INVESTIGATING DYADIC INTERACTIONS WITHIN THE FAMILY AS AN
INTERDEPENDENT SYSTEM: ASSOCIATIONS BETWEEN MOTHERS AND
ADOLESCENT SIBLINGS

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All Glory, Honor, and Praise

be to the Lord Jesus Christ

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS.....	ii
LIST OF TABLES.....	vi
LIST OF FIGURES.....	viii
ABSTRACT.....	ix
CHAPTER	
1. INTRODUCTION.....	1
Families as a System	
Developmental Trajectory of Family Conflict	
Spillover and Compensation within the Family System	
The Present Study	
2. METHOD.....	21
Participants	
Procedures	
Measures	
Missing Data	
3. RESULTS.....	29
Descriptive Statistics	
Latent Growth Curve Modeling Analytical Plan	
Model Results	
Tests of Sibling Spillover	
Tests of Sibling Compensation	
4. DISCUSSION.....	42

Spillover of Negative Relationship Qualities

Positive Sibling Relationships as Compensatory

Conflict Intensity vs. Conflict Frequency

Birth Order Effects

Sibling Gender Composition Effects

Limitations and Future Directions

Conclusion and Implications

TABLES.....	55
FIGURES.....	73
REFERENCES.....	84
VITA.....	100

LIST OF TABLES

Table	Page
1. Correlation Matrix of Main Study Variables and Moderators.....	55
2. Mixed Model ANOVA Table for Means and Standard Deviation for Parent-Adolescent Conflict Intensity.....	57
3. Mixed Model ANOVA Table for Means and Standard Deviation for Parent-Adolescent Conflict Frequency.....	58
4. Estimated Covariance Matrix, Means and Standard Deviation Vector of Latent Variables.....	59
5. Model Selection by Chi-Square Difference Test Table by Sibling Gender Composition.....	60
6. Model Selection of Adolescent Reported Parent-Adolescent Conflict Intensity Spillover Model.....	61
7. Parameter Estimates in the Two-Factor Shift Model for Adolescent Intensity Spillover Model.....	62
8. Model Selection of Adolescent Reported Parent-Adolescent Conflict Frequency Spillover Model.....	63
9. Parameter Estimates in the Two-Factor Shift Model for Adolescent Frequency Spillover Model.....	64
10. Model Selection of Mother Reported Parent-Adolescent Conflict Frequency Spillover Model.....	65
11. Parameter Estimates in the Two-Factor Shift Model for Mother Frequency Spillover Model.....	66
12. Model Selection of Adolescent Reported Parent-Adolescent Conflict Intensity Compensation Model.....	67
13. Parameter Estimates in the Two-Factor Shift Model for Adolescent Intensity Compensation Model	68
14. Model Selection of Adolescent Reported Parent-Adolescent Conflict Frequency Compensation Model.....	69

15. Parameter Estimates in the Two-Factor Shift Model for Adolescent Frequency Compensation Model	70
16. Model Selection of Mother Reported Parent-Adolescent Conflict Frequency Compensation Model.....	71
17. Parameter Estimates in the Two-Factor Shift Model for Mother Intensity Frequency Model	72

LIST OF FIGURES

Figure	Page
1. Conceptual Model of Main Study Analysis.....	73
2. Growth Trajectory of Adolescent Reported Conflict Intensity: Test of Spillover Effects.....	74
3. Sibling Gender Composition Comparison of Growth Trajectory Adolescent Reported Conflict Intensity: Test of Spillover Effects.....	75
4. Growth Trajectory of Mother Reported Conflict Frequency: Test of Spillover Effects.....	76
5. Sibling Gender Composition Comparison of Growth Trajectory Mother Reported Conflict Frequency: Test of Spillover Effects.....	77
6. Growth Trajectory of Adolescent Reported Conflict Intensity: Test of Compensation Effects.....	78
7. Sibling Gender Composition Comparison of Growth Trajectory Adolescent Reported Conflict Intensity: Test of Compensation Effects	79
8. Growth Trajectory of Adolescent Reported Conflict Frequency: Test of Compensation Effects.....	80
9. Sibling Gender Composition Comparison of Growth Trajectory Adolescent Reported Conflict Frequency: Test of Compensation Effects.....	81
10. Growth Trajectory of Mother Reported Conflict Frequency: Test of Compensation Effects.....	82
11. Sibling Gender Composition Comparison of Growth Trajectory Mother Reported Conflict Frequency: Test of Compensation Effects.....	83

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ABSTRACT

Adolescence is a developmental time period of self-exploration and self-discovery for that brings about change to family processes and interactions. Conflict during this time can be interpreted as a mechanism that reconceptualizes how the family as a system operates. In light of research supporting the increase in parent-adolescent conflict and the importance of sibling relationship qualities during adolescence, the literature is unclear about how these two aspects of family interactions are associated with each other and their implications within the family system. Therefore, the present study examined the interconnectedness of family subsystems and changes in family processes and dynamics in adolescence over time. The present study found that sibling relationship quality influenced the trajectory of parent-adolescent conflict over time. Specifically, spillover effects and compensation effects were found in both adolescent-reported and mother-reported adolescent conflict. Importantly, the context of sibling gender composition revealed that spillover and compensation effects were stronger for same-sex siblings than for mixed-sex siblings. The results showcase the importance of examining multiple familial relationships during adolescent development and illustrate how family interactions and processes are interconnected.

CHAPTER 1

INTRODUCTION

Adolescence is a developmental period of physical, mental, and emotional, change for an individual (Steinberg, 2005). Adolescents are tasked with the goal of developing their self-identity and autonomy while remaining connected to family, peers, and romantic partners (Jung & Hect, 2004). Although adolescent youth begin to shift their focus to other social networks, such as mixed-sex peer and romantic interactions (Hand & Furman, 2009), the family remains the most important context for adolescent development. The family is important for adolescent development for three reasons: first, family relationships have developmentally acted as a model of how to interact socially with others prior to adolescent development, and these interactions have downstream effects later in life (Sarason & Sarason, 2009); secondly, during adolescent development, family relationships can either help or hinder healthy development as adolescents navigate new experiences, trials, and milestones (Jaggers, Church, Tomek, Hooper, Bolland, & Bolland, 2015; Stocker and Youngblade, 1999); and lastly, the behaviors, emotions, and interactions of one family subsystem can influence other subsystems through ‘spillover’ and ‘compensation’ effects.

Therefore, families must cohesively support their adolescent to accommodate the changes their adolescent is experiencing and thus, positively contribute to their development (Richmond & Stocker, 2006). In sum, change in adolescents is mirrored by change in familial relationships with adolescent onset. For the purpose of this study, we investigated longitudinal change in family relationships, specifically shifts in the

trajectories of parent-adolescent older sibling and parent-adolescent younger sibling conflict when controlling for the positive and negative qualities of sibling relationships during adolescence.

Adolescents during this time of change must learn how to successfully individuate from their family. However, adolescents' gradual autonomy attainment is not completely determined by the adolescent, as the family plays a vital role in the individuation process. Shifts in family processes, such as adjusting from parental regulation to parent-adolescent co-regulation, are necessary to accommodate adolescents' need to develop their identity (Broderick, 1993). Critically, a mechanism and catalyst for this shift is the increase in conflict (e.g. disagreement) between adolescents and other family members (Weymouth, Buehler, Zhou, & Hanson, 2016; Campione-Barr, Greer, Schwab, & Kruse, 2014). Engaging in conflict not only diminishes parental control of the adolescent but increases the relative authority and power an adolescent has in their family. In choosing which clothes to wear, which friends to have, and which activities to participate in (Smetana, 1989), renegotiation in family decision-making is made possible by conflict. Conflict, then, can be viewed as a catalyst for change in the family dynamics of the family system. Thus, conflict prepares the family and the adolescent for the next stage of life by decreasing parental control and increasing the relative autonomy of adolescents.

Similar to the parent-adolescent relationship, the nature of sibling relationships also changes during adolescence. Because of their non-voluntary and egalitarian nature, sibling relationships engender characteristics of both family (genetic similarity and shared reality/experience) and peer relationships (companionship and intimacy) (Feinberg, Solmeyer, & McHale, 2012; McHale, Kim, & Whiteman, 2006). However,

because of the need to individuate, sibling interactions during early adolescence are the least egalitarian and least intimate, with sibling conflict peaking around age 12 (Kim, McHale, Osgood & Crouter, 2006). As such, older siblings in particular seek to develop relationships with others of similar age and cognitive abilities (Furman & Buhrmester, 1985; Cooper & Ayers-Lopez, 1985). Increased involvement with peers and romantic partners detracts from the intimacy siblings once shared in childhood (Laursen, Coy, & Collins, 1998; Updegraff, McHale, & Crouter, 2002; McHale et al., 2006; Kim et al., 2006). Eventually, conflict decreases as siblings grow older as they become more egalitarian after late adolescence and in transition into young adulthood (Kim et al., 2006; Lindell, Campione-Barr, & Greer, 2014). In spite of the changes in sibling relationships from childhood to middle adolescence, the sibling relationship offers protection, context for socialization, and a practice ground for conflict resolution (Gass, Jenkins, and Dunn, 2007; Milevsky & Levitt, 2005; Ram & Ross, 2001). These positive qualities of the sibling relationship benefit both siblings individually and collectively (Campione-Barr, et al., 2014). Therefore, it is important to study the qualities of the sibling relationship and how they relate to changes in family dynamics across the entire family system. Focusing on changes in family functioning during adolescence and conflict as a mechanism of that change can increase in the understanding of how the parent-adolescent and sibling relationship relate to another and impact individual adolescent development and family functioning.

Although studying entire families as one cohesive group over time is ideal, researchers have found this difficult to do for many reasons. Principle among these difficulties are methodological considerations, measurement issues, and monetary

concerns. Despite advancements in statistical analyses, triadic or more units of analyses are still in their infancy and are not widely utilized or accepted, often limiting analyses to dyadic interactions. Recruiting and retaining participants longitudinally is problematic as it is exceedingly difficult to provide monetary compensation per each family member involved and participating over time. In the same vein, more time points for participation increase the odds of attrition, which can affect the size of the sample and even statistical procedures. These barriers to holistic family-wide analyses and variations in family structure (e.g., single-parent home, presence of stepparents, step- or half-siblings) and processes make generalizing results about the family far reaching. For the present study, generalizing results about the family was complicated as our sample in ethnic make-up (mostly White), SES (higher SES), and family structure (two-parent household) were fairly homogenous. However, the hope of the present study was to generate attention to examining and analyzing the interrelatedness of families and how change in an individual result is changes in entire family dynamics.

Therefore, in order to gain a more complete understanding of the longitudinal course and importance of family relationships during the transitory stage of adolescence, the present study had three central aims. The *first aim* examined longitudinal associations between parent-older sibling and parent-younger sibling conflict. In accordance with the theoretical foundations of Family Systems Theory (Cox & Paley, 1997; Minuchin, 1985; Broderick, 1993) and supporting empirical evidence (Feinberg et al., 2003; Moed et al., 2015), family relationships, specifically dyadic interactions, have the propensity to influence and be influenced by other family relationships. This particular concept applies to sibling relationships, as this dyadic relationship is important given older and younger

siblings co-exist in the same household and interact with each other while retaining individual characteristics (i.e. temperament, gender, age, etc.), leading to differential interactions with their parents (Shanahan, McHale, Crouter, & Osgood, 2007). Therefore, the *second aim* of this study analyzed the mechanism by which influence of parent-adolescent older sibling conflict on parent-adolescent younger sibling conflict occurs by examining the quality of the sibling relationship in adolescence. Although empirical research denotes that conflict in parent-older interactions can ‘spillover’ into parent-younger conflict interactions (Shanahan et al., 2007), it is possible that spillover effects may not always be observed. Therefore, in accordance with theory on spillover and compensation effects (Cox, Paley, & Harter, 2001; Iturralde, Margolin, & Shapiro, 2013), the quality of sibling relationship, that is the emotional tone of the relationship, can be a mechanism influencing how similar (spillover) or dissimilar (compensation) conflict looks like in parent-adolescent older sibling and parent-adolescent younger sibling relationships. Lastly, since previous research studies highlight the importance of sibling gender composition (e.g. same-sex and mixed-sex sibling dyads) as a factor associated with differential outcomes in development (Cole and Kerns 2001; Furman and Buhrmester 1992; Kim et al. 2006), the *third aim* investigated differences in proposed associations based on sibling gender composition.

