Putting parenting in perspective: An investigation of parental and contextual factors that shape parenting behaviors

by

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Statement of Originality

I, GAO, Xiaozi, hereby declare that I am the sole author of the thesis and the material presented in this thesis is my original work except those indicated in the acknowledgement. I further declare that I have followed the University's policies and regulations on Academic Honesty, Copyright and Plagiarism in writing the thesis and no material in this thesis has been submitted for a degree in this or other universities.

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Abstract

Parenting behaviors are determined by multiple parental and contextual factors. Yet despite an understanding of the independent processes that result in negative parenting, how these factors operate together in shaping parenting behaviors remains relatively unclear. From a process-oriented perspective of parenting, the study tested how household chaos operated as a mediating mechanism underlying the relationship between parental impulsivity and limit setting behaviors. Guided by the dual-system model of parenting, this study further examined how parental impulsivity and perspective taking interactively influence parent limit setting behaviors. Lastly, the study tested how the two models worked together to explain parenting behaviors.

The current project assumed a longitudinal design using two time-points separated by 10 months. At Time 1, 134 caregiver-child dyads were recruited and parental limit setting behaviors were observed in a laboratory setting. Caregivers also completed a survey measuring their self-reported impulsivity (neuroticism), perspective taking ability, and limit setting behaviors. At Time 2, 94 dyads returned 10 months later, with caregivers answering the survey questions presented at Time 1 again, in addition to reporting on family chaos and participating in a delay discounting task, the latter functioning as a behavioral measure of impulsivity.

The findings suggested that parental impulsivity is related to more negative limit setting behaviors and more chaotic household environments; results also suggested that a more chaotic household environment is related to higher negative limit setting behaviors. Mediation analysis showed that household chaos mediated the relationship between parental

impulsivity and limit setting. Finally, to investigate how these factors operate together to influence parenting, a moderated mediation analysis was conducted, with the results showing that parental perspective taking only moderated the indirect relationship between parental impulsivity and limit setting mediated via household chaos. Specifically, the association was only significant among parents with low perspective taking ability.

Overall, these results demonstrated the value of understanding the role of parental perspective taking and household chaos in explaining the link between parental impulsivity and dysfunctional limit setting.

Keywords: Impulsivity, perspective taking, household chaos, limit setting

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Table of Contents

List of Tables

List of Figures

Putting parenting in perspective: An investigation of parental and contextual factors that shape parenting behaviors

Chapter 1: Introduction

Decades of investigations into parenting behavior have widely acknowledged that appropriate or adaptive parenting behavior is beneficial for the mental health, cognition, and social development of the child (Bruggen, Stams, & Bögels, 2008; Pinquart, 2016; Pomerantz & Wang, 2009). In contrast, problematic parenting behavior has been related to increased risks of child developmental problems (Gershoff et al., 2010; Gryczkowski, Jordan, & Mercer, 2010; Laskey & Cartwright-Hatton, 2009). As such, understanding the antecedents to why parents display harsh or negative parenting behaviors is an important area of inquiry. To that end, parenting models that have investigated the risk factors have emphasized the role of parental impulsivity in understanding maladaptive parenting (Johnston, Mash, Miller, & Ninowski, 2012; Schumacher, Slep, & Heyman, 2001). Moreover, empirical research has suggested associations between parental impulsivity and problematic parenting behaviors, including inconsistent discipline, low involvement, and less positive expectations (Mokrova, O'Brien, Calkins, & Keane, 2010; Ninowski, Mash, & Benzies, 2007). This body of empirical work indicates that increased parental impulsivity hampers parenting behaviors; however, it does not examine "how" such relationships occur and "when" these associations would be undermined or strengthened. The goal of the present study is to examine how (mediation) and under what circumstances (moderation) parental impulsivity may predict negative parenting.

Researchers have suggested that parental characteristics not only influence parenting directly, but also indirectly through other contextual factors (Belsky & Barends, 2002), which include both psychosocial and physical factors (Ackerman & Brown, 2010). From a process-

oriented perspective, the first goal of the current study is to examine whether physical contextual factors, specifically household chaos, may operate as a mediating mechanism underlying the association between parental impulsivity and problematic parenting.

Furthermore, research has increasingly demonstrated that the parental cognitive capacity, in particular the ability of perspective taking, may operate as an important factor for improving parenting (Azar, Reitz, & Goslin, 2008; Grusec, Danyliuk, Kil, & O'Neill, 2017). Guided by the cognitive models of parenting, specifically the dual-system model, the second goal of the current study is to test how parental cognitive perspective taking may serve as an individual factor in moderating the association between parental impulsivity and negative parenting.

1.1 Parenting

Previous research has defined parenting in a variety of ways. Traditionally, parenting has been defined in typological terms, in which individual parents are assigned to groups or styles based on multiple dimensions, of which two major dimensions are warmth and control. Parental warmth involves the affect and acceptance parents display to their children, such as hugging, smiling, or other displays of love (Rohner, 1986); while parental control generally refers to the control strategies that parents use to regulate their children's behaviors (Grolnick & Pomerantz, 2009; Pomerantz & Wang, 2009), usually applied in dealing with challenging situations or problematic behaviors such as daily activities, social manners, and screen time management (Kochanska, Coy, & Murray, 2001). The typological approach yielded three well-known parenting styles–, namely authoritarian, authoritative, and permissive parenting– based on the two dimensions of warmth and control (Baumrind, 1971). In essence, authoritarian parents are characterized as highly demanding and largely unresponsive in a distant parent-child relationship. Authoritative parents provide firm and clear guidance to

their children in a warm and loving relationship. Finally, permissive parents provide very little guidance and structure, a type of parenting that is usually associated with poor child outcomes (Mandara, 2003).

Recent developments in parenting research have moved beyond this typological approach to focus on understanding the extent to which specific parenting behaviors affect child development (Hammond, Müller, Carpendale, Bibok, & Liebermann-Finestone, 2012; Reed, Howse, Ho, & Osborne, 2017). Delineating specific behaviors of certain parenting styles is helpful for extending the understanding of parenting influences, in addition to informing parental intervention programs in practice, by identifying the relations between specific parenting practices and poor child outcomes.

The social and emotional developments of young children are primarily influenced by parenting and the family environment (Grusec, 2011). Children gain social skills by interacting with their parents in daily activities. Furthermore, the effect of parenting on child development persists well into later adjustments. Taking attachment as an example, early mother-child attachment predicts children's cognitive and social performance during middle childhood (West, Mathews, & Kerns, 2013). Likewise, early parental punitive discipline predicts lower self-regulation in the child during middle childhood, even after controlling for the initial level of self-regulation (Colman, Hardy, Albert, Raffaelli, & Crockett, 2006). As such, understanding parenting behaviors during these early stages is useful for promoting child social development and preparing children for school entry.

1.2. Theoretical Models for Understanding Parenting

Given its importance to child development, identifying predictors of parenting is of growing interest in research and intervention uptake. Belsky's (1984) process model of parenting proposed that parenting behavior is determined by a combination of three factors:

parent characteristics, child characteristics, and the context. This model focused on the importance of personality and psychological well-being (for instance, whether depression or other mental health symptoms are present) at the parental level, difficult temperaments at the child level, and social support (for instance, from friends and relatives) as a contextual factor. Belsky argued that parental characteristics such as personality (McCabe, 2014; Prinzie, Stams, Deković, Reijntjes, & Belsky, 2009) and personal developmental history likely contribute the most to parenting styles. Belsky and Barends (2002) also affirm that parental characteristics not only influence parenting behavior directly, but also indirectly through other contextual factors.

Socioecological models of parenting argue that parenting occurs within a contextual system encompassing a variety of environmental factors (Bronfenbrenner & Morris, 2007; Luster & Okagaki, 2006). In recent decades, researchers have emphasized the importance of social environmental factors such as social support or marital quality in the literature (Belsky, 1984; Taraban & Shaw, 2018). In addition to social environments, physical environments have also recently garnered the attention of researchers, having been identified as a major correlate of parenting and child development across a variety of domains (Christian et al., 2015; G. W. Evans & Wachs, 2010; Ferguson, Cassells, MacAllister, & Evans, 2013). These physical environments include the family household, childcare center or school, and the community and neighborhood (Kotchick, 2002; Leventhal & Brooks-Gunn, 2000). Of these environments, the family household is the most proximate environmental influence on parenting and children as parents mostly interact with children at home, especially preschoolers who have not yet entered the primary education system. The current study adopts the process model of parenting to explain how physical environments mediate the link between parental characteristics and parenting.

Although Belsky's process model inspired a series of studies on understanding parenting behaviors in the past several decades, researchers argued that the greatest contributor to parenting behavior, parental personality, is relatively stable during adulthood (Terracciano, Costa, & McCrae, 2006); however, the promotion of feasible intervention development requires the identification of other malleable parental characteristics. To address this limitation, researchers have advanced Belsky's theory by incorporating parental cognition in their understanding of parenting (Azar, 1986; Azar et al., 2008; Bornstein, 2016; Crittenden, 1993; Milner, 2003; Sigel, Lisi, & Ann, 2002). To date, both the literature and empirical evidence have supported the associations between parental cognitive capacity deficits and maladaptive parenting behaviors (Crandall, Deater-Deckard, & Riley, 2015; Lorber, O'Leary, & Kendziora, 2003).

The current study adopts the dual-system model of cognition to understand parenting (Hofmann, Friese, & Strack, 2009). According to this model, social behaviors are predicted by the interplay of the impulsive and controlled systems. Although different terms have been used to label the dual-system model–such as the competing neural system model (Bickel et al., 2007), the reflective impulsive model (Strack & Deutsch, 2004), or the heuristic and systematic model (Chaiken, 1999)–all share the general assumption that the two systems interactively predict behaviors. At the impulsive level, the cognitive process is perceived to be fast and impulsive, acting without much consideration, whereas at the controlled level, the cognitive process is considered to be effortful and reflective. Researchers have proposed that distinct neural systems may underlie the two processes, with the impulsive system being governed by the limbic and paralimbic areas, while the controlled system is governed by the prefrontal cortex (Bickel, Jarmolowicz, Mueller, Gatchalian, & McClure, 2012; Bickel et al., 2007). A hyperactive impulsive system might weaken the controlled system and result in harsh or negative parenting behaviors, while a hyperactive controlled system might buffer the

risks of the impulsive system on parenting behaviors. This dual-system model of cognition has been applied to research explaining poor- or well-regulated parenting behaviors in the literature (Sturge-Apple, Rogge, Skibo, Peltz, & Suor, 2015; Sturge-Apple, Suor, & Skibo, 2014).

1.3. Limit Setting

Researchers have proposed that limit setting as an influential and representative strategy of parental control (Houck & LeCuyer-Maus, 2002, 2004). Limit setting broadly describes parenting behaviors aimed at providing firm, clear, and consistent limits regulating children in order to achieve appropriate and desirable behaviors. Parental limit setting skills are essential in encouraging appropriate actions and regulating disruptive behaviors in children. Disruptions in this skill are often manifested in either overly harsh and overreactive, or overly permissive and lax, strategies in response to challenging situations (Gerard, 1994). Studies have demonstrated that parental maladaptive limit setting compromises a wide variety of child developmental outcomes including school readiness (MacPhee, Prendergast, Albrecht, Walker, & Miller-Heyl, 2018; Walker & MacPhee, 2011) and social competence (Houck & LeCuyer-Maus, 2002, 2004), in addition to being associated with more problematic behaviors in the child (Osborne, McHugh, Saunders, & Reed, 2008; Reed et al., 2017). The investigation of parental limit setting will be helpful in understanding parental control in Hong Kong context. Previous research has suggested that Chinese parents are more likely to display parental control than their American counterparts, yet maladaptive parental control was negatively associated with children's development everywhere (Ng, Pomerantz, & Deng, 2014; Pomerantz & Wang, 2009).

Investigating parental limit setting behaviors is especially important in early childhood. The transition from toddlerhood to preschool age is associated with advancements

in gross motor skills and increased mobility, but relatively undeveloped self-regulative abilities; consequently, children at this age are likely to engage in a range of misbehaviors. Before attending primary school, children require guidance on knowing how to behave appropriately and acceptably; as a result, a fuller range of parental disciplinary strategies tend to surface during early childhood (Straus & Fauchier, 2007).

1.4. Parental Impulsivity and Household Chaos in Relation to Limit Setting

Process models of parenting have addressed the importance of understanding the mechanisms underlying the link between factors and parenting within the family context (Belsky, 1984). Although the links between parental impulsivity and inappropriate discipline are well-established in the literature (Chen & Johnston, 2007; Johnston & Chronis-Tuscano, 2017; Park, Hudec, & Johnston, 2017), how these processes occur remains less understood. Understanding how parental impulsivity results in negative parenting will be useful for prioritizing the best intervention targets for future parenting education programs.

Ecological models argue that individuals should be examined in context, which includes both social and physical environments (Bronfenbrenner, 1994; Luster & Okagaki, 2006). While it is well understood how social environments function as a mechanism linking parental impulsivity and parenting, how physical environments work in the same way has been less studied. Of these studies, Ackerman and Brown (2010) distinguish between the psychosocial and physical aspects that are experienced by family members. The physical environment of the home, including the amounts of indoor or outdoor space, people per room, family size, and residential density; forms one important component of the overall context that influences child development (Christian et al., 2015; Ferguson et al., 2013). The current study proposes to better understand parenting through the physical environment of the household, specifically through household chaos.

Generally speaking, highly chaotic situations in the household are characterized by factors such as crowdedness, noise, lack of routines, and unpredictability (G. W. Evans & Wachs, 2010). There are several reasons to why a chaotic household environment may serve as an explanatory mechanism for parenting behaviors. First, a large body of evidence suggests that parental impulsivity exerts a significant influence on household chaos (Deater-Deckard, Chen, Wang, & Bell, 2012; Peviani et al., 2019); for instance, it might be difficult for parents who have self-regulation problems to organize and plan family routines. Next, a chaotic household environment may create risks towards effective parenting (Corapci & Wachs, 2002; Dumas et al., 2005; Valiente, Lemery-Chalfant, & Reiser, 2007; Whitesell, Teti, Crosby, & Kim, 2015). To date, only one study has explored this possibility (Mokrova et al., 2010), with its results showing that parental ADHD symptoms are related to a more chaotic household environment, in turn resulting in more inconsistent disciplinary actions; however, no studies have investigated this relationship longitudinally. Aiming to address this gap in the literature, the first goal of the current study is to examine household chaos as an explanatory mechanism for the link between parental impulsivity and limit setting over time.

1.5. Parental Impulsivity and Perspective Taking in Relation to Limit Setting

Within the dual-system framework of parenting, the impulsive systems can be stimulated for several reasons (Deater-Deckard, Sewell, Petrill, & Thompson, 2010; Deater-Deckard, Wang, Chen, & Bell, 2012; Sturge-Apple et al., 2015, 2014). Generally referring to the response tendencies that an individual displays toward internal or external stimuli without regard for long-term goals (Evenden, 1999; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001), parental impulsivity may elicit reactive and emotional parenting behaviors through its automaticity. Because of its close relationship with executive function and self-regulation (Nigg, 2017), impulsivity has been operationalized in different ways in parenting literature,

ranging from impulsive attention deficit hyperactivity disorder (ADHD) symptoms (Chen & Johnston, 2007; Lorber, O'Leary, & Smith Slep, 2011) and impulsive personality traits (Pearson et al., 2018) to impulsive decision making (Friedman et al., 2016), and executive function impairment (Rohrbeck & Twentyman, 1986). Differences in these related constructs represent the degrees to which parental cognitive or affective self-control are involved in order to restrain maladaptive impulses and respond appropriately to stressful stimuli (Finkenauer et al., 2015). Indeed, there is emerging evidence that parents who demonstrate poor self-control or high impulsivity are at risk of engaging in negative parenting behaviors (Crandall et al., 2015). For instance, parental impulsivity has been identified as a predictor of parental neglect (Schumacher et al., 2001), abuse (Rohrbeck & Twentyman, 1986), laxness, and overreactivity (Harvey, Danforth, McKee, Ulaszek, & Friedman, 2003).

On the other hand, the controlled system overrides the influence of the impulsive and automatic process on behaviors through its effortful and goal-directed process (Hofmann et al., 2009). Research has increasingly documented that parental executive function serves as a controlled process that buffers the influence of the automatic system on parenting by actively maintaining consciousness and attention (Deater-Deckard et al., 2010; Deater-Deckard, Wang, et al., 2012; Sturge-Apple et al., 2014). For example, Sturge-Apple and colleagues (2014) suggested that parental working memory moderates the associations between automatic cognitions and harsh discipline. Parental set-shifting was also found to moderate the influence of parental autonomic physiological arousal on hostile parenting (Sturge-Apple, Li, Martin, Jones-Gordils, & Davies, 2019).

Although previous works have demonstrated the buffering role of the controlled or effortful system of parents, most studies have primarily focused on parental working memory or executive function; few works have tested the influence of parental perspective taking, a key aspect of parental cognitive capacity (Azar et al., 2008). Generally referring to the ability

to see the perspective of others and consider alternative points of view (Davis, 1980), perspective taking is regarded as an effortful cognitive process that requires an individual's mental control (Epley, Keysar, Van Boven, & Gilovich, 2004; Lin, Keysar, & Epley, 2010). Therefore, perspective taking could be perceived as an index of the controlled system. The literature on the relation between executive function and perspective taking, which was studied as theory of mind, revealed that executive function is a necessary but not sufficient prerequisite of theory of mind (Devine & Hughes, 2014), indicating that in addition to executive function, there is distinct conceptual construct in perspective taking that may explain the development of individual's development.

A core skill in the administration of effective discipline (Grusec et al., 2017), perspective taking allows parents to assume multiple perspectives and consider situations based on various parameters. This is especially important in the context of limit setting, as parents need to understand that their children's views or internal states may be different from their own, identify the reasons for misbehaving, and engage in more appropriate limit setting strategies. Under this context, the impulsive system may drive parents to react emotionally or non-rationally to their children, engaging in behaviors such as yelling at or spanking them; conversely, the controlled system allow parents to employ their cognitive resources to actively consider their children's situation, including their developmental stage, the severity of the misbehavior, and the reasons for misbehaving; in order to provide appropriate disciplinary behaviors such as reasoning or discussion. To date, no studies have examined how perspective taking may operate to moderate parental impulsivity within the limit setting context. To address this gap in the literature, the second goal of the current study is to examine whether parental perspective taking moderates the association between parental impulsivity and negative limit setting.

Whereas the extant literature pertaining to the relation between parent characteristics

and parenting practices has demonstrated important links, currently there is a lack of longitudinal research examining the associations between parental impulsivity and parenting behaviors over extended time periods. Although parenting was traditionally thought to be stable (Eisenberg et al., 1999), there is emerging evidence that parenting behaviors are likely to change over time, with the influence of other family members and family dynamic (Lengua, Honorado, & Bush, 2007; Lengua & Kovacs, 2005). Additionally, previous meta-analysis investigating the effect of parental personality on parenting practice also suggested a stronger effect size from cross-sectional design than from longitudinal design (McCabe, 2014). Thus, longitudinal studies are needed to explore temporal associations between parental impulsivity and parenting. In other words, longitudinal design would be able to demonstrate how parental impulsivity at one time point associates with parenting behaviors measured at a subsequent time point. The current study extended the literature on parental limit setting by examining longitudinal stability and variability over two time points and tested whether parental impulsivity provided unique statistical prediction after controlling for the prior limit setting behaviors.

In summary, parenting is a multi-faceted phenomenon that is subject to the influence of both individual and contextual level factors. The current study has two main goals. First, it tests whether parental impulsivity will exert influence on parenting through its impact on household chaos. It Is hypothesized that household chaos will mediate the association between parental impulsivity and negative parenting. Second, the study seeks to examine whether parental perspective taking moderates the impairment of impulsivity on parental limit setting, predicting weaker relations for parents with a higher perspective taking ability.

The following literature review provides an overview of the constructs of interest in the present study, including impulsivity, household chaos, perspective taking, and their relationships to parenting. The first section reviews the existing theoretical framework of

impulsivity, followed by its deleterious effects on parenting. The second section reviews the justification of examining the role of household chaos in parenting. The third section elaborates on the role of perspective taking within the family system. Finally, the last section provides operationalized definitions for the main constructs.

