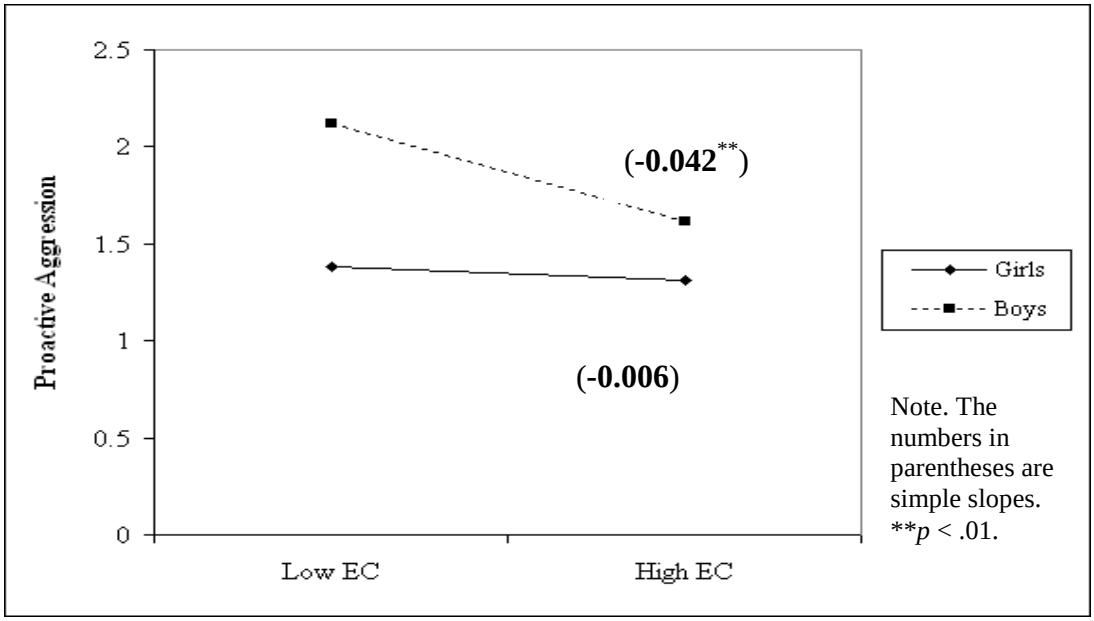


Figure 4.3. The Gender x Effortful Control interactive effects in relation to adolescents' Proactive Aggression.

Results from the hierarchical multiple regressions, where reactive aggression / proactive aggression was the dependent variable (DV) and psychopathy was the predictor are give in Table 4.7.

Table 4.7

Regressions of Reactive and Proactive Aggression on Psychopathy

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive Aggression	Step 1 (controlling for):				
	Proactive Aggression	.379**	.279	.279	207.986**
	Effortful Control	-.102**			
	Step 2 (moderator):				
	Gender	-.093**	.285	.006	8.044**
	Step 3 (main effect):				
	Psychopathy	.252**	.330	.045	71.970**
	Step 4 (gender moderation):				
	Psychopathy x Gender	-.032	.331	.001	1.629

Table continues

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Proactive Aggression	Step 1 (controlling for):				
	Reactive Aggression	.367**	.259	.259	187.790**
	Effortful Control	-.018			
	Step 2 (moderator):				
	Gender	.121**	.283	.024	36.542**
	Step 3 (main effect):				
	Psychopathy	.284**	.344	.061	99.518**
	Step 4 (gender moderation):				
	Psychopathy x Gender	.090**	.352	.008	13.259**

Note: ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

In the case of psychopathy, it was positively associated with both reactive aggression [$\beta = .252$, $t(1071) = 8.49$, $p<.001$] and proactive aggression [$\beta = .284$, $t(1071) = 9.84$, $p<.001$]. Psychopathy accounted for 6.4% of unique variance in proactive aggression after controlling for the effects of effortful control and reactive aggression, and 4.5% of the unique variance in reactive aggression after controlling for the effects of effortful control and proactive aggression. In terms of relative strength of association, the Fisher z-test on correlations indicated that the difference between the psychopathy-reactive aggression correlation and the psychopathy-proactive aggression correlation was not significant, z = -.80, $p > .05$.

The gender x psychopathy interaction was found to be significant for proactive aggression but not for reactive aggression. The interaction is plotted in Figure 4.4, which shows the mean values of proactive aggression (dependent variables) at -1*SD* and +1*SD* of psychopathy (predictor), with gender as the moderator. Psychopathy was positively associated with proactive aggression for both the boys and the girls.

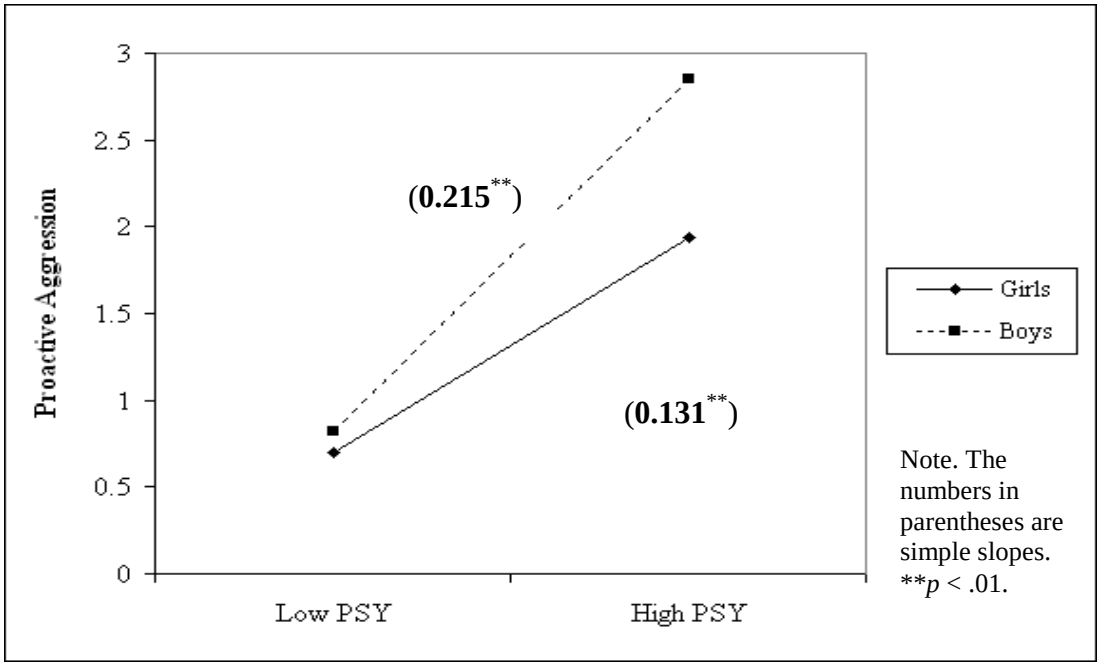


Figure 4.4. The Gender x Psychopathy interactive effects in relation to adolescents' Proactive Aggression.

Our findings only partially supported Hypothesis H2, with effortful control showing significant negative association with only reactive aggression. We did not find any significant association between effortful control and proactive aggression

as hypothesized. Psychopathy's positive associations with both reactive and proactive aggression, with the lack of significant difference between these two associations, resulted in Hypothesis H3 being only partially supported. Gender moderations were also found for effortful control's associations with reactive and proactive aggression, as well as for psychopathy's association with proactive aggression as hypothesized. Only the association between psychopathy and reactive aggression did not show gender moderation, contrary to our prediction.

4.5 Findings about Social-Environmental Effects on Reactive-Proactive Aggression

The research questions and corresponding hypotheses related to the social-environmental effects on reactive-proactive aggression are given in Table 4.8.

Table 4.8

Research Questions 2.1.2 (a) and (b) and their Corresponding Hypotheses

Research Questions	***Hypotheses***
RQ2.1.2a) How do the experience of different parenting styles associate with manifestation of reactive and proactive aggression? Will there be any gender effect?	▪ H4: Reactive aggression will be positively associated with the experience of authoritarian parenting but NOT associated with other parenting styles, and gender moderation is expected. ▪ H5: Proactive aggression will be positively associated with the experience of permissive parenting but NOT associated with other parenting styles, and gender moderation is expected. ▪ H6: Both reactive and proactive aggression will show either no significant association or a negative association with an authoritative parenting style, and gender moderation is expected. ▪ H7: For the Chinese adolescents, both reactive and proactive aggression will show either no significant association or a negative association with Asian 'Guan' parenting, and gender moderation is expected.

Table continues

Research Questions	*Hypotheses*
RQ2.1.2b) How is the perception of peer social support associated with manifestation of reactive and proactive aggression? Will there be any gender effect?	▪ H8: Both reactive and proactive aggression will show either no significant association or a negative association with peer social support, and gender moderation is expected.

The zero-order correlations between reactive aggression, proactive aggression, the different parenting styles and peer social support are given in Table 4.9.

Table 4.9

Intercorrelations for Reactive Aggression, Proactive Aggression, different Parenting Styles and Peer Social Support

		1	2	3	4	5	6	7
1	Reactive Aggression	--						
2	Proactive Aggression	.497**	--					
3	Authoritarian Parenting	.117**	.080**	--				
4	Permissive Parenting	.026	.101**	-.017	--			
5	Authoritative Parenting	-.023	-.061*	.037	.219**	--		
6	'Guan' Parenting	.010	-.091**	.027	-.046	.324**	--	
7	Peer Social Support	-.019	-.063*	.006	.028	.245**	.119**	--

Note: * $p < .05$, ** $p < .01$; $N = 1066$

Results from the hierarchical multiple regressions are given in Tables 4.10 to Tables 4.13, where reactive aggression / proactive aggression was the dependent variable (DV) and each of the parenting styles was the predictor in turn.

Tables 4.10

Regressions of Reactive and Proactive Aggression on Authoritarian Parenting

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive	Step 1 (controlling for):				
Aggression	Proactive Aggression	.513**	.256	.256	91.698**
	Permissive Parenting	-.016			
	Authoritative Parenting	-.005			
	'Guan' Parenting	.036			
	Step 2 (moderator):				
	Gender	-.075**	.261	.005	7.015**
	Step 3 (main effect):				
	Authoritarian Parenting	.080**	.267	.006	9.183**
	Step 4 (gender moderation):				
	Authoritarian Parenting x Gender	-.014	.268	.001	.296
Proactive	Step 1 (controlling for):				
Aggression	Reactive Aggression	.497**	.269	.269	98.218**
	Permissive Parenting	.095**			
	Authoritative Parenting	-.044			
	'Guan' Parenting	-.045			
	Step 2 (moderator):				
	Gender	.145**	.291	.022	31.851**
	Step 3 (main effect):				
	Authoritarian Parenting	.019	.291	0	.522
	Step 4 (gender moderation):				
	Authoritarian Parenting x Gender	-.018	.291	0	.458

Note: ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

Tables 4.11

Regressions of Reactive and Proactive Aggression on Permissive Parenting

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive	Step 1 (controlling for):				
Aggression	Proactive Aggression	.514**	.262	.262	94.378**
	Authoritarian Parenting	.080**			
	Authoritative Parenting	-.005			
	'Guan' Parenting	.036			
	Step 2 (moderator):				
	Gender	-.075**	.267	.005	7.893
	Step 3 (main effect):				
	Permissive Parenting	-.016	.267	0	.342
	Step 4 (gender moderation):				
	Permissive Parenting x Gender	-.018	.268	.001	.442
Proactive	Step 1 (controlling for):				
Aggression	Reactive Aggression	.496**	.261	.261	94.102**
	Authoritarian Parenting	.018			
	Authoritative Parenting	-.045			
	'Guan' Parenting	-.047			
	Step 2 (moderator):				
	Gender	.146**	.283	.022	31.791**
	Step 3 (main effect):				
	Permissive Parenting	.096**	.291	.008	12.727**
	Step 4 (gender moderation):				
	Permissive Parenting x Gender	.052*	.294	.003	4.097*