Families as a System

Based on family systems theory (Minuchin, 1985; 1974), families are interconnected and interdependent systems. As a system, families are ordered, organized, self-regulatory, and self-stabilizing (Cox & Paley, 1997). In addition to existing as an ordered system, families are not static and subject to change. The actions and interactions

within a family from its members define the function of that family. That is, characteristics of a family such as structure, dynamics, and processes can change over time in the same fashion as the members of that family, individually change over time. The non-static nature of families is clear during adolescence, when a mandatory restructuring of dynamics and processes must occur in response to change in one individual. Families during adolescent development must strike a balance between interconnectivity and independent integrity. This process protects and preserves the identity of adolescents, as well as prevents from enmeshment and coalitions within families to develop as adolescents' transition into adulthood.

Marital Subsystem

Family systems theory posits that change in one individual leads to change across an entire family. Family systems theory hypothesizes that individuals are nested within families and have the ability to influence each other (Cox & Paley, 1997). Although the family is a whole comprised of individuals, the family can be separated into dyadic subsystems. These subsystems are hierarchical, and the interactions between subsystems of the family are governed by boundaries (Petronio, 2010). As the hierarchical head of the family, the marital subsystem institutes family paradigms that guide family processes, dynamics, and interactions (Broderick, 1993). Parents are responsible carrying out the goal of the family: to socialize and impart a specific set of values, beliefs, and ideals onto their children (Broderick, 1993). Importantly, this subsystem must operate functionally and cohesively as it affects other familial relationships. For example, during adolescence, research supports that negative marital interactions negatively impact adolescent development, specifically peer relationships and romantic relationships (Miga, Gdula, &

Allen, 2012; Hare, Miga, & Allen, 2009). Therefore, parents must work in tandem effectively and be aware of the changes to be made to the family during adolescence to ensure positive and healthy adolescent development.

Parent-Adolescent Subsystem

The next important family subsystem is the parent-child subsystem. Due to its natural hierarchy, parents influence their children's development by satisfying children's basic needs, allocating resources for development, and guiding behavior through parent-child interactions (Bronfenbrenner, 1986). Parents directly influence their children's interpersonal interactions with others through their goal of socializing children for society (Koerner & Schrod, 2014). Prior to socialization efforts, attachment must take place. Looking at attachment in childhood, positive parent-child interactions such as warmth, affection, and responsiveness develop a secure base script for youth to base relationships with others on (Groh, Roisman, Haydon, Bost, McElwain, Garcia, & Hester, 2015; Pittman, Keiley, Kerpelman, & Vaughn, 2011). The emotional security hypothesis proposes that a non-secure attachment between parent and child predicts anxiety in social settings with others (El-Sheikh, 1994). In the case of adolescent development, individuals with insecure attachment may develop adjustment problems and struggle in social relationships with others (Lee & Hankin, 2009). Research by Sarason and Sarason (2009) indicate that childhood interactions carry over into other stages in life. The findings support the importance of a stable and warm parent-child relationship as it impacts individual adolescent development.

Sibling Subsystem

Sibling relationships tend to be long lasting and close relationships over an individual's lifetime (Stocker, Lanthier, & Furman, 1997). A portion of an individual's learning and development in childhood, including moral and cognitive growth, can be attributed to interactions with their siblings (Dunn, 1988; Furman & Buhrmester, 1985; Stocker, 1993). Sibling relationships also provide a context for children to develop social skills for friends and romantic partners (Bank, Burraston, & Synder, 2004; Updegraff et al. 2002). Siblings also positively contribute to each other's individual psychological adjustment and prosocial development (Harper, Padilla-Walker, & Jensen, 2016). Siblings, from childhood, are intense relationships since they are non-voluntary while simultaneously being egalitarian and hierarchical.

Notably, sibling relationship qualities are an important indicator of their dynamics and interactions. Sibling dynamics (i.e. expressing warmth, support, closeness) influence individual adjustment. If sibling dynamics are positive, they tend to buffer the development of internalizing behavior problems (Gass et al. 2007). Electing to share information is an important indicator of involvement, trust, concern, and openness in the family (Smetana, Campione-Barr, & Metzger, 2006). Disclosure is an important communication practice that deepens and develops relationships. For disclosure in families, it is important to understand who is being disclosed to and what is being disclosed. Research shows that siblings who disclosed information to one another in particular social cognitive domains, experienced a positive change in their relationship quality (Campione-Barr et al., 2014). Specifically, younger siblings disclosing information to their older sibling in the personal domain felt positive about their relationship quality. Furthermore, older siblings of brother-brother dyads disclosing

information in the multifaceted domain felt more positive about their sibling relationship quality (Campione-Barr et al., 2014). Interestingly, older adolescents disclosing to younger brothers personal and multifaceted issues, reported less depressive symptoms. In sum, the sibling dyad is an important family subsystem as sibling relationships function differently than other family subsystems.

Considering the gender of both siblings, previous research studies has found that sister-sister dyads tend to be closer and more intimate than any other dyad compositions (Furman & Buhrmester, 1985; Feinberg, Solmeyer, and McHale, 2012). When examining sibling relationship qualities, research studies have found that siblings of mixed-sex composition have less positivity and intimacy (Kim, McHale, Osgood, & Crouter, 2006; Buist, Dekovic', Meeus & van Aken, 2002; Buhrmester & Furman, 1990) and more negativity (Aguilar, O'Brien, August, Aoun, & Hektner, 2001) than same-sex siblings. The importance of these studies point out the importance of context when considering dyadic, family interactions. Based on the findings of previous research on the gender composition of siblings and relationship quality amongst them, the present study hypothesized that mixed-sex sibling dyads will have less positive and more negative relationship qualities between them than same-sex dyads.

Developmental Trajectory of Family Conflict

Adolescence is a time of change. Individuals during adolescent development begin to assert their own thoughts and influence family goals, processes, and paradigms (Broderick, 1993). Importantly, this transitory change in development is not solely confined within the adolescent, as it also affects the family an adolescent is a part of. At its core, conflict is an incompatibility of goals and is normative and non-neutral concept

(Adams & Laursen, 2007). During adolescent development, adolescents are tasked with the goal of individuating and becoming more independent (in their beliefs, values, ideals, and decision-making). However, the goal of the family is to socialize individuals to be contributing and independent members of society by establishing rules and regulations that guide family interactions. Families experience a shared reality and have schemas through which they see the world and interact with (Koerner & Fitzpatrick, 2006). As such, families uniquely adopt patterns of communication as a socialization tool to base communication and interaction with others (Koerner & Fitzpatrick, 2006). Although part of a shared reality, adolescents in a family must begin to break away from this shared reality.

Conflict between a developing adolescent and the family is an indication that change within the family needs to take place to facilitate healthy development of the adolescent and the family. Conflict, therefore, becomes the mechanisms of change in family roles, boundaries, dynamics, and processes. Notably, conflict is not a unitary construct, and can be considered either intense or frequent and these have important implications for adolescent development and family functioning. It is important to note that conflict between parent and adolescent that is frequent is not particularly problematic (Steinberg & Silk, 2002; Arnett, 1999): it is the intensity of conflicts that is indicative of and predicts family-wide problems (Moed et al., 2015). Importantly, findings point to a subsequent decrease in conflict in both parent-child and sibling relationships as adolescents' age into young adulthood (Lindell & Campione-Barr, 2017).

Importantly, not all families handle conflict the same way. Family conflict manifests itself in particular patterns, stemming from individual personalities or

temperament. Saxbe, Rodriguez, and Margolin (2013) propose that families have conflict typologies that classify how they resolve conflict within the family and even outside of the family. In adolescence, conflicts within the entire family increases, but normally dissipates as family reorganize and restructure their system of hierarchy, communication, and accommodation. However, conflict can remain unresolved if families are not working together to ensure a smooth renegotiation of family roles, function, and goals. This is likely to be non-normative levels of conflict that can have negative implications for individual development and family functioning (Saxbe, Rodriguez, and Margolin, 2013). Stated earlier, it is important to note that conflict is not a unitary construct, but can be considered either intense or frequent. Specifically, there is a fundamental difference between conflict intensity and conflict frequency. Highly intense conflicts compared to highly frequent conflict are more maladaptive since they indicate unresolved communication about the incompatible goals of the family. Conflict severity within the family in general has been linked to poor adjustment outcomes for children (El-Sheikh, Cummings, Kouros, Elmore-Staton, & Buckhalt, 2008). Generally, the frequencies of family-wide conflicts dwindle over time (Stocker, Lanthier, & Furman, 1997; Laursen et al., 1998), but this is not always the case with intense conflicts. Therefore, it is necessary that intense conflicts within the family during adolescence be investigated to understand how it affects individual adjustment and family cohesion.

Parent-Adolescent Conflict

The start of conflict between the adolescent and their family typically occurs in early adolescence (Laursen et al., 1998). Conflict between parents and a developing adolescent varies with conflict frequency peaking in early adolescence and conflict

intensity peaking in middle adolescence and occur daily on average (Laursen et al., 1998; Laursen, 1993; Montemayor, 1986). The topic of conflict is typically about chores, homework, and other non-trivial things, where teens are reluctant to comply with parental wishes (Smetana, 1989; Montemayor, 1986). From an adolescent's perspective, parents' conflicts with adolescents are typically about issues deemed as personal to adolescents (Smetana & Asquith, 1994). Conversely, parents view certain issues outside of their parental control, and this could be seen as being protective of their children rather than diminishing autonomy. The literature suggests that since parents and adolescents can correctly identify the subject(s) of conflict, it is the reasoning of the conflict that is the problem. Further, the research suggests that children understand their parents' perspective but choose to not agree with their reasoning, implying an adolescents' attempt to claim autonomy (Steinberg, 2005). Smetana and Asquith (1994) conclude that parent-adolescent conflict stem from differences on issues either being under parental authority or personal jurisdiction of the adolescent.

Based on the literature, it can be understood that conflict between parents and adolescents occurs because parents attempt to manage the personal issues and autonomy of their adolescent, while the adolescent is attempting to protect against infringement upon personal issues and promote their desire for more autonomy. The disagreement and ensuing conflict lead to shifts in family communication originally spear-headed by parents, to parent-adolescent negotiation in order to accommodate an adolescent's autonomy and facilitate independence (Cox & Paley, 1997; Minuchin, 1985). Generally, this conflict is between parent and adolescent can be considered normative. However, the extent to which these parent-child conflicts are normative is relative, as research shows

that parent-child conflict predicts negative youth maladjustment development (Caples & Barrera, 2006; Wang, Brinkworth, & Eccles, 2013; Maggs & Galambos, 1993; Yeh, 2011). It is also important to note that conflict intensity tends to be more salient than conflict frequency (Montemayor, 1986). Thus, the present study investigated trajectories of conflict intensity and conflict frequency in parent-adolescent older sibling and parent-adolescent younger sibling interactions and how adolescent individuation brings about changes in family roles and dynamics during adolescence.

Although conflict is intense and frequent during this time, few research studies have examined conflict as a mechanism for change in family dynamics. In a study investigating the implications of parent-adolescent conflict and family dynamics, Shanahan and colleagues (2007) found that maternal-older sibling conflict contributed to earlier onset of conflict between mothers and younger siblings. The results of this study suggest that other family subsystems are affected and influenced by conflict during adolescence. Furthermore, the results illustrate that interactions in one family subsystem can impact and ‘spillover’ into other familial relationships. Despite the findings, the specific intervening factor influencing the process of *how* this interaction occurs has not been identified or studied.

Despite research alluding to the spillover of dynamics in hierarchical subsystems (i.e. from the marital subsystem to the parent-child subsystem; see Erel & Burman, 1995), it is not clear as to how spillover functions in parent-adolescent relationships when controlling for the influence of another family relationship (i.e. sibling relationship). Moreover, Shanahan and colleagues (2007) only examined parent-adolescent conflict frequency and not parent-adolescent conflict intensity. Since each sibling interacts with

the same parents in a vertical dyadic relationship, the sibling subsystem may be an important relational factor in the process of *how* spillover or compensation effects manifest within the family system over the course of adolescence. More specifically, the valence within the sibling relationship can influence the trajectory of conflict. Therefore, the present study investigated qualities of the sibling relationship as a potential mechanism influencing and shifting the similarity or dissimilarity in parent-older sibling and parent-younger conflict trajectories.

Importantly, context matters in family relationships and thus, gender of both individuals in a dyad should be considered. Despite the research on the gender constellation of parents and adolescents and conflict between them, the results have been contradictory. Some research has found that girls tend to have less conflict with their fathers and more cohesion with their mothers than boys (Fuligni, 1998). However, in a predominately Mexican American sample, girls have been found to have more conflict with both parents than boys (Pasch, Deardorff, Tschann, Flores, Penilla, & Pantoja, 2006). Despite the research findings on the importance of gender in parent-adolescent conflicts, the literature has not examined how the gender constellation of the siblings impacts parent-adolescent conflict in two-sibling households. Therefore, the present sought to understand how sibling gender constellation influences parent-adolescent conflict in parent-older dyads and parent-younger dyads.