Chapter 2: Literature Review

2.1. Parental Impulsivity in Parenting

Impulsivity is a widely investigated topic in the fields of personality psychology (Whiteside & Lynam, 2001) and psychopathology, with numerous studies having been conducted on personality disorders, drug abuse, obesity, and other issues (Chamorro et al., 2012); however, the term "impulsivity" is operationalized in different ways across the literature. This section first elucidates the conceptualization of impulsivity before explaining its relationship to parenting.

2.1.1. Structure of Impulsivity

The conceptualization of impulsivity has been a challenge for decades; despite the agreement that it is a multifaceted construct, its underlying structure has not yet been identified. Earlier studies report multiple factors of impulsivity, both in terms of self-reported and behavioral measures (Cyders & Coskunpinar, 2012; Reynolds, Ortengren, Richards, & de Wit, 2006; Sharma, Kohl, Morgan, & Clark, 2013; Stahl et al., 2014). More recent studies provided further evidence of the heterogeneous nature of impulsivity in empirical studies (Caswell, Bond, Duka, & Morgan, 2015; Knezevic-Budisin, Pedden, White, Miller, & Hoaken, 2015; MacKillop et al., 2016). Different models have been suggested in the literature. For example, Knezevic-Budisin et al. (2015) assessed various facets of impulsivity among young adults from separate communities. Their explorative factor analysis and principal component analysis both yielded two-factor models: the dysexecutive control factor and the reward-seeking factor. Another study by MacKillop et al. (2016) measured multiple impulsivity aspects among 1252 young adults individually in a laboratory environment. Their

confirmatory factory analysis revealed a three-factor model of impulsivity: the impulsive choice, the impulsive action, and impulsive personality traits.

On the other hand, instead of exploring the structure of impulsivity in an empirical study (Caswell et al., 2015; Knezevic-Budisin et al., 2015; MacKillop et al., 2016), Sharma, Markon, and Clark (2014) separately conducted a meta-analysis of commonly-used self-reported measures (n = 58) and behavioral measures (n = 15) of impulsivity; revealing a three-factor model for the former and a four-factor model for the latter (see Figures 1 and 2). The three factors in the model for self-reported measures of impulsivity were neuroticism/negative emotionality (NE), disinhibition, and extraversion/positively emotionality (PE); which were similar to those established in Tellegen's (1982) Big Three personality model. According to Sharma, Markon, and Clark (2014); neuroticism/NE or negative urgency–referring to the rush response to negative events–is the basis for impulsive behaviors, extraversion is related to sensation-seeking behaviors, and disinhibition underpins behavior that lacks planning, premeditation, or perseverance. Statistically, neuroticism is moderately related to extraversion and disinhibition (r = .22 and .32 respectively).

The four factors in the model for behavioral measures of impulsivity devised by Sharma, Markon, and Clark (2014) are inattention, inhibition, shifting, and impulsive decision-making. Specifically, shifting, inattention, and inhibition have all been tested as indicators of executive function (Chan, Shum, Toulopoulou, & Chen, 2008; Menghini, Addona, Costanzo, & Vicari, 2010; Miyake & Friedman, 2012). Although impulsive decision-making, usually measured by the delay discounting task, was found to relate to executive function (Olson, Hooper, Collins, & Luciana, 2007; Weatherly & Richard Ferraro, 2011), it is typically perceived as being distinct from executive function.

When examining impulsivity in parenting, it is therefore necessary to investigate impulsive decision-making as having a distinct effect on outcome behavior in order to

differentiate between the influences of executive function and impulsivity. Cyder and Coskunpinar (2011) find that a relation between self-reported impulsivity and behavioral-measure impulsivity exists but with a small effect size (r = .097), indicating that these models may measure different aspects of impulsivity. Based on these methods of measuring impulsivity, the relation between impulsivity and parenting behaviors is reviewed below in two parts.

2.1.2. Parental Self-Reporting of Impulsivity and Parenting

Available research investigating self-reported parental impulsivity usually conducted these measurements in the context of symptoms of parental ADHD, a clinical disorder resulting from attention impairment (Johnston & Chronis-Tuscano, 2017; Park et al., 2017). For example, Chronis-Tuscano et al. (2008) found that maternal ADHD impulsivity is positively related to inconsistent discipline, while being negatively related to involvement and positive parenting. Maternal ADHD symptoms were also significantly related to less maternal sensitivity and more intrusiveness (Semple, Mash, Ninowski, & Benzies, 2011), higher parenting dissatisfaction and lower parenting efficacy (Banks, Ninowski, Mash, & Semple, 2008), and reduced consistency in parenting behavior and child monitoring (Murray & Johnston, 2006).

In other studies investigating the relationship between parental impulsivity and disciplinary behaviors, parental impulsivity was measured under the model of personality (Le Vigouroux, Scola, Raes, Mikolajczak, & Roskam, 2017; Metsäpelto & Pulkkinen, 2003). In these studies, extraversion/PE was found to relate to both positive parenting behaviors such as sensitivity (Smith et al., 2007) and negative parenting behaviors such as power assertion (Clark, Kochanska, & Ready, 2000). Disinhibition as it relates to conscientiousness/constraint displayed mixed results; higher parental conscientiousness was related to both adaptive

parenting behavior such as responsiveness (Clark et al., 2000) and structure (Verhoeven, Junger, Van Aken, Deković, & Van Aken, 2007), as well as maladaptive parenting behavior such as rejection and overcontrolling (Neitzel & Stright, 2004).

Finally, neuroticism/NE has been found to consistently relate to maladaptive parenting behaviors (McCabe, 2014; Prinzie et al., 2009), although the consistent effect of parental neuroticism might be gender-specific to mothers and not fathers (Achtergarde, Postert, Wessing, Romer, & Müller, 2015). Researchers have argued that neuroticism reflects a basic emotional dimension (Canli, 2004; Watson, Wiese, Vaidya, & Tellegen, 1999); highly neurotic individuals are sensitive to negative mood experiences (Canli, 2004; Watson & Clark, 1992). As parenting is a salient emotional experience (Teti & Cole, 2011), negative emotionality may result in the risk of engaging in negative parenting behavior (Hiraoka et al., 2016). The current study focuses on parental neuroticism/NE as a self-reported measure of impulsivity.

2.1.3. Parental Behavioral Impulsivity and Discipline

The relation between parental behavioral impulsivity and parenting behaviors has been explored primarily in the domains of executive function. In particular, studies found that poor maternal working memory is associated with less time attending to infants (Chico, Gonzalez, Ali, Steiner, & Fleming, 2014), more harsh parenting when faced with child misbehavior (Deater-Deckard et al., 2010) or other risk factors (Sturge-Apple et al., 2014), and less maternal sensitivity (Gonzalez, Jenkins, Steiner, & Fleming, 2012). Moreover, maternal attention shifting has been correlated with less maternal sensitivity (Chico et al., 2014). Finally, a composite executive function deficit has been related to harsher parenting (Deater-Deckard & Bell, 2017; Deater-Deckard, Wang, et al., 2012) and lower quality in the mother-infant relationship (Turner, Wittkowski, & Hare, 2008).

Despite the abundance of research concerning the three factors of inhibition, inattention, and shifting that are common to both executive function and impulsivity; few studies have investigated the specific influence of impulsive decision-making on parenting as a factor exclusive to behavioral impulsivity. According to Sharma, Markon, and Clark (2014), both hypothetical and contingent discounting tasks load exclusively on the impulsive decision-making factor; it is hence a preferred measure for assessing this specific facet of impulsivity. As a form of motivation-based impulsivity, delay discounting may influence parenting behaviors in two ways; parents may either display harsh disciplinary methods to obtain immediate child compliance, or they may use more tender but time-consuming techniques such as reasoning to achieve desirable long-term behaviors (Harrison, 2017). Although the significant association between parental delay discounting and maladaptive discipline was not found to be significant after controlling for self-reported impulsivity in the final analytical model of Harrison (Harrison, 2017), there is evidence that delay discounting is significantly associated with more family environment difficulties and problems (Friedman et al., 2016), as well as household chaos (Peviani et al., 2019). Given the lack of existing empirical studies, it is valuable to examine parental impulsive decision-making using delay discounting tasks to better understand of the role of parental behavioral impulsivity on disciplinary behavior. The current study therefore assesses parental delay discounting as a behavioral measure of impulsivity.

2.2. Household Chaos in Parenting

The process models of parenting have argued that parental characteristics affect parenting through family context (Belsky, 1984). However, the effect of household chaos as the physical context on the family as an ecological system is less understood.

Environmental chaos has been investigated in multiple contexts, including the household (Coldwell, Pike, & Dunn, 2006; Dumas et al., 2005), schools (Maxwell, 2010), and childcare institutions (Wachs, Gurkas, & Kontos, 2004). In the current study, the relationship between household chaos and parenting is investigated, on account of the household being the most proximate living context for children before school entry. A considerable portion of the literature has shown that children exposed to chronic household chaos display a number of maladaptive developments across a variety of domains (G. W. Evans & Wachs, 2010), including socio-emotional development (Berry et al., 2016), problem behaviors (Jaffee, Hanscombe, Haworth, Davis, & Plomin, 2012), cognitive development (Seidler & Ritchie, 2018), school readiness (Hur, Buettner, & Jeon, 2015), and school achievement (Hanscombe, Haworth, Davis, Jaffee, & Plomin, 2011). Researchers have suggested that household chaos affects child behavioral outcome in two pathways. Household chaos might directly impair child development, as beneficial interactions between the child and the physical environment become attenuated due to the lack of structure and regularity (G. W. Evans & Wachs, 2010). Another process highlights the indirect effect of household chaos through parenting; parents who live in a chaotic environment may have unstable and inconsistent childcare arrangements, making it difficult for them to display responsiveness or sensitivity to their children after establishing the organization or structure of the household environment (Corapci & Wachs, 2002).

2.2.1. Household Chaos and Parenting

There is growing research suggesting that a chaotic family environment creates risks for effective parenting (Corapci & Wachs, 2002; Dumas et al., 2005; Valiente et al., 2007; Whitesell et al., 2015). Household chaos appears to exert its influence on parenting through its demand and strain on the self-regulation capacities of the parent. Research suggests that

parents with high impulsive tendencies or poor self-regulation tend to run a chaotic household (Bridgett, Burt, Laake, & Oddi, 2013; Peviani et al., 2019; Valiente et al., 2007). In turn, the tension and stress created at home may distract parents from actively engaging with children and therefore interfere with their parenting sensitivities (Corapci & Wachs, 2002; G. W. Evans, Maxwell, & Hart, 1999; Matheny, Wachs, Ludwig, & Phillips, 1995). Additionally, parents who are continuously exposed to disorganization, noise, and crowdedness might experience higher tension or fatigue; further increasing their negative responses to their child. Over recent decades, research has uncovered direct links between household chaos and impairments in both parenting and child development (Ferguson et al., 2013).

2.2.2. Parent Impulsivity and Household Chaos

It is likely that parental personality or cognitive characteristics also affect household chaos, as both a stable and calm emotional status, in addition to regulatory skills and strategies, are necessary to maintain a structured and organized household environment. There are many existing works examining the relationship between parental characteristics and household chaos level. For example, Deater-Deckard and colleagues found that poor maternal executive function– a behavioral measure of impulsivity (Sharma, Markon, & Clark, 2014)–was associated with a more chaotic household environment (Deater-Deckard, Chen, et al., 2012; Deater-Deckard, Wang, et al., 2012). Peviani et al. (2019) also reported that parental delay discounting was associated with greater environmental chaos in a sample of families of adolescent children. In addition, self-reported parental self-regulation was also suggested to relate to elevated household chaos (Bridgett et al., 2013; Valiente et al., 2007). Finally, Hur et al. (2015) found that more severe parental depression symptoms were associated with a higher level of household chaos.

To date, research on household chaos has investigated how parental self-regulation or impulsivity impacts household chaos (Bridgett et al., 2013), in addition to how household chaos affects parenting behaviors (Coldwell et al., 2006). Nevertheless, existing research has yet to examine the possibility that household chaos exerts its influence as a mediator through which parental impulsivity affects parenting.

2.2.3. Household Chaos and Socioeconomic Status

It has been suggested that household chaos is stable over time (Deater-Deckard et al., 2009; Matheny et al., 1995) and related to lower socioeconomic status (Deater-Deckard, Chen, et al., 2012; G. W. Evans, Gonnella, Marcynyszyn, Gentile, & Salpekar, 2005; Z. Wang, Deater-Deckard, & Bell, 2013). Although household chaos is more prevalent among families that have socioeconomic risks, previous research has suggested that household chaos is a distinct construct (Dumas et al., 2005) that contributes to family processes and child outcomes regardless of socioeconomic status (Coldwell et al., 2006; G. W. Evans & Wachs, 2010; Hart, Petrill, Deater-Deckard, & Thompson, 2007; Pike, Iervolino, Eley, Price, & Plomin, 2006). In the current study, parental socioeconomic status indicators such as family income and education levels were significant covariates that were controlled in the statistical analysis.

2.3. Parental Perspective Taking in Parenting

2.3.1. Perspective Taking as a Cognitive Capacity

In past decades, parenting models have emphasized the importance of parental cognition regarding parenting behaviors (Bornstein, 2016; Goodnow, 2002; Holden & Buck, 2002; Sigel et al., 2002). The cognitive view of parenting provides more practical values for developing education programs to improve parenting behavior (Azar et al., 2008). Existing

research on parent cognition has primarily focused on the content of cognition. For example, Holden and Buck (2002) proposed that parents' attitudes and values towards child-rearing guide how they raise their children. Parenting knowledge also affects parenting behavior, which in turn affects child development (Bornstein, Putnick, & Suwalsky, 2018; Goodnow, 2002). Parenting attributions (Bugental & Happaney, 2002) and competence (de Haan, Prinzie, & Deković, 2009) have also captured the attention of researchers.

Another approach to understanding parenting cognition focuses on the complexity of cognition (Demick, 2002). For example, Newberger (1980) proposed a four-stage theory of parental awareness representing the ability of the parent to differentiate the child from himself or herself. Egoistic orientation (Stage 1) is when the parent only considers his or her own needs and desires; conventional orientation (Stage 2) is when the parent consider socially-defined norms and traditions; subjective-individualistic orientation (Stage 3) is when the parent considers meeting the child's needs; and interactional orientation (Stage 4) is when the parent perceives the child to be an individual, complex psychological self-system, therefore needing to consider both the views of himself or herself and those of the child. This four-stage theory has given rise to a large number of studies related to parent perspective taking (Gerris, Deković, & Janssens, 1997; Rodrigo, Janssens, & Ceballos, 2001; Soenens, Duriez, Vansteenkiste, & Goossens, 2007), emphasizing its significance towards effective parenting.

2.3.2. Perspective Taking and Parenting

Grusec et al. (2017) suggest that perspective taking is a core skill in the administration of effective discipline. Parental perspective taking may also encourage parents to be more attuned and responsive to their child by facilitating their awareness to the child's perspective and internal states (Soenens et al., 2007).

The role of parental perspective taking in parenting behavior and child development has been well-documented. For example, one investigation found that maternal emotional distress was related to decreased responsiveness through lower parental perspective taking (Gondoli & Silverberg, 1997). Maternal perspective taking was also shown to predict autonomy support given to young adolescents over time (Mageau, Sherman, Grusec, Koestner, & Bureau, 2017). In another study, in which adolescents were interviewed about disagreements with their parents, the results showed that maternal perspective taking was negatively related to conflict intensity (Lundell, Grusec, McShane, & Davidov, 2008). On the contrary, higher parental perspective taking was found to relate to fewer adolescents' externalizing behaviors, despite the effects being moderated by clear parental expectations (Sher-Censor, Assor, & Oppenheim, 2015). Parental perspective taking was also shown to benefit child biological processes relevant to asthma (Manczak et al., 2017). While investigating the interaction between parental perspective taking and difficult child temperaments, Clark et al. (2000) found that parents who were more advanced in perspective taking ability used power assertion less, regardless of the negative emotionality of child, whereas parents less advanced in perspective taking ability were more likely to use power assertion with children exhibiting higher negative emotionality. In other words, the ability to take alternative perspectives may buffer the risk of implementing power assertive parenting on the difficult child. Such findings suggest that parental perspective taking may attenuate the appearance of negative parenting in the face of difficult children.

2.4. Measurement Review

Researchers have reached the consensus that impulsivity is a multidimensional construct, but have proposed different subcomponents over the years (Cyders & Coskunpinar, 2011; MacKillop et al., 2016; Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001; Nigg,

2000; Reynolds, Ortengren, Richards, & de Wit, 2006; Sharma, Kohl, Morgan, & Clark, 2013). Both self-reported and behavioral measures have been used to identify varying factors of impulsivity; however, no significant overlap between both measures has been attested (Cyders & Coskunpinar, 2012). The following parts provide the rationale for why specific measures were chosen for the purposes of the current study.

2.4.1. Self-Reported Impulsivity Measure

The factor of neuroticism was chosen as an index of self-reported impulsivity for several reasons. First, neuroticism has been consistently found to relate to negative parenting behavior, whereas extraversion and disinhibition were related to both positive and negative parenting behavior. The interest of the current study in the risk factors of parenting prompted the choice of neuroticism as an indicative measure. Second, Sharma, Markon, and Clark (2014) suggested that neuroticism was the basis of "impulsive behavior" and therefore also a factor highly related to dysfunctional parenting behavior. Third, researchers have suggested that parenting is a salient emotional experience (Dix, 1991; Teti & Cole, 2011); emotional stability therefore plays an important role in displays of effective caregiving (Prinzie et al., 2009). In the current study, self-reported parental impulsivity is measured using the neuroticism factor of the 10-item Big Five Inventory (BFI-10; Rammstedt & John, 2007)personality measurement test.

2.4.2. Behavioral Impulsivity Measure

Impulsive decision-making is used to measure parental behavioral impulsivity, given that it is a unique factor of behavioral impulsivity, whereas inattention, inhibition, and shifting are also aspects of executive function (Sharma et al., 2014). Impulsive decision-making is usually assessed using the Monetary Choice Questionnaire (Kirby & Maraković,

1996), and it is considered a personality trait (Odum, 2011) that correlates to the rate of the devaluation of delayed rewards (DD rate; Mazur, 1987), which is best modelled using a hyperbolic function. Either real or hypothetical rewards can be used in question tasks, as a series of studies have suggested that there is no significant difference in DD rate between real or hypothetical rewards (Johnson & Bickel, 2002; Lawyer, Schoepflin, Green, & Jenks, 2011; Madden, Begotka, Raiff, & Kastern, 2003). A neuroimaging study proposed that real and hypothetical rewards activate concordant areas of the brain in regions corresponding to both limbic and executive function (Bickel, Pitcock, Yi, & Angtuaco, 2009); moreover, a meta-analysis testing the convergent validity of different self-control measures suggested no significant difference between the two reward types (Duckworth & Kern, 2011).

The current study uses a 21-item version of the Monetary Choice Questionnaire with hypothetical rewards. Each item requires participants to choose between receiving a smaller sum of money sooner or a larger sum of money later. The main evaluation index is calculated using the following formula:

$$V = A / (1 + kD)$$

Where V represents the discounted value of the outcome, A represents the undiscounted value, D represents the delay time, and k is the log-transformed parameter that represents how quickly V decreases as D increases. Frequently used for statistical analysis in prior research (Sze, Stein, Bickel, Paluch, & Epstein, 2017), higher k-values represent higher levels of impulsivity (Rachlin, 1974), ranging from 0.00 to 0.25. Previous research has shown that k is relatively stable, exhibiting a high test-retest reliability one year later (Kirby, 2009).