Note: * $p < .05$, ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

Tables 4.12

Regressions of Reactive and Proactive Aggression on Authoritative Parenting

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive	Step 1 (controlling for):				
Aggression	Proactive Aggression	.513**	.262	.262	94.497**
	Authoritarian Parenting	.080**			
	Permissive Parenting	-.016			
	'Guan' Parenting	.035			
	Step 2 (moderator):				
	Gender	-.075**	.267	.005	7.844**
	Step 3 (main effect):				
	Authoritative Parenting	-.006	.267	0	.041
	Step 4 (gender moderation):				
	Authoritative Parenting x Gender	-.001	.267	0	.001
Proactive	Step 1 (controlling for):				
Aggression	Reactive Aggression	.497**	.268	.268	97.446**
	Authoritarian Parenting	.019			
	Permissive Parenting	.095**			
	'Guan' Parenting	-.045			
	Step 2 (moderator):				
	Gender	.146**	.289	.021	32.177**
	Step 3 (main effect):				
	Authoritative Parenting	-.044	.291	.002	2.462
	Step 4 (gender moderation):				
	Authoritative Parenting x Gender	-.006	.291	0	.050

Note: ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

Tables 4.13

Regressions of Reactive and Proactive Aggression on 'Guan' Parenting (for Chinese Adolescents)

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive	Step 1 (controlling for):				
Aggression	Proactive Aggression	.507**	.267	.267	64.612**
	Authoritarian Parenting	.108**			
	Permissive Parenting	-.020			
	Authoritative Parenting	-.032			
	Step 2 (moderator):				
	Gender	-.074*	.272	.005	5.254*
	Step 3 (main effect):				
	'Guan' Parenting	.018	.272	0	.269
	Step 4 (gender moderation):				
	'Guan' Parenting x Gender	-.008	.272	0	.060
Proactive	Step 1 (controlling for):				
Aggression	Reactive Aggression	.494**	.268	.268	65.090**
	Authoritarian Parenting	.024			
	Permissive Parenting	.106**			
	Authoritative Parenting	-.021			
	Step 2 (moderator):				
	Gender	.142**	.289	.021	20.522**
	Step 3 (main effect):				
	'Guan' Parenting	-.042	.290	.001	1.463
	Step 4 (gender moderation):				
	'Guan' Parenting x Gender	.015	.290	0	.210

Note: * $p < .05$, ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

After controlling for the effects of reactive aggression and the other alternative parenting styles, proactive aggression was positively correlated to permissive parenting [β = .096, t(1062) = 3.61, p<.01], but not significantly associated with authoritarian parenting and authoritative parenting. The Fisher z-test on correlations indicated that the difference between permissive parenting-reactive aggression correlation and the permissive parenting-proactive aggression correlation is significant, z = -2.59, p < .01.

In contrast, after controlling for the effects of proactive aggression and the other alternative parenting styles, reactive aggression was positively associated with only authoritarian parenting [β = .080, t(1019) = 3.03, p<.01], but not significantly associated with permissive or authoritative parenting styles. However, the Fisher z-test on correlations indicated that the difference between authoritarian parenting-reactive aggression correlation and the authoritarian parenting-proactive aggression correlation is not significant, z = 1.41, p > .05.

For the analyses involving only the Chinese adolescents, no evidence of any significant association was found between 'Guan' parenting and reactive aggression as well as between 'Guan' parenting and proactive aggression.

For gender moderation effect, we found only gender x permissive parenting interaction for proactive aggression, whereby permissive parenting was positively associated with proactive aggression for both the boys and the girls. The interaction plot is given in Figure 4.5, which shows the mean values of proactive aggression

(dependent variables) at -1*SD* and +1*SD* of permissive parenting (predictor), with gender as the moderator. No other gender x parenting style interaction effect was found.

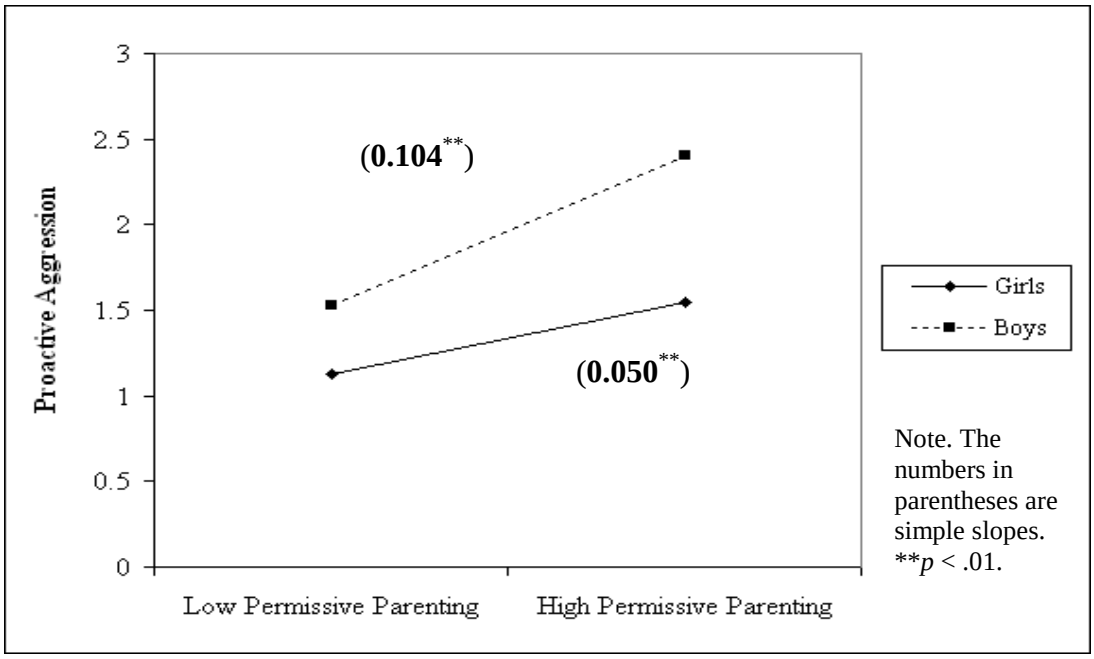


Figure 4.5. The Gender x Permissive Parenting interactive effects in relation to adolescents' Proactive Aggression.

Where peer effect is concerned, results from the hierarchical multiple regressions, where reactive aggression / proactive aggression was the dependent variable (DV) and peer social support was the predictor is given in Tables 4.14.

Tables 4.14

Regressions of Reactive and Proactive Aggression on Peer Social Support

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Reactive Aggression	Step 1 (controlling for):				
	Proactive Aggression	.514**	.253	.253	363.281**
	Step 2 (moderator):				
	Gender	-.078**	.259	.006	8.586**
	Step 3 (main effect):				
	Peer Social Support	-.003	.259	0	.035
	Step 4 (gender moderation):				
	Peer Social Support x Gender	-.013	.259	0	.249
Proactive Aggression	Step 1 (controlling for):				
	Reactive Aggression	.500**	.253	.253	363.281**
	Step 2 (moderator):				
	Gender	.155**	.277	.024	36.655**
	Step 3 (main effect):				
	Peer Social Support	-.012	.278	.001	.439
	Step 4 (gender moderation):				
	Peer Social Support x Gender	-.038	.279	.001	2.100

Note: ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

There was no evidence that peer social support was significantly associated with either reactive or proactive aggression, after controlling for effects due to

alternate forms of aggression-subtype. No gender moderation effect was found for peer social support's association with reactive and proactive aggression.

The existence of a unique, positive association between reactive aggression and authoritarian parenting provided support for Hypothesis H4. However, the lack of gender interaction in this association resulted in Hypothesis H4 being only partially supported. The positive, unique association between proactive aggression and permissive parenting which was found, together with the existence of gender interaction effect in this association, supported Hypothesis H5. Both Hypothesis H6 and H7 were only partially supported. This is because no evidence of authoritative parenting and 'Guan' parenting having a significant association with either reactive aggression and proactive aggression was found (as hypothesized), but contrary to expectation, no evidence of any gender interaction was found for these associations. Hypotheses H8 was also partially supported. This is because no evidence of any significant association was found between reactive and proactive aggression and peer social support (as hypothesized), but contrary to expectation, no gender interaction was found for these associations.

4.6 Findings from the Analyses on Syndromes and Behavioral Outcomes Prediction

The research questions and corresponding hypotheses related to reactive and proactive aggression's prediction of syndromes and behavioral outcomes are given in Table 4.15.

Table 4.15

Research Question 2.2 and its Corresponding Hypotheses

Research Questions	***Hypotheses***
RQ2.2) Are there gender effects in how reactive and proactive aggression predict different empirically derived syndromes (as manifested in terms of internalizing or externalizing problems) and behavioral outcomes (expressed in terms of delinquent behaviors) within the 13-15 age range?	▪ H9: Reactive aggression at 13 or 14 years old will be more predictive of internalizing syndromes compared to externalizing syndromes and delinquent behaviors concurrently; and no gender moderation is expected. ▪ H10: Proactive aggression at 13 or 14 years old will be more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes concurrently, and gender moderation is expected.

Table continues

Research Questions	*Hypotheses*
	▪ H11: Reactive aggression at 13 or 14 years old will be more predictive of internalizing syndromes compared to externalizing syndromes and delinquent behaviors prospectively (about a year later); and no gender moderation is expected. ▪ H12: Proactive aggression at 13 or 14 years old will be more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes prospectively (about a year later), and gender moderation is expected.

The zero-order correlations between reactive aggression, proactive aggression, internalizing syndromes (at both Time 1 and Time 2), externalizing syndromes (at both Time 1 and Time 2) and delinquent behaviors (at both Time 1 and Time 2) are given in Table 4.16.

Table 4.16

Intercorrelations for Reactive Aggression, Proactive Aggression, Internalizing Syndromes (Time 1, Time 2), Externalizing Syndromes (Time 1, Time 2) and Delinquent Behaviors (Time 1, Time 2)

	1	2	3	4	5	6	7	8
1 Reactive Aggression	--							
2 Proactive Aggression	.497**	--						
3 Internalizing Syndromes (Time 1)	.451**	.250**	--					
4 Externalizing Syndromes (Time 1)	.601**	.659**	.482**	--				
5 Delinquent Behaviors (Time 1)	.450**	.549**	.259**	.608**	--			
6 Internalizing Syndromes (Time 2)	.305**	.144**	.683**	.335**	.212**	--		
7 Externalizing Syndromes (Time 2)	.435**	.423**	.326**	.610**	.465**	.480**	--	
8 Delinquent Behaviors (Time 2)	.371**	.384**	.221**	.449**	.661**	.262**	.542**	--

Note: ** $p < .01$; $N = 1076$

Results from the hierarchical multiple regressions for the concurrent prediction of adjustment outcomes are given in Table 4.17 and Table 4.18. In these regression models, internalizing syndromes, externalizing syndromes and delinquent behaviors scores at Time 1 were taken in turn to be the dependent variable (DV) and reactive aggression or proactive aggression was the predictor.