Conflict in the Sibling Subsystem

Of equal importance, sibling relationships begin to undergo changes. In addition to increased conflict with parents (Moed et al., 2015; Steinberg & Silk, 2002, Arnett, 1999), adolescents also experience increases in conflict with their siblings in early

adolescents (Furman & Buhrmester, 1985; Kim et al., 2006). Adolescent conflict with siblings is estimated to occur several times an hour with various degrees of frequency and intensity (Lollis, Ross, & Leroux, 1996). Siblings, especially pre- and early adolescents have many conflicts with each other about different issues. However, these conflicts range in different levels of intensity and different rates of frequency. Further, conflicts occur in different domains, such as the invasion of personal and equality and fairness domains (Campione-Barr & Smetana, 2010). Research has shown that childhood sibling conflict is linked with negative adjustment in adolescence and early adulthood (Bowes, Wolke, Joinson, Lereya, & Lewis, 2014; Kim et al., 2007). Additionally, based on the frequency and intensity of sibling conflicts and aggression, siblings are at greater risk of mental health problems (Tucker & Finklehor, 2015). Increases in sibling conflict can be attributed to independent adolescent individuation (Whiteman, McHale, Crouter, 2007; Larson, Richards, Moneta, Holmbeck, & Duckett, 1996), parental differential treatment (Shanhan et al., 2008; McHale, Crouter & Cumsille, 2003), and perceived social domain threats (Turiel, 2002; Smetana et al, 2006; Recchia & Howe, 2010; Campione-Barr et al., 2014).

Importantly, the increase in sibling conflict is temporary (barring extraneous events/family dysfunction) and tends to decrease over time (Campione-Barr & Killoren, 2019; Kim et al., 2006; Feinberg et al., 2003). Importantly, sibling gender composition was examined the aims of the present study, as previous studies have found that conflict has been to be present more in dyads with at least one brother (Kim, McHale, Osgood, & Crouter, 2006; Updegraff et al., 2002). Based on these studies, it can be hypothesized that mixed-sex sibling dyads would have more conflict amongst themselves than same-sex

dyads, thus potentially have more negative sibling relationship qualities than same-sex dyads.

Spillover and Compensation within the Family System

Spillover in the Family System

According to Family Systems Theory (Cox & Paley, 1997), family members and family subsystems have the ability to influence each other. The ‘spillover hypothesis’ posits that relationship interactions (both positive and negative), behaviors, and emotional states (i.e. valence) can transfer from one member or subsystem to other members or subsystems (Cox, Paley, & Harter, 2001). Research examining the spillover phenomenon has found that problematic marital relationships can negatively affect parent-child relationship interaction (Gerard & Krishnakumar, 2006; Osborne & Fincham, 1996). Additionally, spillover effects have been found to affect sibling relationships. In a study examining marital conflict, conflict in the marital subsystem was associated with more negativity in the sibling relationships (Iturralde, Margolin, & Shapiro, 2013). Further, Stocker and Youngblade (1999) found that marital conflict predicted poor sibling relationship quality and warmth. Importantly, spillover effects are not always negative. One longitudinal study has found that positivity within the marital relationship can contribute to a sense of positivity in other family subsystems (Ackerman, Kashy, & Donnellan, 2011). Specifically, the study found that when parents positively engaged with one another during a conflict resolution task, the same behavior was performed by siblings. The data suggests that due to the nature of the family as a system, emotions, behaviors, and relationship dynamics can transfer from one subsystem to another.

Despite studies investigating spillover effects, these potential effects between the parent-older sibling and parent-younger sibling subsystem have seldom been studied (see Shanahan et al., 2007 for exception). Despite the importance and significance of Shanahan and colleagues' study (2007), the study did not explore the potential active role sibling relationship qualities play in the spillover effects across relationships. Based on the possibility of spillover effects, the present study hypothesized that negative sibling relationship qualities would influence and shift the trajectory of parent-adolescent conflict. Specifically, the negative valence of the sibling relationship was expected to shift the trajectories of parent-adolescent conflict such that parent-older siblings' and parent-younger siblings' conflict trajectories would be similar. Based on the theory of spillover, the conflict trajectories of parent-adolescent in older and younger siblings should be similar when accounting for negative sibling relationship qualities.

Compensation within the Family System

Considering the research supporting the negative emotional transference between family subsystems, a small percentage of research has found evidence contrary to expected spillover effects. Specifically, research has found that divorce resulting from marital conflict was associated with positive sibling interactions, where siblings grew more closely together and female siblings exhibited care-taking behaviors (Roth, Harkins, & Eng, 2014). Moreover, in families with greater marital distress, siblings experienced greater positivity among themselves and were protected against greater anxiety (Iturralde, Margolin, & Shapiro, 2013). These findings confirm that spillover effects may not always result from negative, interpersonal subsystem interactions. Critically, the compensation hypothesis posits that active measures can be taken to halt the transference of negative behaviors, emotions, or relational interactions.

The concept of compensation within the family system can apply to sibling relationships. Since any family subsystem has the propensity to actively affect family relationships and act as protective agent for that subsystem and individual development, siblings may compensate for negative parent-adolescent dynamics (Portner & Riggs, 2016; East, 2009; Milevsky, 2005). In the case of early adolescence when conflict between parents and adolescents is at its peak (Laursen et al., 1998), instances of high conflict levels may be compensated for by a supportive sibling relationship and positive sibling interactions. However, the literature has not explicitly examined positive sibling relationship quality as a compensatory dynamic against highly conflictive parent-child interactions during adolescent development. Thus, the present study proposed that in support of the compensation hypothesis, positive sibling relationship qualities would influence and shift the trajectory of parent-adolescent conflict. Specifically, the positive valence of the sibling relationship shifts the trajectories of parent-adolescent conflict such that parent-adolescent older siblings' and parent-adolescent younger siblings' conflict trajectories will be dissimilar.

The Present Study

Understanding that parent-adolescent conflict frequency peaks in early adolescence and conflict intensity peaks in middle adolescence, it is possible that the emotional tone of the quality of the sibling relationship may influence the parent-adolescent conflict trajectory of older siblings and the parent-adolescent conflict trajectory of younger siblings. Shanahan and colleagues (2007) finding that earlier peaks in parent-adolescent conflict of second-born siblings and how conflict in this relationship mirrored parent-adolescent older sibling conflict, supports the notion that families are connected and that interactions within a relationship can influence other relationships.

Despite their important findings (Shanahan et al., 2007), it is unclear what mechanism is at work contributing to a similarity in parent-adolescent conflict in older and younger sibling relationships with their parents. It is possible that spillover or compensation effects to occur. That is, the extent to which the conflict trajectories of parent-adolescent older sibling and parent-adolescent younger sibling are influenced by qualities of the sibling relationship.

To investigate these processes, our first aim was to examine the trajectory of how parent-older sibling conflict frequency and intensity longitudinally coincide with parent-younger sibling conflict frequency and intensity across three years of adolescent development. Second, we explored how shifts in these trajectories across time are affected when controlling for the positive and negative relationship qualities of siblings at each of the three time points under examination. Additionally, we investigated the effect of birth order and compared the trajectories of older sibling and younger sibling trajectories to examine differences in trajectories consistent with either spillover or compensation effects.

From our proposed research questions, the following hypotheses are put forth that characterize the trajectories and interpersonal changes across family relationships both between and within families:

- First, based on the spillover hypothesis (Erel & Burman, 1995), we hypothesized that the trajectory of highly conflictive parent-older sibling conflict will be mirrored in the parent-younger sibling conflict when simultaneously accounting for negative sibling relationship quality at each time point (i.e., negative relationships in one family relationship spillover to another family relationship).

- Alternatively, based on the compensation hypothesis (Krishnakumar & Buehler, 2000), we hypothesized that the trajectory of highly conflictive parent-older sibling conflict will not be mirrored in the parent-younger sibling conflict when simultaneously accounting for positive sibling relationship quality at each time point (i.e., positive relationships in one family relationship compensate in other family relationship).
- Second, it is hypothesized that based on the literature on conflict type (Montemayor, 1986), parent-adolescent conflict intensity trajectory, due to its salience within the family system, will be susceptible to influence from conflict intensity than parent-adolescent conflict frequency trajectory. That is, the valence of sibling relationship quality will more strongly influence parent-adolescent conflict intensity more than parent-adolescent conflict frequency.
- Third, it is hypothesized that adolescent reports of parent-adolescent conflict will differ from parent reports of parent-adolescent conflict, but it is not predicted whose report of conflict will be higher.
- Lastly, our final hypothesized research question proposed that the parent-adolescent conflict trajectories will be different based on the gender composition of siblings (e.g. mixed-sex and same-sex). Specifically, families with same-sex siblings will experience more spillover effects and compensation effects than mixed-sex siblings, due to the similarity of gender and closeness of relationship supported by the literature (Updegraff et al., 2002).

CHAPTER 2

METHOD

Participants

Eighth, tenth, and twelfth-grade students and a sibling no more than four years younger in a large Midwestern school district in a small city were recruited and contacted through mailed letters to six junior high and high schools. Families of adolescents who were interested and who met the criteria were asked to call or email the researchers. Of the 3,030 families contacted, 145 families agreed to participate (4.52%).

At Time 1, our entire sample consisted of 145 sibling dyads ($N = 290$ adolescents; 138 males, 152 females). Older siblings ranged from 12-18 years ($M = 14.97$, $SD = 1.68$) and younger siblings ranged from 9-17 years ($M = 12.20$, $SD = 1.92$). Participants were members of the following first-born/second-born sibling gender compositions: older brother-younger brother ($n = 36$), older sister-younger sister ($n = 43$), older brother-younger sister ($n = 28$), older sister-younger brother ($n = 38$). At Time 1, younger siblings averaged 12.20 years of age ($SD = 1.92$) and older siblings averaged 14.97 years of age ($SD = 1.68$). On average, first- and second-born siblings were separated in age by 2.77 years ($SD = 1.21$).

The ethnic make-up of the sample was primarily European American (91.7%) with the remainder identifying as African American (5.6%) or other ethnicities (2.8%). The median family income was between \$70,000 and 84,000 (13.2%), and most of the parents of the adolescents had at least a college degree (70.2%). Of the 145 families who participated at Time 1, 123 participated one year later at Time 2 with at-home

questionnaires. Of the 123 families who participated at Time 2, 99 families participated in the following year at Time 3. Families who did not participate at Time 2 or at Time 3 did not differ by ethnicity, income, or main study variables from those families who participated in all three waves. However, those families who continued in the study at Time 2, reported higher maternal education ($t = 46.67, p = .00$) and less separated marital status ($t = 11.68, p = .00$) than those who did not continue after Time 1. Moreover, those families who continued in the study at Time 3, reported more maternal education ($t = 97.27, p = .00$) and less separated marital status ($t = 33.46, p = .00$) than those who did not continue after Time 2.

Parents of Participants. Parents who met criteria for the study and who joined the children for a 2-hour visit at Time 1 were considered the primary parent. For primary parents, there was no statistically significant difference between mothers and fathers in ethnicity and all the main study variables except for two variables. However, due to the small number of fathers participating as primary parents in the sample, only mothers' perspectives of parent-adolescent conflict were considered. Mothers who participated in the study differed in income ($t = .73, p = .000$), education ($t = 8.03, p = .005$), marital status ($t = 1.29, p = .005$).

Procedure

At Time 1, families who met the study criteria and agreed to participate were invited to the laboratory for a 2-hour visit. Prior to the start of the family visit, families were paid a \$50 honorarium for their participation. As part of a larger study, family members gave consent and assent, completed a series of questionnaires, answered questions in a one-on-one interview with a trained investigator, and participated in two sibling videoed interactions: a conflict-resolution discussion task and a family vacation

planning task. In order to keep the research activities from becoming too arduous for participants, tasks were divided such that a third of the questionnaires were completed, then the interview or one of the discussion tasks was completed, and this process was repeated two more times with the order of the questionnaires remaining the same for all participants, with the interviews and conflict-resolution discussion task being counterbalanced. Only questionnaire data is utilized in the present study. At Time 2 and Time 3, participants were contacted again through email and phone calls. For Time 2 and 3, families were sent online questionnaires (or paper by request) and returned the questionnaires at their earliest convenience. Families were paid a \$50 honorarium at each time point for their continued participation.

Measures

Sibling Relationship Quality. The Network of Relationships Inventory (NRI), created by Furman and Buhrmester (1985) and adapted by Adams and Laursen (2007), was utilized for this study. The NRI is a subjective, 33-item measure that assesses sibling relationship quality. Siblings indicated the quality of their relationship with their corresponding sibling on a scale of 1 (*little to none*) to 5 (*the most*). The measure contains 13, 3-item subscales that are most typically combined into three broader categories: positivity/support, negativity, and relative power (Adams & Laursen, 2007). Based on the present study's primary goals, we only examined positive relationship qualities and negative relationship qualities.