2.4.3. Parenting Behavior Measure

Parenting practice assessment techniques fall into three broad categories: interview data, questionnaire data, and observation data. Each data collection method has its advantages

and disadvantages. Interviews provide detailed and in-depth information. Questionnaires can be easily administered with little training; however, social desirability response bias may impact the validity of self-reported measures (Schwarz, 1999). Lastly, observation is regarded as providing a reliable and objective assessment of a particular context (Heyman, Lorber, Eddy, & West, 2014), but is costly and time-consuming. Previous research has reviewed some of the measures of parenting behavior and proposed that multiple methods be implemented concurrently to capture the targeted behavior (McKee, Jones, Forehand, & Cuellar, 2013). In the current study, both self-reported parental measures and laboratory observation tasks are used to capture parental disciplinary behavior.

2.4.4. Household Chaos Measure

Based on the theory and measures of household chaos (Matheny et al., 1995), some researchers have used home observations to capture environmental disorganization (Whitesell, Crosby, Anders, & Teti, 2018; Whitesell et al., 2015). These observed aspects of chaos generally measured the disorganization usually experienced daily by parents and children. Other studies have employed specific measures of chaos such as household density and residential instability (Lengua et al., 2007, 2014; Martin, Razza, & Brooks-Gunn, 2012). Among the various measures of household chaos, everyday experienced disorganization was the most examined in previous research.

Other researchers have assessed household chaos in a broader sense, including not only measures of disorganization but also those of instability (G. W. Evans & Wachs, 2010). Disorganization–characterized by high noise levels, dense population, and lack of structure–is usually experienced daily by family members, whereas instability is characterized by frequent changes in household composition and residential environment such as caregiver changes, residential moves, or general changes in the people within the household. Usually treated as a

separate indicator of household chaos, instability has been examined along with disorganization in prior literature, and has shown different effects from disorganization (Vernon-Feagans, Garrett-Peters, Willoughby, & Mills-Koonce, 2012; Vernon-Feagans, Willoughby, Garrett-Peters, & The Family Life Project Key Investigators, 2016; Zvara et al., 2014). Although instability has been found to relate to impaired child outcomes (Schmitt, Finders, & McClelland, 2015; Sturge-Apple, Davies, Cicchetti, Hentges, & Coe, 2017), it is not likely experienced daily by children. The current study mainly focuses on the dimension of disorganization that describes the everyday household situation, indicated by levels of noise, crowding, regularity, and routine.

In prior literature, most researchers assess the disorganization of the household using Confusion, Hubbub and Order Scale (CHAOS; Matheny et al., 1995), which provides brief and reliable parent-reported ratings of household chaos that have been validated in detailed home observations. Growing evidence indicates that CHAOS scores are associated with a host of inappropriate parenting behaviors and poor child outcomes (Deater-Deckard et al., 2009; Dumas et al., 2005; Mokrova et al., 2010; Pike et al., 2006).

Chapter 3: The Present Study

As stated above, the two main goals of the current study are firstly, investigating whether household chaos mediates the impulsivity-limit setting relation; and secondly, testing whether parental perspective taking moderates the association between impulsivity and negative limit setting. To achieve these primary goals, the current study tests the following specific hypotheses:

Hypothesis 1a. Parental neuroticism is positively related to negative limit setting.

Hypothesis 1b. Parental delay discounting is positively related to negative limit setting.

Hypothesis 2a. Parental neuroticism is positively related to household chaos.

Hypothesis 2b. Parental delay discounting is positively related to household chaos.

Hypothesis 3. Household chaos is positively related to negative limit setting.

Hypothesis 4a. Household chaos mediates the relationship between parental neuroticism and negative disciplinary behaviors.

Hypothesis 4b. Household chaos mediates the relationship between parental delay discounting and negative disciplinary behaviors.

Hypothesis 5a. Parental perspective taking moderates the direct relationship between parental neuroticism and negative limit setting.

Hypothesis 5b. Parental perspective taking moderates the direct relationship between parental delay discounting and negative limit setting.

Hypothesis 6a. Parental perspective taking moderates the indirect relationship between parental neuroticism and negative limit setting through household chaos; that is, a two-way interaction exists between parental neuroticism and parental perspective taking in the prediction of household chaos.

Hypothesis 6b. Parental perspective taking moderates the indirect relationship between parental delay discounting and negative limit setting through household chaos; that is, a two-way interaction exists between parental delay discounting and parental perspective taking in the prediction of household chaos.

Figure 3 illustrates the proposed model based on these hypotheses.

Chapter 4: Research Design and Methodology

The current study assumes a longitudinal design using two time-points separated by 10 months. This dual-point longitudinal or "half longitudinal" design is a cost-effective way of examining mediation effects and much more widely preferred than the cross-sectional design (Cole & Maxwell, 2003). Using autoregressive analysis, the predictor can be said to have a lagged effect on the dependent variable if the association is significant after controlling for the initial level of dependent variable. Data were collected from a sample of normally developed children between ages 4 to 8, in addition to their main caregivers.

4.1. Participants

T1 sample. 134 normally developing children between ages 4 and 7 (64 boys and 70 girls, *M* = 68.6 months, *SD* = 12.17 mos., range = 47-94 mos.) and their primary caregivers were recruited at time 1 (T1). The children were predominately ethnically Chinese, fluent in Cantonese, and without any abnormal developmental diagnoses. Of the 134 primary caregivers, 114 (85.1%) were mothers, 18 (13.4%) were fathers, and 2 (1.5%) were grandparents. Caregivers reported both parents' educational levels and monthly household income on ordinal scales. Among the parents of 134 children, 46.3% of mothers and 43.3% of fathers had completed senior secondary education; 43.6% of mothers and 38.8% of fathers had completed higher diploma or bachelor education; and 9.8% of mothers and 17.9% of fathers had continued their education in master programs or above. Both the median and mean statistic of family income were within the range of HK$25,001-HK$45,000.

T2 sample. Of the original 134 families, 94 (70%) returned to the laboratory approximately 10 months later for time 2 (T2) measures. The final sample of 94 children

were between ages 4 and 8 at T2 (47 boys and 47 girls, *M* = 80.3 mos., *SD* = 12.54 mos., range = 57-104 mos.). Of the 94 primary caregivers, 76 (80.91%) were mothers, 16 (17.0%) were fathers, and 2 (2.1%) were grandparents.

4.2. Procedure

The data collected here was part of a larger project investigating child social development. Procedures were approved by the Human Research Ethics Committee of the Education University of Hong Kong (EdUHK). Participants were recruited through Hong Kong kindergartens and primary schools, and all caregivers gave informed written consent for participation. Families were invited to a developmental psychology laboratory at both time points. Each session lasted around one hour, including rest breaks.

At T1, caregivers engaged in a limit setting task with their children, in which caregivers were required to prohibit their child from touching a desired iPad; caregiver limit setting behaviors were video recorded and subsequently coded. Caregivers then independently completed a survey measuring their demographic status, impulsivity, and perspective taking and limit setting behaviors; while the children completed tasks measuring their social development in another room. Children also simultaneously completed a series of cognitive tasks, the results of which have been reported in other articles. At the end of the experiment, children were offered small gifts, while caregivers were debriefed and gifted a supermarket coupon worth HK$50 as compensation.

At T2, in addition to retaking the survey questionnaire completed at T1, caregivers also reported their perceptions of household chaos, as well as completing a hypothetical version of the Monetary Choice Questionnaire as a behavioral measure of impulsivity. Meanwhile, the children completed other tasks measuring their social cognitive development.

Once again, at the end of the experiment, children were offered small gifts, while caregivers were debriefed and gifted with a supermarket coupon worth HK$50 as compensation.

4.3. Measures

Demographic measures. At T1, caregivers reported demographic information including their child's age and gender, diagnostic histories of learning difficulties or disorders observed in the child if applicable, their relationships with their children, and family socioeconomic status (SES). Parent education level was recorded using the following scale: *1 = primary school; 2 = secondary school; 3 = bachelor degree; 4 = master's degree; 5 = doctoral degree or above.* Family income in terms of monthly household income was recorded using the following scale: *1 = below HK$12,500; 2 = HK$12501-HK$25000; 3 = HK$25001-HK$45000; 4 = above HK$45000.* A composite SES score was created by summing the education level of both caregivers with the family income level, with a range of 5-14 (M = 8.64, SD = 1.89). One caregiver did not provide information regarding parent education and income.

Neuroticism. At T1, caregivers completed a questionnaire measuring neuroticism using the 10-item Big Five Inventory (BFI-10; Rammstedt & John, 2007) test derived from the standard 44-item Big Five Inventory (BFI) test (Benet-Martinez & John, 1998; John, Donahue, & Kentle, 1991; John & Srivastava, 1999). Rammstedt and John's (2007) multilingual and multicultural validation study demonstrated that BFI-10 possesses robust psychometric properties, accounting for almost 70% of the variance of the full BFI test. Previous studies observed the correlations between the two items for measuring neuroticism in both tests to range from .36 to .40 (Anusic, Lucas, & Donnellan, 2012; Furler, Gomez, & Grob, 2013). Consistent with these findings, the correlation between the two items of

neuroticism subscales in the current sample was 0.517. Both the 44-item and 10-item BFI tests have been validated in empirical studies using Chinese samples (Carciofo, Yang, Song, Du, & Zhang, 2016; Leung, Wong, Chan, & Lam, 2012; Peng, 2012; C. W. Wang, Ho, Chan, & Tse, 2015), with evidence supporting the utility of the 10-item test.

Perspective taking. At both time points, parental perspective taking was measured by the Chinese version (C-IRI) of the Interpersonal Reactivity Index (Davis, 1980) which has previously been confirmed to show good validity and reliability among both normal and clinical samples (F. Zhang, Dong, & Wang, 2010). This 7-item perspective taking subscale assesses an individual's cognitive tendency to take another's point of view. Question items include "when I'm upset at someone, I usually try to 'put myself in his shoes' for a while" and "I try to look at everybody's side of a disagreement before I make a decision." Items were rated on a 5-point Likert scale from "strongly disagree" (1) to "strongly agree" (5). In the current study, Cronbach's α was .715 at T1 and .690 at T2.

Self-reported limit setting behavior. At both time points, parental limit setting behaviors were measured using the 12-item limit setting subscale of the Parent-Child Relationship Inventory (PCRI) test (Gerard, 1994). Frequently used as an indicator of parental behavioral control in previous studies (MacPhee et al., 2018; Oliver, Guerin, & Coffman, 2009; Walker & MacPhee, 2011), the subscale has also been previously confirmed to have good internal consistency, reliability, and construct validity among a sample of mainland and Hong Kong Chinese parents with children between ages 3 to 15 (Ganotice, Downing, Mak, Chan, & Yip, 2015). Question items include "I have trouble disciplining my child" and "I sometimes find it hard to say no to my child." All items were answered in the form of "to what extent do you agree the following" statements, which were rated on a 5-

point Likert scale from “strongly disagree” (1) to “strongly agree” (5), with higher scores representing more negative disciplinary behaviors. In the current study, Cronbach’s α was 0.711 at T1 and .733 at T2.

Observed limit setting behavior. At T1, parental disciplinary behaviors were observed in a 3-minute limit setting task requiring caregivers to prohibit children from playing a desired game. In the experiment, an experimenter introduced an iPad game to the child; to avoid other potential interferences, there were no other toys in the room except for the iPad. The experimenter then told the child that she needed to leave the room to prepare for recording work, instructing the child to wait and refrain from touching the iPad. Prior to this, caregivers were asked to stop the child from touching the iPad as in a natural household context. The experimenter then left both caregiver and child in the room for 3 minutes, concluding observations after the time had passed. The whole process was video recorded for later coding.

To code the recorded parental limit setting behaviors, each 3-minute video was divided into three 1-minute episodes. The behaviors were then coded on a macroscopic scale using a coding scheme adopted from Lengua, Honorado, and Bush (2007). First, behaviors in each 1-minute episode were assigned a global score from 1 to 5 according to the coding manual, with 1 representing the lowest level of behavior and 5 the highest level. A score of 1 indicated that parental limit setting was very inconsistent and that commands might have been highly unclear; the caregiver therefore failed to set necessary and appropriate limits. Conversely, a score of 5 indicated that the caregiver clearly established, maintained, and followed through on limits that were easy for the child to understand. Both the average and reversed average scores across the 3 episodes were then calculated, with the latter being taken as an index of negative or ineffective limit setting behavior. Finally, inter-coder reliability

was assessed by having a second coder independently code 20 random selected videos (about 16% of the effective videos). The intra-class correlation (ICC) between the raters was good, with a value of .856.

To obtain more information about negative parental limit setting strategies, an additional micro-coding method adapted from Kuczynski (1984), LeCuyer-Maus (2002), and van Zeijl et al. (2007) was adopted. The strategies of power assertion, physical direction, and giving in were coded for every 15-second time segment in the entire 3-minute video using dummy variables, with 0 representing the absence of such strategies, and 1 representing their presence. *Power assertion* was coded when the caregivers directly commanded or requested that the child perform another task, or threatened to prohibit the child from playing the iPad. For example, parents sometimes commanded in a harsh tone of voice, “don’t touch” “I said no”. *Physical direction* was coded when the caregivers physically prevented or interfered with the child touching the iPad, such as removing the children’s hands from the iPad screen or physically restricting the children’s arms from reaching the iPad. *Giving in* was coded when the caregivers did not follow their own prohibition rules and did nothing when their children started playing the iPad game. The total occurrences of all three codes were used as the dependent variable. The ICC values between the two coders assessing a randomly selected 16% of the samples were good, ranging from .911 for physical direction to .995 for giving in.

Delay discounting. At T2, parental delay discounting as an indicator of impulsivity was measured using a task. Caregivers completed a hypothetical 21-item version of the Monetary Choice Questionnaire (Kirby & Maraković, 1996), choosing between a smaller immediate reward or a larger future reward. For example, participants were asked to choose

between receiving 30 dollars tonight or 85 dollars in 14 days. The hyperbolic function was used to calculate and model the DD rate (Mazur, 1987).

Household chaos. At T2, an abridged version of the CHAOS scale was applied to assess household chaos (Matheny et al., 1995). The scale has been widely used in previous studies, exhibiting Cronbach's α values of .54 in Hur et al. (2015); .56 in Coldwell et al. (2006); and .65 in Wang et al. (2013). The inventory of the scale includes six items measuring routine, noise, and environmental confusion; including "my child has a regular bedtime routine," "it is a real zoo in our home," and "I cannot hear myself think in our home." In the current study, rather than using the original binary (yes/no) measure (Hur et al., 2015), caregivers rated their agreement with the items on a 5-point Likert scale. The average of the scores was taken as an index of chaos, with a higher score representing a more chaotic household environment. The scale reliability was acceptable for the current sample and consistent with prior studies, with a relatively attenuated Cronbach's α value (0.651) possibly being due to the small number of items comprising the scale.

Regarding the translation process, a committee approach was adopted to translate the CHAOS scale items into Chinese (Brislin, 1970), a method considered appropriate when translators have a preference for a target language (Cha, Kim, & Erlen, 2007). A group of bilingual academic members majoring in psychology worked together to produce a consensus translation of each item and ensure that it maintained the meaning and intent of the original item. In general, questionnaire items were translated literally for the current study after multiple checks regarding linguistic equivalence (Peña, 2007); for example, "it is a real zoo in our home" was translated as: 「我们家杂乱吵闹得像一个动物园。」

4.4. Analytic Plan

All analyses in the current study were conducted using IBM SPSS 24.0, Mplus 8.0 (Muthén & Muthén, 2017), and JASP (JASP Team, 2018). First, prior to completing primary data analysis, descriptive statistics and internal consistency of scale scores for all variables were examined. Secondly, bivariate correlations were conducted to explore the relations between parental neuroticism, delay discounting, household chaos, perspective taking, and limit setting behaviors. Thirdly, the moderating effect of parental perspective taking on the relationship between parental impulsivity (neuroticism and delay discounting) and limit setting (both self-reported and observed measures) was tested. Fourth, the indirect relationship between parental impulsivity (neuroticism and delay discounting) and negative limit setting behaviors mediated via household chaos was tested. Lastly, how this indirect relationship differs with respect to different levels of perspective taking was tested in an integrated moderated mediation model. All data analyses were conducted using both the traditional frequentist method and Bayesian estimations (L. Wang & Preacher, 2015).

4.4.1. Bayesian Estimation

In recent years, Bayesian analysis has garnered the interest of social science researchers (van de Schoot et al., 2014; van de Schoot, Winter, Ryan, Zondervan-Zwijnenburg, & Depaoli, 2017). Advantages of Bayesian analysis have been well documented in the literature, with the method being favored from both theoretical and methodological perspectives (Lee & Wagenmakers, 2005; van de Schoot et al., 2014, 2017). One of the key theoretical differences between conventional and Bayesian statistical analysis lies in the nature of the unknown parameters. Whereas traditional statistics assumes that there is only one true population parameter–for instance, one fixed but unknown true regression coefficient–in the view of Bayesian statistics, all unknown parameters can be treated as

uncertain and be determined by a probability distribution. As a consequence, the Bayesian method provides an interval and a corresponding probability that the interval contains the unknown parameter, rather than one particular estimation as provided by conventional statistics (van de Schoot & Depaoli, 2014). Another key difference is that Bayesian estimation allows for the incorporation of prior knowledge into new data rather than testing null hypotheses. Such prior knowledge can be obtained from previous empirical studies, meta-analysis, expert knowledge, or theoretical expectations (van de Schoot et al., 2014; Zondervan-Zwijnenburg, Peeters, Depaoli, & Van de Schoot, 2017; Zyphur & Oswald, 2015). Moreover, the degree of incorporation can range from noninformative priors, where no prior knowledge is specified (for instance, a center at zero and a wide variance of 10^{10}), to informative priors where hyperparameters (for instance, a known mean and a known variance) are specified to provide greater certainty about the parameters being estimated. Observed evidence is combined with prior knowledge and then summarized by the resulting distribution, thereby producing an updated understanding of the prior knowledge.

From a methodological perspective, Bayesian analysis is not based on the large sample sizes that traditional frequentist methods deal with and thus may produce better small-sample performance, especially when established prior knowledge is available (van de Schoot, Broere, Perryck, Zondervan-Zwijnenburg, & Loey, 2015; Z. Zhang, Hamagami, Wang, Nesselroade, & Grimm, 2007). Another methodological benefit of Bayesian analysis is that it can deal with non-normal distributions well (van de Schoot et al., 2014; L. Wang & Preacher, 2015); Wang and Preacher (2015) have demonstrated the superiority of Bayesian estimation over maximum likelihood (ML) estimations for complex models, such as those involving multiple moderators.

4.4.2. Correlational Analysis

The traditional frequentist test for correlation, the Pearson correlation coefficient test, produces a *p* value for drawing conclusions. The common rule is that one can reject the null hypothesis that no relation exists when $p < .05$. An alternative Bayesian hypothesis test for correlations is the so-called Bayes factor (BF; Kass & Raftery, 1995). The BF computes the probability that the observations support the null hypothesis (H_0) or the alternative hypotheses (H_1). In contrast to the *p*-value, which does not allow researchers to quantify the evidence for H_0, the BF evaluates the evidence in favor of H_0; it is a weighted average likelihood ratio that indicates the strength that the evidence provides in favor of the alternative hypothesis (BF_{10}) or the null hypothesis (BF_{01}) (Wetzels & Wagenmakers, 2012). The value of BF_{10} can range from zero to infinity; a higher BF_{10} indicates stronger evidence for rejecting the null hypothesis. For example, $BF_{10} = 5$ indicates that the observed data are five times more likely under the alternative hypothesis than the null hypothesis. Researchers have devised a series of categories for labelling various Bayes factors in terms of intervals. $1 < BF_{10} < 3$ indicates anecdotal evidence for H_1; $3 < BF_{10} < 10$ indicates moderate evidence for H_1; $10 < BF_{10} < 30$ indicates strong evidence for H_1; $30 < BF_{10} < 100$ indicates very strong evidence for H_1; and $BF_{10} > 100$ indicates extremely strong evidence for H_1. Conversely, $1/3 < BF_{10} < 1$ indicates anecdotal evidence for H_0; $1/10 < BF_{10} < 1/3$ indicates moderate evidence for H_0; $1/100 < BF_{10} < 1/30$ indicates strong evidence for H_0; $1/100 < BF_{10} < 1/30$ indicates very strong evidence for H_0; and $BF_{10} < 1/100$ indicates extremely strong evidence for H_0 (Wetzels & Wagenmakers, 2012). In the current correlational analysis, both the Pearson correlation coefficient test and Bayes factor testing were included.