Table 4.17

Reactive Aggression Concurrent Prediction of Internalizing Syndromes, Externalizing Syndromes and Delinquent Behaviors

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Internalizing Syndromes at Time 1	Step 1 (controlling for):				
	Proactive Aggression	.052	.065	.065	74.258**
	Step 2 (moderator):				
	Gender	-.133**	.092	.027	32.294**
	Step 3 (main effect):				
	Reactive Aggression	.430**	.229	.137	190.613**
	Step 4 (gender moderation):				
	Reactive Aggression x Gender	.052	.232	.003	3.777

Tables continues

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Externalizing Syndromes at Time 1	Step 1 (controlling for): Proactive Aggression	.490**	.432	.432	819.052**
	Step 2 (moderator): Gender	-.039	.437	.005	7.184**
	Step 3 (main effect): Reactive Aggression	.353**	.529	.092	211.113**
	Step 4 (gender moderation): Reactive Aggression x Gender	-.025	.530	.001	1.362
Delinquent Behaviors at Time 1	Step 1 (controlling for): Proactive Aggression	.399**	.286	.286	430.477**
	Step 2 (moderator): Gender	.056*	.287	.001	1.910
	Step 3 (main effect): Reactive Aggression	.254**	.335	.048	76.897**
	Step 4 (gender moderation): Reactive Aggression x Gender	-.004	.335	0	.021

Note: * $p < .05$, ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

Table 4.18

Proactive Aggression Concurrent Prediction of Internalizing Syndromes, Externalizing Syndromes and Delinquent Behaviors

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Internalizing Syndromes at Time 1	Step 1 (controlling for): Reactive Aggression	.432**	.211	.211	287.211**
	Step 2 (moderator): Gender	-.131**	.226	.015	21.522**
	Step 3 (main effect): Proactive Aggression	.048	.229	.003	3.557
	Step 4 (gender moderation): Proactive Aggression x Gender	.026	.229	0	.780
Externalizing Syndromes at Time 1	Step 1 (controlling for): Reactive Aggression	.353**	.357	.357	597.103**
	Step 2 (moderator): Gender	-.039	.359	.002	2.361
	Step 3 (main effect): Proactive Aggression	.488**	.529	.170	389.431**
	Step 4 (gender moderation): Proactive Aggression x Gender	-.004	.529	0	.033

Tables continues

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Delinquent Behaviors at Time 1	Step 1 (controlling for):				
	Reactive Aggression	.251**	.206	.206	279.106**
	Step 2 (moderator):				
	Gender	.053*	.220	.014	19.311**
	Step 3 (main effect):				
	Proactive Aggression	.412**	.335	.115	185.094**
	Step 4 (gender moderation):				
	Proactive Aggression x Gender	-.031	.336	.001	1.294

Note: * $p < .05$, ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

For concurrent predictions (i.e. predicting outcomes at Time 1), the findings indicated that reactive aggression was positively associated with internalizing syndromes [$\beta = .430$, $t(1072) = 13.84$, $p<.001$], externalizing syndromes [$\beta = .353$, $t(1072) = 14.52$, $p<.001$], and delinquent behaviors [$\beta = .254$, $t(1072) = 8.76$, $p<.001$], after controlling for the effects of proactive aggression's overlap with reactive aggression. By comparing the strength of these three significant associations based on their β–weights, reactive aggression's association with internalizing syndromes was the strongest, followed by externalizing syndromes, and delinquent behaviors. The Fisher z-tests on the relative strengths of these

correlations indicated that the differences between them were all significant. In the case of proactive aggression, it was positively associated to only externalizing symptoms [β = .488, t(1072) = 18.25, p<.001] and delinquent behaviors [β = .412, t(1072) =12.98, p<.001], but there was no evidence of a significantly association with internalizing symptoms, after accounting for the overlap effect of reactive aggression. Fisher z-test indicated that the difference between the correlation of proactive aggression to externalizing symptom and the correlation of proactive aggression to delinquent behavior association was significant. No gender moderation was found for any of the reactive and proactive aggression's concurrent predictions.

Taken together, these findings supported Hypothesis H9, which hypothesized reactive aggression would be more predictive of concurrent internalizing syndromes compared to externalizing syndromes and delinquent behaviors, and no gender moderation was expected. Hypothesis H10 was only partially supported because although the findings indicated that proactive aggression was more predictive of externalizing syndromes and delinquent behaviors compared to internalizing syndromes, there was no evidence of the hypothesized gender moderation effect.

Results from the hierarchical multiple regressions for the prospective prediction of adjustment outcomes are given in Table 4.19 and Table 4.20. In these regression models, internalizing syndromes, externalizing syndromes and

delinquent behaviours scores at Time 2 were taken in turn to be the dependent variable (DV), while controlling for internalizing syndromes, externalizing syndromes and delinquent behaviours scores at Time 1 respectively, and reactive aggression or proactive aggression was the predictor.

Table 4.19

Reactive Aggression Prospective Prediction of Internalizing Syndromes, Externalizing Syndromes and Delinquent Behaviors

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Internalizing	Step 1 (controlling for):				
Syndromes at	Proactive Aggression	-.042	.468	.458	410.202**
Time 2	Internalizing Syndromes at Time 1	.695**			
	Step 2 (moderator):				
	Gender	0	.468	0	.001
	Step 3 (main effect):				
	Reactive Aggression	.002	.468	0	.010
	Step 4 (gender moderation):				
	Reactive Aggression x Gender	-.021	.469	.001	.726

Tables continues

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Externalizing	Step 1 (controlling for):				
Syndromes at	Proactive Aggression	-.011	.378	.378	282.754**
Time 2	Externalizing Syndromes at Time 1	.557**			
	Step 2 (moderator):				
	Gender	.018	.378	0	.294
	Step 3 (main effect):				
	Reactive Aggression	.108**	.385	.007	11.110**
	Step 4 (gender moderation):				
	Reactive Aggression x Gender	-.038	.387	.002	2.127
Delinquent	Step 1 (controlling for):				
Behaviors at	Proactive Aggression	.013	.448	.448	378.029**
Time 2	Delinquent Behaviors at Time 1	.613**			
	Step 2 (moderator):				
	Gender	.073**	.452	.004	7.185**
	Step 3 (main effect):				
	Reactive Aggression	.091**	.458	.006	10.032**
	Step 4 (gender moderation):				
	Reactive Aggression x Gender	0	.458	0	0

Note: ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

Table 4.20

Proactive Aggression Prospective Prediction of Internalizing Syndromes, Externalizing Syndromes and Delinquent Behaviors

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Internalizing	Step 1 (controlling for):				
Syndromes	Reactive Aggression	.002	.467	.467	407.786**
at Time 2	Internalizing Syndromes at Time 1	.694**			
	Step 2 (moderator):				
	Gender	0	.467	0	.064
	Step 3 (main effect):				
	Proactive Aggression	-.042	.468	.001	2.517
	Step 4 (gender moderation):				
	Proactive Aggression x Gender	-.007	.468	0	.066
Externalizing	Step 1 (controlling for):				
Syndromes	Reactive Aggression	.110**	.385	.385	291.421**
at Time 2	Externalizing Syndromes at Time 1	.559**			
	Step 2 (moderator):				
	Gender	.021	.385	0	.435
	Step 3 (main effect):				
	Proactive Aggression	-.022	.385	0	.200
	Step 4 (gender moderation):				
	Proactive Aggression x Gender	.018	.385	0	.417

Tables continues

Dependent Variable	Independent Variables	β	R^2	ΔR^2	ΔF
Delinquent Behaviors at Time 2	Step 1 (controlling for):				
	Reactive Aggression	.095**	.452	.452	384.930**
	Delinquent Behaviors at Time 1	.615**			
	Step 2 (moderator):				
	Gender	.079**	.458	.006	9.438**
	Step 3 (main effect):				
	Proactive Aggression	-.006	.458	0	.176
	Step 4 (gender moderation):				
	Proactive Aggression x Gender	.047	.460	.002	3.266

Note: ** $p < .01$; β, standardized slope; R^2, percentage of variance explained

For prospective predictions (i.e. predicting outcomes at Time 2), reactive aggression was associated with externalizing syndromes [$\beta = .108$, $t(929) = 3.33$, $p<.001$] and delinquent behaviors [$\beta = .091$, $t(929) = 3.17$, $p<.01$], but there was no evidence of a significant association with internalizing syndromes, after controlling for proactive aggression's overlap with reactive aggression and the effects of relevant behavior scores at Time 1. There was no evidence of gender moderation effect found for this set of prospective predictions. Fisher z-tests indicated that the correlation of reactive aggression with internalizing syndromes was significantly different from the correlation of reactive aggression with externalizing syndromes. However, the difference between the correlation of reactive aggression with

internalizing syndromes and the correlation of reactive aggression with delinquency was not significant. The finding of significant relationship between reaction aggression with externalizing syndromes and delinquency but not with internalizing syndromes is basically contrary to our prediction. Hence, Hypothesis H 11 was not supported.

On the other hand, there was no evidence of any significant association between proactive aggression and internalizing syndromes, externalizing syndromes or delinquent behaviors, after controlling for the effects of proactive aggression's overlap with reactive aggression and the effects of the relevant syndrome scores at Time 1. In addition, no gender moderation was found for any of these prospective predictions. As there was no evidence any significant prospective associations in this regression model, Hypothesis H12 cannot be supported.

Overall, there was no evidence of any significant gender difference found for both reactive and proactive aggression's concurrent as well as prospective predictions of internalizing and externalizing syndromes as well as delinquent behaviors.

4.7 Findings from the Analyses on Person-Environmental Dynamics

The research questions and corresponding hypotheses related to the person-environment interaction effects on reactive-proactive aggression are given in Table 4.21.

Table 4.21

Research Questions 3.1 and 3.2 and their Corresponding Hypotheses

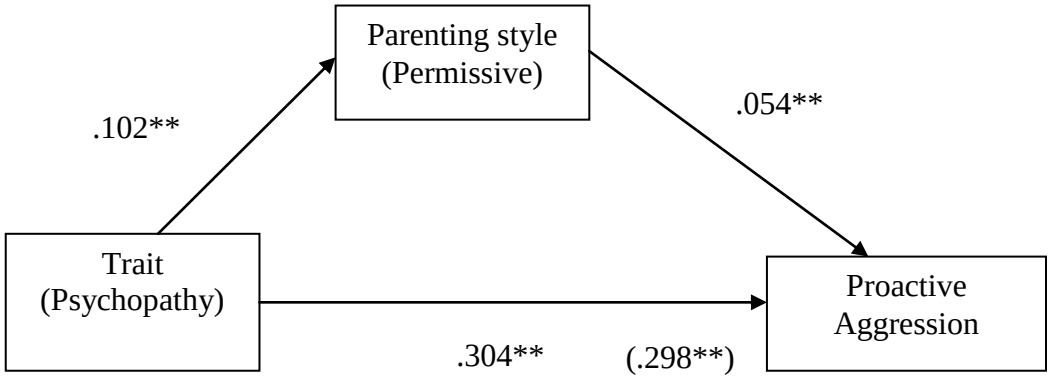
Research Questions	***Hypotheses***
RQ3.1) How do parenting styles mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?	▪ H13: Given H2, H3 and H4, authoritarian parenting is expected to mediate the association of EC and reactive aggression and also mediates the association of PSY and reactive aggression, but will NOT mediate associations of EC or PSY and proactive aggression. ▪ H14: Given, H2, H3 and H5, permissive parenting is expected to mediate the association of EC and proactive aggression and also mediates the associations of PSY and proactive aggression, but will NOT mediate the associations of EC or PSY and reactive aggression.

Tables continues

Research Questions	*Hypotheses*
	▪ H15: Given H2, H3 and H6, authoritative parenting is expected to mediate the associations of EC with both reactive and proactive aggression and also mediate the associations of PSY with both reactive and proactive aggression. ▪ H16: Given H2, H3 and H7, Asian 'Guan' parenting is expected to mediate the associations of EC with both reactive and proactive aggression and also mediate the associations of PSY with both reactive and proactive aggression.
RQ3.2) Does peer social support mediate the relations between disposition (EC, PSY) and reactive and proactive aggression?	• H17: Given H2, H3 and H8, peer social support is expected to mediate the associations of EC with both reactive and proactive aggressions and also mediate the associations of PSY with both reactive and proactive aggression.

The mediation analyses yielded only one case (see Figure 4.6) in which all the conditions for mediation effect were satisfied (c.f. Section 3.6.3), namely

psychopathy was positively associated with proactive aggression [β = .304, t(1028) = 10.62, p<.01] as well as with permissive parenting [β = .102, t(1029) = 3.27, p<.01], and permissive parenting was positively associated with proactive aggression after controlling for the effects of psychopathy [β = .054, t(1027) = 2.15, p<.05]. In addition, the strength of association (as reflected by β-weight) between psychopathy and proactive aggression was reduced from .304 to .298 when permissive parenting was entered as a mediator into the model. Taken together, our findings showed that permissive parenting partially mediated the effects of psychopathy on proactive aggression, Sobel test z = 2.74, p < .01. However, the effect size of this partial mediation is .006, which is a small effect according to Kenny (2012).