For the positivity/support factor, 24 items from the eight positive subscales were examined: admiration ("How much does your brother/sister treat you like you're admired and respected?"), affection ("How much does your brother/sister like or love you?"), instrumental aid ("How much does your brother/sister teach you how to do things that

you don't know?"), intimacy ("How often do you tell your brother/sister things that you don't want others to know?"), nurturance ("How much do you help your brother/sister with things she/he can't do by her/himself?"), reliable alliance ("How sure are you that this relationship will last in spite of fights?"), intimate disclosure ("How often do you share secrets and private feelings with this person?"), and support ("How much do you turn to this person for support with personal problems?"). The items used were computed into composite scores (the average of all the items) for sibling relationship quality.

For the negativity factor, 9 items across 3 subscales were examined: conflict ("How often do you and your brother/sister disagree and quarrel with each other?"), antagonism ("How much do you and your brother/sister get on each other's nerves?") and criticism ("How often does this person point out your faults or put you down?").

Cronbach's alphas at Time 1 evidenced high reliability for both sibling perceptions of relationship quality (Positivity: older siblings = .95, younger siblings = .95; Negativity: older siblings = .93, younger siblings = .93). Cronbach's alphas at Time 2 evidenced high reliability for both sibling perceptions of relationship quality (Positivity: older siblings = .95, younger siblings = .95; Negativity: older siblings = .95, younger siblings = .96).

Mother-Adolescent Conflict. Mother-adolescent conflict was measured using the Issues Checklist (Robin & Foster, 1984). Originally a 20-item checklist, the modified parent-adolescent checklist contains 11 items related to parent-adolescent conflict frequency and intensity. Sample items included "helping out around the house/doing chores" and "how you keep your bedroom." Adolescents each reported on the frequency and intensity of their conflict with their mother separately at Time 1 and Time 3. Conflict frequency items were rated on a scale of 1 (*not at all*) to 5 (*very often*). Conflict intensity

items were rated on a scale of 1 (*calm*) to 5 (*angry*). For the purposes of this study, both reports by adolescents and mothers were used.

For adolescent reports of mother-adolescent conflict, Cronbach's alphas at Time 1 for both sibling perceptions of conflict frequency and intensity with their mother or father were acceptable (Frequency: older siblings = .80, younger siblings = .75; Intensity: older siblings = .77, younger siblings = .80). Cronbach's alphas at Time 2 for both sibling perceptions of conflict frequency and intensity with their mother or father were acceptable (Frequency: older siblings = .85, younger siblings = .80; Intensity: older siblings = .82, younger siblings = .80). Separate mean scores were used in the final analyses. Cronbach's alphas at Time 3 for both sibling perceptions of conflict frequency and intensity with their mother or father were acceptable (Frequency: older siblings = .82, younger siblings = .78; Intensity: older siblings = .86, younger siblings = .84). Separate mean scores of adolescents reported, mother-adolescent conflict frequency and intensity were used in the final analyses.

For reports of maternal-adolescent conflict, Cronbach's alphas at Time 1 for maternal perceptions of conflict frequency and intensity with their children were acceptable (Frequency: older siblings = .80, younger siblings = .75; Intensity: older siblings = .77, younger siblings = .80). Cronbach's alphas at Time 2 for maternal perceptions of conflict frequency and intensity with their children were acceptable (Frequency: older siblings = .83, younger siblings = .81; Intensity: older siblings = .80, younger siblings = .84). Cronbach's alphas at Time 3 for maternal perceptions of conflict frequency and intensity with their children were acceptable (Frequency: older siblings = .82, younger siblings = .78; Intensity: older siblings = .79, younger siblings = .77).

Separate mean scores of parents reported, mother-adolescent conflict frequency and intensity were used in the final analyses.

Missing Data

Due to attrition over time and failure to complete all questionnaire items, there was missing data in the present study. At Time 1, data of mother-adolescent conflict from measures employed were missing at a total rate of 1.4% for conflict frequency and 2.1 % for conflict intensity for older siblings. For younger siblings, data were missing at a total rate of 5.6% for both conflict frequency conflict intensity. With the exception of mother-younger conflict intensity, Little's MCAR test (Little, 1988) indicated that all of these data were missing completely at random (mother-older conflict frequency: $X^2 [20] = 26.15, p = .161$; mother-older conflict intensity: $X^2 [30] = 22.59, p = .832$; mother-younger conflict frequency $X^2 [59] = 54.79, p = .631$; mother-younger conflict intensity: $X^2 [59] = 128.49, p = .000$).

At Time 2, data of siblings on relationship qualities from measures employed were missing at a rate that ranged from 15.2% to 17.9% for positivity and 15.2% to 17.2% for negativity from older siblings' perspective. From younger siblings' perspective, data were missing at a rate that ranged from 15.9% to 19.3% for positivity and 15.2% to 17.2% for negativity. Little's MCAR test indicated that all of these data were missing completely at random (older sibling reported positive sibling relationship qualities: $X^2 [330] = 305.74, p = .827$; older sibling reported negative sibling relationship qualities: $X^2 [101] = 77.38, p = .961$; younger sibling reported positive sibling relationship qualities: $X^2 [315] = 338.82, p = .170$; younger sibling reported negative sibling relationship qualities: $X^2 [106] = 105.39, p = .498$).

At Time 3, data of mother-adolescent conflict from older siblings' perspective were missing at a rate that ranged from 32.4 % to 33.1% for conflict frequency and from 33.1% to 34.5% for conflict intensity. Data of mother-adolescent conflict from younger siblings' perspective were missing at a rate that ranged from 33.1 % to 34.5% for conflict frequency and from 33.8% to 35.2% for conflict intensity. Little's MCAR test indicated that these data were missing completely at random (mother-older conflict frequency: $X^2 [30] = 25.19, p = .716$; mother-older conflict intensity: $X^2 [39] = 53.49, p = .061$; mother-younger conflict frequency: $X^2 [30] = 42.81, p = .061$; mother-younger conflict intensity: $X^2 [47] = 41.77, p = .688$).

Robust Maximum Likelihood Estimation

Prior to conducting statistical analyses, data estimation for handling missingness was addressed. Compared to multiple imputation (MI), maximum likelihood has many advantages for addressing missing data (Allison, 2012). Estimating missing data via the maximum likelihood (ML) approach produces estimates that are statistically optimal. This means that estimates are consistent, unbiased, asymptotically efficient, and asymptotically normal. These advantages far outweigh multiple imputation, which is subject to biased and inconsistent estimates (Allison, 2012).

Importantly, maximum likelihood assumes that data follow a normal distribution. Furthermore, in the case of structural equation modeling, continuous variables estimated by ML must follow a multivariate normal distribution. Considering the assumptions of ML estimation, the statistical trends of the data were explored via Leverage, Mahalanobis Distance, and Cook's D analyses. Based on inferential statistical analyses, it was found that the data violated the assumptions of multivariate normality. Influential cases

contributing to the non-normality of the data were identified. However, these cases were not taken out or adjusted in order to retain a sample reflective of the true population.

Therefore, robust maximum likelihood (MLR) was used to handle missing data and to optimally estimate parameters. Moreover, MLR standard errors and chi-square test statistics are corrected to increase robustness against skewness, kurtosis, or both (Li, 2016). Therefore, maximum likelihood was utilized in the present study.

CHAPTER 3

RESULTS

Descriptive Statistics

Several analytical strategies were employed to address our three primary research aims. Before assessing the three primary research aims, we investigated longitudinal changes in family relationships and a set of control variables. Preliminary analyses included correlation analysis of all main study variables (see Table 1) and a 2 (Rater; Adolescent vs. Parent) X 2 (Conflict Type; Frequency vs. Intensity) X 3 (Time; Time 1, Time 2, Time 3) X 2 (Sex: Mixed-Sex vs. Same-Sex) X Birth Order (Older Sibling vs. Younger Sibling) mixed model ANOVA with reporter, conflict type, and time as within-subjects factors and sex and birth order as between subjects factors (see Table 2 for means). Significant main effects of reporter, $F(1, 175) = 6.10, p < .02, \eta^2 = .03$; conflict type, $F(1, 175) = 1760.88, p < .001, \eta^2 = .91$; and time, $F(1, 175) = 23.67, p < .001, \eta^2 = .12$. Additionally, there was only one main effect significant qualified by a significant Conflict X Time interaction, $F(2, 350) = 29.37, p < .001, \eta^2 = .14$.

Independent samples t-test revealed that adolescents had reported significantly higher average conflict ($M = 2.08, SD = .02$) than mothers ($M = 1.99, SD = .02$), $t(175) = 3.09, p = .00$. For conflict type, independent samples t-test revealed that conflict frequency was reported significantly more ($M = 2.50, SD = .70$) than conflict intensity ($M = 1.61, SD = .53$), $t(175) = -36.44, p = .00$. For time, independent samples t-test revealed that Time 1 had significantly higher conflict ratings ($M = 2.17, SD = .77$) than Time 2 ($M = 2.00, SD = .75$), $t(175) = 5.02, p = .00$, and Time 3 ($M = 1.99, SD = .02$), t

(175) = 3.09, $p = .00$. Moreover, Time 2 had significantly higher conflict ratings ($M = 2.00$, $SD = .75$) than Time 3 ($M = 1.88$, $SD = .70$), $t(175) = 8.52$, $p = .00$.

Overall, parent-adolescent conflicts reported by adolescents were higher than mother reports of parent-adolescent conflicts for both conflict intensity and frequency over all three waves examined. Moreover, conflict frequency was consistently higher than conflict intensity over all three waves examined; furthermore, conflict decreased consistently from time 1 to time 2 and from time 2 to time 3. Lastly, females reported more conflict than males and there was no difference between first-borns and second-borns in their reports of conflict.

Latent Growth Curve Modeling Analytical Plan

In order to examine the trajectory and change over time of parent-adolescent conflict associated with sibling relationship qualities, a two-factor shift, state-trait, latent growth curve modeling (LGCM) approach with an structural equation modeling (SEM) framework was utilized (Mplus 8.4; Muthen & Muthen, 2012). For a visual representation of the conceptual model analyzed, see Figure 1. In latent growth curve modeling, the concept of growth can be described by two latent factors. The latent intercept factor points to the mean intercept across the entire sample (between-level), while the variability, or variance of the intercept factor, describes the individual differences (within-level) surrounding the mean intercept value. The latent intercept factor is a constant for any given individual across time and the factor loadings set at 1 for each point in time reflect this constancy. The latent slope factor mean denotes the average rate of change across the entire sample, and the latent slope factor variance describes the individual differences of subjects in their rate of change. The factor

loadings for the slope factors can be fixed to connote a pattern of growth (i.e. linear, quadratic, cubic, etc.) or estimated freely to express the non-linearity of growth over time.

As stated previously, latent growth curve models were analyzed within a Structural Equations Modeling (SEM) framework. All models were first examined as unconditional (base) models to establish intercept values and growth of mother-adolescent conflict from the perspective of adolescents' and mothers' separately. Once unconditional models were determined as appropriately fitting the data, the time-variant covariate of sibling relationship qualities over time, the time-invariant predictor of birth order, and a grouping variable of sibling gender composition were individually added to the models in subsequent analyses. The covariance matrix, means vector, and standard deviations are presented in Table 3.

Model Results

Preliminary Analyses

In order to characterize the pattern growth of the data, we first conducted preliminary data analyses to see whether the growth trajectories were linear or non-linear. Testing the possibility that growth was linear, factor loadings of the T1, T2, and T3 in parent-adolescent conflict intensity and frequency on the latent slope factor were fixed at 0, 1, and 2. These linear models were compared non-linear models in which the factor loadings of the T1 and T2 variables on the latent slope factor were fixed at 0 and 1, and the T3 factor loadings were freely estimated. Chi-square difference tests were utilized to determine the best-fitting models. The chi-square difference tests indicated that parent-adolescent conflict intensity and frequency growth followed a linear trajectory from both

mothers' reports and adolescents' reports, and for both sibling gender compositions. These unconditional models (base models without the inclusion of time-invariant predictor and grouping variable) demonstrated acceptable model fit, determined by the model fit indices (see Model Selection Tables: Tables 5, 7, 9, 11, 13, & 15).

After establishing that the data fit the unconditional model, we formulated a multivariate, state-trait model in which the inclusion of positive or negative sibling relationship qualities latent intercept factor at T1, T2, and T3. These were correlated with the latent intercept factor and latent slope factor of parent-adolescent conflict intensity and frequency. Specifically, the individual indicators of positive and negative sibling relationship qualities latent factor at T1, T2, and T3 were correlated with the individual indicators of parent-adolescent conflict intensity and frequency at T1, T2, and T3. The latent intercept and slope factors were freely estimated. See Figure 1 for this conceptual model. Additionally, within waves, measurement errors for parent-adolescent conflict were fixed at 0. In accordance with the shift model approach, sibling relationship qualities measurement errors were freely estimated. Furthermore, a chi-square difference test was utilized for our multigroup analysis of sibling gender composition to examine which group had better model fit (see Table 4). Report of model findings will include significant ($p < .05$) and marginally significant ($p < .10$) findings. Including marginally significant effects in this study is important given the novelty of this study in analyzing multiple family subsystems simultaneously. Additionally, marginal significant effects in the higher order models will be disclosed based on the relative size of the sample.