4.4.3. Mediation Analysis

The mediation effect, which is the product of two regression coefficients, is always skewed. Consequently, the results of the Sobel test are always biased (Zhao, Lynch, & Chen, 2010), leading to biased confidence interval estimates. Alternatives to this problem are provided in Bayesian statistics (Yuan & MacKinnon, 2009) and bootstrapping. In the current mediation analysis, the bootstrap method was first used, followed by the Bayesian method with noninformative priors, to better understand the mediation effect.

The frequentist maximum likelihood (ML) with bias-corrected bootstrapping was used first to estimate the indirect effect (Preacher & Hayes, 2008). Bootstrapping generates an approximation of a sampling distribution of a statistic and yields estimates of *p* values and confidence intervals (CIs) by repeated random sampling from the available data. An effect is considered significant if the 95% CI did not include zero. In the current analysis, The indirect effect was estimated with 1000 resamples and a bias-corrected CI for each parameter. Model fit was then assessed based on the chi-square test (χ^2), comparative fit index (CFI), the Tucker-Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). According to both Kline (2015) and Byrne (2013), a model is considered to have an acceptable model fit if the χ^2 value is non-significant, the CFI and TLI values are greater than .90, the RMSEA value is less than .08, and the SRMR value is less than .10.

The data was then analyzed using the Bayesian method with noninformative priors. This analysis implemented the Markov chain Monte Carlo (MCMC) estimation process throughout 10000 iterations to generate a posterior distribution based on the prior distribution and observed data (Muthén & Asparouhov, 2012). At least two MCMC chains were run in parallel to monitor model convergence, which was then assessed using both graphical inspection of the trace plot and the Gelman-Rubin potential scale reduction (PSR) factor

(Asparouhov & Muthén, 2010; Gelman, Meng, & Stern, 1996). The convergence is supported if the trace plot shows that multiple independent chains appear to be stationary and the PSR value is less than 1.05 (Asparouhov & Muthén, 2010). Thereafter, model fit was assessed using a posterior predictive *p*-value (PPP), which represents the deviation between the generated data and the observed data; PPP values below .05 are indicative of poor fit, whereas values around .5 indicate a good fit. A Bayesian credible interval (CrI) estimate was also constructed, with the estimate being considered significant when the CrI did not encompass zero. The CrI is akin to but also different from the frequentist confidence interval (CI) estimate, given that the CrI is interpreted in a distinct manner; for example, the interpretation for 95% CI is that 95% of the intervals via repeated sampling contain the true population value, whereas 95% CrI is interpreted as a 95% probability that the population value is between the given upper and lower bounds (van de Schoot et al., 2014). The current analysis employed a minimum of 10000 iterations each for two independent MCMC chains to generate posterior distribution. Noninformative priors for the regression coefficients and independent inverse gamma priors for the variance parameters were used, given that they are most frequently used in Bayesian regression analysis (Gelman, Carlin, Stern, & Rubin, 2004; L. Wang & Preacher, 2015).

4.4.4. Hierarchical Regression Analysis

Bayes factors were notated as BF_{mn}, with *BF* representing the Bayes factor, *m* representing the first specified model, and *n* representing the model compared to *m*. The analysis computed the likelihood in favor of the data of *m* as contrasted to the data of *n*. In the current analysis, BF_{mn} represents the comparison between the selected model and the previous model, providing the ability to compare the relative additional contribution of the

previous model. A *BF* greater than 3 represents significant evidence supporting the selected model over the compared model, and a *BF* greater than 10 represents strong evidence.

4.4.5. Moderated Mediation Analysis

The index was the same as the Bayesian mediation analysis.

Chapter 5: Results

5.1. Descriptive Statistics

Data were first checked for outliers. According to Tabachnick and Fidell (1996), a case is an outlier if the *z*-score for the variable is above or below 3.29. For the analyses of observed parenting, one mother in the macro-coded limit setting data and another case in the micro-coded data were both determined to be outliers and therefore dropped; both cases were retained for analyses other than observed parenting. As shown in the Table 1, 40 caregivers did not attend the second assessment. To determine whether one-time and returning caregivers differed statistically on the main variables, independent sample *t*-tests were conducted to compare continuous measures. The results showed that caregivers who returned at T2 did not differ significantly from those who only participated at T1 on SES ($t = 1.56$, $p = .12$), neuroticism ($t = 1.66$, $p = .10$), or perspective taking ($t = -.06$, $p = .96$). Returning caregivers were also not significantly different from one-time caregivers in observed limit setting behaviors, both in terms of macroscopic ($t = .659$, $p = .512$) and microscopic coding ($t = 1.515$, $p = .132$); however, returning caregivers exhibited significantly higher self-reported negative limit setting behaviors ($t = 2.21$, $p < .05$). It may be that caregivers who perceived that they had greater disciplinary difficulties or negative behaviors were more likely to participate in the research.

5.2. Hypothesis 1: Relations Between Impulsivity and Limit Setting

Table 2 displays the Pearson correlation coefficients between pairs of main variables, in addition to their corresponding Bayes factors. The results showed an extremely strong correlation between T1 neuroticism and T1 self-reported negative limit setting ($r = .422$, $BF_{10} = 38502.730$), as well as a moderate correlation between T1 neuroticism and T2 self-reported

negative limit setting (r = .261, BF_{10} = 3.061), results that supported Hypothesis 1a. On the other hand, the results also provided evidence that T1 neuroticism is not correlated to either macro-coded (r = -.007, BF_{10} = 0.122) or micro-coded observed negative limit setting (r = -.009, BF_{10} = 0.112), which were contrary to Hypothesis 1a.

There was moderate evidence that T2 parental delay discounting was related to T2 negative limit setting (r = .279, BF_{10} = 4.959), providing evidence supporting Hypothesis 1b.

5.3. Hypothesis 2: Relations Between Impulsivity and Household Chaos

As shown in Table 2, a moderate correlation exists between T2 household chaos and T1 parental neuroticism (r = .276, BF_{10} = 4.609), supporting Hypothesis 2a. Moreover, there was an extremely strong correlation between T2 household chaos and T2 delay discounting (r = .437, BF_{10} = 1771.871), supporting Hypothesis 2b.

5.4. Hypothesis 3: Relations Between Household Chaos and Limit Setting

As shown in Table 2, the results provided extremely strong evidence for the correlation between T2 household chaos and T2 negative limit setting (r = .563, BF_{10} = 3.797e+6), supporting Hypothesis 3.

5.5. Hypothesis 4: Mediating Role of Household Chaos

Household chaos was only measured as a potential mediator at T2. In addition, it was applied to test the indirect effect of delay discounting on limit setting, where only T2 data was used; by comparison, in testing the indirect effect of neuroticism on limit setting, data from both time points was used. For all analyses, child age, child gender, and family SES were controlled for in the model.

Figures 4 and 5 respectively present the basic mediation models for neuroticism and for delay discounting based on Bayesian estimations, along with the path coefficients for each path. Table 3 provides an overview of the results regarding standardized direct effects of a selected variable on another.

5.5.1. Hypothesis 4a

In support of Hypothesis 4a, results suggest that the effects of T1 parental neuroticism on T2 limit setting behaviors may be mediated by household chaos, extending the existing literature. In other words, greater parental neuroticism was related to greater household chaos, which in turn was related to greater negative limit setting behaviors. These patterns were essentially consistent even after controlling for the effects of family SES.

Table 3 displays both Bayesian and 95% CrI estimates for the direct relationships between variables, while Figure 4 presents the basic mediation model based on the Bayesian estimation. As shown in Table 3, family SES was a significant variable associating with both household chaos and limit setting behaviors, and was therefore included in the main analysis. Baseline parental limit setting behavior, child age, and child gender at T1 were all controlled for.

The results of ML estimations with bootstrapping showed that the data did not fit the model well (χ^2 = 10.958, p = .052, CFI = .938, TLI = .813, RMSEA = .095, SRMR = .093). Although both were accounted for in the model, neither child age (β = .044, 95% CI = [-.128, .216], p = .616) nor gender (β = .056, 95% CI = [-.116, .229], p = .522) was a predictor of T2 negative limit setting behaviors. It was found that household chaos accounted for a significant proportion of the relation between T1 family SES and T2 negative limit setting, with an unstandardized estimation of -.057, 95% CI of [-.098, -.015], and a p-value less than .01. Yet the indirect effect of T1 parental neuroticism on T2 negative limit setting

through household chaos was only marginally significant when family SES was controlled for in the mediation model, with an unstandardized estimation of .039, 95% CI of [-.005, .082], and a *p*-value of .084. The model explained around 42.6 % of total T2 negative limit setting behaviors.

The Bayesian estimations revealed that the probability of the hypothesized model demonstrated a good fit (PPP = .268). Model convergence was supported by a final PSR value of less than 1.05. Although both were accounted for in the model, neither child age (β = .043, 95% CrI = [-.106, .190]) nor gender (β = .051, 95% CrI = [-.106, .198]) was a predictor of T2 negative limit setting behaviors based on the Bayesian estimation. As shown in Figure 4, both indirect relationships were significant. In other words, T2 household chaos mediated the association between T1 SES and T2 negative limit setting, with an unstandardized estimation of -.057 and a 95% CrI of [-.106, -.018]. Beyond the effect of SES, the indirect effect of T1 parental neuroticism on T2 negative limit setting mediated via household chaos was also significant, with an unstandardized estimation of .038 and a 95% CrI of [.003, .083]. The path model of the relationship between parental neuroticism and limit setting, as illustrated based on Bayesian estimations in Figure 4, explained around 43.9% of the total negative limit setting behaviors at T2.

The Bayesian estimation provided an opportunity to yield evidence supporting or disproving the model. Results showed that the Bayesian estimates corroborated the frequentist estimation with regards both to magnitude and direction, with differences emerged only in terms of the statistical relevance of the effects. Specifically, the marginal index of good fit under the frequentist method was good with the Bayesian estimation. These findings suggested that household chaos mediated the relationship between T1 parental neuroticism and T2 limit setting behaviors after controlling for T1 limit setting behaviors and demographic variables, supporting Hypothesis 4a overall.

5.5.2. Hypothesis 4b

As parental delay discounting was measured at Time 2, the examination of the association between delay discounting and limit setting was based on cross-sectional data. As family SES was not expected to change significantly within 10 months, T1 family SES was included in the main analysis with child age and gender as covariates. Table 3 displays both Bayesian and 95% CrI estimates for the direct relationships between variables, while Figure 5 presents the basic mediation model based on the Bayesian estimation.

The results of ML with bootstrapping showed that the data fit the model well (χ^2 = 1.962, p = .375, CFI = 1.000, TLI = 1.003, RMSEA = .000, SRMR = .039). Although both were accounted for in the model, neither child age (β = .034, 95% CI = [-.145, .205], p = .710) nor gender (β = .014, 95% CI = [-.170, .186], p = .877) was a predictor of T2 negative limit setting behaviors. It was found that household chaos accounted for a significant proportion of the relation between family SES and T2 negative limit setting, with an unstandardized estimation of -.068, 95% CI of [-.125, -.030], and p-value less than .01. Additionally, the indirect effect of parental delay discounting on negative limit setting through household chaos was significant over and beyond family SES, with an unstandardized estimation of .100, 95% CI of [.047, .172], and p-value less than .01. The model explained around 32.7% of total T2 negative limit setting behaviors.

Bayesian estimations showed that the probability of the hypothesized model demonstrated a good fit (PPP = .488). Model convergence was supported through a final PSR value of less than 1.05. Although both were accounted for in the model, neither child age (β = .037, 95% CrI = [-.130, .193]) nor gender (β = .006, 95% CrI = [-.163, .171]) was a predictor of T2 negative limit setting behaviors based on the Bayesian estimation. As shown in Figure 5, household chaos mediated the association between family SES and negative limit

setting, with an unstandardized estimation of -.070 and 95% CrI of [-.126, -.025]. Beyond the effect of SES, the indirect effect of parental delay discounting on negative limit setting mediated via household chaos was also significant, with unstandardized estimation of .096 and 95% CrI of [.044, .160]. The path model of the relationship between parental neuroticism and delay discounting, as illustrated based on Bayesian estimations in Figure 5, explained around 34.1% of the total negative limit setting behaviors at T2.

The Bayesian estimation corroborated the MLR estimation both in terms of magnitude and direction, differing only in the confidence interval, therefore supporting Hypothesis 4b.

5.6. Hypothesis 5: Moderating Role of Perspective Taking

5.6.1. Hypothesis 5a

Both self-reported and observed parental limit setting were measured at T1. For the macro-coded limit setting behaviors, 27 caregivers did not participate in the 3-minute limit setting task and were therefore coded as missing data. Moreover, one case was determined to be an outlier as the *z*-score for the variable exceeded 3.29. Finally, one mother in the macro-coded limit setting data and another case in the micro-coded data were both determined to be outliers; the scores for these cases were therefore deleted. A total of 104 video cases were left for analysis of the observed limit setting behavior. As noted above, parent limit setting behavior was observed using both macroscopic and microscopic coding. The negative limit setting at both scales was highly correlated to each other ($r = .638$, $p < .001$). The two scales were therefore standardized and the total score was taken as an index of observed negative limit setting behavior. Using T1 data, the hypothesis of whether parental perspective taking moderates the direct effect of neuroticism on negative limit setting was tested separately using self-reported and observed data. Both standard regression techniques and the Bayes

factors were used to provide robust information (Liang, Paulo, Molina, Clyde, & Berger, 2008; Rouder & Morey, 2012). Using data from both time points enabled analysis of change in parental negative limit setting over time controlling for initial parenting.

The independent variables were entered into the regression in three blocks: 1) child age, child gender, and family SES were first entered as covariates to account for differences between age and gender groups; followed by 2) parent neuroticism and perspective taking ability; and finally, by 3) the two-way interaction between neuroticism and parental perspective taking. Tables 4.1 and 4.2 displayed the results of the regression analyses for self-reported limit setting concurrently and longitudinally. Table 5 displayed the results of the regression of observed limit setting. Specifically, the results of concurrent self-reported limit setting were generally consistent with Hypothesis 5a, albeit marginally significant, while the results of longitudinal self-reported limit setting did not support hypothesis 5a. The results for observed limit setting did not support Hypothesis 5a.

As shown in Table 4.1, demographic variables were not direct predictors of self-reported limit setting. Together, the three variables accounted for 2.7% of the variance in negative limit setting. Parent neuroticism and perspective taking ability, entered second into the regression, significantly explained an additional 21.2% of the variance. The interaction between parent neuroticism and perspective taking provided a marginally significant contribution to the explanation of parent negative limit setting, in addition to the main effects of all the predictors, explained a further 2.2% of the variance. The final model, which included all the predictors and the interaction term, was significant ($F(6, 126) = 7.427$, $p < .001$). Bayes factor analysis showed that the model which included the two main predictors was more supportive of the alternative hypothesis over Model 1 ($BF = 27.385$). Moreover, compared to Model 2, which lacked the interaction term, the data provided anecdotal

evidence for Model 3, which included the interaction term (*BF* = 1.65), corresponding to the marginal significance concluded from traditional linear regression analysis.

As shown in Table 4.2, demographic variables were not direct predictors of self-reported limit setting, while limit setting at Time 1 significantly predicted limit setting at Time 2, (β = .520, p < .000, 95 % CI = [.349, .719]). Together, the four variables accounted for 32.2% of the variance in negative limit setting. Parent neuroticism and perspective taking ability, entered second into the regression, were both also not related to limit setting; the interaction between parent neuroticism and perspective taking did not contribute significantly to the explanation of parent negative limit setting at Time 2. Bayes factor analysis showed that limit setting at Time 1 was a strong predictor of limit setting at Time 2 (BF = .30076.373). The data also did not provide evidence for supporting Model 3, which included the interaction term (BF = 1.257). Overall, the results of longitudinal analysis on self-reported limit setting did not support hypothesis 5a.

As shown in Table 5, demographic variables were not related to observed parent limit setting behaviors. Together, the three variables accounted for 4.6% of the variance in negative limit setting. Parent neuroticism and perspective taking ability, entered second into the regression, were both also not related to observed limit setting; the interaction between parent neuroticism and perspective taking did not contribute significantly to the explanation of parent negative limit setting in conjunction with the effects of main variables and covariates. The final model 3, which included all the predictors as well as the interaction term, was not significant, ($F(6, 97) = 1.080$, p = .380). Bayes factor analysis showed that the model including the two main predictors was not more supportive of the alternative hypothesis over Model 1 (*BF* = .201). Moreover, compared to Model 2, which lacked the interaction term, the data also did not provide evidence for supporting Model 3, which

included the interaction term (*BF* = .741). Overall, the observed data did not support Hypothesis 5a.

5.6.2. Hypothesis 5b

Only self-reported parental limit setting data was measured at T2. Hierarchical regression was used to test whether parental perspective taking moderates the relationship between parental delay discounting and limit setting. The independent variables were entered in three blocks: 1) child age, child gender, and family SES were entered as covariates; followed by 2) parent delay discounting and perspective taking ability; and finally, by 3) the two-way interaction between delay discounting and parental perspective taking. Table 6 represents the results of the regression analysis.

As shown in Table 6, demographic variables were not related to parent self-reported limit setting behaviors at T2. Together, the three variables accounted for 6.9% of the variance in negative limit setting. Parent delay discounting and perspective taking ability, entered second into the regression, were both significantly related to parent limit setting, contributing an explanation for an additional 20.3% of the variance. Caregivers with a higher delay discounting level (more impulsive) tend to display greater negative limit setting behaviors (β = .213, $p < .05$, 95 % CI = [.012, .187]); conversely, caregivers with higher perspective taking ability tend to display less negative limit setting behaviors (β = -.379, $p < .000$, 95 % CI = [-.261, -.088]). Finally, the interaction between parent neuroticism and perspective taking did not significantly explain parent negative limit setting when analyzed in conjunction with the effects of main variables and covariates. The final model 3, which included all the predictors as well as the interaction term, was not significant ($F(6, 97) = 1.080$, $p = .380$). Bayes factor analysis showed that model 2 which includes the two main predictors was supported over Model 1 (*BF* = 1418.873). Moreover, compared to Model 2,

which lacked the interaction term, the data also did not provide evidence for supporting Model 3, which included the interaction term (*BF* = .412). Overall, the data did not support Hypothesis 5b.

5.7. Hypothesis 6: Integrated Moderated Mediation Relationships

5.7.1. Hypothesis 6a

Table 7 presents the results of the analysis evaluating whether the indirect effects of parental neuroticism on self-reported negative limit setting behaviors through household chaos at T2 (10 months later) were conditioned by parental perspective taking, which were controlled for demographic characteristics and prior self-reported negative limit setting (baseline). As discussed previously, parental perspective taking did not moderate the direct association between neuroticism and limit setting in the model, providing no support for Hypothesis 5a. Interestingly, parental perspective taking emerged as a protective factor in terms of attenuating the risky influence of parental neuroticism on household chaos, in turn influencing limit setting, which supports Hypothesis 6a.