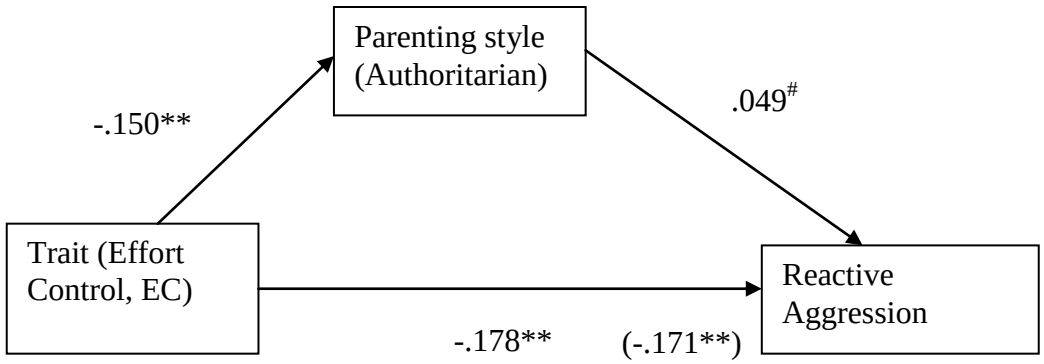


Note: ** p<.01, * p<.05

Figure 4.6: Permissive parenting partially mediating Psychopathy-Proactive Aggression association

The above results only partially supported Hypothesis H14, as we did not find permissive parenting to have significant mediating effect in the effortful control to proactive aggression association that was also hypothesized in H14.

In another mediation model tested, namely authoritarian parenting mediating effortful control - reactive aggression association (see Figure 4.7), we found effortful control to be negatively associated with reactive aggression [β = -.178, t(1028) = -6.66, p<.01] and with authoritarian parenting [β = -.150, t(1138) = -5.11, p<.01]. The association of authoritarian parenting with reactive aggression (after controlling for effortful control) only approached significance [β = .049, t(1027) = 1.84, p = .066]. As one of the mediation conditions was not satisfied (i.e. the p value of authoritarian parenting's association with reactive aggression failed to reach the conventional significance level of p < .05), Hypothesis H13 was not supported.



Note: ** p<.01, # p<.1,

Figure 4.7: Authoritarian parenting partially mediating Effortful Control-Reactive Aggression association

Authoritative parenting, ‘Guan’ parenting and peer social support did not show any mediation effect in any of the disposition – reactive and proactive aggression associations. Therefore, Hypotheses H15, H16 and H17 were also not supported.

4.8 Summary of the Results

The findings from this study indicated that a two-factor structure model, comprising reactive aggression and proactive aggression as distinct components, fit the data better than a single-factor solution.

In terms of differential associations with dispositional variables, reactive aggression was negatively associated with effortful control and positively associated with psychopathy, whereas proactive aggression was not significantly associated effortful control but positively associated with psychopathy. However, the strength of psychopathy’s association with proactive aggression was not significantly different from that of its association with reactive aggression. Gender moderation effects were also found for effortful control’s associations with both reactive and proactive aggression, as well as psychopathy’s association with proactive aggression.

In terms of social-environmental influences, reactive aggression was uniquely and positively associated with authoritarian parenting, whereas proactive

aggression was uniquely and positively associated with permissive parenting. There was no evidence that the Authoritative parenting and the 'Guan' parenting styles, as well as peer social support were associated with either reactive or proactive aggression. In terms of gender moderation effects, we found it only in permissive parenting's association with proactive aggression.

Turning to predictive patterns, there was no evidence of gender differences in the concurrent predictions. Reactive aggression was found to predict internalizing and externalizing syndromes, as well as delinquency, whereas proactive aggression predicted externalizing syndromes and delinquency, but did not predict internalizing syndromes. The differences in the strength of these associations were all significant, with reactive aggression's association with internalizing syndromes being the strongest, followed by externalizing syndromes and delinquent behaviors. Proactive aggression's association with externalizing syndromes was also stronger than its association with delinquent behaviors.

For prospective prediction, there was also no evidence of any gender difference, but the predictive patterns were somewhat different from the concurrent one. Although reactive aggression still significantly predicted externalizing syndromes and delinquent behaviors (positive associations) prospectively, it no longer significantly predict internalizing syndromes. For proactive aggression, it did not significantly predict internalizing or externalizing syndromes and delinquennt behavior prospectively. Overall, reactive aggression seems to be able

to significantly predict the "acting out" forms of behaviors (externalizing syndromes and delinquent behaviors) whereas proactive aggression did not significantly predict any of the adjustment or behavioral outcomes within the one year study period.

Finally, in terms of person-environment interaction effects on reactive and proactive aggression, only one mediation model (permissive parenting mediating psychopathy - proactive aggression association) met all the conditions for significant mediation effect.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter will discuss the findings from the present study in the following order:

- factor structure of reactive and proactive aggression and their overlap
- dispositional differences between reactive and proactive aggression
- differences in social environmental effects on reactive and proactive aggression
- differences in adjustment and behavioral outcome predictions
- effects of person-environment dynamics on reactive and proactive aggression
- summary of findings and implications
- strengths and limitations of this study

5.2 Factor Structure of Reactive and Proactive Aggression and their Overlap

Using both exploratory factor analysis and confirmatory factor analysis, we found evidence supporting a two-factor structure for reactive and proactive

aggression despite the moderate overlap (r = .497) between them. Exploratory factor analysis indicated the extraction of two major components with primarily reactive items loaded onto one and proactive items loaded onto the other. Confirmatory factor analysis revealed that a two-factor solution comprising reactive and proactive aggression fit the data better than a single-factor solution. These findings support Hypothesis H1 and are aligned to results from previous studies supporting a two-factor structure as the better and more appropriate solution (Crick & Dodge, 1996; Day et al., 1992; Little, Brauner, et al., 2003; Pellegrini et al., 1999; Poulin & Boivin, 2000a; Salmivalli & Nieminen, 2002).

With regard to the overlap between reactive aggression and proactive aggression, the correlation coefficient of r = .497 found in this study is similar in magnitude to those found in other studies using Asian samples. For example, Seah and Ang (2008) reported r = .53 in their study using a sample of 13 – 15 year old Singapore adolescents, while Xu and Zhang (2008) reported correlation coefficients ranging from .40 to .49 in their studies using three separate samples of elementary school students in China, and Fung et al. (2009) reported a reactive-proactive overlap of .54 with a sample of Hong Kong adolescents. The overlap between reactive aggression and proactive aggression in these Asian samples seems generally lower than those reported by studies using Western samples (e.g. r = .76, Dodge & Coie, 1987; r = .87, Dodge et al., 1990; r = .82, Poulin & Boivin, 2000a). Polman et al. (2007), in their meta-analysis of such studies, also noted that

most of them found a correlation of approximately .70. While it is premature to conclude, this observation of a seemingly lower overlap in the Asian samples is noteworthy for further investigation as it may be indicative of a clearer distinction between the two aggression subtypes in the Asian context. Xu and Zhang (2008) postulated that this lower reactive-proactive overlap could be due to Asian children and adolescents being more sensitive to and avoidant of proactive aggression (in contrast to reactive aggression) due to its instrumental nature. Being associated with proactive aggression will make one stand out (negatively) in an Asian society, which values social harmony and group orientation, and strongly disapproves of the use of violence, especially for the purpose of personal gain.

Turning to another aspect of the issue of statistical overlap between reactive and proactive aggression, Little, Jones, et al. (2003) have argued that the high correlation between proactive and reactive aggression evident in most prior research is an artifact of traditional measurement approaches. In other words, the problem is not so much that proactive and reactive aggression co-occur, but rather the measurement approaches most often used to assess these functions of aggression produce high inter-correlation. They pointed out that traditional methods of assessing proactive and reactive aggression have typically used items that include overlapping forms of aggression. For instance, in the widely used measure developed by Dodge and Coie (1987), a proactive item is "uses physical force to dominate", and a reactive item is "when teased, strikes back". Both items

demonstrate an overt (physical) form, but the first item concerns a proactive function, whereas the second item deals with a reactive function. Thus, part of the overlap between these measures of proactive and reactive aggression is due to the variance shared in the form of aggression. They recommended that future research use measures that provide distinct assessment of the functions in order to more clearly distinguish the correlates of proactive and reactive aggression. The instrument used for measuring reactive and proactive aggression in this study, the Reactive and Proactive Aggression Questionnaire (RPQ) developed by Raine et al. (2006) also faces this issue of the confounding of form and function of aggression in some of its items, e.g. "I yell at others (verbal form) when they annoy me (reactive function)", "I yell at others (verbal form) so they will do things for me (proactive function)", "I get mad or hit others (physical form) when they tease me (reactive function), and "I use force (physical form) to get others to do what I want (proactive function)". As such, different functions may then not be distinguished by respondents if they tend to pay attention to the form (which may be the same for reactive and proactive items). Such emphasis on forms of behavior may result in artificially high correlations between reactive and proactive aggression, because forms of aggression are generally highly correlated. Nevertheless, a clear disentanglement of form from function in individual indicators of instruments is not easy to achieve because all aggression (whether serving a reactive or proactive function) has to manifest itself through some form. An instrument which measures

purely the function of aggression cannot presently be found. In their attempt to assess the distinct functions of aggression, Little, Jones, et al. (2003) developed a self-report instrument that can reflect variance that is attributable to form and variance that is attributable to function. However, even Little et al.'s questionnaire was not designed to distinguish between reactive and proactive aggression at the manifest level and still have form and function included in each item. Instead, they used structural equation modeling techniques to separate form and function as latent constructs, and provided individual scores that are derived from group modeling.

To get around this issue of content overlap, *Raine* et al. (2006) recommended using residualized scores of proactive and reactive aggression to study 'clean' proactive aggression which is independent of reactive aggression, and 'clean' reactive aggression which is independent of proactive aggression. These scores can be obtained by regressing reactive aggression on proactive scores and Pearson standardized residuals (with a mean of 0 and SD of 1) are saved to index 'clean' proactive aggression, while the standardized residuals of proactive aggression on reactive aggression are saved to index 'clean' reactive aggression. The present study applied the similar principle of using 'clean' scores of reactive and proactive aggression by including the alternate aggression subtype as a control variable for each other (i.e., reactive aggression score was used as a control variable in the regression model when proactive aggression was the dependent

variable, and vice-versa) (see Section 3.6.3 for details). This process ensured that any significant association between reactive aggression or proactive aggression and the variable of interest would only emerge after accounting for the variance attributable to the alternate subtype of aggression. According to Raine et al. (2006), residualized scores are less reliable than raw scores because they contain a higher proportion of error variance. As such, effect sizes for these residualized scores should be viewed as conservative floor estimates of the true effect, and that differences between proactive and reactive aggression may well be underestimated. In addition, such residualized scores also have the advantage of being free of the shared method variance confound which is a significant problem in some studies. Overall, the use of proactive and reactive scores as controls against each other in our analyses provides a more stringent test of differential effects, and gives greater confidence regarding the reliability and validity of the differences that were found between proactive and reactive aggression and the relevant correlates.