Tests of Sibling Spillover

Adolescent Report

For the first aim, we investigated the intercept and trajectory of parent-adolescent conflict and intensity and frequency at 3 consecutive time points from adolescents' perspective. We then regressed parent-adolescent conflict intensity and frequency on the variable birth order controlled examined the state-trait value of negative sibling relationship qualities over the same time period to see if it significantly influenced the trajectory of parent-adolescent conflict across each time point. Lastly, we tested how the initial start and trajectory of parent-adolescent conflict, controlling for negative sibling relationship qualities differed between same-sex and mixed-sex dyads in multi-group comparison analyses.

Conflict Intensity. Prior to examining our first research aim in this model, model fit indices were checked to see if the data fit the model. Based on model fit indices, the data fit the model well (see Table 5). In testing the first aim, it was found that the trajectory of conflict intercept value of reported parent-adolescent older sibling conflict intensity was 1.736 with a negative slope of -0.08, indicating a linear decline in conflict intensity over time. The trajectory of conflict intercept value of reported parent-adolescent younger sibling conflict intensity in this model was 1.747 with a negative slope of -0.10, suggesting a stronger linear decline in conflict intensity over time.

We then tested for spillover effects by accounting for the influence of negative valence of sibling relationship quality on the trajectory of parent-adolescent conflict in older siblings and younger siblings (see Table 6). It was found that the conflict trajectories of parent-adolescent older siblings and younger siblings did not significantly differ from one another ($b = .01, p = .80$). However, it was found that when accounting for the influence of negative sibling relationship quality, an increase in the slope of the

trajectory of parent-adolescent conflict occurred at Time 2 ($b = .06, p = .04$).

Standardized estimates of the shift in trajectory suggest the magnitude of the effect of negative sibling relationship quality on the trajectory of conflict intensity was significant ($B = .27, p = .01$). The results suggest spillover effects present as evidenced by the conflict trajectories of parent-adolescent older siblings and younger sibling being similar to each other when accounting of the negative qualities of the sibling relationship. See Figure 2 for a visual representation of the average parent-adolescent conflict trajectories of a subset of participants from the total sample.

In our multigroup analysis comparing same-sex and mixed-sex sibling dyads on the aforementioned research aim, it was found that there was a significant difference in the parent-adolescent conflict trajectory between same-sex sibling dyads and mixed-sex sibling dyads, such that same-sex siblings reported significantly more parent-adolescent conflict ($b0 = 1.90; b1 = -0.10$) than mixed-sex sibling dyads ($b0 = 1.53; b1 = -.05$; see Figure 3). However, controlling for sibling relationship quality negativity, standardized estimates suggest the magnitude of spillover effect was stronger for mixed-sex sibling dyads ($B = .31, p = .03$) than for same-sex sibling dyads ($B = .23, p = .08$).

Conflict Frequency. For conflict frequency, model fit indices were checked to see if the data fit the model. Based on model fit indices, the data did not fit the model particularly well (see Table 7). In testing the first aim, it was found that the trajectory of conflict intercept value of reported parent-adolescent older sibling conflict frequency in this model was 2.710 with a negative slope of -0.21, indicating a linear decline in conflict frequency over time. The trajectory of conflict intercept value of reported parent-

adolescent younger sibling conflict frequency in this model was 2.769 with a negative slope of -0.21, suggesting no difference in decline of conflict frequency over time.

We then tested for spillover effects by accounting for the influence of negative valence of sibling relationship quality on the trajectory of parent-adolescent conflict in older sibling and younger siblings (see Table 8). Based on the results, it was found that there was no statistical difference in conflict trajectories of parent-adolescent older siblings and younger siblings ($b = .00, p = .10$). Furthermore, when accounting for the influence of negative sibling relationship quality, no increase in the slope of the trajectory of parent-adolescent conflict was found at any time point. The results suggest no spillover effects present in conflict frequency trajectories of parent-adolescent older siblings and younger siblings when accounting of the negative qualities of the sibling relationship.

In our multigroup analysis comparing same-sex and mixed-sex sibling dyads, no significant difference was found between in the parent-adolescent conflict trajectory of same-sex sibling dyads and mixed-sex sibling dyads.

Mother Report

Conflict Intensity. For this particular model, there was a problem with model convergence. Therefore, no results are available for testing this model. Measures to promote model convergence were taken (i.e. free parameters). The reason as to why this model did not converge was that there was a negative correlation between mother reports of parent-adolescent conflict intensity and negative sibling relationship quality. Additionally, the lack of variability in the report of parent-adolescent conflict from mothers may have influenced this model in not converging.

Conflict Frequency. Model fit indices for spillover effects were checked to see if the data fit the model. Based on model fit indices, the data fit the model well (see Table 9). In testing the first aim, it was found that the trajectory of conflict intercept value of reported parent-adolescent older sibling conflict frequency in this model was 2.583 with a negative slope of -0.12, indicating a linear decline in conflict frequency over time. The trajectory of conflict intercept value of reported parent-adolescent younger sibling conflict frequency in this model was 2.587 with a negative slope of -0.22, suggesting a stronger linear decline in conflict frequency over time.

Second, we tested for spillover effects by accounting for the influence of negative valence of sibling relationship quality on the trajectory of parent-adolescent conflict in older sibling and younger siblings (see Table 10). Based on the results, it was found the conflict trajectories of parent-adolescent older siblings and younger siblings did not significantly differ from one another ($b = -0.00$, $p = .94$). However, it was found that when accounting for the influence of negative sibling relationship quality, a marginally significant increase in the slope of the trajectory of parent-adolescent conflict occurred at Time 2 ($b = .06$, $p = .09$). Standardized estimates of the shift in trajectory suggest the magnitude of the effect of negative sibling relationship quality on the trajectory of conflict intensity was marginally significant ($B = .16$, $p = .07$). The results suggest that spillover effects were present in the conflict trajectories of parent-adolescent older siblings and younger sibling as evidenced by shifts in trajectories when accounting of the negative qualities of the sibling relationship. See Figure 4 for a visual representation of the average parent-adolescent conflict trajectories of a subset of participants from the total sample.

Lastly, we conducted a multigroup analysis comparing same-sex and mixed-sex sibling dyad. It was found that there was a significant difference between the parent-adolescent conflict trajectory of same-sex sibling dyads and mixed-sex sibling dyads, such that same-sex siblings reported significant more parent-adolescent conflict ($b0 = 2.65$; $b1 = -0.20$) than mixed-sex sibling dyads ($b0 = 2.52$; $b1 = -0.16$; see Figure 5). Additionally, the spillover effect was stronger for same-sex sibling dyads ($B = .22$, $p = .05$) than for mixed-sex dyads ($B = .03$, $p = .82$).

Tests of Sibling Compensation

Adolescent Report

Conflict Intensity. Model fit indices for compensation effects were checked to see if the data fit the model. Based on model fit indices, the data fit the model well (see Table 11). In testing the first aim, it was found that the trajectory of conflict intercept value of reported parent-adolescent older sibling conflict intensity in this model was 1.736 with a negative slope of -0.08, indicating a linear decline in conflict intensity over time. The trajectory of conflict intercept value of reported parent-adolescent younger sibling conflict intensity in this model was 1.747 with a negative slope of -0.10, suggesting a stronger linear decline in conflict intensity over time.

Secondly, we tested for compensation effects by accounting for the influence of positive valence of sibling relationship quality on the trajectory of parent-adolescent conflict in older sibling and younger siblings (see Table 12). Based on the results, it was found the conflict trajectories of parent-adolescent older siblings and younger siblings did not significantly differ from one another ($b = .01$, $p = .85$). However, it was found that when accounting for the influence of positive sibling relationship quality, a marginally significant decrease in the slope of the trajectory of parent-adolescent conflict occurred at

Time 2 ($b = -.04, p = .09$). Standardized estimates of the shift in trajectory suggest the magnitude of the effect of positive sibling relationship quality on the trajectory of conflict intensity was marginally significant ($B = -.15, p = .07$). The results suggest that although not dissimilar from one another, compensation effects were present in the conflict trajectories of parent-adolescent older siblings and younger sibling as evidenced by shifts in trajectories when accounting of the positive qualities of the sibling relationship. See Figure 6 for a visual representation of the average parent-adolescent conflict trajectories of a subset of participants from the total sample.

Lastly, we conducted a multigroup analysis comparing same-sex and mixed-sex sibling dyads. It was found that there was a significant difference between the parent-adolescent conflict trajectory of same-sex sibling dyads and mixed-sex sibling dyads, such that same-sex siblings reported significant more parent-adolescent conflict ($b0 = 1.90; b1 = -0.12$) than mixed-sex sibling dyads ($b0 = 1.53; b1 = -0.05$; see Figure 7). Additionally, the compensation effect was stronger for same-sex sibling dyads ($B = -.03, p = .05$) than for mixed-sex dyads ($B = .14, p = .27$).

Conflict Frequency. Model fit indices for compensation effects were checked to see if the data fit the model. Based on model fit indices, the data fit the model well (see Table 13). In testing the first aim, it was found that the trajectory of conflict intercept value of reported parent-adolescent older sibling conflict frequency in this model was 2.701 with a negative slope of -0.21, indicating a linear decline in conflict frequency over time. The trajectory of conflict intercept value of reported parent-adolescent younger sibling conflict frequency in this model was 2.769 with a negative slope of -0.21, suggesting a stronger linear decline in conflict frequency over time.

We then tested for compensation effects by accounting for the influence of positive valence of sibling relationship quality on the trajectory of parent-adolescent conflict in older sibling and younger siblings (see Table 14). Based on the results, it was found the conflict trajectories of parent-adolescent older siblings and younger siblings did not significantly differ from one another ($b = .01, p = .89$). Moreover, it was found that when accounting for the influence of positive sibling relationship quality, no significant decrease in the slope of the trajectory of parent-adolescent conflict was observed. The results suggest that compensation effects were not present in the conflict trajectories of parent-adolescent older siblings and younger sibling as evidenced by shifts in trajectories when accounting of the positive qualities of the sibling relationship. See Figure 8 for a visual representation of the average parent-adolescent conflict trajectories of a subset of participants from the total sample.

Lastly, we conducted a multigroup analysis comparing same-sex and mixed-sex sibling dyads conflict trajectories. It was found that there was a significant difference between the parent-adolescent conflict trajectory of same-sex sibling dyads and mixed-sex sibling dyads, such that same-sex siblings reported significant more parent-adolescent conflict ($b0 = 2.84; b1 = -0.12$) than mixed-sex sibling dyads ($b0 = 2.51; b1 = -0.30$; see Figure 9). Additionally, the compensation effect was stronger for same-sex sibling dyads ($B = -.40, p = .02$) than for mixed-sex dyads ($B = -.02, p = .92$).

Mother Report

Conflict Intensity. Like conflict frequency, for this model, there was a problem with model convergence. Therefore, no results are available for testing this model. Measures to promote model convergence were taken (i.e. free parameters). The reason as

to why this model did not converge was that there was a negative correlation between mother reports of parent-adolescent conflict intensity and positive sibling relationship quality. Additionally, the lack of variability in the report of parent-adolescent conflict from mothers may have influenced this model in not converging.

Conflict Frequency. Model fit indices for compensation effects were checked to see if the data fit the model. Based on model fit indices, the data fit the model well (see Table 15). In testing the first aim, it was found that the trajectory of conflict intercept value of reported parent-adolescent older sibling conflict frequency in this model was 2.583 with a negative slope of -0.12, indicating a linear decline in conflict frequency over time. The trajectory of conflict intercept value of reported parent-adolescent younger sibling conflict frequency in this model was 2.587 with a negative slope of -0.22, suggesting a stronger linear decline in conflict frequency over time.

Secondly, we tested for compensation effects by accounting for the influence of positive valence of sibling relationship quality on the trajectory of parent-adolescent conflict in older sibling and younger siblings (see Table 16). Based on the results, it was found the conflict trajectories of parent-adolescent older siblings and younger siblings did not significantly differ from one another ($b = -0.01, p = .92$). However, it was found that when accounting for the influence of positive sibling relationship quality, a marginally significant decrease in the slope of the trajectory of parent-adolescent conflict occurred at Time 3 ($b = -.06, p = .06$). Standardized estimates of the shift in trajectory suggest the magnitude of the effect of positive sibling relationship quality on the trajectory of conflict intensity was significant ($B = -.15, p = .05$). The results suggest that although not dissimilar from one another, compensation effects were present in the conflict trajectories

of parent-adolescent older siblings and younger sibling as evidenced by shifts in trajectories when accounting of the positive qualities of the sibling relationship. See Figure 10 for a visual representation of the average parent-adolescent conflict trajectories of a subset of participants from the total sample.