The indirect effects relationship was first estimated from 1000 bias-corrected bootstrap samples, with parent neuroticism as the predictor, parental perspective taking ability as the moderator, household chaos as the mediator, and T2 negative limit setting as the outcome. Family SES was included as a contributor to the model, while child age and child gender were controlled as covariates, and T1 limit setting was controlled as the baseline. Results revealed that the model fit the data well (χ^2 = 12.483, p = .131, CFI = .960, TLI = .881, RMSEA = .073, SRMR = .052). As shown in Table 7, the effect of the interaction term (neuroticism*perspective taking) on limit setting was not significant (β = -.056, 95% CI = [-.192, .080], p = .419); however, the data showed that parent perspective taking ability marginally moderated the relationship between parent neuroticism and household chaos (β =

-.181, 95% CI = [-.390, -.028], p = .09). The test of moderated mediation effects was also marginally significant (β = -.060, 95% CI = [-.132, .012], p = .100), indicating that the indirect effect of parental neuroticism on negative limit setting through household chaos did not differ statistically at varying levels of parent perspective taking ability. Despite this statistical insignificance, the results displayed the tendency that the indirect effect was stronger for caregivers who had lower perspective taking ability; for example, when the value of perspective taking was at 2*SD* below the mean, the indirect effect was β = .070, with a 95% CI of [-.022, .161] and p-value of .135, and when the value was at 1*SD* below the mean, the indirect effect was β = .040, with a 95% CI of [-.021, .100] and p-value of .201. Conversely, when the value of perspective taking was at 1*SD* above the mean, the indirect effect was β = -.020, with a 95% CI of [-.065, .025] and p-value of .374, and when the value was at 2*SD* above the mean, the indirect effect was β = -.050, with a 95% CI of [-.121, .021] and p-value of .164. Additionally, the results showed that parental perspective taking did not moderate the effect of family SES on either household chaos (β = .092, 95% CI = [-.082, .266], p = .300), or limit setting (β = .024, 95% CI = [-.124, .173], p = .746). The model explained around 48.8% of total T2 negative limit setting behaviors.

Thereafter, the indirect effects relationship was estimated using Bayesian moderated mediation, with parent neuroticism as the predictor, parental perspective taking ability as the moderator, household chaos as the mediator, and T2 negative limit setting as the outcome. Family SES was included as a contributor to the model, while child age and child gender were controlled as covariates. The results showed the model demonstrated a good fit (PPP = .354). Model convergence was supported by a final PSR value of less than 1.05. As shown in Table 7, there was a significant interaction between parental neuroticism and perspective taking on household chaos (β = -.171, 95% CrI = [-.328, -.009]), but not directly on limit setting (β = -.053, 95% CrI = [-.200, .092]). Furthermore, the moderated mediation test was

significant (β = -.060, 95% CrI = [-.131, -.003]), indicating that the indirect effect of parental neuroticism on negative limit setting through household chaos differed at varying levels of parent perspective taking ability. The Bayesian estimation provided more evidence to interpret the marginal results of the frequentist method. Figure 6 depicts the Bayesian moderated mediation model of parental neuroticism as a loop plot. As can be seen, household chaos mediated the effect of parental neuroticism on limit setting at lower values of parental perspective taking. For instance, at 2*SD* below the mean, the indirect effect was β = .070 with a 95% CrI of [.002, .153]. Yet at higher values of parental perspective taking, household chaos did not mediate the effect of neuroticism on limit setting. For example, at 1SD above the mean, the indirect effect was β = -.020 with a 95% CrI of [-.074, .029], and at 2SD above the mean, the indirect effect was β = -.050 with a 95% CrI of [-.132, .020]. Moreover, the results showed parental perspective taking did not moderate the effect of family SES on either household chaos (β = .085, 95% CrI = [-.084, .244]) or limit setting (β = .023, 95% CrI = [-.122, .166]). The model explained 48.7% of the variance in T2 negative limit setting behaviors. Overall, the current results provided evidence for Hypothesis 6a.

5.7.2. Hypothesis 6b

The Bayesian integrated moderated mediation model is shown in Table 8 and pictured in Figure 7. In general, the results of the integrated model did not support Hypothesis 5b; in contrast, they provided support for Hypothesis 6b. The indirect effect of parental delay discounting on limit setting through household chaos was not significant when caregivers were characterized by a high degree of perspective taking. Specifically, the indirect effect was nonsignificant for caregivers with a perspective taking score of 1*SD* above mean and greater, but significant for caregivers with a score lower than 1*SD* above the mean.

The indirect effects relationship was first estimated from 1000 bias-corrected bootstrap samples, with parental delay discounting as the predictor, parental perspective taking ability as the moderator, household chaos as the mediator, and T2 negative limit setting as the outcome. Table 8 presents the results of the analysis examining whether the indirect effect of parental delay discounting on negative limit setting through household chaos varies depending on the level of parental perspective taking. Results revealed that the model fit the data well (χ^2 = 8.468, p = .389, CFI = .995, TLI = .990, RMSEA = .025, SRMR = .070). As shown in Table 8, although the effect of the interaction term (delay discounting*perspective taking) on limit setting was not significant (β = .006, 95% CI = [-.169, .181], p = .943), the data showed that parent perspective taking ability moderated the relationship between parent delay discounting and household chaos (β = -.210, 95% CI = [-.361, -.059], p = .006). Furthermore, the moderated mediation test was significant (β = -.071, 95% CI = [-.137, -.005], p = .034), indicating that the indirect effect of parental delay discounting on negative limit setting through household chaos was likely to differ at varying levels of parent perspective taking ability statistically. The results displayed the tendency that the indirect effect was stronger and more significant for those caregivers who have lower perspective taking ability; for example, when the value of perspective taking was at 2*SD* below the mean, the indirect effect was β = .143, with a 95% CI of [.040, .245] and p-value less than .01, and when the value was at 1*SD* below the mean, the indirect effect was β = .107, with a 95% CI of [.034, .180] and p-value less than .01. Conversely, when the value of perspective taking was at 1*SD* above the mean, the indirect effect was β = .036, with a 95% CI of [-.005, .077] and p-value of .088, and when the value was at 2*SD* above the mean, the indirect effect was β = .000, with a 95% CI of [-.056, .056] and p-value of .994. Additionally, the results showed that parental perspective taking did not moderate the effect of family SES on either household chaos (β = -.106, 95% CI = [-.264, .052], p = .186) or limit

setting (β = -.057, 95% CI = [-.233, .118], p = .583). The model explained around 34.2% of total T2 negative limit setting behaviors.

Thereafter, the indirect effects relationship was estimated using Bayesian moderated mediation, with parental delay discounting as the predictor, parental perspective taking ability as the moderator, household chaos as the mediator, and T2 negative limit setting as the outcome. Family SES was included as a contributor to the model, while child age and child gender were controlled as covariates. The results showed the model demonstrated a good fit (PPP = .479). Model convergence was supported by a final PSR value of less than 1.05. As shown in Table 8, there was a significant interaction between parental delay discounting and perspective taking on household chaos (β = -.201, 95% CrI = [-.344, -.048]), but not on limit setting (β = .006, 95% CrI = [-.162, .175]). Furthermore, the moderated mediation test was significant (β = -.142, 95% CI = [-.306, -.024]), indicating that the indirect effect of parental delay discounting on negative limit setting through household chaos differed at varying levels of parent perspective taking ability. Figure 7 depicts the Bayesian moderated mediation model of parental delay discounting as a loop plot. As can be seen, household chaos mediated the effect of parental delay discounting on limit setting at lower values of parental perspective taking. For instance, at 2*SD* below the mean, the indirect effect was β = .143 with a 95% CrI of [[.046, .268], and at 1*SD* below the mean, the indirect effect was β = .107 with a 95% CrI of [.037, .196]. Yet at higher values of parental perspective taking, household chaos did not mediate the effect of delay discounting on limit setting. For example, at 1SD above the mean, the indirect effect was β = .036 with a 95% CrI of [-.002, .087], and at 2SD above the mean, the indirect effect was β = .000 with a 95% CrI of [-.064, .064]. Moreover, the results showed that parental perspective taking did not moderate the effect of family SES on either household chaos (β = -.101, 95% CI = [-.257, .060]) or limit setting (β = -.054, 95% CI = [-.226, .118]).

The model explained 36.1% of the variance in T2 negative limit setting behaviors. Overall, the data provided support for Hypothesis 6b.

5.8. Summary of the Results

The present study aimed to achieve two main goals, namely to test the mediating role of household chaos underlying the relationship between parental impulsivity and limit setting, as well as to test the moderating role of parental perspective taking in the relationship between parental impulsivity and limit setting. To achieve these goals, the study examined a series of hypotheses, with Hypotheses 1a through 4b addressing the first goal, Hypotheses 5a and 5b addressing the second goal, and Hypotheses 6a and 6b addressing the integration of both goals.

Table 9 displays a summary of the results concerning these hypotheses. As shown in Table 9, Hypotheses 1a through 4b were all supported. Both parental neuroticism and delay discounting were related to negative limit setting. Parental neuroticism was related to more chaotic household situations, which in turn related to more negative limit setting behaviors, controlling for limit setting at T1. Mediation analysis based on T2 data also showed that household chaos significantly mediates the relationship between parental delay discounting and negative limit setting. Hypotheses 5a and 5b were not supported, indicating that parental perspective taking does not moderate the direct relationship between neuroticism and limit setting, nor the direct relationship between delay discounting and limit setting. Yet statistical analysis results provide evidence for Hypotheses 6a and 6b. Specifically, parental perspective taking moderates the indirect relationship between parental neuroticism and limit setting mediated via household chaos, supporting Hypothesis 6a. Parental perspective taking also moderates the indirect relationship between parental delay discounting and limit setting mediated via household chaos, supporting Hypothesis 6b.

Chapter 6: Discussion

The goals of the current study were to explain "how" and "when" parental impulsivity hampers limit setting behaviors. Adopting a process-oriented approach (Belsky, 1984), the present study first addressed the question of "how" through testing how household chaos served as an explanatory mechanism underlying the relationship between parental impulsivity and limit setting. Dual-system models of parenting stress the interplay of the impulsive system and the controlled system in shaping parenting behaviors (Sturge-Apple et al., 2019, 2015, 2014). Within these frameworks, the present study then addressed the question of "when" through examining whether parental perspective taking moderates the influence of parental impulsivity on limit setting.

Several important results emerged from the findings. First, in terms of the results obtained from Bayesian estimates, both self-reported and behavioral parental impulsivity were found to relate to greater negative limit setting behaviors and household chaos; moreover, household chaos was found to relate to negative limit setting behaviors. Next, the mediation model suggests that household chaos is an important mechanism linking the relationship between parental impulsivity and limit setting behaviors. Thereafter, findings from both the moderation model and moderated mediation model suggest that parental perspective taking only moderated the indirect relationship between impulsivity and limit setting mediated via household chaos. Specifically, the effect was only significant when caregivers have low perspective taking ability, while when caregivers had higher perspective taking abilities, the relationship was not significant anymore.

6.1. Parental Impulsivity and Negative Parenting

6.1.1. Parental Neuroticism and Limit Setting

Generally speaking, a higher level of parental neuroticism was associated with a higher level of inappropriate limit setting behaviors. This relationship replicates the findings of the previous research (Oliver et al., 2009), which has shown that highly neurotic parents tend to get anxious and nervous easily, as well as lack emotional stability (Vondra & Belsky, 1993), therefore making it difficult for them to calmly establish appropriate limits for their children. The results of the current study support and extend those in prior literature regarding the links between parent personality and parenting behaviors.

Nevertheless, the correlation analysis showed that parent neuroticism did not associate with observed parenting behaviors. This could be due to the variations among different methods used to assess the constructs. Researchers have suggested that questionnaires are more likely to measure parent attitudes or beliefs regarding their behaviors, whereas observations are more likely to uncover the actual behaviors specific to the situation (Bornstein, Cote, & Venuti, 2001). It is possible that stronger relations were found between variables when similar methods were used (Bornstein, Cote, & Venuti, 2001; Cote & Bornstein, 2000). Another potential explanation for the non-significant effect of observed parenting is that the hypothesized effect may be attenuated, amid the short laboratory observation being unable to adequately capture the full extent of day-to-day parenting activities, especially negative parenting behaviors. Moreover, caregivers were aware that they were being video-recorded in a laboratory context, which would influence the frequency of inappropriate behaviors, such as assertions of power, yelling, or spanking.

Furthermore, the weak relations between self-reported and observed limit setting calls for caution when interpreting results obtained from different assessments of parenting behaviors, as each method has its own strengths and limitations. Previous literature has

suggested that results obtained using one method may not necessarily coordinate with those obtained using another method (Bornstein, Cote, & Venuti, 2001); many studies have examined the correspondence between self-reported and observed parenting measures, either failing to find an association between the two, or otherwise only finding a weak link (Bornstein et al., 2001; Cote & Bornstein, 2000; Tulviste, Mizera, De Geer, & Tryggvason, 2003). Given that self-reporting and observation methods have their own advantages and disadvantages, they are complementary with each other in their explanations of parenting behaviors (Bornstein et al., 2001). Future research should adopt multiple approaches simultaneously to conduct the most comprehensive investigation possible of parenting.

6.1.2. Parental Delay Discounting and Limit Setting

The current study found significant correlations between parental delay discounting and self-reported negative limit setting. This is important as although researchers have hypothesized that parental delay discounting may influence parenting practices, past studies have failed to find consistent evidence of the direct association between the two, with one study proposing that a significant zero-order correlation between parent delay discounting and parenting behaviors exists (Friedman et al., 2016), while others have not made such propositions (Harrison, 2017; Peviani et al., 2019). The results of the current study therefore reconcile certain inconsistencies in the prior literature.

6.2. Household Chaos as a Mediator

6.2.1. Parental Neuroticism Predicted Parenting Through Household Chaos

The present data provides evidence for the potential mediation effect of household chaos, under which higher parental neuroticism is related to a more chaotic household environment, thereby resulting in greater negative limit setting behaviors. More importantly,

the mediation effect remained significant even when family SES was controlled for in the model. The results were similar to another model that found that parental temperamental effortful control–a key construct that is considerably related to neuroticism (D. E. Evans & Rothbart, 2007)–was linked to a less chaotic household environment among parents of school-aged children (Valiente et al., 2007).

One possible explanation for this finding relating parental neuroticism to household chaos is that neuroticism has an independent influence on noise sensitivity, which might prevent parents from effectively dealing with noise, thereby subjectively rating it to be higher (Belojevic, Jakovljevic, & Slepcevic, 2003; Shepherd, Heinonen-Guzejev, Hautus, & Heikkilä, 2015). Given that a chaotic household environment is usually characterized by crowdedness and noisiness, neurotic parents who tend to be noise-sensitive are more likely to display symptoms of anger, anxiety, and nervousness than their non-neurotic counterparts (Iwata, 1984), resulting in more inappropriate parenting behaviors (Berg-Nielsen, Vikan, & Dahl, 2002). Another potential explanation is based on the hypothesis that neuroticism reflects basic emotional dimension (Canli, 2004; Watson et al., 1999). Parents who are highly neurotic tend to get anxious and nervous easily, as well as lack emotional stability (Vondra & Belsky, 1993), thereby make it difficult for them to create a structured, organized, and quiet family environment.-A third explanation suggests that neurotic parents appears to have children with more internalizing and externalizing problems due to genetic influence (Ellenbogen & Hodgins, 2004); previous research has suggested that the probability of a child inheriting neuroticism from parents is .31 (Pedersen, Plomin, McClearn, & Friberg, 1988). In any case, the results of the current study add to the growing literature linking parent characteristics and parenting by acknowledging the mechanism of household chaos.

6.2.2. Parental Delay Discounting Related to Parenting Through Household Chaos

The current study found a direct association between parental delay discounting and household chaos, replicating and extending the results of previous research that was aimed at parents of adolescent children (Peviani et al., 2019). As discussed in previous research, this relationship may be because behaviors related to parental delay discounting–such as unplanned, rapid reactions to stimuli and impulsive decision making–might lead to greater family stress and a more chaotic household environment. Given that the current results suggest that a mediation effect of household chaos underlies the relationship between parental impulsivity and parenting, perhaps inconsistencies regarding the relationship between delay discounting and parenting behaviors across previous studies were due to the omission of considering household chaos as a mediating factor or of testing this mediation effect. For example, in the study by Peviani et al. (2019), parent delay discounting was found to relate to increased household chaos, and household chaos was found to related to harsher parenting of adolescents. However, they did not test whether parent delay discounting was indirectly related to harsh parenting through household chaos. In another study, Harrison (2017) included both self-reported impulsivity and delay discounting in the final parenting model, whose results showed that while delay discounting had no direct effect on parenting practice, it did predict parenting knowledge, which in turn predicted laxness and overreactivity; however, Harrison also did not report a mediation test. Although these studies did not explicitly test the mediating effects of household chaos, their results do reveal that parental delay discounting might be indirectly correlated to parenting behaviors via other variables. Only one study (Friedman et al., 2016) suggested a direct association between parental delay discounting and parenting; however, this association was moderated by the child's characteristics rather than the parent's. When measuring delay discounting among parents of

youth between ages 10 to 12, Friedman et al. (2016) found that parental delay discounting was positively related to parenting problems among sons with highly problematic behaviors. The results of the current study therefore build on previous works by suggesting that delay discounting actually does have an indirect effect on inappropriate parenting as mediated through a chaotic household environment.

Another strength of the results of the current study is the inclusion of family SES in the model as a main covariate in the analysis. Substantial research on the association between SES and parenting (Hoff, Laursen, Tardif, & Bornstein, 2002; Roubinov & Boyce, 2017), as well as between SES and household chaos (G. W. Evans, Eckenrode, & Marcynyszyn, 2010; G. W. Evans et al., 2005), has suggested that parenting within families of lower SES appears to be harsher and poorer (Luthar & Latendresse, 2005; Repetti, Taylor, & Seeman, 2002), and the household environment tends to be more chaotic (G. W. Evans et al., 2005), compared to families of higher SES. The results of the current study therefore advance the previous work by suggesting that the effect of delay discounting on parenting is over and beyond the influence of family SES.

Although not directly related to the research questions of the current study, the results showed that household chaos mediated the relationship between family SES and negative limit setting, in addition to explaining additional variance in limit setting. This finding is aligned with those of previous work suggesting that parents of lower education levels and incomes are more susceptible to experiencing chaotic household environments (G. W. Evans et al., 2010; Whitesell et al., 2015), in turn leading to poorer parenting (Coldwell et al., 2006; Corapci & Wachs, 2002; Whitesell et al., 2015). To our knowledge, the present study was the first to investigate the links between delay discounting and parenting while considering the effect of family SES in the model.

6.3. Parental Perspective Taking as a Moderator

6.3.1. Perspective Taking Buffers the Risk of Neuroticism on Household Chaos

In both the hierarchical regression and integrated moderated mediation models, parental perspective taking did not moderate the direct association between neuroticism and limit setting. Interestingly, parental perspective taking emerged as a protective factor in terms of attenuating the risk influence of parental neuroticism on household chaos. In other words, the indirect association between parental neuroticism and negative limit setting mediated via household chaos was dependent on the level of parental perspective taking. Specifically, when caregivers had higher levels of perspective taking ability, the association between parent neuroticism and negative limit setting became nonsignificant (Figure 6). These findings raised the possibility that when coupled with perspective taking, parental neuroticism may not necessarily be associated with negative outcomes in parenting.

There were several reasons to believe that neuroticism and perspective taking jointly influence household environment. First, the findings of the current study were congruent with prior research that attested the role of parental perspective taking in promoting appropriate parenting behaviors (Clark et al., 2000; Lundell et al., 2008; Manczak et al., 2017). As a core skill of mentalizing abilities, perspective taking was suggested to be a relatively effortful process, rather than an automatic one (Epley et al., 2004; Lin et al., 2010), that likely promotes parental reflection and rationalization in distressing situations. In contrast, parental neuroticism is a vulnerability when dealing with stressful situations, as neurotic parents tend to lack emotion stability, resulting in reactive, impulsive and inappropriate responses (Le Vigouroux et al., 2017; Prinzie et al., 2009). Supporting the dual-system theory of parenting, the impulsive and controlled systems work together interactively to predict the parental abilities of maintaining routines and planning.

Another possible explanation may be that although neurotic parents tend to raise children with more problem behaviors (Ellenbogen & Hodgins, 2004), children would perceive their parents to be warm and supportive if the parents take their perspectives into consideration, likely promoting their adjustments to their parents' neurotic behaviors and making less chaos in household (Chen, Liu, & Li, 2000).

6.3.2. Perspective Taking Buffers the Risk of Delay Discounting on Household Chaos

The results of the current study advance research on the link between parental delay discounting and negative parenting in several ways. First, the results found that parental delay discounting was indirectly related to negative parenting through household chaos, and that the direct relationship between the two was not significant when household chaos was included in the model. Secondly, the moderated mediation analysis suggested that parental perspective taking moderated the indirect relation between parent delay discounting and negative limit setting such that the association weakened as parental perspective taking ability increased. These findings provide some cues and evidence for potential intervention targets.