5.3 Dispositional Differences between Reactive and Proactive Aggression

Our finding of effortful control being negatively associated with reactive aggression is consistent with the theoretical understanding that low levels of effortful control may be specifically related to reactive aggression due to poor emotional regulation and the inability to inhibit aggressive urges (Frick & Morris,

2004). It is also consistent with findings from the two recent studies (Rathert et al., 2011; Xu et al., 2009) that examined the relation between these two variables and found similar negative association. In contrast, we found no evidence of significant association between effortful control and proactive aggression. This result is different from Xu et al.'s (2009) finding of a negative association, but similar to Rathert et al.'s (2011) finding. There are theoretical grounds to expect no significant association between effortful control and proactive aggression. According to Frick and Morris (2004), poor effortful control is not characteristic of proactively aggressive behavior. Rather the ability to engage in purposeful aggressive acts requires a good degree of behavioral regulation, and this requirement suggests that proactive aggression may be influenced by higher levels of effortful control as compared to reactive aggression. With the Fisher z-test indicating that the difference between the effortful control- reactive aggression correlation and the effortful control- proactive aggression correlation being significant, our results seem to suggest that effortful control is differentially related to reactive and proactive aggression and partially support Hypothesis H2. This differential, which emerged in this present study but not in Xu et al.'s study, may be due to the high overlap between reactive and proactive aggression (Xu et al. 2009). The lower reactive and proactive aggression correlation in our sample, together with the use of the alternate aggression subtype as a control for the effects of reactive-proactive overlap in our regression analyses have probably enabled the

differential correlations to emerge. This argument finds support in the work of Rathert et al. (2011), whereby they used a similar strategy to control for the reactive-proactive overlap of $r = .79$ (which was much higher compared to $r = .50$ found in our sample), and found significant (negative) effortful control-reactive aggression association but failed to obtain statistical significance for the effortful control – proactive aggression association. Finally, the results indicate that effortful control showed clear restraining effects on reactive aggression as hypothesized but not on proactive aggression. This finding underscores the notion of reactive aggression as an emotion-laden behavior and its manifestation as a result of emotional dysregulation (Rathert et al., 2011). It also highlights the fact that individuals with high effortful control, who have the ability to regulate their emotions and behavior and engage in willful attentional shifting in an adaptive manner, will be in a good position to modulate their reactive anger responses.

The notion of reactive aggression as an outcome of emotional dysregulation is especially evident in the case of the girls in our sample, because the results indicated that girls with low effortful control reported significantly higher level of reactive aggression than girls with high effortful control. However, the boys did not report any significant difference in reactive aggression regardless of their level of effortful control. This pattern of result suggests that raising effortful control has a protective effect on adolescent girls where reactive manifestation of aggression is concerned, but this did not appear to be the case for boys. This apparently stronger

effect of effortful control on the female gender's behavioral outcome was also reflected by Karreman et al.'s (2009) longitudinal study on the effect of effortful control on children's manifestation of externalizing problems. They found that girls who had a low level of effortful control showed greater increases in externalizing problems from 3 to 4.5 years than boys with a low level of effortful control, whereas at high level of effortful control, girls and boys did not differ much in their change in externalizing problems over the same period. However, the association between effortful control and proactive aggression presented a contrasting picture where gender effect is concerned. The results showed that it was the boys with low effortful control who reported significantly higher level of proactive aggression compared with boys with high effortful control, whereas the girls did not report any significant difference in their proactive aggression level, whether they had high or low effortful control. Such result suggests that raising effortful control has a protective effect on the manifestation of proactive aggression for the adolescent boys but not for the girls. Considering the two sets of findings on the gender effects on effortful control's associations with reactive and proactive aggression together, we can see that effortful control seems to have a unique effect on reactive aggression in female adolescents, and on proactive aggression in male adolescents. Two implications arise from this pattern of results. First, these unique sets of gender specific associations provide further empirical evidence that supports the distinction between reactive and proactive aggression. Second, these findings hold

promise for the availability of more effective interventions for aggressive behavior, premised upon the application of effortful control on target groups with specific gender and aggression sub-type combination.

Turning now to the relation of psychopathy with reactive and proactive aggression, we found psychopathy to be positively associated with both aggression subtypes and the strength of these two associations were not significantly different. This finding partially supported our hypothesis that there would be positive associations between psychopathy and reactive and proactive aggression, but did not support the postulation on the relative strength of the two associations. The positive association of psychopathy with proactive aggression is aligned to the theoretical understanding that proactive aggression is a key behavioral manifestation of individuals with psychopathic traits (c.f. Section 2.5). Given that there are also studies that reported psychopathy / psychopathic traits having significant association with proactive aggression but not with reactive aggression (e.g. Fite, Stoppelbein, & Greening, 2009a; Van Baardewijk et al., 2011), what is perhaps of greater interest is to understand the significant association between psychopathy and reactive aggression found in this study, and why psychopathy does not differentiate between these two aggression subtypes definitively. With regard to this respect, the work of Cima and Raine (2009) provides a possible clue. They pointed out that "different sub-characteristics of psychopathy were differentially related to reactive as well as proactive aggression, and that while

psychopathic personality is predominantly characterized by proactive aggression, some psychopathy components are more related to reactive aggression" (p. 835). Following Cima and Raine's (2009) argument, we examined how the three constituent traits of psychopathy, namely impulsivity, narcissism, and callous-unemotional trait (according to Antisocial Processes Screening Device used in this study; Frick & Hare, 2001), are associated with reactive and proactive aggression. We found that while narcissism is positively associated with both reactive and proactive aggression, and impulsivity is only positively associated with reactive aggression and not significantly associated with proactive aggression, whereas callous-unemotional trait is only positively associated with proactive aggression and not significantly associated with reactive aggression. However, these findings must be understood as just indicative (and therefore was not reported in Chapter 4 as main findings) because the internal consistency of these constituent trait scales are on the low side (Cronbach's alpha for impulsivity is .63, for narcissism is .74, and for callous unemotional is .45). Nevertheless, they corroborate Cima and Raine's (2009) point, and indicate that certain constituent traits of psychopathy relate differentially to reactive aggression as compared to proactive aggression. In fact, the two sets of differential associations found, namely impulsivity and callous-unemotional with reactive and proactive aggression, are aligned to current theoretical understanding of these relations. For instance, the unique association of impulsivity with reactive aggression is aligned with the notion that reactive

aggression is primarily an angry or frustrated, and spontaneous response, which is often related to lack of inhibitory control (Holmes & Will, 1985; Raine et al., 2006). In the case of the unique association of callous-unemotional trait with proactive aggression, it is consistent with the profile of proactively aggressive individuals who are depicted generally as manipulative, parasitic, autonomically under-aroused, and emotionally blunted (Hare et al., 1999; Newman, 1997; Patrick & Zempolich, 1998). A number of research studies have also established the unique association of proactive aggression with callous-unemotional trait or the lack of empathy (e.g. Frick et al., 2003; Kimonis et al. 2006; Mayberry & Espelage, 2007). Hence, to explain the significant association between psychopathy and reactive aggression found in this study, we propose that it may be due to the contributions from the significant impulsivity-proactive aggression association and also the narcissism-proactive aggression association. This is in contrast to the significant association between psychopathy and proactive aggression also found in this study, which we think is due to the contributions from the significant callous-unemotional trait-proactive aggression association and also the narcissism-proactive aggression association. With respect to differentiating between the two aggression-subtypes, our results have provided indications that the constituent elements of psychopathy may be able to distinguish reactive aggression from proactive aggression even though psychopathy itself may 'fail' to relate differentially to these two functions

of aggression. However, these views are only tentative and require further validation.

With respect to gender effect, we found only significant gender x psychopathy interaction for proactive aggression but not for reactive aggression. In addition, psychopathy was positively associated with proactive aggression for both the boys and the girls, although the boys with high psychopathy reported a higher level of proactive aggression compared to girls with high psychopathy, whereas the difference in proactive aggression level between boys and girls belonging to the low psychopathy group was much smaller. These findings corroborate with evidence from extant literature on proactive aggression being a major behavioral manifestation of the psychopathic personality and that psychopathy is generally more associated with and more severe in the males than the females (cf. Section 2.5). Although having psychopathic traits affects both males and females negatively, our findings indicate that the negative effect is more pronounced for the males. Hence, early detection of such traits and early intervention can go towards attenuating such negative effects, particularly for the boys. Further elucidation of the possible differential mechanisms underlying the gender difference in psychopathy's association with proactive aggression can contribute towards improving the effectiveness of such interventions.

5.4 Differences in Social Environmental Effects on Reactive and Proactive Aggression

In terms of parenting effects, the results indicate that reactive aggression is uniquely and positively associated with authoritarian parenting style and proactive aggression is uniquely and positively associated with permissive parenting style, which are generally aligned with our Hypotheses, H4 and H5. This pattern of association provides support for Dodge's (1991) etiological model, which postulated that reactive and proactive aggression stem from different socialization experiences with proactive aggression being associated with parenting practices that are overly supportive, fail to monitor children's behavior and tolerate aggression; whereas reactive aggression is associated with parental hostility, rejection and even physical abuse. This study found no evidence of any significant association between authoritative parenting and proactive aggression, as well as between authoritative parenting and reactive aggression. Therefore, Hypothesis H6 was supported. This lack of association is a contrast with the clear associations that authoritarian and permissive parenting have with manifestation of aggressive behaviors, whether reactive and proactive. It is indicative of the advantage that positive parenting practices, such as authoritative parenting, can possibly have on children's manifestation of aggressive behavior. The explanations for the unique reactive aggression-authoritarian parenting association and proactive aggression-permissive parenting association predicted by Dodge's model have been provided

in a number of studies (Dodge, 1991; Dodge et al., 1997; Smithmyer et al., 2000, Xu et al., 2009). They can be summarized as reactive aggression being the result of children of authoritarian parents having learned to react negatively to harm and threat from their social environment, whereas proactive aggression stems from parent's failure to restrain the instrumental use of aggression or even an endorsement by parents for its use.

As there is currently no previous study that has directly examined the association between authoritative parenting and reactive and proactive aggression to our knowledge, a ready explanation cannot be found for our finding in this aspect. Nevertheless, a plausible explanation for the observed results can be developed from established theories and research findings from the field of parenting. Authoritative parenting reflects the combination of high responsiveness and high control. It involves characteristics such as a high degree of warmth and acceptance, respect for and encouragement of the child's autonomy, disciplining by setting reasonable limits on the child's behavior, and using reasoning and induction (Baumrind, 1996; Maccoby & Martin, 1983). In addition, the parent-child relationship is bidirectional, where parents' actions can contribute distinctively to children's behavioral outcomes and parental behavior in turn can be influenced by children's behavior (Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000). Given the generally warm and accepting style of authoritative parents, it is unlikely that they will normally elicit a reactive anger response from their children.

Even when they encounter children in a reactive mode, their responsive, encouraging, and measured actions are likely to temper the reactive outburst and limit the escalation of reactive aggression. Such parental behaviors could explain the lack of association between authoritative parenting and reactive aggression. As a part of their study on the relation between Chinese children's temperamental characteristics and parenting styles, Zhou et al. (2004) examined the relation between authoritative parenting and dispositional anger / frustration (which is conceptually related to reactive aggression) and found no significant association between the two variables. Citing Cassidy (1994), Zhou and colleagues offered another explanation for this lack of association, which is that authoritative parents tend to be more open and receptive to children's negative affect. Thus, they may be willing to accept children's dispositional tendencies rather than attempt to influence children's emotional experiences and expressiveness to suit their own preference. Therefore, the weak or non-significant association between children's dispositional anger / frustration and authoritative parenting is likely the result of such parents adjusting their parenting practices to fit their children's dispositional tendencies. In the case of proactive aggression, it is likely that the authoritative parents will engage the aggressive child (rather than let the behavior pass, as would happen in the case of the permissive parents), applying appropriate (rather than excessive or extreme) discipline and helping him or her develop an understanding of acceptable behaviors through reasoning and communication. Such parenting

practices will not only restrain proactive aggression, but will prevent the development of positive reinforcement and instrumental use of aggressive behaviors in the future. Following the understanding that proactive aggression is a socially learned response (Bandura, 1973, 1983), the authoritative parents' rational and controlled manner in parent-child interactions will also provide a positive behavioral model for the child. Children growing up in a home environment with authoritative parenting have lower exposure to parental aggression as compared to growing up in an authoritarian home where such expression is more likely. This difference naturally translates to a lower chance of modeling the behavior of coercive parents.