Lastly, we conducted a multigroup analysis comparing same-sex and mixed-sex sibling dyads. It was found that there was a significant difference between the parent-adolescent conflict trajectory of same-sex sibling dyads and mixed-sex sibling dyads, such that same-sex siblings reported significant more parent-adolescent conflict ($b0 = 2.82$; $b1 = -0.12$) than mixed-sex sibling dyads ($b0 = 2.51$; $b1 = -0.30$, see Figure 11). Additionally, the compensation effect was stronger for same-sex sibling dyads ($B = -.21$, $p = .03$) than for mixed-sex dyads ($B = -.13$, $p = .30$).

CHAPTER 4

DISCUSSION

Adolescence is a developmental time period of individual change in youth that is also marked by increased conflict in parent-adolescent interactions (Moed et al., 2015) and changes in sibling relationship quality (Kim, McHale, Crouter, Osgood, 2007). However, the literature is unclear about how these two aspects of family dynamics are associated with each other and their implications within the family system. Because of the interdependent nature of the family (Minuchin, 1974), it is imperative that the entire family system be studied. Therefore, the goal of the present study was to investigate how qualities of the sibling relationship influence parent-adolescent conflict over a three-year span. Specifically, the present study examined the influence of positive and negative sibling relationship qualities on parent-adolescent conflict intensity and frequency of older and younger siblings. Furthermore, the present study investigated how these associations may reveal spillover and/or compensation effects. Additionally, these family processes were examined in context to see how trajectories of parent-adolescent conflict influenced by sibling relationship qualities varied by birth order and sibling gender composition.

The present study found evidence for spillover and compensation effects in the parent-adolescent conflict trajectories of older and younger siblings when accounting for both the negative and positive aspects of sibling relationship qualities over time. Moreover, adolescents and mothers differed in their report of parent-adolescent conflict and same-sex and mixed-sex sibling dyads differed in their average parent-adolescent conflict trajectory over time. The findings of the present study also extend previous

research on the similarity of the parent-adolescent conflict of older and younger siblings' (Shanahan et al., 2007).

Spillover of Negative Relationship Qualities

The findings of the present study coincide with the literature that both conflict intensity and conflict frequency decrease over time (Laursen et al., 1998). In line with our first hypothesis, parent-adolescent conflict was influenced by the qualities of the sibling relationship. While our findings did confirm our hypothesis about the negative tone of sibling relationship quality influencing parent-adolescent conflict, there were no differences in parent-adolescent conflict of older and younger siblings. Despite no differences between older and younger siblings, when accounting for the negative valence of the sibling relationship quality, parent-adolescent conflict for both siblings was altered. Specifically, negative sibling relationship qualities impacted parent-adolescent conflict over time by contributing to a slower rate of decline in parent-adolescent conflict.

In family systems theory, the idea that the emotional tenor of one family subsystem can impact another family subsystem is well understood, especially when considering the marital subsystem's influence on the parent-child or the sibling subsystem (Repetti, Taylor, Seeman, 2002; Grych and Fincham, 1999). However, these effects have been understudied in adolescent family relationships, particularly between the parent-adolescent subsystem and the sibling subsystem. The findings of this study are particularly interesting since it upholds contemporary family systems theory that posits *any* family subsystem, regardless of relative hierarchy, can influence another subsystem (Cox & Paley, 1997). In the present study, negative sibling relationship qualities, particularly how much conflict, antagonism, and criticism exists in the relationship,

influenced how intense and how frequent parent-adolescent conflicts were had and sustained over time. It appears the negativity in different family subsystems lends itself to a cyclic pattern of negativity within the family. The intensity and frequency of parent-adolescent conflict persisting as adolescents continue to grow can have negative implications for individual adolescent development (Dekovic, 1999) as well as family-wide interactions (Saxbe, Rodriguez, & Margolin 2013). Furthermore, negative qualities of the sibling relationship can further magnify the implications of continued parent-adolescent conflict leading to adolescent internalizing and externalizing problems (Lippold, Hussong, Fosco, & Ram, 2018) and family hostility (Richmond & Stocker, 2006).

The evidence found for the transference of negative emotionality in the present study demonstrates the importance of analyzing multiple family relationships simultaneously to understand how adolescent development affects the family system and vice versa. Furthermore, the evidence found speaks to the need for studying the family system as holistically as possible since inclusion of the sibling relationship in the present study illustrated the interconnected nature of family relationships. Future research studies, if possible, should account for additional family relationships when analyzing adolescent development. All in all, the findings of the present study suggest that in the context of the family system, the emotional tone of one dyadic family relationship can transfer to another dyadic family relationship.

Positive Sibling Relationships as Compensatory

In line with our first hypothesis, parent-adolescent conflict was also influenced by the positive qualities of the sibling relationship. It was found that positive sibling

relationship qualities significantly impacted parent-adolescent conflict over time.

Similarly, in addition to our findings confirming our hypothesis for the negative qualities of the sibling relationship, there was no difference in average parent-adolescent conflict between older and younger siblings when considering the influence of the positive of sibling relationship qualities. However, when accounting for the positive qualities of the sibling relationship, parent-adolescent conflict for both siblings had a sharper rate of decline over time. Moreover, the influence of positive sibling relationship qualities was stronger for same-sex siblings than for mixed-sex siblings.

Compared to the models analyzing the impact of the negativity of the sibling relationship on parent-adolescent conflict, parent-adolescent conflict more sharply decreased over time when accounting for the positive qualities of the sibling relationship. As a point of emphasis, a major gap in contemporary literature on adolescent development process about how one family relationship can influence and impact another family relationship, particularly in compensatory ways. The findings of compensatory outcomes in this study are important to note since they uphold contemporary family systems theory that subsystem influence is not limited to the same direction. That is, the emotional tone of one dyadic family subsystem can override, or be in contrast to the emotional tone of another dyadic family relationship. In the present study, the positivity of the sibling subsystem, particularly how much instrumental aid, support, adoration, and other positive affective relational qualities existing in their relationship, influenced how *strongly* and *swiftly* parent-adolescent conflicts diminished and decreased over time.

In a few studies, previous research has shown instances of protective or buffering effects provided by one dyadic, family relationship offsetting the effects of another

family relationship. Research by Dekovic and Buist (2005) and Jenkins and Smith (1990) found that sibling interactions can act buffers against the effects of negative marital hostility. However, the gap in the literature presents itself when a lack of information is known about compensation effects that do not involve the marital relationships. Moreover, this gap in understanding is further widened when methodological limitations, such as studying a consistent sample longitudinally, create difficulties in examining compensation effects in families. More research on addressing methodological limitations, as done in the present study, are needed to address protective factors and compensatory resilience in family relationships during adolescent development.

The findings suggest that in the context of the family system, the emotional tone of one dyadic family relationship, can transfer and impact other dyadic family relationships. The evidence found for the transference of positivity of the sibling relationship contributing to the more rapid decline of parent-adolescent conflict in the present study illustrates the necessity of examining how multiple family relationships simultaneously interact with each other during adolescence. Future research studies should strongly consider analyzing additional family relationships when studying adolescent development.

Conflict Intensity vs. Conflict Frequency

Our second hypothesis was supported as it was found that parent-adolescent conflict intensity was significantly more impacted by the emotional tenor of the sibling relationship quality than parent-adolescent conflict frequency. Depending on the qualities of the sibling relationship, parent-adolescent conflict intensity either increased or decreased to a greater extent than conflict frequency. With the negative sibling

relationship qualities, parent-adolescent conflict intensity increased, while the positive qualities of the sibling relationship quality decreased conflict intensity. Given that in the present study the average parent-adolescent conflict intensity had a flatter slope despite a lower initial starting point than conflict frequency, seems to denote that conflict intensity remains more consistently present over time. Research has found that in parent-adolescent relationships (Montemayor, 1983), intense conflicts are more detrimental to adolescent development than frequent conflicts. It appears that conflict intensity tends to be more salient than conflict frequency. It is possible that highly intense parent-adolescent conflicts are maladaptive and indicate unresolved communication between adolescents and parents. To bring about family cohesion and reduce family hostility, parents should support adolescents and engage them during their development as research supports that involved parenting will benefit their adolescents in their development (Lippold et al., 2018). Additionally, based on the results of the present study, parents and siblings should encourage positive aspects of sibling relationship qualities so that families can potentially reduce parent-adolescent conflict intensity during adolescence to benefit individual adjustment and family cohesion.

Our third hypothesis was supported as we found differences in the reporter of parent-adolescent conflict. Specifically, on average, adolescent reports of parent-adolescent conflict, whether conflict intensity or conflict frequency, were higher than mother reports. In other research, it has been found that adolescent reports tend to more accurately characterize a particular behavior or interaction (Short, Gradisar, Lack, Wright, & Chatburn, 2013; Jaccard, Dittus, & Gordon, 1998). Based on previous research and the present study, it can be concluded that adolescents are more accurate and perhaps

less biased than parents in report parent-adolescent conflict. Future research should still analyze different perspectives/reports on the same construct to see the relative trends of the sample.

Birth Order Effects

For models testing for both spillover and compensation, older siblings and younger siblings did not differ significantly in their average parent-conflict. This was an interesting finding since given older siblings and younger siblings live in a shared environment, still have a personal relationship with a parent that is unique. Siblings in the present study were no more than four years in age difference. Research studies affirm that greater differences in sibling age typically result in greater differences between siblings (Kidwell, 1981). It is believed that greater age spacing allows for more time to be devoted by parents to meet each child's needs independently, as well as each child being able to express their individual characteristics without overlapping with their sibling(s). Because of the proximity in age of siblings, siblings in the present may be more similar to one another than if the age gap between them were greater. As a result, their conflict pattern with a parent is most likely similar.

Another possible reason as to why there was a lack of findings in this area may be due to perceptions each adolescent has about their relationship with their parent. Importantly, younger siblings consistently reported more parent-adolescent conflict intensity and frequency than older siblings, despite not significantly differing in average parent-adolescent conflict. Although no more than four years in age difference, younger siblings may be reporting more conflict with parents based on parental differential treatment (PDT). PDT is an important concept to consider during adolescent

development; especially when the age difference between dyadic siblings is not large (McHale, Updegraff, Jackson-Newsom, Tucker, & Crouter, 2000). Parental Differential Treatment (PDT) is the belief in unequal treatment of oneself relative to a sibling in the form of favorable allocation of resources to one sibling compared to another (McHale et al., 2000). If parent-adolescent interactions are perceived to be unfair between siblings, increased conflict can result. It is possible, based on the results of the present study, that younger siblings may perceive less favorable treatment from a parent compared to their older sibling, resulting in higher rating of conflict in parent-adolescent conflict. Despite this reasoning, given a larger sample size, a significant difference in average trajectory between older and younger siblings might have been observed.

Sibling Gender Composition Effects

Lastly, our final hypothesis was supported as it was found that the influence of sibling relationship quality on parent-adolescent conflict was different in the context of sibling gender composition. Previous research finds that mixed-sex sibling dyads may display less warmth and more conflict in their interactions during adolescence than same-sex sibling dyads (Feinberg, Solmeyer, & McHale, 2012; Furman & Buhrmester, 1985). However, findings of our study show that, with the exception of the negative sibling relationship qualities impacting parent-adolescent conflict intensity, same-sex siblings broadly had higher levels of parent-adolescent conflict. Since same-sex, dyadic sibling relationships are warmer and more supportive (McHale et al., 2000; Updegraff et al., 2002), it could be that same-sex sibling dyads have more parent-adolescent conflict because they learn from each other and model for each other how to have conflicts with a parent. Social learning theory posits that behaviors are more readily learned from

individuals that are close and warm (Bandura, 1972). Furthermore, sibling disclosure may aid in how conflicts are discussed between siblings about each parent-adolescent relationship. Research by Campione-Barr and colleagues (2015) found that sibling disclosure typically and positively improves sibling relationship quality. Specifically, for younger siblings, the more they disclosed information that was personal to them, the more positive they felt about their relationship with their sibling (Campione-Barr et al., 2015). For sibling gender composition, mixed-sex sibling and brother-brother dyads in particular disclosed more to a sibling than to mothers (Campione-Barr et al., 2015). Siblings, particularly mixed-sex sibling and brother-brother dyads may be engaging in more disclosure than sister-sister sibling dyads in the present study. Parent-adolescent conflict difficulties and how to resolve them may be shared between siblings. As a result, a difference in parent-adolescent conflict may be observed between mixed-sex and same-sex sibling dyads. Therefore, the context of sibling gender composition should be considered as sibling disclosure could be the reason for why mixed-sex and same-sex sibling dyads may differ in their respective parent-adolescent conflicts.