Previous research has suggested that higher parental delay discounting is related to greater household chaos (Peviani et al., 2019). It is plausible that the relationship likely varies depending on other parental characteristics such as perspective taking ability, given the researchers have argued that predictors of parenting not only exert their effects on parenting behaviors directly, but also interactively with each other (Taraban & Shaw, 2018). The results of the current study suggest that parental perspective taking might serve as a protective factor that buffers the negative influence of parental delay discounting on household chaos.

The results of the current study can be explained from several perspectives. One possible explanation might be that parents with higher perspective taking ability are more

likely to understand their children's thoughts and therefore help their children develop self-regulating abilities, learn rules, and establish routines; resulting in a less chaotic household environment. Another explanation is that parents who take the cognitive perspective of their children were likely to feel good and psychological well of themselves (Weinstein & Ryan, 2010), as well as competent and confident, thereby contributing to a structured and organized family environment (Jones & Prinz, 2005). It is also possible that parents with higher perspective taking ability appear to be more tolerant towards frustration (Graumann, 1996); they are therefore more likely to rate their household situation as less chaotic. A third explanation might be due to the self-reported measure of household chaos, which reflects the tendency that parents perceived their household to be chaotic. Parents who have higher perspective taking ability might perceive the household situation from multiple perspectives, including the limited space in the household or the child's developmental stage. Consequently, they may not have high expectations of their household situation, resulting in relatively low ratings of household chaos. Even if the situation is objectively chaotic, it is possible that such parents perceive it to be acceptable for a family with a toddler or preschooler.

Overall, the moderating effect of parental perspective taking on the link between parental delay discounting and limit setting was consistent with the dual-system theory of parenting, which theorizes that social behavior is determined by the interplay of an impulsive and a controlled process (Bickel et al., 2007; Hofmann et al., 2009; Strack & Deutsch, 2004). The findings indicate that impulsivity-related parental characteristics put parents at the risk of a chaotic household environment (Peviani et al., 2019). In contrast, parental perspective taking was hypothesized as a higher level of cognition where parents consider their own perspectives, as well as their children's perspectives and even the overall family environment. When parents have the disposition to react to their child in unplanned ways, perspective

taking ability may serve as a buffer that moderates the link between delay discounting and household chaos.

6.3.3. Perspective Taking Buffers the Indirect Relationships But Not the Direct Relationships

The results of the current study suggested that parental perspective taking moderated the indirect associations between parental impulsivity and negative limit setting through household chaos but not the direct associations between parental impulsivity and limit setting. There are several possible reasons to explain the fact that parental perspective taking did not buffer the direct relationship. First, the current study measured parent "general" perspective taking using items such as "I sometimes find it difficult to see things from the other person's point of view", instead of specific perspective taking in a dyadic context of parent-child interaction. Long (1990) argued that relations between an individual's general perspective taking and dyadic perspective taking were moderate, suggesting those who could take others' perspective-takers in general do not necessarily take the perspective of a partner or a child in the dyad. Therefore, it might be possible that instead of general perspective taking, dyadic perspective taking may exert the most influence in a specific context.

Secondly, according to the bioecological perspective (Bronfenbrenner & Morris, 2007; Cox & Paley, 1997), parental general perspective taking might affect parenting through the family environment or marital relationship, rather than directly through the parent-child relationship. Family is a hierarchically organized system consisting of smaller subsystems including parental, marital, and sibling relationships. Interactions occur within and across these embedded subsystems. The current model included both the parent-child system and the parent-environment system. It might be possible that parents who were general perspective-takers were likely to have spouses who take their perspectives too (Ohtaka & Karasawa,

2019), which might increase the spouses' domestic help in chores. As hypothesized, household situation served as a pathway linking parental impulsivity and dysfunctional limit setting, therefore parental general perspective taking was more likely to be effective in moderating the indirect relationships rather the direct relationships.

6.4. Strengths and Contributions of the Current Study

6.4.1. Theoretical Contributions

First, the current study built upon the previous dual-system model of parenting by adding to it the moderating role of parental perspective taking. Although previous research has demonstrated the importance of perspective taking in parenting (Manczak et al., 2017; Sher-Censor et al., 2015), no studies to date have investigated it within the dual-system model. Given the effortful nature of perspective taking (Epley et al., 2004; Lin et al., 2010), the findings provide further evidence that complex parenting process are influenced by parental cognitive abilities (Azar et al., 2008).

Second, the results showed that parental perspective taking moderates the influence of impulsivity on household chaos. The results complemented previous findings, since they suggest that parental cognitive ability not only directly influences parenting behaviors, but also affects the household environment, which in turn affects parenting behaviors. According to family systems theory, a family is a complex and integrated system where family members are interdependent and reciprocally influence each other; however, most of the previous research has only focused interrelations within subsystems such as the marital system, the co-parent system, or the parent-child system (Cox & Paley, 1997). It is also important to view the family subsystem and the physical environmental context as reciprocally influential on each other, given that the physical environment both influences and is influenced by the individual behavior of family members. For example, current research proposes that parental

characteristics influence the household environment that they inhabit, which in turn shapes their parenting behaviors. The current study contributes to extant research on family systems theory by supporting the existence of interrelations between parental characteristics and the physical environment.

Third, the present findings contribute to the literature by identifying that the physical environmental factor of household chaos serves as an important underlying mechanism of the relationship between parental impulsivity and parenting behaviors. According to Belsky's (1984) process model of parenting, parental characteristics not only influence parenting directly, but also indirectly through other contextual factors; however, previous research has disproportionately addressed the importance of social environmental contexts such as marital relationships and social support (Taraban & Shaw, 2018). Another line of research has demonstrated that the physical environment accounts for unique predictive variances in terms of infant development, even after controlling for variances associated with the social environment (Wachs, 1990); the current study therefore contributes to this line by emphasizing that parental characteristics also influence parenting indirectly through the physical environmental factor of household chaos.

Fourth, the current study contributes to the literature by providing another cultural perspective. Although consistent evidence for the negative impact of family chaos has been attested in Western society, researchers have argued whether such impacts are moderated by cultural difference worldwide. For instance, previous research has proposed that after a certain population density was reached, further crowdedness would have little influence on parents and children (Liddell & Kruger, 1989). The crowdedness in certain regions such as India or Hong Kong may very well exceed this threshold (Fuller, Edwards, Sermsri, & Vorakitphokatorn, 1993; Liddell & Kruger, 1989); however, it remains unclear whether household chaos has similar adverse influences on parenting in Hong Kong, a densely

populated city where 2-4 people share a room, as those attested in Western societies. The current study thus contributes to previous research by suggesting similar negative influences on parenting in the context of Hong Kong.

Fifth, the inclusion of impulsive choice contributes to the understanding of parenting from a decision-making perspective. Before a parent reacts to the child, either a conscious or an unconscious process is activated to decide between using harsh methods to obtain immediate compliance from the child, or using more time-consuming methods such as reasoning or discussion to develop the child's self-regulation ability for the future. The current study supports the idea that parents who prefer to obtain immediate gratification tend to display more negative limit setting behaviors; however, it should also be noted that parents who prefer delayed gratification may also employ negative limit setting strategies such as spanking or hitting if they think that such strategies are beneficial for child development in the long-term. If this is the case, parental attitudes and values regarding physical punishment may also be an important moderator. Future research may examine this possibility by including these attitudes and values as potential variables.

Sixth, although not associated with each other, neuroticism and delay discounting had similar impact on dysfunctional limit setting in the current study. These results suggested that the null correlation between the neuroticism and delay discounting is more than a measurement issue, instead, the two aspects might each tap on unique variances of impulsivity. These findings suggested avenues for future research on parental impulsivity. Research had shown although relations between the two aspects of the impulsivity were low to very low, correlations of measures within each aspect were moderate (Sharma et al., 2014). Future research may include other aspects of impulsivity in the same model. If the independent variables are associated with the outcome but were independent of each other,

the total predictive power would be increased. Additionally, the predictive power of each independent variable could be compared.

Lastly, the current study found that the moderated mediation relationship between impulsivity, perspective taking, household chaos, and limit setting is above and beyond the influence of family SES. It has been well-documented that socioeconomic adversity has a strong influence on family processes and child developmental outcomes (Conger, Conger, & Martin, 2010; Conger et al., 2002; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000; Roubinov & Boyce, 2017); however, very few studies in the literature have controlled for the effect of family SES. The results of the current study showed that moderating effect of perspective taking ability was not the case for family SES, suggesting that the disciplinary process may be specific to the inherent characteristics of parents and not to other contextual risks. Future studies that aim to mitigate the risk of lower family SES should therefore explore other potential moderators.

6.4.2. Methodological Strengths

First, the current study captured limit setting behaviors using both parental self-reporting and laboratory observations. Although there were a few differences found between both methods, the combination of both methods helped to obtain a more comprehensive understanding of parenting. Future research may extend the methodology of this study by including home visits to capture parenting behaviors and household situations in a more natural context, as observations of parent-child interactions are less likely to be distorted when occurring at home rather than in structured and artificial settings (Gardner, 2000).

Second, the current study extended previous work on parental impulsivity by investigating the role of the behavioral-measured impulsivity factor of impulsive choice, which was rarely examined in the prior literature. While previous research mostly

investigated parental behavioral impulsivity in terms of executive function or dysfunction, more recent research has shown that impulsive choice is a construct related to but also distinct from executive function (Sharma, Markon, & Clark, 2014). The current study operationalized impulsive choice by measuring it using a delay discounting task, namely a hypothetical Monetary Choice Questionnaire, thereby contributing to the literature by addressing the importance of impulsive decision making regarding parental impulsivity. Future research may design more domain-specific paradigms to measure impulsive decision-making by parents in a limit setting context. For example, researchers have innovated a hypothetical treatment outcome choice task to measure parenting delay discounting regarding treatment outcomes (Call, Reavis, McCracken, Gillespie, & Scheithauer, 2015); parents choose between a treatment that exerts a delayed effect lasting for ten years or a treatment exerts an immediately effect but lasts for less time. Future researchers should aim to design additional innovative paradigms for measuring delay discounting in the context of parental discipline.

Third, the current study measured parent limit setting behaviors at two time points 10 months apart, allowing for autoregression analysis to examine the developmental changes of poor parenting over time (Hertzog & Nesselroade, 2003; Menard, 2002) controlling for baseline parenting behavior. Many researchers have argued that the two-wave or "half longitudinal" research design is more cost-effective and therefore preferable for examining mediation effects compared to the widely-used cross-sectional design (Cole & Maxwell, 2003; Little, Preacher, Selig, & Card, 2007; Preacher, 2015). Yet other researchers believe that "two waves of data are better than one, but maybe not much better." (Rogosa, Brandt, & Zimowski, 1982) Future research should involve at least three time points to allow testing for the assumptions of stationarity and equilibrium (Cole & Maxwell, 2003).

6.4.3. Practical Implications

First, the current findings highlighted the role of household chaos in negative parenting, suggesting that household chaos interventions – including the promotion of family routines and structures, as well as the reduction of crowdedness and noise – may reduce the possibility of inappropriate parenting behaviors manifesting. This implication is especially pertinent to Hong Kong, where crowdedness and noise are quite common in the household. One direction for future parenting interventions or education programs is to convey the message that it is important to maintain routine, order, and calmness in the household. In addition to education programs, assistance should be given to families on creating calmer and more orderly household environment in their homes when necessary. For example, economic support or professional social workers could help reduce parental stress and strive towards managing a calm and well-organized home.

Secondly, the results emphasized the important buffering effect of parental perspective taking, which undermined the risks of parental impulsivity and household chaos. Consequently, parental perspective taking should be adopted as a potential target of parent intervention programs (Azar et al., 2008; Rodrigo, 2010). A practical application example of parental perspective taking is the H.A.L.T. method recommended in *No-Drama Discipline* (Siegel & Bryson, 2016), which teaches parents to stop and ask themselves the following question before reacting the child: “is my child hungry, angry, lonely, or tired?” Parental perspective taking ability is similarly emphasized in *Reflective Parenting* (Cooper and Redfern, 2015). Moreover, previous research has shown that perspective taking can be trained in adulthood. In one recent study (Hamilton-Giachritsis, Banakou, Garcia Quiroga, Giachritsis, & Slater, 2018), immersive virtual reality was used to place parents in the child’s position and have them interact with a “mother avatar” to solicit positive or negative behaviors. The results of the study showed that experiencing negative maternal behavior

increased the participants' perspective taking ability, indicating that it is feasible and practical to train this ability through embodiment techniques. The results of the current study therefore encourage future prevention and intervention programs aiming to promote effective parenting to focus on enhancing parental perspective taking ability.

Third, parental delay discounting might have implications for parenting intervention programs. The effects of intervention programs usually do not manifest immediately after the intervention ends because behavioral changes take time. It is plausible that parental delay discounting contributes to the attrition rate from intervention programs. In other words, parents who discount the future rewards are more likely to fail to adhere to the intervention programs.

6.5. Limitations and Future Directions

Although preliminary, the findings of the current study provide a stepping stone towards the direction of examining how the dual-system and process theories of parenting operate together in affecting parenting behaviors; however, several caveats should be considered when interpreting the data presented here.

First, given the difficulty that families had with travelling to the university laboratory where testing occurred, the current study is limited by its small sample size. Moreover, the current sample was composed of mostly middle-class Hong Kong caregivers who are relatively highly educated; it remains unclear how the constructs would interact with each other among low-income families. In addition, more information about the fathers of the participating children would reveal more about the paternal influence in the household environment and overall parenting behaviors. Future research might therefore extend these findings to more diverse samples in terms of caregiver roles, family SES, or ethnic background to confirm whether they can be broadly generalized.

Secondly, the current study employed the "half longitudinal" design when examining the role of parental neuroticism, in which the assessment of the mediator occurred at the same time point as the outcome; whereas the cross-sectional design was used when examining the role of parental delay discounting. Although there were two time points considered for the "half longitudinal" design, the follow-up period of 10 months was relatively short; it is therefore important to further examine the relationships discovered in the current study over longer periods of time. Future studies should also involve at least three time points, at which parental characteristics, household chaos, and parenting behaviors are measured at all time points; to test the stationarity of the variables (Cole & Maxwell, 2003). Moreover, despite using a mediation model, a stringent causal effect could not be obtained given the correlational design of the analysis. Thus, future research may consider employing experimental or interventionist designs to investigate the causal effects between variables.

Third, some variables were limited by how they were measured. In the current study, household chaos was quantified using information provided by caregivers, yet a family household situation can also be assessed using objective indices such as the per capita amount of space owned by each family member, in addition to whether they have their own bed or bedrooms. Although most of the existing work examining the influence of household chaos has primarily relied on parent-reported chaos, future research should consider using more rigorous assessment through interviews or observations to better capture the physical environment of the household (Whitesell et al., 2018, 2015). Moreover, future research should make efforts to measure multiple chaotic environments outside of the household, including the neighborhood, school, classroom or the childcare center; given that according to Bronfenbrenner's (1994) ecological model of development, child development is affected by chaos in multiple systems. Given that the current study only measured household chaos as a general indicator of the household situation, additional investigations with multiple measures

will help to elucidate the different effects of other specific aspects of the household situation, such as noise, crowdedness, or instability. Moreover, the measure of parental perspective taking in the current study using self-reporting data in questionnaires may be biased due to social desirability response bias (Van de Mortel, 2008). Future research should consider examining parental perspective taking using assessments with greater ecological validity, such as through spontaneous coding of perspective taking behaviors as observed through interviews of parents discussing personal life experiences (Manczak et al., 2017).

Fourth, it is important to recognize the bidirectional nature of the system linkages (Bornstein, 2016). Previous research had tested the reciprocal association between household chaos and child development (Kamp Dush, Schmeer, & Taylor, 2013). However, there is a lack of research testing how parental characteristics and chaos influence each other bidirectionally. One limitation of the current study was that household chaos was not measured at Time 1. Hence cross-lagged panel model to test the causal relations was not possible. Future research should consider the bidirectional relationships between household environment and parenting behaviors.

Fifth, it is plausible that impulsivity might moderate the relation between household chaos and negative limit setting such that this relation might be stronger when parental impulsivity is high (vs. low). Literature on this possibility was mixed. Deater-Deckard et al. . (2012) found that the interaction effect of parental executive function and household chaos on harsh parenting was not significant. Mokrova et al. (2010) found the interplay between fathers' ADHD symptoms and household situation on ineffective discipline was significant; while that of mothers was not. Although not reported here, the results from the current study did not support this hypothesis, probably due to the fact that the current sample was mainly composed of mothers. A second reason might be due to the special housing conditions of Hong Kong. Hong Kong is a modernized society characterized of extremely expensive

housing, highly dense population, and limited living space, arguably more so than any other places in the world. To change such living condition is beyond individual families' capacity, even for those parents with high executive function and/or low impulsivity. Yet a third explanation might be related to SES. The sample in the current study was predominantly from middle class families. As the household situation of high SES background families would be quite different from that of low SES background, a more diverse sample in terms of SES is needed to test this hypothesis. Future research should include both fathers and mothers, and recruit from a diverse geographical and social economical background.

Last but not the least, adopting a quantitative approach, the current study has yet to fully explore the rich observational data. A qualitative approach could potentially provide complementary insights in parental perspective taking and limit setting strategies. For example, other than the frequency and proportion of behaviors quantified in the current analysis, qualitative parent-child interaction such as tone of voice, facial expressions, and eye contact could be coded. Some parents displayed physical intrusions of children's behaviors while talking to their children in a very sensitive tone. Contradictory on the surface, behaviors like this might be indicators of certain culturally adaptive parenting practice, which the current quantitative analysis failed to capture. Furthermore, previous research has shown that the adoption of first-person pronouns (e.g., "I") could index a higher level of self-focus; while the third-person pronouns (e.g., "he") or the first-person plural pronouns (e.g., "we") signal higher level of perspective taking (Humphreys, King, Choi, & Gotlib, 2018; Seih, Chung, & Pennebaker, 2011). Another possibility future direction is to code the use of pronouns during the parent-child interaction to index parental perspective taking.

6.6. Conclusions

The results of the current study advance the growing body of parenting research suggesting that parental characteristics are important predictors of parenting behaviors. The results also suggested that household chaos functioned as one mechanism through which parental impulsivity exerts effects on limit setting, which is not surprising given that an organized and structured household is beneficial for encouraging appropriate parenting behaviors (Dumas et al., 2005). In addition, the current study explicated the role of parental perspective taking by showing how the indirect association between parental impulsivity and limit setting mediated via household chaos changes was dependent on parental perspective taking; more specifically, the association was only significant in parents with low perspective taking ability. These results open up exciting avenues of further research regarding the roles of household environment and parental perspective taking in influencing parenting behaviors.

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Appendix

A Tables and Figures

Table 1. *Descriptive Statistics of All Variables.*

	Time 1						Time 2	
	Dropouts (n = 40)		Returners (n = 94)		Total (n = 134)		Total (n = 94)	
	M	SD	M	SD	M	SD	M	SD
Age (month)	65.75	10.81	69.74	12.57	68.55	12.17	80.26	12.54
Gender (girl)	57.5%		50%		52.2%		50%	
SES	8.25	1.68	8.81	1.96	8.64	1.89	--	--
Parental impulsivity								
Neuroticism	2.70	.82	2.98	.94	2.90	.91	--	--
Delay discounting (log)	--	--	--	--	--	--	-2.08	.57
Parental perspective taking	3.75	.44	3.75	.51	3.75	.49	3.71	.48
Household chaos	--	--	--	--	--	--	2.37	.66
Limit setting (rep)	2.48	.54	2.68	.45	2.62	.49	2.66	.46

Limit setting (obs_macro)	1.778	.780	1.678	.674	1.706	.704
Limit setting (obs_micro)	2.917	3.316	2.146	2.213	2.368	2.589

Note. SES = Social Economic Status; log = the statistic was log transformed; rep = parent self-report negative limit setting behaviors; obs = laboratory-observed parent negative limit setting behaviors.