Turning to 'Guan' parenting, the results indicate that it is not significantly associated with either reactive or proactive aggression of Chinese adolescents in the study sample, as predicted by our Hypothesis H7. This finding is noteworthy in the context of the popular notion that Asian parenting is characterized by high parental control and relatively lower levels of parental warmth (Chao, 1994; Lin & Fu, 1990; Steinberg, Dornbusch, & Brown, 1992). These parental behaviors and attitudes are typical of the authoritarian parenting style, which has been shown to relate to negative outcomes in Caucasian teenagers (Steinberg et al., 1992). However, while authoritarian parenting is uniquely and positively associated with reactive aggression, 'Guan' parenting is not. This is despite the fact that 'Guan' parenting comprises a heavy dose of discipline and diligence expectations, and

even the use of physical punishment for misbehavior. According to Chao (1994), 'Guan' and authoritarian parenting are not the same. The concept of 'Guan' is more than just the authoritarian emphasis of conforming to an absolute standard without explaining, listening, or providing emotional support. Rather, it involves imposing of a set of societal and parental standards, with the purpose to assuring familial and societal goals of harmonious relations with others and the integrity of the family unit, and not so much to dominate the child (Lau & Cheung, 1987). In addition, the notion of 'Guan' also implies for the Asian parent the sense of involved care and concern for the child, which is not implied in the notion of authoritarian parenting (Chao, 1994). Hence, despite the apparent strictness and the perception of high control related with the Asian approach to parenting, 'Guan' parenting is not associated with the negative outcomes of reactive and proactive aggression in contrast to authoritarian parenting. Given the Asian socio-cultural norms, it is possible that Asian adolescents are more likely to interpret their parents' restrictions and control as expressions of parental care, guidance, and love rather than hostility and domination. For instance, Rohner and Pettengill (1985) have found that in contrast to the negative perception of Caucasian teenagers, parental strictness correlated positively with parental warmth in Asian teenagers. It is also possible that the 'involved care and concern' aspect of 'Guan' parenting provided a counter-balance to the more demanding aspects of this parenting approach. As such, 'Guan' parenting is less likely to elicit anger reaction among Asian adolescents,

thereby explaining the non-significant 'Guan' parenting-reactive aggression association. In addition, 'Guan' parenting is also not significantly associated with proactive aggression, probably due to the restraining effects flowing from strong elements of parental supervision and discipline emphasis related to the notion of 'Guan'. Nevertheless, although the association pattern of 'Guan' parenting with reactive and proactive aggression was clearly different from that of authoritarian and permissive parenting, it was the same as that of authoritative parenting. At the same time, both authoritative and 'Guan' parenting styles are moderately correlated in our sample ($r = .324$, $p < .01$), and both are generally characterized by high demand / supervision coupled with high support / warmth (Baumrind, 1971, Chao, 1994). When these evidences are taken together, it raises the issue of whether these two parenting concepts were perceived by the participants as significantly different from each other. Extant literature has reported on the differentiation of 'Guan' parenting from authoritarian parenting (see Chao, 1994), but work differentiating 'Guan' and authoritative parenting are scarce. This line of investigation is beyond the scope of the present study, but should be the subject of subsequent study.

Similar to 'Guan' parenting, we found no evidence that peer social support had a significant association with either reactive aggression or proactive aggression. This finding follows our hypothesis (Hypothesis H8) that peer social support will not be significantly associated with reactive and proactive aggression in an Asian context, in contrast to studies from the West that found positive associations

between proactive aggression and various indicators of peer affiliation as well as negative associations between reactive aggression and peer affiliation variables. Such results provide further evidence, in addition to Xu and Zhang's (2008) study, to support the view that Asian socio-cultural norms can influence in ways different from the West how children and adolescents view aggression and how they behave in relation to one another. More specifically, the Asian notion of the need to control public display of emotions (including anger frustration), the strong social disapproval of reactive aggression against peers (Kang, Shaver, Sue, Min, & Jing, 2003), as well as the low tolerance toward the instrumental use of aggression (Chen, 2000; Xu & Zhang, 2008), have probably contributed to suppressing the manifestation of both reactive and proactive aggression among the adolescents in their interaction with one another. Hence, the lack of any significant association between reactive and proactive aggression and peer social support observed in our study sample.

For gender effect, we found only gender x permissive parenting interaction for proactive aggression. Permissive parenting was positively associated with proactive aggression for both the boys and the girls, whereby boys who perceived high permissive parenting reported a much higher level of proactive aggression than the corresponding girls group. In contrast, the difference in proactive aggression level between the genders was less pronounced when permissive parenting was perceived to be low. This finding indicates that increasing parental

permissiveness can have a more pronounced effect for the boys than the girls where manifestation of proactive aggression is concerned. Taken together with the earlier finding that boys are also more vulnerable to the effects of psychopathic traits on proactive aggression manifestation, it points to the possibility that high psychopathy and permissive parenting can be a particularly potent combination for predisposing boys to exhibit proactive aggression. Further study will be required to validate this hypothesis.

In summary, our study found the following social-environmental effects on reactive and proactive aggression:

- the unique associations between reactive aggression and authoritarian parenting as well as between proactive aggression and permissive parenting postulated by Dodge's (1991) model also exist among Asian adolescents;
- authoritative parenting as well as 'Guan' parenting are not associated with proactive aggression and reactive aggression, indicating the advantage positive parenting practices can have on preventing reactive and proactive aggression compared to that of authoritarian and permissive parenting;
- peer social support is not associated with both reactive and proactive aggression, in contrast to the positive associations that proactive aggression have and the negative associations which reactive aggression

have with various indicators of peer affiliation often found in studies from the West;

- the increase in permissive parenting can have a more pronounced effect for the boys than the girls where manifestation of proactive aggression is concerned, but no other gender difference was found in associations of the other parenting styles / peer support with reactive and proactive aggression.

Overall, these findings align with the view that proactive aggression is supported by permissive socialization experiences, whereas reactive aggression is related to aversive experiences. The results also extend the existing understanding of parenting and peer effects on reactive and proactive aggression by highlighting the effects of positive parenting practices, gender as well as the influence of the Asian social cultural context on these functions of aggression.

5.5 Differences in Adjustment and Behavioral Outcome Predictions

The present study examined reactive and proactive aggression's concurrent and prospective prediction of internalizing and externalizing syndromes as well as delinquent behaviors among a group of Asian adolescents from a gender difference perspective. For concurrent prediction, both the males and the females showed the same prediction patterns for reactive aggression and proactive aggression as no

gender effect was found. Reactive aggression is positively associated with internalizing and externalizing syndromes as well as delinquency, with reactive aggression's association with internalizing syndromes being the strongest, followed by externalizing syndromes and delinquent behaviors. For proactive aggression, it was positively associated with both externalizing syndromes and delinquency. These patterns of finding provide support for Hypotheses H9 and H10, and are broadly aligned with evidence from the extant literature regarding the unique associations between reactive aggression and internalizing problems and between proactive aggression and externalizing problems as well as delinquency. However, the existence of significant (though weaker) associations between reactive aggression and externalizing syndromes as well as delinquency requires further explanation. Although many of the prior studies reported a unique reactive aggression-internalizing problems association, some studies found a significant association between reactive aggression and delinquent behaviors. For example, Fite et al. (2010) reported reactive aggression (after controlling for overlap with proactive aggression) being associated with delinquency in addition to depression and anxiety (features of internalizing problems) for a group of 16-year-old males. Fite et al.'s (2010) study was longitudinal, and they also reported that the reactive aggression-delinquency association ceased to be significant when examined prospectively 10 years later when the subjects were 26 years old. Based on these observations, they drew on Moffit's (1993) distinction between life-course

persistent and adolescent-limited antisocial behaviors and proposed that reactive aggression may be associated with the less severe adolescent-limited form of antisocial behavior, whereby the reactively aggressive adolescents desist from delinquent behaviors as they mature. In this respect, we observed in our study sample that reactive aggression was still significantly associated with externalizing syndrome and delinquency one year later. If Fite et al.'s (2010) hypothesis is right, a longer duration of another 4 to 5 years (when our sample population reach the end of their adolescence at about 18- or 19-year-old) will be required before we are able to observe signs of desistence from delinquency in our study subjects.

Turning our attention now to prospective predictions, no gender effects were found for any of the prospective associations examined. In addition, the results indicated that reactive aggression was not associated with internalizing syndromes one year later (in spite of the presence of a significant association at the beginning). This lack of association is contrary to the predictions in Hypotheses H11, as well as the findings of unique associations between these two variables from the majority of the existing literature. However, Fite et al. (2010) also reported finding no significant prospective association between reactive aggression and depression (an element of internalizing syndromes), after controlling for the stability of depression over the time period of their study. Extrapolating beyond the data, this lack of significant prospective association may suggest that reactive aggression is related to the anxiety and depression (internalizing problems) that

beset young adolescents as they face the challenges that come with embarking on a new developmental phase of their life at 13 or 14 years old. However, because the level of internalizing problems of the participants has remained stable over the one year period of study, the association between reactive aggression and internalizing problem did not show significance when examined one year later, after controlling for the baseline internalizing syndromes score.

The positive prospective associations of reactive aggression with externalizing syndromes and delinquency (after controlling for the relevant baseline scores) are also contrary to the predictions of Hypothesis H11 and need further elaboration. This association is basically contrary to findings from the extant literature, which points to reactive aggression's unique prediction of internalizing problems (e.g. Card & Little, 2006). The plausible explanation for the observation of a significant concurrent association between reactive aggression and externalizing syndromes and delinquency has already been provided earlier in this discussion. Our observation of the existence of significant associations between reactive aggression and externalizing syndromes as well as delinquency one year later does not immediately support Fite et al.'s (2010) notion of 'adolescent-limited' delinquency. However, as highlighted earlier, given that the one year period for our prospective study is relatively short, further developments that can alter the manifestation of reactive aggression in these adolescents may occur over the course

of time and produce different predictive outcomes. As such, it is premature to draw any definite conclusion regarding this finding at this point in time.

In addition, our results found no evidence that proactive aggression was significantly associated with internalizing syndromes prospectively, consistent with the existing literature. We also found no evidence that proactive aggression was significantly associated with externalizing syndromes and with delinquent behaviors one year later, despite showing significant association at the beginning. Therefore, Hypothesis H12 was not supported. The lack of significance in this set of associations can be due to the relative stability of the level of externalizing problems and delinquent behaviors of the proactively aggressive participants over the one year study period.

Finally, given the well established understanding of gender differences in aggressive manifestation in general, the lack of any gender effects in all of the predictions examined in our study is worth further examination. In particular, we have predicted significant gender effects for proactive aggression's associations with the various adjustment and behavioral outcome measures, based on the argument that girls who are proactively aggressive will likely to also manifest internalizing syndromes rather than externalizing syndromes or delinquency (as would be the case of boys). However, our findings did not indicate that this gender difference existed, hence the lack of significant gender effect. In fact, the results indicated that for both genders, proactive aggression was associated to

externalizing syndromes and delinquency when measured concurrently, and these associations were no longer significant one year later, probably due to the stabilization of symptoms (as discussed earlier). Our finding of proactively aggressive girls' tendency to manifest externalizing syndromes or delinquent behaviors is counter to existing literature's indication of girl's tendency to exhibit internalizing rather than externalizing behaviors, as well as the strong social disapproval of externalizing behaviors in girls in the Asian context. However, we cannot find any indication from extant literature that can provide a ready explanation for this observation and recommend that future studies be done to investigate this phenomenon.

Overall, our study of reactive and proactive aggression's prediction of behavioral and adjustment outcomes found no evidence of any significant gender effects. The results of the concurrent predictions are also broadly consistent with findings from the extant literature regarding the unique associations between reactive aggression and internalizing problems, as well as between proactive aggression and externalizing problem / delinquent behaviors. In contrast, the investigation has also surfaced associations that were not predicted based on evidence from the extant literature, such as (i) the concurrent and prospective positive associations between reactive aggression and externalizing syndromes as well as delinquent behaviors; (ii) the lack of evidence of a significant prospective association between reactive aggression and internalizing syndromes; and (iii) the

lack of evidence of a significant prospective association between proactive aggression and externalizing syndromes / delinquency, despite the presence of a significant concurrent association in both cases. Plausible explanations have been given for each of these unexpected findings. Nevertheless, it is important to recognize that the prospective study spanned only a limited period of about a year during a highly dynamic developmental phase of the participants under study. As such, further investigation of these observations, especially over longer duration, as well as finding out if these observations are also replicated in other similar samples, is crucial before further conclusion can be made.