Limitations and Future Directions

In light of the contributions made by extending previous findings of sibling and parent-adolescent conflict, the present study contained some limitations. Foremost, the present study examined a predominately European-American, middle-class sample, which in essence limits the generalizability of the results found. As a whole, the sample under examination was relatively ‘healthy,’ with low levels of conflict frequency (i.e. an average of 2.6 on a 5-point Likert scale) and even lower levels of conflict intensity (i.e. an average of 1.7 on a 5-point Likert scale). Additionally, the average change in conflict

intensity and frequency overtime was small in magnitude. Without much variability in the present sample, it is difficult to conclude that the results found typify the changes in family system dynamics during adolescent development in most families across the United States and in families all over the world. Therefore, future studies should include more diverse families as different cultures engender different family dynamics that are likely to vary across families during adolescent development.

Additionally, only two-parent, stably married family households were considered. Family structure is an important aspect of family systems theory. Family systems theory highlights the importance of family roles, and as such, family structure provides a framework for interactions and roles of individuals within the family. Based on family structure, differences in family dynamics and processes occur based on the roles needed to be played by members of the family. It is important to note that not all family structures operate in the same fashion. Research by Bulanda and Manning (2008) found that girls in cohabitating households, for example, had the same odds ratio of early sexual activity (before age 15) as girls in single-parent households. These odds ratios significantly differed in comparison to two-parent, stably married households (Bulanda & Manning, 2008). The authors hypothesize that cohabitating households have more instability (less parental monitoring) and more transitions than two-parent households.

Divorce in families also speaks to potential differences in the outcomes of family dynamics based on family structure. Amato and Cheadle (2008) examined the various effects of parental divorce on child adjustment where interparental conflict diminishes effective parenting, contributes to harsher parenting, and more parent-child conflict (Maccoby & Martin, 1983; Grych & Fincham, 1999). Research by Demo and Fine (2010)

suggest that family structure spurs on the potential creation of non-biological family relationships (i.e. stepsiblings, cohabitating parent-child relationship, etc) that function differently than two-parent, stably married households. Furthermore, the non-related members of the family may be less inclined to perform duties or responsibilities of genetically similar family members (Geary, 2002). Therefore, it can be understood that family structure plays a significant role in family dynamics. It is important, then, that families of various structures be taken into account to better understand changes in family dynamics during adolescent development.

Lastly, in addition to the importance of family structure within the family system, one specific family subsystem was omitted from analyses in the present study. Although the present study included both the parent-adolescent subsystems and the sibling subsystem, the present study lacked information about the marital/parental subsystem as a means to fully assess the extent of the interconnectedness of the family system. The marital/parental subsystem is the beginning of the family system. As such, this subsystem has relatively more power than other family subsystems. However, the marital/parental subsystem is not the 'end all-be-all' of the family system and contemporary family systems theory conveys that interactions within a family are circular and interconnected (Cox & Paley, 1997).

Research by Mastrotheodoros, van der Graff, Dekovic, Meeus, and Branje (2019) examined how destructive forms of interparental conflict (i.e. conflict engagement, conflict withdrawal, and problem solving) were positively associated with negative parent-adolescent interactions (i.e. parental support, parent-adolescent negative interactions, and parental behavioral control). The research demonstrates that more

negative marital interactions contribute to ‘diminished’ parenting, where marital/parental partners are preoccupied with their own problems and neglect to be involved parents that support their children (Maccoby & Martin, 1983; Grych & Fincham, 1999; Tucker, McHale, & Crouter, 2008). Results show that low parent-child support and harsh parenting contribute to sibling conflict (Tucker & Finklehor, 2017). These studies provide insight into how subsystems interact with each other influence one another in the area of conflict. Therefore, future studies should include the marital/parental subsystem as it influences and is influenced by other family subsystems.

Conclusions and Implications

In sum, the findings of the present study denote the importance of simultaneously analyzing multiple family systems to better understand the impact of adolescent development on the entire family system over time. Specifically, sibling relationship quality can influence parent-adolescent conflict of both older and younger siblings, particularly in same-sex dyads. Importantly, older and younger siblings, regardless of higher negative or higher positive relationship qualities, tend to have similar parent-adolescent conflict trajectories. However, the sibling relationship qualities do affect the rate of decline in conflict over time, with positive valence having a stronger impact on the decline of parent-adolescent conflict over time. During adolescent development, parents should encourage positive interactions between siblings and sibling should police themselves in cultivating and maintaining healthy and positive relationships. In doing so, parent-adolescent conflict will most likely decrease over time quicker, and thus, return the family system to a homeostatic state. Furthermore, parents should discourage excess negativity in sibling relationships and siblings should be wary of letting negativity in

their quality of their relationship persist as this will sustain or increase conflict within the family system longer than is developmentally appropriate.

Table 1. Correlation Matrix of Main Study Variables and Moderators

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Sex_A	--															
2. Age	-.03	--														
3. Gender Compensation	.04	-.08	--													
4. Maternal Age	-.02	.14*	-.15*	--												
5. Maternal Education	-.04	-.11	-.10	.36**	--											
6. Maternal Income	.00	-.02	-.01	.25**	.50**	--										
7. Maternal Ethnicity	.08	.13*	-.14*	-.12	-.15**	-.23**	--									
8. Birth Order	-.08	-.59**	-.02	.02	-.02	-.01	.02	--								
9. Ado Report P-A Conflict Frequency T1	.12	.04	.13*	-.15*	-.22**	-.15*	.08	.00	--							
10. Ado Report P-A Conflict Intensity T1	-.01	.03	.11	-.18**	-.25**	-.18**	-.05	.00	.55**	--						
11. Pos Sibling Relationship Quality T1	.22**	-.13*	.24**	-.13*	-.09	.01	.13*	.07	.18**	-.00	--					
12. Neg Sibling Relationship Quality T1	.01	-.26**	.17**	-.10	-.06	.08	-.19**	.08	.05	.30**	-.05	--				
13. Mom Report P-A Conflict Frequency T1	.02	-.09	.09	-.09	-.13*	-.02	-.03	.00	.15*	.16**	-.03	.22**	--			
14. Mom Report P-A Conflict Intensity T1	.02	-.04	.13*	-.21**	-.12	-.05	-.04	-.01	.10	.25**	-.03	.24**	.65**	--		
15. Mom Report P-S Conflict Frequency T1	-.04	.05	-.01	-.04	-.02	-.15*	-.00	.02	.12	.28**	-.12*	.19**	.39**	.36**	--	
16. Mom Report P-S Conflict Intensity T1	-.05	.03	.06	-.13*	-.01	-.13*	-.06	.01	.24**	.39**	-.08	.22**	.31**	.49**	.68**	--

Note. *significance at the < .05 level; **significance at the < .01 level; Ado= Adolescent; P-A= Parent-Adolescent; P-S= Parent-Sibling; Pos= Positive; Neg= Negative

Table 1 (cont.) Correlation Matrix of Main Study Variables and Moderators

Variable	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
17. Ado Report P-A Conflict Frequency T2	.04	-.10	.21**	-.08	-.00	-.12	.07	.02	.42**	.32**	.09	.22**	.17*	.08	.22**	.21**
18. Ado Report P-A Conflict Intensity T2	.05	-.04	.18**	-.13	.03	-.01	-.12	-.01	.36**	.50**	.01	.25**	.11	.16*	.23**	.29**
19. Pos Sibling Relationship Quality T2	.13*	-.16*	.17*	-.01	.17**	.02	.12	.05	.09	-.15*	.60**	-.01	-.17**	-.23**	-.13	-.07
20. Neg Sibling Relationship Quality T2	.05	-.22**	.22**	-.11	.07	.05	-.06	.09	.13	.23**	-.07	.67**	.20**	.22**	.18**	.19**
21. Mom Report P-A Conflict Frequency T2	.13*	-.17**	.15*	-.01	-.04	-.03	.12	.01	.15*	.13*	-.01	.22**	.48**	.27**	.23**	.18**
22. Mom Report P-A Conflict Intensity T2	.01	.01	.16*	.01	.14*	.15*	-.05	.00	.08	.28**	.01	.25**	.45**	.54**	.32**	.39**
23. Mom Report P-S Conflict Frequency T2	-.10	-.00	.01	.06	-.02	-.11	-.21**	.01	.08	.23**	-.08	.10	.35**	.32**	.64**	.48**
24. Mom Report P-S Conflict Intensity T2	-.09	.01	.00	.09	.12	-.00	-.18**	.00	.09	.24**	-.03	.17**	.40**	.51**	.46**	.55**
25. Ado Report P-A Conflict Frequency T3	-.01	-.01	.14	-.04	-.01	-.08	-.06	.02	.31**	.34**	.04	.19*	.17*	.18**	.21**	.29**
26. Ado Report P-A Conflict Frequency T3	.05	-.03	.16*	-.12	-.02	-.08	-.03	-.00	.30**	.35**	-.02	.14	.22**	.28**	.15*	.28**
27. Ado Report P-S Conflict Frequency T3	.07	.01	.22**	-.03	-.05	-.00	.16*	-.06	.07	-.05	.46**	.01	-.14	-.12	-.15*	-.17*
28. Ado Report P-S Conflict Frequency T3	.05	-.12	.27**	-.11	-.02	.09	-.10	-.22**	.11	.16*	-.05	.29**	.23**	.26**	.12	.16*
29. Mom Report P-A Conflict Frequency T3	.08	-.31**	.21**	.09	.10	.03	.01	.00	.14*	.05	-.03	.19**	.42**	.21**	.15*	.23**
30. Mom Report P-A Conflict Frequency T3	.02	-.20**	.17*	.10	.03	.05	-.12	.00	.10	.15*	-.07	.23**	.58**	.51**	.28**	.32**
31. Mom Report P-A Conflict Frequency T3	-.08	-.04	-.01	-.02	-.04	-.16*	-.24**	.00	.10	.17*	-.08	.07	.28**	.35**	.60**	.56**
32. Mom Report P-A Conflict Frequency T3	-.08	.08	-.09	-.06	-.03	-.05	-.19**	.00	.08	.20**	-.05	.12	.30**	.56**	.43**	.58**

Note. *significance at the < .05 level, **significance at the < .01 level. Ado= Adolescent; P-A= Parent Adolescent; P-S= Parent-Sibling; Pos= Positive; Neg= Negative

Table 2

Means (Standard Deviations) of Adolescent-Parent Conflict Intensity by Reporter, Dyad Partner, Time, Sex, and Birth Order

	<u>Males</u>		<u>Females</u>	
	1 st Born	2 nd Born	1 st Born	2 nd Born
<i>Time 1</i>				
Adolescent				
Mother	1.61 (.48)	1.62 (.50)	1.62 (.43)	1.76 (.50)
Mother				
Adolescent	1.62 (.43)	1.52 (.41)	1.50 (.38)	1.58 (.39)
Sibling	1.60 (.41)	1.47 (.42)	1.51 (.45)	1.63 (.44)
<i>Time 2</i>				
Adolescent				
Mother	1.59 (.60)	1.52 (.47)	1.55 (.46)	1.57 (.57)
Mother				
Adolescent	1.47 (.38)	1.47 (.44)	1.48 (.45)	1.48 (.40)
Sibling	1.55 (.49)	1.54 (.52)	1.48 (.50)	1.48 (.47)
<i>Time 3</i>				
Adolescent				
Mother	1.76 (.61)	1.60 (.62)	1.45 (.51)	1.45 (.50)
Mother				
Adolescent	1.44 (.42)	1.41 (.48)	1.43 (.47)	1.45 (.43)
Sibling	1.55 (.58)	1.42 (.40)	1.41 (.39)	1.52 (.54)

Table 2 (*cont.*)

Means (Standard Deviations) of Adolescent-Parent Conflict Frequency by Reporter, Dyad Partner, Time, Sex, and Birth Order

	<u>Males</u>		<u>Females</u>	
	1 st Born	2 nd Born	1 st Born	2 nd Born
<i>Time 1</i>				
Adolescent				
Mother	2.72 (.79)	2.51 (.59)	2.66 (.73)	2.70 (.63)
Mother				
Adolescent	2.53 (.74)	2.47 (.74)	2.42 (.66)	2.46 (.65)
Sibling	2.32 (.67)	2.17 (.58)	2.20 (.53)	2.33 (.61)
<i>Time 2</i>				
Adolescent				
Mother	2.39 (.65)	2.46 (.68)	2.38 (.73)	2.42 (.64)
Mother				
Adolescent	2.32 (.45)	2.31 (.64)	2.39 (.75)	2.41 (.65)
Sibling	2.36 (.58)	2.22 (.49)	2.17 (.50)	2.28 (.59)
<i>Time 3</i>				
Adolescent				
Mother	2.18 (.58)	2.25 (.72)	2.24 (.63)	2.28 (.61)
Mother				
Adolescent	2.24 (.66)	2.16 (.70)	2.29 (.84)	2.38 (.82)
Sibling	2.25 (.62)	2.08 (.43)	2.10 (.45)	2.25 (.61)