Table 2. *Bayesian Factors and Person Correlations Between Main Variables*

		1	2	3	4	5	6	7	8	9	α / r	skewness
1.T1 neuro	Pearson's r	--									.52	.183
	BF_{10}	--										
2.T1 PT	Pearson's r	-.254**	--								.72	-.409
	BF_{10}	8.130	--									
3.T1 limit (rep)	Pearson's r	.422 **	-.326**	--							.71	.079
	BF_{10}	38502.730	163.113	--								
4.T1 limit (obs_macro)	Pearson's r	-.007	.027	.061	--						--	.724
	BF_{10}	.122	.127	.147	--							
5. T1 limit (obs_micro)	Pearson's r	-.009	.063	.034	.638***	--					--	1.626
	BF_{10}	.112	.142	.120	3.566e+10	--						
6.T2 DD	Pearson's r	.104	-.179	.183	.028	-.030	--				--	-.353
	BF_{10}	.210	.556	.595	.148	.138	--					
7.T2 PT	Pearson's r	-.286**	.605	-.313**	.092	.026	-.170	--			.69	-.444
	BF_{10}	6.054	1.032e +8	13.292	.194	.136	.486	--				

8.T2 chaos	Pearson's r	.276**	-.363**	.392**	.008	.006	.437**	-.481**	--		.65	.362
	BF_{10}	4.609	75.407	234.885	.144	.133	1771.871	18387	--			
9.T2 limit (rep)	Pearson's r	.261*	-.120	.549**	-.058	.029	.279**	-.433**	.563**	--	.71	.343
	BF_{10}	3.061	.249	1.345e +6	.162	.137	4.959	1510	3.797e +6	--		
10. Age	Pearson's r	.125	.133	.012	-.086	-.172	-.151	-.151	-.087	-.012	--	-.079
	BF_{10}	0.300	.346	.109	.177	.692	.482	.481	.181	.130		
11. Gender	Pearson's r	-.065	.007	-.110	-.126	-.155	.069	.069	-.188	-.099	--	--
	BF_{10}	.142	.108	.240	.277	.495	.147	.147	.654	.201		
12. SES	Pearson's r	-.159	.214*	-.123	.038	.021	-.135	-.135	-.355**	-.254*	--	.295
	BF_{10}	.569	2.218	.292	.131	.115	.359	.356	51.995	2.520		

Note. ** < .01; * < .05; T1 = Time 1; T2 = Time2; Neuro = neuroticism; PT = parental perspective taking; limit = parental limit setting behavior; DD = parental delay discounting

Table 3. *Summary of Standardized Direct Effects in The Hypothesized Mediation Model*

	MLE		Bayesian Noninformative prior	
	β	CI	β	CrI
Neuroticism				
T1 Neuro → T2 chaos	.208*	[.006, .409]	.204	[.015, .383]
T1 SES → T2 chaos	-.303***	[-.460, -.146]	-.300	[-.468, -.114]
T2 Chaos → T2 limit setting	.415***	[.234, .596]	.404	[.221, .573]
T1 Neuro → T2 limit setting	-.021	[-.186, .145]	-.022	[-.189, .146]
T1 SES → T2 limit setting	-.047	[-.195, .100]	-.046	[-.205, .115]
T1 limit setting → T2 limit setting	.442**	[.189, .695]	.430	[.235, .603]
T1 Neuro → T1 limit setting	.414***	[.264, .564]	.408	[.255, .546]
T1 SES → T1 limit setting	-.057	[-.210, .096]	-.057	[-.215, .101]
Delay discounting				
T2 Delay discounting → T2 Chaos	.414***	[.250, .546]	.398	[.227, .557]
T1 SES → T2 Chaos	-.297***	[-.436, -.146]	-.289	[-.447 -.117]

T2 Chaos → T2 limit setting	.516***	[.302, .680]	.508	[.317, .678]
T2 Delay discounting → T2 limit setting	.058	[-.115, .223]	.041	[-.148, .231]
T1 SES → T2 limit setting	-.069	[-.240, .087]	-.065	[-.240, .109]

Note. ** < .01; * < .05; T1 = Time 1; T2 = Time2

Table 4. 1. *The Moderating Effect of Parental Perspective Taking on Concurrent Association Between Neuroticism and Self-Report Limit Setting (N = 134)*

	Model1			Model2			Model3		
variable	β	p	CI	β	p	CI	β	p	CI
Age	.029	.742	[-.006, .008]	-.002	.982	[-.006, .006]	.036	.660	[-.005, .008]
Gender	-.105	.227	[-.269, .064]	-.078	.316	[-.225, .073]	-.082	.289	[-.227, .068]
SES	-.128	.147	[-.078, .012]	-.016	.839	[-.045, .037]	-.010	.905	[-.043, .038]
Neuro				.356	.000	[.094, .251]	.327	.000	[.079, .238]
PT				-.236	.005	[-.194, -.036]	-.239	.004	[-.194, -.038]
Interact							-.156	.053	[-.130, .001]
ΔR^2	.027			.212			.022		
ΔF	1.191			17.687**			3.812†		
BF_m	.080			1119159.454			1.652		

Note. ** < .01; * < .05; † < .01; T1 = Time 1; T2 = Time2; Neuro = neuroticism; PT = parental perspective taking; limit = parental negative limit setting behavior; Interact = parental neuroticism*parental perspective taking

Table 4. 2. *The Moderating Effect of Parental Perspective Taking on Longitudinal Association Between Neuroticism and Self-Report Limit Setting (N = 94)*

	Model1			Model2			Model3		
variable	β	p	CI	β	p	CI	β	p	CI
Age	.033	.710	[-.005, .008]	.020	.828	[-.006, .007]	.051	.578	[-.005, .009]
Gender	.017	.853	[-.148, .179]	.020	.826	[-.147, .184]	.007	.939	[-.158, .170]
SES	-.160	.081	[-.080, .005]	-.164	.081	[-.082, .005]	-.156	.094	[-.079, .006]
Limit T1	.520	.000	[.349, .719]	.526	.000	[.334, .747]	.478	.000	[.278, .702]
Neuro				.031	.753	[.074, .101]	.021	.833	[-.077, .096]
PT				.067	.490	[-.055, .114]	.071	.456	[-.052, .115]
Interact							-.166	.086	[-.124, .008]
ΔR^2	.322			.004			.023		
ΔF	0.464***			.268			3.017		
BF_m	30076.373			.118			1.257		

Note. ** < .01; * < .05; † < .01; T1 = Time 1; T2 = Time2; Neuro = neuroticism; PT = parental perspective taking; limit = parental negative limit setting behavior; Interact = parental neuroticism*parental perspective taking

Table 4. *The Moderating Effect of Parental Perspective Taking on Association Between Neuroticism and Observed Limit Setting (N = 104)*

	Model1			Model2			Model3		
variable	β	p	CI	β	p	CI	β	p	CI
Age	-.147	.141	[-.052, .007]	-.158	.123	[-.054, .007]	-.181	.083	[-.058, .004]
Gender	.137	.165	[-1.196, .207]	-.132	.190	[-1.192, .240]	-.128	.203	[-1.178, .254]
SES	.113	.259	[-.086, .317]	.109	.282	[-.093, .316]	.095	.348	[-.108, .304]
Neuro				.028	.794	[-.332, .433]	.037	.732	[-.317, .450]
PT				.073	.501	[-.265, .518]	.057	.598	[-.286, .493]
Interact							.115	.271	[-.136, .480]
ΔR^2	.046			.004			.012		
ΔF	1.620			.228			1.225		
BF_m	.175			.201			.741		

Note. ** < .01; * < .05; T1 = Time 1; T2 = Time2; Neuro = neuroticism; PT = parental perspective taking; limit = parental negative limit setting behavior; DD = parental delay discounting; Interact = parental neuroticism*parental perspective taking

Table 5. *The Moderating Effect of Parental Perspective Taking on Relationship Between Delay Discounting and Limit Setting (N = 94)*

	Model1			Model2			Model3		
variable	β	P	CI	β	p	CI	β	p	CI
Age	.020	.851	[-.007, .008]	.029	.758	[-.006, .008]	.037	.696	[-.005, .008]
Gender	-.065	.528	[-.248, .128]	-.061	.512	[-.225, .113]	-.057	.543	[-.223, .118]
SES	-.249	.018	[-.107, -.010]	-.140	.145	[-.077, .012]	-.141	.145	[-.078, .012]
Neuro				.213	.026	[.012, .187]	.221	.023	[.015, .192]
PT				-.379	.000	[-.261, -.088]	-.376	.000	[-.260, -.086]
Interact							-.059	.531	[-.108, .056]
ΔR^2	.069			.203			.003		
ΔF	2.195			12.120***			.395		
BF_m	.384			1418.873			.412		

Note. ** < .01; * < .05; T1 = Time 1; T2 = Time2; Neuro = neuroticism; PT = parental perspective taking; limit = parental negative limit setting behavior; DD = parental delay discounting; Interact = parental neuroticism*parental perspective taking

Table 6. *Indirect Effect of Parental Neuroticism on Self-Reported Negative Limit Setting Through Household Chaos Conditional on Parental Perspective Taking*

	Frequentist estimate		Bayesian estimate	
Predictor	β	CI	β	CrI
T2 Household chaos				
T1 Neuroticism	.049	[-.139, .237]	.048	[-.139, .236]
T1 Perspective taking	-.204*	[-.406, -.001]	-.192	[-.356, -.018]
SES	-.249**	[-.413, -.086]	-.235	[-.397, -.062]
T1 Baseline limit setting	.202	[-.041, .444]	.190	[-.025, .387]
T1Neuroticism * T1 perspective taking	-.181	[-.390, .028]	-.171	[-.328, -.009]
SES * T1 perspective taking	.092	[-.082, .266]	.085	[-.084, .244]
R^2	.305			.312
T2 Limit setting				
Age	.028	[-.149, .205]	.027	[-.121, .174]
Gender	.066	[-.102, .235]	.061	[-.094, .208]
T1 baseline limit setting	.442***	[.203, .680]	.411	[.228, .575]

T2 Household chaos	.422***	[.222, .623]	.416	[.234, .585]
SES	-.060	[-.215, .096]	-.055	[-.210, .102]
T1 neuroticism	-.010	[-.186, .165]	-.011	[-.174, .152]
T1 perspective taking	.164*	[.002, .327]	.152	[-.006, .305]
T1 Neuroticism * T1 perspective taking	-.056	[-.192, .080]	-.053	[-.200, .092]
SES * T1 perspective taking	.024	[-.124, .173]	.023	[-.122, .166]
R^2	.488			.487

Note. ** < .01; * < .05; T1 = Time 1; T2 = Time2; CI = frequentist confidence interval; CrI = Bayesian credible interval

Table 7. *Indirect Effect of Parental Delay Discounting on Self-Reported Negative Limit Setting Through Household Chaos Conditional on Parental Perspective Taking*

	Frequentist estimate		Bayesian estimate	
Predictor	β	CI	β	CrI
T2 Household chaos				
T2 Delay discounting	.397***	[.245, .548]	.389	[.231, .538]
T2 Perspective taking	-.410***	[-.567, -.252]	-.391	[-.535, -.233]
SES	-.222**	[-.377, -.067]	-.212	[-.360, -.054]
T2 delay discounting * T2 perspective taking	-.210*	[-.361, -.059]	-.201	[-.344, -.048]
SES * T2 perspective taking	-.106	[-.264, .052]	-.101	[-.257, .060]
R^2	.446			.444
T2 Limit setting				
Age	.035	[-.134, .204]	.033	[-.131, .197]
Gender	-.007	[-.177, .164]	-.008	[-.175, .159]
T2 Household chaos	.392**	[.178, .606]	.378	[.152, .589]
SES	-.058	[-.236, .120]	-.054	[-.228, .120]

T2 Delay discounting	.074	[-.117, .266]	.071	[-.121, .263]
T2 perspective taking	-.247*	[-.445, -.050]	-.230	[-.417, -.032]
T2 delay discounting * T2 perspective taking	.006	[-.169, .181]	.006	[-.162, .175]
SES * T2 perspective taking	-.057	[-.232, .118]	-.054	[-.226, .118]
R^2	.342			.361

Note. ** < .01; * < .05; T1 = Time 1; T2 = Time2; CI = frequentist confidence interval; CrI = Bayesian credible interval

Table 8. *Summary of the Results*

	Sample	Analysis	Results
Goal 1: the mediating role of household chaos			
H1a: Parental neuroticism → negative limit setting	T1 & T2	Bivariate correlation	Supported
H1b: Parental delay discounting → negative limit setting		Bivariate correlation	Supported
H2a: Parental neuroticism → household chaos	T1 & T2	Bivariate correlation	Supported
H2b: Parental delay discounting → household chaos	T2	Bivariate correlation	Supported
H3: household chaos → negative limit setting	T2	Bivariate correlation	Supported
H4a: Parental neuroticism → household chaos → negative limit setting	T1 & T2	Mediation	Supported
H4b: Parental delay discounting → household chaos → negative limit setting	T2	Mediation	Supported
Goal 2: moderating role of parental perspective taking			
perspective taking ↓ H5a: Parental neuroticism → negative limit setting	T1 & T2	Hierarchical regression	Not supported
perspective taking ↓ H5b: Parental delay discounting → negative limit setting	T2	Hierarchical regression	Not supported

Integrate Goal 1 & Goal 2			
perspective taking ↓ H6a: Parental neuroticism → household chaos → negative limit setting	T1 & T2	Moderated mediation	Supported
perspective taking ↓ H6b: Parental delay discounting → household chaos → negative limit setting	T2	Moderated mediation	Supported

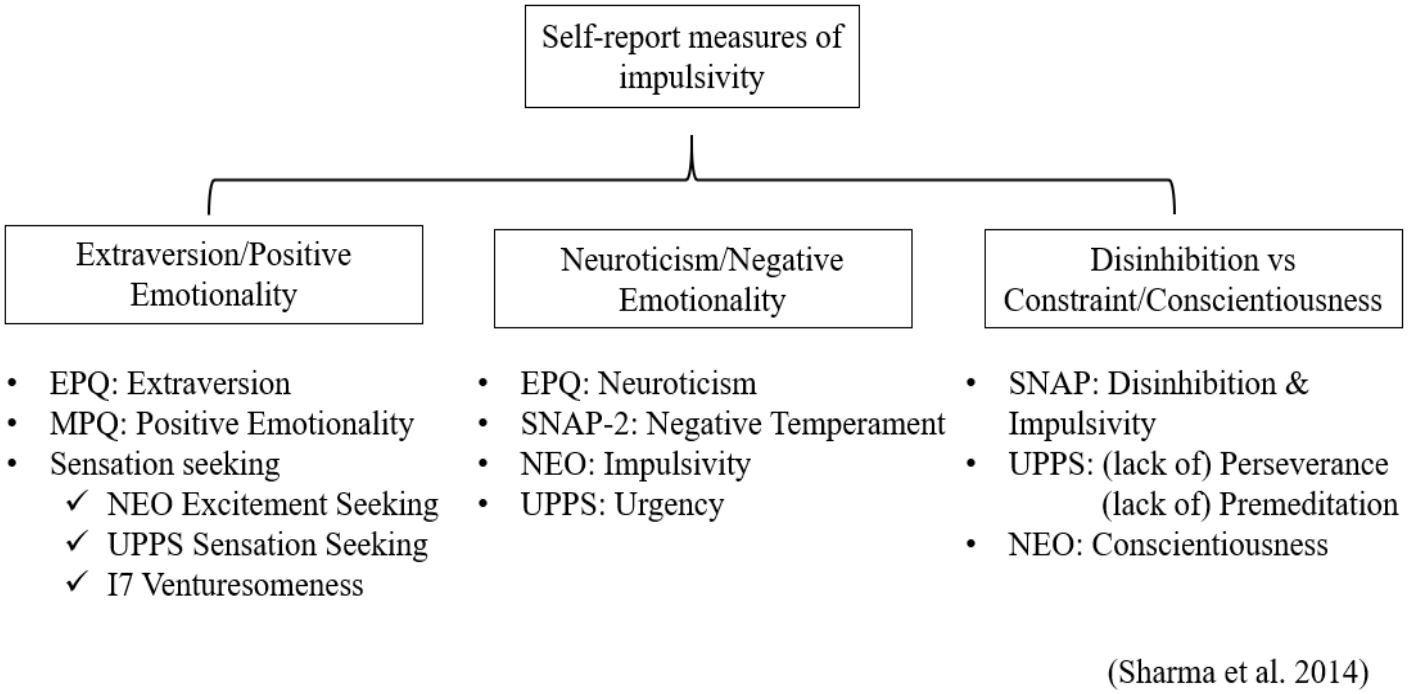

Figure 1. Conceptualization and Operational Definition of Self-Report Impulsivity

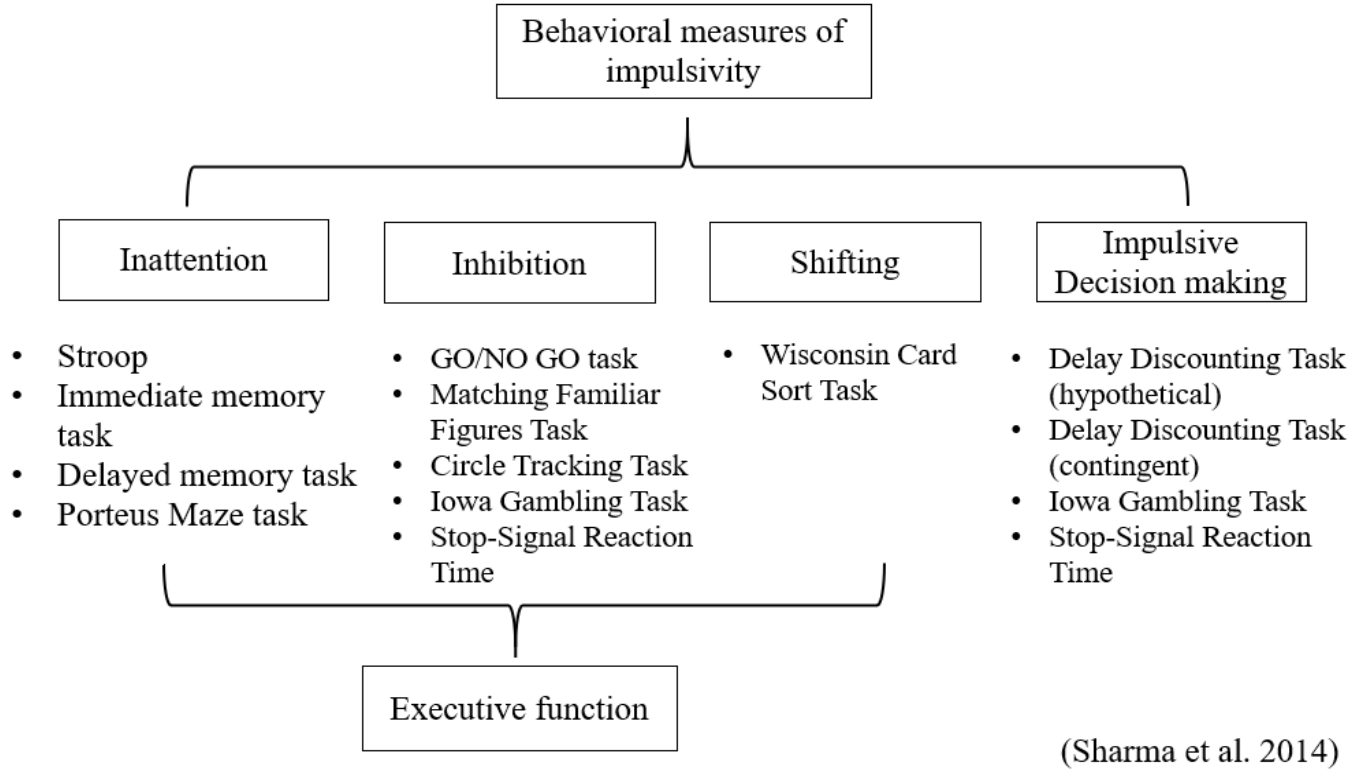

Figure 2. Conceptualization and Operational Definition of Behavioral Impulsivity

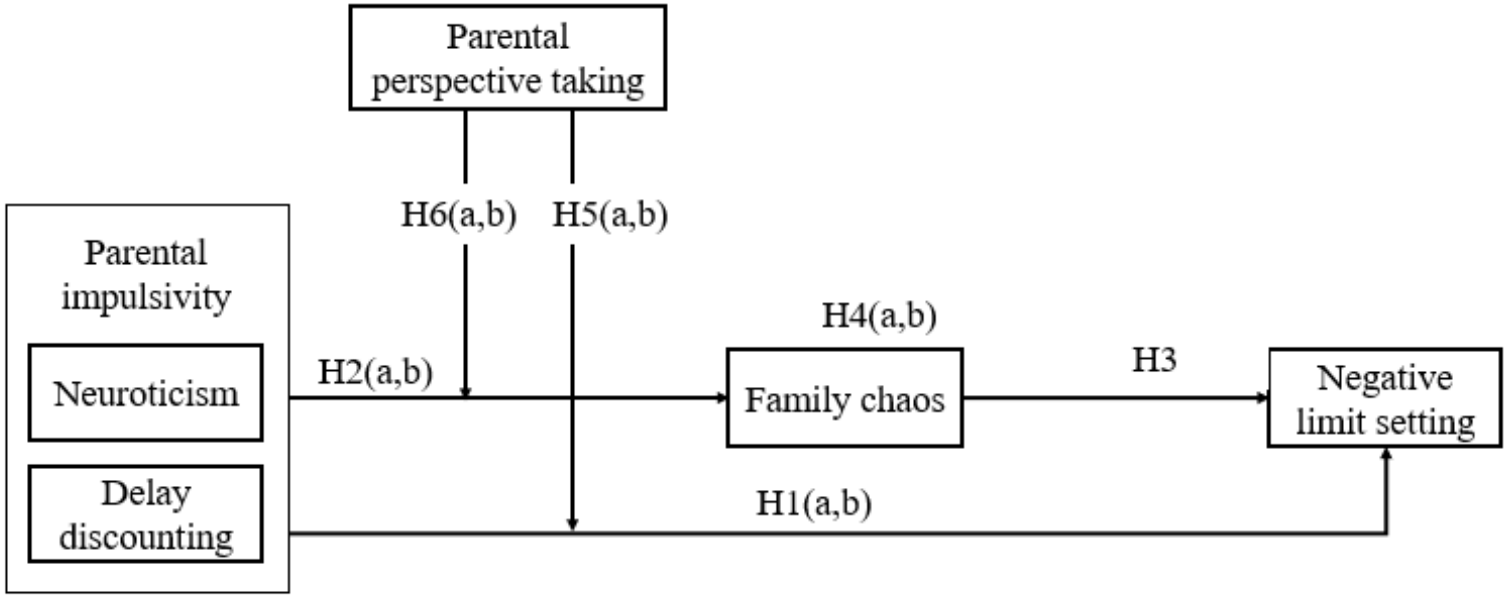

Figure 3. Proposed Hypothesized Moderated Mediation Model.