5.6 Effects of Person-Environment Dynamics on Reactive and Proactive Aggression

The investigation of person-environmental dynamics is focused on finding out how adolescents of varying temperamental profiles differ in their risk for manifesting reactive and proactive aggression in the presence of different parenting and peer experiences. In this respect, there are many perspectives to investigating such interplay of person and environmental influences. For example, many studies investigated the interactive effects of various combinations of temperament x environmental factors (e.g., Vitaro, Barker, et al., 2006; Xu et al., 2009), whereas others investigated the mediator role of temperament factors on the effects of

parenting practices on children's social functioning (e.g. Zhou et al., 2004). In the present study, the mediator's role of parenting practices (both positive and negative) and peer support in the influence of temperament on reactive and proactive aggression was investigated. This choice is based on the theoretical premise that temperamental characteristics are constitutionally based differences that emerge early in life and show stability over time, but are modifiable by experience (Collins et al., 2000). In particular, the choice of examining the environmental factors, such as parenting and peer effects, in the mediator role (rather than the temperamental factors, which are less susceptible to modification) follows MacKinnon, Krull, and Lockwood's (2000) argument that the mediator ideally should be something that can be changed. The more malleable nature of the environmental mediator is essential as it provides greater room for manipulation during prevention or intervention efforts to elicit stronger effects.

In this respect, we found permissive parenting partially mediated the effects of psychopathy on proactive aggression (see Figure 4.6), partially supporting the postulation of Hypothesis H14. However, the effect size for this mediation was small. We also tested whether authoritarian parenting mediated the effects of effortful control on reactive aggression. The results indicated that while effortful control is negatively associated with authoritarian parenting, the association between authoritarian parenting and reactive aggression only approached significance (see Figure 4.7), and Hypothesis H13 cannot be supported as a result.

There was no evidence that authoritative parenting, 'Guan' parenting, and peer social support showed any mediation effect in any of the disposition-reactive and proactive aggression associations. Therefore, Hypotheses H15, H16 and H17 were not supported.

Based on the pattern that emerged from testing all the mediation models, we see a unique psychopathy-permissive parenting-proactive aggression effect pathway, as well as a possible effortful control-authoritarian parenting-reactive aggression effect pathway. These pathways are aligned with existing evidence of the unique associations among psychopathy, permissive parenting, and proactive aggression on one hand, and those among effortful control, authoritarian parenting, and reactive aggression on the other hand. While the mediation model provides a general indication of how a predictor 'causes' the mediator, which in turn 'causes' the outcome (Frazier, Tix, & Barron, 2004), causal relation cannot be established for these mediation pathways with our cross-sectional and correlational data. Instead, the correlations between temperament characteristics and parental / peer effects as well as between parental / peer effects and reactive or proactive aggression reflect bidirectional processes. As such, it is possible that temperamental characteristics may set in motion a chain of reactions from others and put children at risk or protect them from developing aggression. Specifically, a permissive parental environment, which is characterized by low parental restriction on inappropriate behaviors and weak monitoring (Parke & Buriel, 1998), may

provide weak or hardly any restraint on children who are psychopathic and have a tendency to achieve personal gains or benefits through the use of aggression in an instrumental manner. This set of dynamics, therefore, provides a possible explanation for the observation whereby part of the effects of psychopathy on proactive aggression is mediated through the condition of permissive parenting. In the case of the associations of effortful control and authoritarian parenting with reactive aggression, we can draw on the idea of evocative person-environment interaction from Patterson's (1982) Coercion Theory as a possible explanation. Children with high effortful control are more likely to manage their impulses and regulate their emotions successfully than children low in effortful control. This, in turn, makes them less susceptible to evoking anger or frustration reaction from their parents. In the case of parents who are authoritarian, children high in effortful control will give these parents lesser opportunities for exercising their authoritarian practices compared to children low in effortful control, and this is reflected by the significant negative association between these two variables. With lower incidence of authoritarian expressions from these parents, there will be a correspondingly lower chance of eliciting a reactive anger or aggressive response from the children. This set of dynamics represents a plausible explanation for the possible partial mediation pathway from effortful control through authoritarian parenting to reactive aggression.

Overall, the unique sets of mediation patterns which we found, namely the psychopathy-permissive parenting-proactive aggression and the possible effortful control-authoritarian parenting-reactive aggression pathways, also provide support to the differentiation of reactive and proactive aggression. Given that negative parenting practices (permissive parenting and possibly authoritarian parenting) showed mediation effect, the absence of mediation effect in the case of positive parenting practices (authoritative and 'Guan' parenting) and in the case of peer support is counter-intuitive. In addition, besides parenting style, there may be other variables not included in the present study that could act as mediators (e.g., parental psychopathology; Hawkins et al., 1998; Ormel et al., 2005; Tremblay et al., 2004; Webster-Stratton & Hammond, 1998; Webster-Stratton & Herbert, 1994). Some of these variables could turn out to be stronger mediators of the relation between temperamental factors and reactive / proactive aggression than parenting style. All these possibilities should be further investigated. Nevertheless, an immediate implication from these findings is that the 'removal' of permissive parenting will contribute to lessening the influence of psychopathy on proactive aggression since this parenting practice significantly mediated a portion of the variance between psychopathy and proactive aggression. Positive parenting practices such as authoritative or 'Guan' parenting, which do not mediate the psychopathy-proactive aggression association, can take its place instead, and this can be done through training permissive parents in parenting skills, such as setting

appropriate behavioral boundaries and expectations, effective communication, being assertive in enforcing boundaries, problem-solving, and negotiation skills.

5.7 Summary of Findings and Implications

The present study is premised on a comprehensive framework. It includes studying the factor structure of the reactive-proactive aggression construct using factor analytical methods. It also examines the effects of salient variables in both dispositional and social environmental domains (including their person-environmental dynamics), as well as investigates reactive and proactive aggression's prediction of adjustment and behavioral outcomes over time. Pulling together the results from the various fronts, the evidence supports the notion of reactive aggression and proactive aggression as distinct and yet related facets of aggression. Our factor analysis results has clearly indicated a two-factor structure with a reactive component and a proactive component. Clear distinction can also be found in the differential associations that the temperamental characteristic of effortful control has with reactive and proactive aggression. Although no differential was found in the associations of psychopathy with the two functions of aggression, there were indications that the callous-unemotional component of psychopathy may be able to differentiate the reactive aggression from proactive aggression. In the case of social environmental effects, the unique associations

between reactive aggression and authoritarian parenting as well as between proactive aggression and permissive parenting postulated by Dodge (1991) were replicated by this study. From the gender difference perspective, girls were found to be more susceptible to the differential in effortful control where manifestation of reactive aggression was concerned, whereas the boys seemed to be more susceptible to effortful control differential in the manifestation of proactive aggression. Similarly, our results indicated that boys were also more susceptible than girls to the differential in psychopathy and permissive parenting in their manifestation of proactive aggression. These observed gender effects add to the evidence for reactive-proactive distinction. The examination of person-environment dynamics provides further support to the argument for differentiation by surfacing the unique psychopathy-permissive parenting-proactive aggression mediation pathway as well as the possible effortful control-authoritarian parenting-reactive aggression pathway. Finally, while the study of the predictive validity of reactive and proactive aggression did not yield results that were entirely consistent with the general pattern found in the existing literature, the main pattern of the unique prediction of internalizing problems by reactive aggression and the unique prediction of externalizing problems / delinquency by proactive aggression were still basically replicated in our study.

Given the generally consistent evidence for understanding reactive and proactive aggression as distinct functions, it naturally warrants the consideration

for differential interventions. This implication is especially so when these different functions of aggression seem to have different developmental pathways and are differentially associated with the various personal and social environmental risk factors. According to Polman (2008), understanding reactive and proactive aggression as distinct functions will facilitate the development of specific interventions by targeting the different reasons *why* children become aggressive. For example, because reactive aggression is related to impulsivity and poor self-regulation usually associated with low effortful control, as well as a tendency to see others' intentions as hostile and threatening, interventions aimed at highly reactively aggressive children should focus on anger management and social cognitive reconstruction, especially with respect to cue selection and attributional biases (Polman, 2008; Vitaro, Brendgen, et al., 2006). In particular, the restraining effect of effortful control on reactive aggression found in our study can also guide the design of specific emotional regulation strategies (such as focusing on training in attending skills and behavioral inhibition) that can prove effective in countering anger-frustration reactions. In addition, to counter the influence of an aversive social environment on reactive children, interventions should include working with parents and peers to reduce harsh discipline and rejection / victimization, complemented by the adoption of a more positive parenting stance and creating greater peer social support. Proactive aggression, in contrast, is a learned behavior that can be changed through the use of operant techniques (Vitiello & Stoff, 1997)

as well as positive modeling (Bandura, 1973, 1983). Hence, proactively aggressive children may benefit from exposure to non-aggressive peers and to reinforcement contingencies that support non-aggressive behaviors (Vitaro, Brendgen, et al., 2006), as well as a consistent restriction on the display of aggressive behaviors (Polman, 2008). Our findings of a unique positive association between permissive parenting and proactive aggression and the restraining effect that authoritative parenting has on proactive aggression are aligned with these intervention proposals. In addition, the gender difference surfaced for these various associations can also advise a better matching of intervention strategies to gender specific target groups to achieve better intervention outcomes.

Besides the clear distinction found between reactive and proactive aggression, this study has also surfaced the different ways the Asian social cultural context may have affected the reactive and proactive aggression as compared to that of the Western context. One aspect is the generally lower overlap (as reflected by the lower correlation coefficients) between the reactive and proactive components of the construct found in Asian samples compared to those found in the Western samples. Our examination of the peer effects on the reactive and proactive aggression also yield clear difference in findings compared to results from the West. In addition, the examination of Asian 'Guan' parenting provides additional cross-cultural understanding of the association between parenting styles and the functions of aggression. These findings add to the current understanding of

the influences that non-Western social cultural contexts have on reactive and proactive aggression. When instruments that specifically tap into the parenting styles of the Malays and the Indians become available, further study can also be conducted to extend the current work and elucidate how the various other Asian parenting behaviors are related to reactive and proactive aggression. The relative levels of the Chinese, Malay and Indian adolescents' perception of authoritarian, permissive and authoritative parenting styles (Baumrind, 1971) for the current study sample are given in Appendix 3.

Finally, this examination of reactive and proactive aggression within the 13 to 15 year old developmental phase has helped to identify salient risk and protective factors pertaining to the manifestation of reactive and proactive aggression within this age range. It has also surfaced a few adjustment and behavioral outcome predictions which are not generally found in the existing literature. These findings may be aberrant findings, but they can also be early indications of yet to be discovered phenomenon pertaining to reactive and proactive aggression, especially given that there are a limited number of studies looking into the developmental pathway of this construct within this particular developmental window (c.f. Section 2.7). As such, further validation of the findings is needed.

5.8 Strengths and Limitations

The present study has several strengths. First, its comprehensive design has enabled us to develop a more complete and coherent understanding of the multifaceted and dynamic phenomenon of reactive and proactive aggression, particularly in the aspect of the complex biosocial interplay in the development of these aggression subtypes. Second, to the best of our knowledge, the exploration of the effects of positive parenting practices and peer social support, as well as the mediator role of social environmental factors in the temperament-aggression association, are new aspects in the study of reactive and proactive aggression, while the examination of gender effect is also a little-explored area. As discussed earlier, these findings have important application value. Third, our study sample is large (about 1200) and is representative of the adolescent population in Singapore. The large sample size provided sufficient statistical power for our analyses, especially during factor analyses and when we needed to use sub-samples for analyzing gender effects. In addition, while the sample comprises a majority of Chinese adolescents (about 67%), there is a substantial proportion of subjects of other ethnicities (i.e. 20.5% Malays, 8.4% Indians, and 4.0% Eurasians). Such a sample, comprising multiple Asian ethnicities, provides the advantage of reflecting influences from a range of Asian social cultural contexts on reactive and proactive aggression compared to other Asian studies which depended on homogenous (mainly Chinese) samples (e.g. Xu et al., 2009; Xu & Zhang, 2008). Fourth, this

study has adopted the strategy of using ‘clean’ reactive and proactive aggression scores (through the use of proactive and reactive scores as control against each other) in all the regression analyses for examining the relevant correlates. As mentioned earlier, this approach has helped us to overcome the central issue of substantial overlap between reactive and proactive aggression that so often plague the study of this construct.