Note. a represents parental neuroticism. b represents parental delay discounting

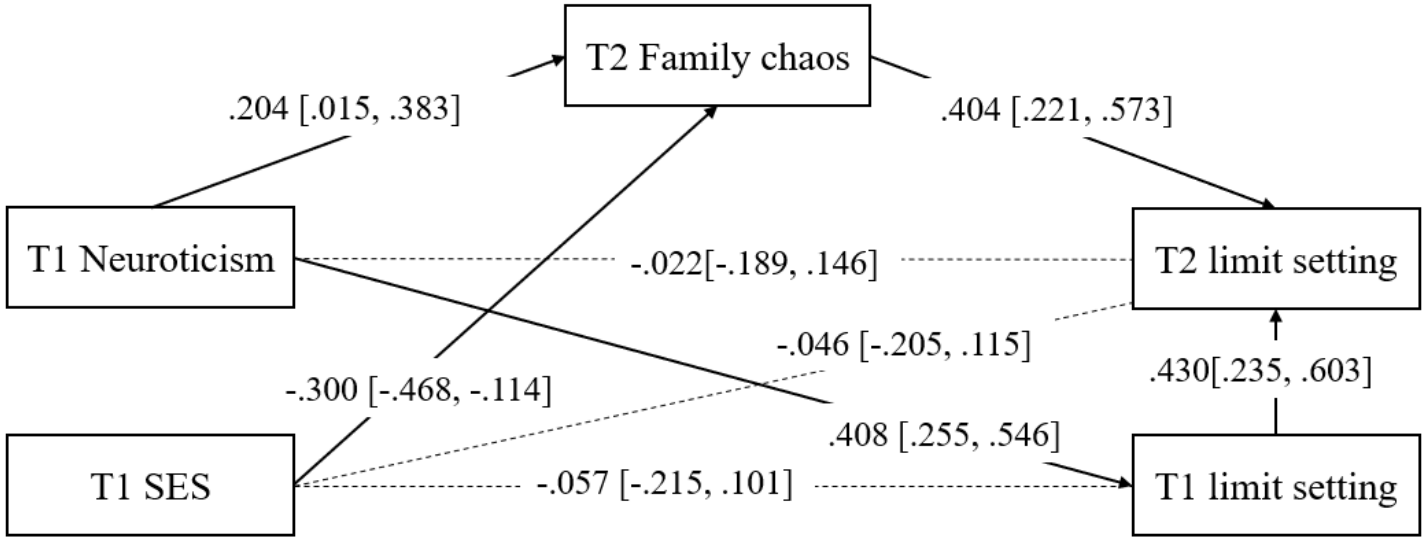

Figure 4. Bayesian Estimation of Mediation Effect of Family in the Relationship Between Parental Neuroticism and Limit Setting Behaviors

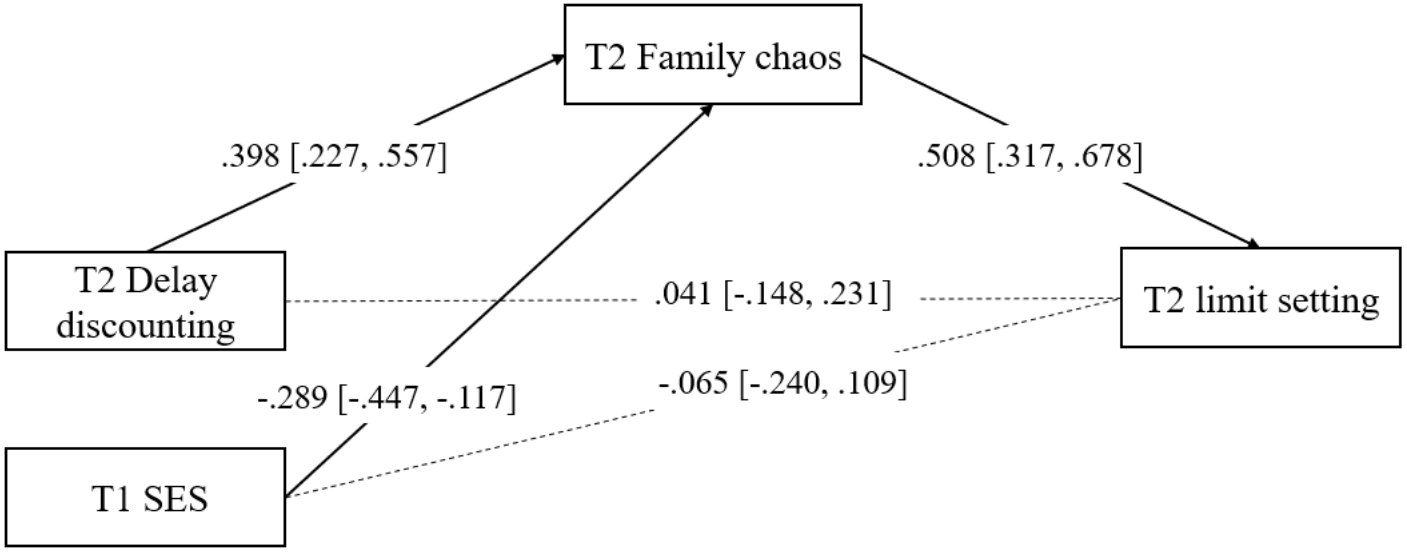

Figure 5. Bayesian Estimation of Parental Delay Discounting on Limit Setting Through Household Chaos

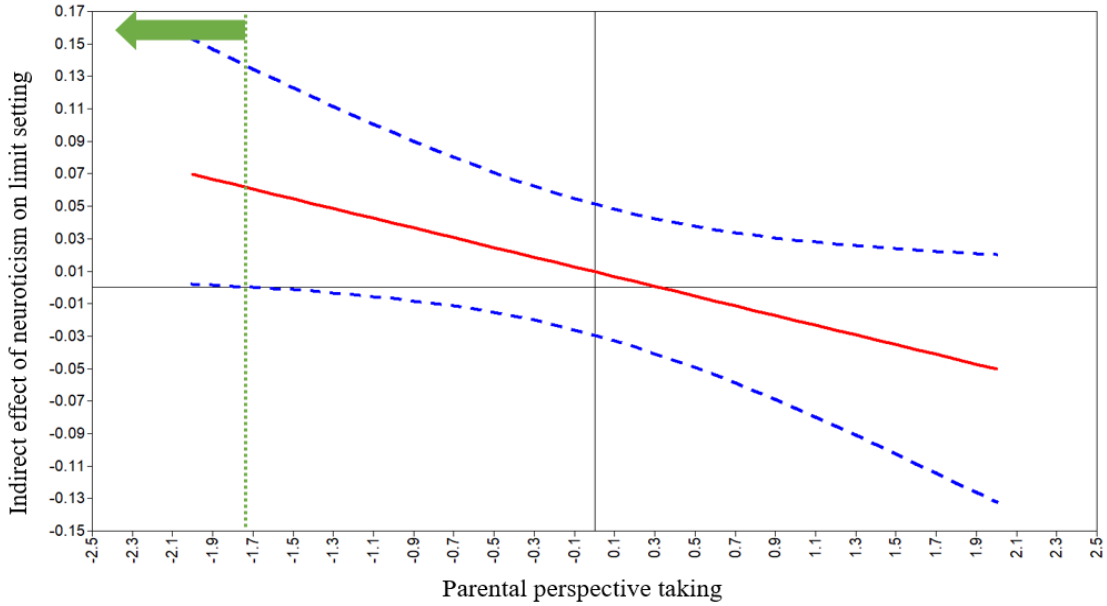

Figure 6. Moderated Mediation Effect of Parental Neuroticism on Negative Limit Setting Behavior Via Household Chaos

Note. Controlling for T1limit setting and demographic variables. The figure shows the moderated mediation as a loop plot. The solid red line shows the indirect effect of neuroticism on limit setting through household chaos (Y axis), while the dashed blue line indicated the upper and lower 95% Bayesian credible interval. Values for the moderator (parental perspective taking) ranged from -2 to +2 standard deviations from the mean (X axis). As shown in the figure, parental neuroticism affect limit setting behavior through household chaos only at lower values of parental perspective taking (in the region where Bayesian credible intervals do not encompass zero; the left region of the green dotted line), but not at higher of parental perspective taking (the right region of the green dotted line).

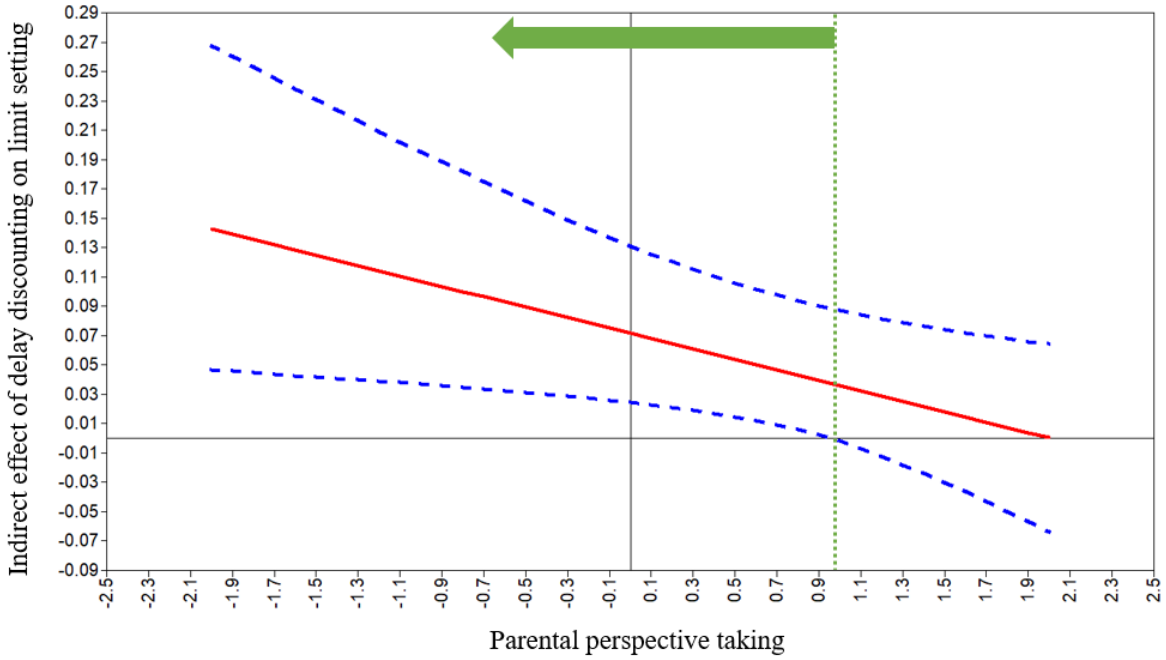

Figure 7. Moderated Mediation Effect of Parental Delay Discounting on Negative Limit Setting Behavior Via Household Chaos

Note. The figure shows the moderated mediation as a loop plot. The solid red line shows the indirect effect (Y axis), while the dashed blue line indicated the upper and lower 95% Bayesian credible interval. Values for the moderator (parental perspective taking) ranged from -2 to +2 standard deviations from the mean (X axis). As shown in the figure, parental delay discounting affects limit setting behavior through household chaos only at lower values of parental perspective taking (in the region where Bayesian credible intervals do not encompass zero; the left region of the green dotted line), but not at higher of parental perspective taking (the right region of the green dotted line).

B Reported Measures

Limit setting scale

1. I have trouble disciplining my child

2. I have a hard time getting through to my child

3. My child is more difficult to care for than most children are

4. I sometimes give in to my child to avoid a tantrum

5. I wish I could set firmer limits with my child

6. My child is out of control much of the time

7. I wish my child would not interrupt when I'm talking to someone else

8. I often lose my temper with my child

9. My child really knows how to make me angry

10. I sometimes find it hard to say no to my child

11. I often threaten to punish my child but never to

12. Some people would say that my child is a bit spoiled.

Perspective taking

1. I sometimes find it difficult to see things from the "other guy's point of view" (R)

2. I try to look at everybody's side of a disagreement before I make a decision

3. I sometimes try to understand my friends better by imagine how things look from their perspective.

4. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments(R)

5. I believe that there are two sides to every question and try to look at them both.

6. When I'm upset at someone, I usually try to "put myself in his shoes" for a while.

7. before criticizing somebody, I try to imagine how I would feel if I were in their place

Household chaos

1. I have a regular morning routine (r)

1. 孩子有一個規律的作息習慣 （例如，每晚於同一時間 睡覺、睡覺前洗澡、讀一個故事、然後祈禱等…）

2. .‘You can’t hear yourself think in our home’,

2. 在我們家裡，你是無法靜心思考的

3. It’s a real zoo in our home’

3. 我們家雜亂吵鬧得像一個動物園

4. ‘We are usually able to stay on top of things’ (r)

4. 我們通常能夠掌控局面

5. There is usually a television turned on somewhere in our home’

5. 家裡總有一台電視是開著的

6. The atmosphere in our house is calm’ (r)

6. 我們家的氣氛是平靜的

Parent neuroticism

4R. is relaxed, handles stress well 4R 我可以很輕鬆地處理壓力

9. gets nervous easily 9 我很容易緊張

C Observed Measures

PARENT LIMIT SETING CODE (Lengua et al., 2007)

Parents need to set limits on their child's behavior in order to keep them safe, maintain some degree of order, and/or help the child navigate through tasks. Limit setting can be categorized into necessary constraints, which are often dictated by social rules, and task-based limit setting, which serves to modulate the child's behavior in an effort to accomplish an established goal. Necessary limit setting would include: protecting the child's safety, protecting property, respect for the room and appropriate behavior (e.g., parent reminds the child to speak in an appropriate tone of voice if the child starts to whine, or removing the child from the situation). Necessary limit setting can refer to the child's behavior (e.g., a parent instructing a child to stop throwing toys) or the child's affect (e.g., telling a child to calm down if he/she is too excited, or a parent intervening if an angry child begins to behave inappropriately).

Task-based limit setting includes parent efforts to help children navigate through tasks and can be observed through verbal commands (e.g., giving child a verbal direction or reminder) or arranging the situation to meet the child's abilities (e.g., redirecting the child's attention or distracting him/her, removing the item or child from the situation).

Qualities of effective limit setting:

1. Parent clearly communicates, establishes or sets the limits of what the child can and cannot do. Parent may define for the child the rules for their behavior during the lab visit.

2. Parent maintains limits when they are tested or broken. Parent maintains limits in the face of defiant/difficult or potentially uncontrollable behavior on the child's part.

3. Parent maintains limits consistently throughout visit (e.g., a behavior can not be unacceptable at one situation and acceptable in another).

4. Parent follows through when the child goes beyond the set limits; parent may restate the limits (e.g., acceptable behavior), warn, and/or reprimand the child for their behavior if limits are broken. (As with maintaining limits, this means reestablishing limits if they have been broken).

5. Parent sets limits that are necessary and appropriate given the situation/task at hand.

NOTE: In this rating, the process of setting and maintaining limits is what is rated, though these characteristics do not embody all of what is considered limit setting. Other qualities such as a parent's affect while setting limits and their comfort with limit setting should be rated on other scales.

Score the parent's effectiveness at setting limits according to the following:

0- None. Parent's limit setting is not visible. The parent may permit virtually any type of behavior from their child. The parent does not communicate limits, maintain them, or follow through with consequences.

1- Very Low. Parent's limit setting very inconsistent and commands may be highly unclear (e.g., they are stated as suggestions with no clear understanding that the parent is asking the child to do something). Parent fails to set limits that are necessary and appropriate for the situation. Parents show difficulty in establishing limits and communicating limits one established. The limits are not predictable by the child either because they are unclear or inconsistently enforced.

2- Low. Parent either randomly or infrequently sets limits. Parent may on occasion (one time) fail to set an appropriate and necessary limit or if the limit is set, it is not maintained.

The parent may communicate a limit, but it is not maintained when tested by the child and consequences are not used when limits are broken. Limit testing may often go uncorrected.

3- Moderate. The parent generally meets definition but has difficulty with some aspect of limit setting. That is, the parent may communicate limits but may not do so effectively, or fails to maintain limits when established. However, the parent's limit setting should have an effect on the child's behavior (for the better) half of the time. The parent may appear hesitant to establish or maintain limits and consequences may not be used consistently. The parent may not respond to one instance of the child's limit testing.

4- Moderately High. Parent generally establishes, maintains, and follows through on limits and limit setting. Parent is communicates clear limits and generally maintains the established limits. On one less significant occasion the parent may show inconsistency, such as not applying a consequence or reestablishing a limit. This code is not necessarily dependent on the amount or frequency of parent's limit setting. (e.g., Child may be generally compliant, but on the occasion that limits are tested, parent mostly meets the described qualities of limit setting.)

5- High. Parent establishes, maintains, and follows through on limits and limit setting on a consistent basis. Limits are clearly established and easy for the child to understand. Limit testing is responded to consistently such that the parent is able to reestablish and/or enforce the limit if broken. All necessary and appropriate limits are established. As with a code of 4, a code of 5 is not necessarily dependent on the amount or frequency of parent's limit setting. (e.g., Child may be generally compliant, but on the occasion that limits are tested, parent meets all the described qualities of limit setting.)