As with any research project, the current study has some limitations. First, the results from this study are based on a community-based adolescent sample and may not generalize to adolescents exhibiting aggressive behavior to a clinical degree. Nevertheless, for the significant patterns of association found in this community sample, it may be possible to expect a higher likelihood of similar findings emerging in a clinical adolescent sample. A complementary study using a clinical adolescent sample should be conducted to verify this assertion. Second, our data (with the exception of the prospective predictions) are mainly cross-sectional and do not permit us to draw conclusions about causal relations or allow inferences to be made about the direction of effects between temperament and parenting and children’s aggression. Future studies should adopt a longitudinal design to enable us to make such conclusions. In addition, longitudinal studies, especially those of longer duration and having more points of observation, will be helpful in providing a clearer picture of the developmental course and stability of the relevant correlates of reactive and proactive aggression. This approach will help overcome some of the

inconclusive findings we faced with the prospective predictions. The third limitation of this study is the possibility that shared method variance artificially inflated the correlations between reactive / proactive aggression scores and the scores of the various correlates under examination because all these sets of scores were obtained through self-report from the same informants. Subsequent studies can use multiple informants to overcome this issue (e.g., having the parents to provide an assessment of the reactive / proactive behaviors of their children as well as describe their own perception of parenting style). Additionally, other behavioral outcome measures can also be used (e.g., students' school discipline records of delinquent or externalizing behaviors, referral for counseling support due to manifestation of internalizing behaviors). On a related note, the use of a series of questionnaires in this study may give rise to response order effect (Lucas, 1992) in which responding to an earlier measure, such as reactive and proactive aggression, may influence responses to a later measure, such as delinquency, because the earlier measure brings to mind more examples of anti-social behavior. This order effect can affect the correlations of reactive and proactive aggression with these latter scales. To overcome this issue, future studies can consider applying counterbalancing of measures whereby participants can be randomly assigned to complete one of two questionnaire orders. Another limitation is with respect to the less than ideal internal reliability obtained for effortful control scale (Cronbach's Alpha = .62). As such, the interpretation of the findings involving the effortful

control scores must be done with this limitation in mind. Finally, this study has adopted the variable-centered approach to examining reactive and proactive aggression, which assumes that reactive aggression and proactive aggression scales tap into different constructs and have independent effects (e.g. Hubbard et al., 2002). One common way in which this approach deals with the reactive-proactive overlap is to add in one aggression subtype as a covariate when using the other to predict outcomes—thus partialling out the influence of one subtype of aggression on the other's association with the outcome behavior (e.g., Raine et al., 2006). Some authors have argued that such techniques fail to address the problem that reactive and proactive aggression are likely to co-occur in individuals sufficiently, and that the technique of using residualized scores is problematic because these scores are arguably harder to conceptualize and interpret than 'types' or 'combinations' (Miller & Lynam, 2006). This has led some researchers to advocate for the use of person-centered approaches to analyses when studying correlates to the different types of aggression (Barker, Tremblay, Nagin, Vitaro, & Lacourse, 2006; Frick, 2006). One methodology of this person-centered approach is to use cluster analysis to identify distinct groupings within the sample with various combinations of reactive and proactive aggression scores (e.g., high reactive and high proactive aggressive individuals, high reactive aggressive individuals only, and low reactive and low proactive aggressive individuals), and then find out how these different groups or clusters relate to the various relevant correlates and

outcomes (e.g. Crapanzano, Frick, & Terranova, 2010). Hence, another study using this same set of data can be conducted employing the person-centered approach to yield results from another perspective that will complement the findings from the current study (see Chiang, Pang, Ang, Kom, & Tan, 2011). Such a combination has the dual benefit of the variable-centric study providing support for the construct validity of reactive and proactive aggression, and the person-centric study providing the further insight into the behavior and adjustment of different groups of adolescents with varying reactive and proactive aggression profiles. Findings from the latter study will produce useful information for designing more targeted interventions to suit the particular needs of the differently aggressive adolescent groups.

5.9 Conclusion

The results of this study has provided a comprehensive description of how certain salient disposition and social environment factors influence the manifestation of reactive and proactive aggression for a group of 13- to 15-year-old Asian adolescents, including gender difference patterns. It has also investigated the predictive validity of the functions of aggression on subsequent adjustment and behavioral outcomes. Some of the findings replicated results from prior studies, whereas others are new findings that extend our current understanding of reactive

and proactive aggression. Implications from the findings as well as possible future research have also been discussed. Overall, this study adds further support to the notion of reactive aggression and proactive aggression as distinct facets of aggression that have practical implications for intervention and treatment, particularly for adolescents from the Asian context.

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APPENDIX 1

Factor Loadings for Exploratory Factor Analysis

1) Factor loadings for One-Factor Model

Items No.	***Reactive / Proactive***	***Item statement***	***Factor loadings***
RPQ13	Proactive	I shout at others so that they will do things for me	**.615**
RPQ23	Reactive	I get mad or hit other others when they tease me	**.609**
RPQ07	Proactive	I hurt others to win a game	**.601**
RPQ20	Reactive	I feel better after hitting or yelling at someone	**.599**
RPQ16	Reactive	I damage things when I am mad	**.597**
RPQ02	Proactive	I fight others to show who is on top	**.580**
RPQ18	Reactive	I get angry or mad when I lose a game	**.572**
RPQ14	Proactive	I take things from other kids	**.564**
RPQ08	Reactive	I get angry or mad when I don't get my way	**.561**
RPQ17	Proactive	I use force to get others to do what I want	**.551**
RPQ05	Reactive	I have temper tantrums	**.547**
RPQ15	Proactive	I damage or break things for fun	**.540**
RPQ04	Reactive	I get angry when frustrated	**.533**
RPQ01	Reactive	I shout at others when they annoy me	**.519**
RPQ03	Reactive	I get angry when others annoy me	**.498**
RPQ11	Proactive	I get others to gang up on other kids	**.496**
RPQ06	Proactive	I get into fights to be cool	**.485**
RPQ19	Reactive	I get angry when others threaten me	**.477**
RPQ22	Reactive	I hit others to defend myself	**.446**
RPQ21	Proactive	I make prank phone calls just for fun	**.445**
RPQ09	Proactive	I use force to get money or things from others	**.440**
RPQ12	Proactive	I carry a weapon to use in a fight	.398
RPQ10	Proactive	I threaten and bully other kids	.398

Note: Factor loading of items above the .40 cut-off level are highlighted in bold.

2) Factor loadings for Two-Factor Model

Items No.	***Reactive / Proactive***	***Item statement***	***Factor loadings***	
			Component	
			1	***2***
RPQ04	Reactive	I get angry when frustrated	**.716**	.023
RPQ03	Reactive	I get angry when others annoy me	**.703**	-.015
RPQ19	Reactive	I get angry when others threaten me	**.665**	-.005
RPQ01	Reactive	I shout at others when they annoy me	**.665**	.055
RPQ08	Reactive	I get angry or mad when I don't get my way	**.649**	.134
RPQ05	Reactive	I have temper tantrums	**.643**	.118
RPQ23	Reactive	I get mad or hit other others when they tease me	**.588**	.266
RPQ18	Reactive	I get angry or mad when I lose a game	**.585**	.215
RPQ16	Reactive	I damage things when I am mad	**.520**	.319
RPQ20	Reactive	I feel better after hitting or yelling at someone	**.489**	.355
RPQ02	Proactive	I fight others to show who is on top	**.430**	.389
RPQ22	Reactive	I hit others to defend myself	**.401**	.225
RPQ11	Proactive	I get others to gang up on other kids	.017	**.700**
RPQ12	Proactive	I carry a weapon to use in a fight	-.070	**.650**
RPQ17	Proactive	I use force to get others to do what I want	.148	**.643**
RPQ15	Proactive	I damage or break things for fun	.144	**.631**
RPQ14	Proactive	I take things from other kids	.190	**.618**
RPQ07	Proactive	I hurt others to win a game	.272	**.585**
RPQ09	Proactive	I use force to get money or things from others	.063	**.571**
RPQ06	Proactive	I get into fights to be cool	.131	**.565**
RPQ13	Proactive	I shout at others so that they will do things for me	.333	**.542**
RPQ10	Proactive	I threaten and bully other kids	.077	**.496**
RPQ21	Proactive	I make prank phone calls just for fun	.182	**.453**

Note: Factor loading of items above the .40 cut-off level are highlighted in bold.

APPENDIX 2

Standardized Coefficients for One-factor and Two-factor Confirmatory Factor Analysis Models

1) Standardized Coefficients for One-factor Model

Items No.	***Reactive / Proactive Item***	***Estimate***
RPQ01	Reactive Aggression	.442
RPQ02	Proactive Aggression	.510
RPQ03	Reactive Aggression	.482
RPQ04	Reactive Aggression	.424
RPQ05	Reactive Aggression	.476
RPQ06	Proactive Aggression	.446
RPQ07	Proactive Aggression	.481
RPQ08	Reactive Aggression	.486
RPQ09	Proactive Aggression	.390
RPQ10	Proactive Aggression	.498
RPQ11	Proactive Aggression	.460
RPQ12	Proactive Aggression	.362
RPQ13	Proactive Aggression	.517
RPQ14	Proactive Aggression	.424
RPQ15	Proactive Aggression	.442
RPQ16	Reactive Aggression	.510
RPQ17	Proactive Aggression	.460
RPQ18	Reactive Aggression	.459
RPQ19	Reactive Aggression	.419
RPQ20	Reactive Aggression	.509
RPQ21	Proactive Aggression	.384
RPQ22	Reactive Aggression	.518
RPQ23	Reactive Aggression	.499

2) Standardized Coefficients for Two-factor Model

Items No.	***Reactive / Proactive Item***	***Estimate***
RPQ01	Reactive Aggression	.571
RPQ03	Reactive Aggression	.644
RPQ04	Reactive Aggression	.593
RPQ05	Reactive Aggression	.579
RPQ08	Reactive Aggression	.520
RPQ16	Reactive Aggression	.487
RPQ18	Reactive Aggression	.463
RPQ19	Reactive Aggression	.515
RPQ20	Reactive Aggression	.530
RPQ22	Reactive Aggression	.450
RPQ23	Reactive Aggression	.533
RPQ02	Proactive Aggression	.496
RPQ06	Proactive Aggression	.503
RPQ07	Proactive Aggression	.577
RPQ09	Proactive Aggression	.482
RPQ10	Proactive Aggression	.576
RPQ11	Proactive Aggression	.560
RPQ12	Proactive Aggression	.493
RPQ13	Proactive Aggression	.513
RPQ14	Proactive Aggression	.496
RPQ15	Proactive Aggression	.506
RPQ17	Proactive Aggression	.494
RPQ21	Proactive Aggression	.392

APPENDIX 3

Relative levels of the Chinese, Malay and Indian adolescents'

Perception of Authoritarian, Permissive and Authoritative Parenting Styles

	Chinese (n=797)		Malay (n=244)		Indian (n=100)	
	M	SD	M	SD	M	SD
Authoritarian parenting	25.58	6.28	26.86	6.16	27.09	6.82
Permissive parenting	14.66	4.35	13.87	4.05	15.12	4.34
Authoritative parenting	24.66	6.72	26.24	6.74	28.86	6.71