Table 3. Estimated Covariance Matrix and Means and Standard Deviation (SD) Vector

Variable	u1	u2	u3	v1	v2	v3	w1	w2	w3	x1	x2	x3	y1	y2	y3	z1	z2	z3	B	Means (SD)
1. u1	.33																			1.75 (.55)
2. u2	.15	.30																		1.63 (.52)
3. u3	.11	.14	.39																	1.61 (.60)
4. v1	.09	.03	.10	.27																1.66 (.48)
5. v2	.07	.06	.07	.17	.30															1.56 (.50)
6. v3	.03	.01	.09	.14	.14	.22														1.54 (.53)
7. w1	.18	.14	.10	.03	.04	.01	.44													2.71 (.70)
8. w2	.12	.21	.13	-.01	.06	.01	.21	.50												2.49 (.69)
9. w3	.13	.12	.30	.07	.07	.06	.14	.19	.41											2.30 (.66)
10. x1	.05	.02	.10	.24	.19	.23	.04	.00	.09	.47										2.58 (.69)
11. x2	.01	.08	.01	.10	.24	.13	.05	.10	.02	.23	.50									2.44 (.69)
12. x3	.07	.03	.11	.10	.07	.09	.11	.05	.13	.14	.05	.36								2.20 (.65)
13. y1	.02	.01	-.04	-.01	.01	-.05	.11	.04	-.02	-.06	-.04	-.09	.58							3.23 (.79)
14. y2	-.09	-.04	-.01	-.11	-.03	-.06	.01	.04	-.02	-.14	-.06	-.04	.41	.72						3.06 (.82)
15. y3	-.10	-.08	-.16	-.05	-.05	-.02	-.05	-.04	-.14	-.13	-.13	-.14	.29	.24	.67					3.09 (.81)
16. z1	.12	.08	.04	.10	.10	.08	-.02	.07	.06	.14	.10	.04	-.03	-.01	-.08	.70				2.75 (.86)
17. z2	.10	.17	.09	.08	.15	.06	-.01	.13	.08	.11	.19	.05	-.01	.02	-.08	.51	.93			2.69 (.97)
18. z3	.06	.08	.07	.11	.12	.10	.05	.04	.07	.14	.13	.06	-.06	-.04	-.14	.17	.27	.66		2.59 (.81)
19. B	-.01	-.00	-.01	.00	.01	.00	-.00	-.01	-.03	.00	.00	.00	-.02	.02	-.04	.03	.01	-.07	.25	1.51 (.50)

Note. u = Adolescent Reported Conflict Intensity; v = Mother Reported Conflict Intensity; w = Adolescent Reported Conflict Frequency; x = Mother Reported Conflict Frequency; y = Positive Sibling Relationship Quality; z = Negative Sibling Relationship Quality; B = Birth Order; 1 = Time 1; 2 = Time 2; 3 = Time 3

Table 4. Model selection for Chi-Square Difference Test in Two-Factor Shift Model by Gender Composition Comparison

	Mixed-Sex Dyads				Same-Sex Dyads					
	Model	χ^2	df	Scaling Correction Factor	<i>p</i>	Model	χ^2	df	Scaling Correction Factor	<i>p</i>
Adolescent Spillover Intensity	Model 2 (Null)	38.76	22	.97		Model 2 (Null)	38.76	22	.97	
	Model 1 (Alt)	22.94	9	.95	.24	Model 1 (Alt)	9.29	9	.91	.01*
Adolescent Compensation Intensity	Model 2 (Null)	28.98	22	1.05		Model 2 (Null)	28.98	22	1.05	
	Model 1 (Alt)	9.67	9	1.07	.11	Model 1 (Alt)	20.04	9	.88	.62
Adolescent Compensation Frequency	Model 2 (Null)	15.36	22	1.05		Model 2 (Null)	15.36	22	1.05	
	Model 1 (Alt)	5.57	9	1.06	.70	Model 1 (Alt)	8.27	9	.98	.89
Mother Spillover Frequency	Model 2 (Null)	45.29	22	1.01		Model 2 (Null)	45.29	22	1.01	
	Model 1 (Alt)	22.62	9	1.02	.04*	Model 1 (Alt)	16.26	9	.91	.01*
Mother Compensation Frequency	Model 2 (Null)	45.29	22	1.01		Model 2 (Null)	45.29	22	1.01	
	Model 1 (Alt)	1.82	9	1.07	.24	Model 1 (Alt)	15.47	9	.96	.01*

Note. * p<.10. **p<.05 ***p<.01.

Table 5. Model selection chart of Adolescent Reported Parent-Adolescent Conflict Intensity Spillover Model

Model	Model comparison	$\chi^2(df; p)$	CFI	TLI	RMSEA (90 % CL)	AIC	BIC
M1: Unconditional Linear Growth Trajectory	--	2.55 (1; .11)	.98	.94	.08 (.00, .19)	1048.15	1077.17
M2: Conditional Linear Growth Trajectory	M1 < M2	11.65 (6; .07)	.98	.94	.06 (.00, .11)	2695.35	2771.53
M3: Conditional Non-Linear Growth Trajectory	M2 > M3	12.55 (5; .03)	.97	.91	.07 (.02, .13)	2695.60	2775.41
M4: Conditional Time-Invariant Covariate	M3 > M4	28.91 (9; .00)	.93	.83	.09 (.05, .13)	2699.58	2786.65
M5: Conditional Time-Invariant Covariate & Multigroup Analysis	M4 < M5	38.76 (22; .02)	.93	.87	.07 (.03, .11)	2704.06	2863.68

Notes. Model comparison controlling for sibling relationship quality negativity in parent-adolescent conflict. Model 5 is the final model.

Table 6. Parameter Estimates in the Two-Factor Shift Model for Adolescent Intensity Spillover

	Initial Status	Growth Rate
<i>Factor Loadings on Growth Factors</i>		
Conflict Intensity T1	1 ^a	0 ^a
Conflict Intensity T2	1 ^a	1 ^a
Conflict Intensity T3	1 ^a	2 ^a
Negative Sibling Quality T1	1 ^a	
Negative Sibling Quality T2	1.10 (.26) ^b	
Negative Sibling Quality T3	.46 (.10) ^b	
<i>Intercepts</i>		
Parent-Adolescent Conflict	1.74 (.10) ^b	
Sibling Relationship Quality	.07 (.25) ^b	
<i>Growth Rate (Slope)</i>		-.09 (.07) ^b
<i>Time-Invariant Covariate:</i>		
<i>Birth Order Effect on Growth Factors</i>		
Birth Order on Conflict	-.01 (.07) ^b	
Birth Order on Sibling Quality	.12 (.10) ^b	
Birth Order on Slope	.01 (.04) ^b	
<i>Covariance between Growth Factors</i>		
Conflict Intercept & Conflict Slope	-.03 (.03) ^b	
Conflict Intercept & Sibling Intercept	.11* (.03) ^b	
Sibling Intercept & Conflict Slope	-.01 (.02) ^b	
<i>Δ in Growth Trajectory</i>		
Conflict & Sib Quality T1		.04 (.03) ^b
Conflict & Sib Quality T2		.06* (.04) ^b
Conflict & Sib Quality T3		.00 (.03) ^b
<i>Residual Variances</i>		
Conflict Intensity T1	.12 (.05) ^b	
Conflict Intensity T2	.13 (.02) ^b	
Conflict Intensity T3	.14 (.05) ^b	
Negative Sibling Quality T1	.28 (.10) ^b	
Negative Sibling Quality T2	.34 (.13) ^b	
Negative Sibling Quality T3	.55 (.06) ^b	

Note. *p<.10. **p<.05 ***p<.01. ^a= Parameter fixed in the model; ^b = Parameter estimate with standard error in parentheses

Table 7. Model selection chart of Adolescent Reported Parent-Adolescent Conflict Frequency Spillover Model

Model	Model comparison	$X^2(df; p)$	CFI	TLI	RMSEA (90 % CL)	AIC	BIC
M1: Unconditional Linear Growth Trajectory	--	0.28 (1; .60)	1.00	1.00	.00 (.00, .13)	1375.08	1404.10
M2: Conditional Linear Growth Trajectory	M1 < M2	19.50 (6; .00)	.94	.85	.09 (.05, .14)	3045.77	3121.95
M3: Conditional Non-Linear Growth Trajectory	M2 > M3	40.67 (5; .00)	.84	.53	.16 (.12, .21)	3047.38	3127.19
M4: Conditional Time-Invariant Covariate	M3 > M4	52.42 (9; .00)	.82	.59	.13 (.10, .17)	3050.17	3137.23
M5: Conditional Time-Invariant Covariate & Multigroup Analysis	M4 < M5	37.43 (22; .02)	.93	.87	.07 (.03, .11)	3056.81	3216.42

Notes. Model comparison controlling for sibling relationship quality negativity in parent-adolescent conflict. Model 5 is the final model.

Table 8. Parameter Estimates in the Two-Factor Shift Model for Adolescent Frequency Spillover

	Initial Status	Growth Rate
<i>Factor Loadings on Growth Factors</i>		
Conflict Frequency T1	1 ^a	0 ^a
Conflict Frequency T2	1 ^a	1 ^a
Conflict Frequency T3	1 ^a	2 ^a
Negative Sibling Quality T1	1 ^a	
Negative Sibling Quality T2	1.25 (.10) ^b	
Negative Sibling Quality T3	.48 (.17) ^b	
<i>Intercepts</i>		
Parent-Adolescent Conflict	2.70 (.13) ^b	
Sibling Relationship Quality	-.02 (.51) ^b	
<i>Growth Rate (Slope)</i>		-.21 (.09) ^b
<i>Time-Invariant Covariate:</i>		
<i>Birth Order Effect on Growth Factors</i>		
Birth Order on Conflict	.01 (.08) ^b	
Birth Order on Sibling Quality	.11 (.09) ^b	
Birth Order on Slope	.00 (.06) ^b	
<i>Covariance between Growth Factors</i>		
Conflict Intercept & Conflict Slope	-.07* (.03) ^b	
Conflict Intercept & Sibling Intercept	.06 (.05) ^b	
Sibling Intercept & Conflict Slope	.03 (.02) ^b	
<i>Δ in Growth Trajectory</i>		
Conflict & Sib Quality T1		-.023 (.04) ^b
Conflict & Sib Quality T2		.06 (.05) ^b
Conflict & Sib Quality T3		-.03 (.04) ^b
<i>Residual Variances</i>		
Conflict Frequency T1	.21 (.05) ^b	
Conflict Frequency T1	.27 (.03) ^b	
Conflict Frequency T1	.14 (.07) ^b	
Negative Sibling Quality T1	.34 (.29) ^b	
Negative Sibling Quality T2	.27 (.47) ^b	
Negative Sibling Quality T3	.55 (.06) ^b	

Note. ^ap<.10. *p<.05 **p<.01. ^a= Parameter fixed in the model; ^b= Parameter estimate with standard error in parentheses

Table 9. Model selection chart of Mother Reported Parent-Adolescent Conflict Frequency Spillover Model

Model	Model comparison	$X^2(df; p)$	CFI	TLI	RMSEA (90 % CL)	AIC	BIC
M1: Unconditional Linear Growth Trajectory	--	1.17 (1; .28)	1.00	.99	.02 (.00, .16)	1393.22	1422.24
M2: Conditional Linear Growth Trajectory	M1 < M2	16.51 (6; .01)	.95	.88	.08 (.04, .13)	3061.20	3137.38
M3: Conditional Non-Linear Growth Trajectory	M2 > M3	14.37 (5; .01)	.96	.87	.08 (.03, .13)	3061.01	3140.82
M4: Conditional Time-Invariant Covariate	M3 > M4	32.93 (9; .00)	.90	.77	.09 (.06, .14)	3065.63	3152.69
M5: Conditional Time-Invariant Covariate & Multigroup Analysis	M4 < M5	45.29 (22; .00)	.89	.79	.09 (.05, .13)	3084.06	3243.67

Notes. Model comparison controlling for sibling relationship quality negativity in parent-adolescent conflict. Model 5 is the final model.

Table 10. Parameter Estimates in the Two-Factor Shift Model for Mother Frequency Spillover

	Initial Status	Growth Rate
<i>Factor Loadings on Growth Factors</i>		
Conflict Frequency T1	1 ^a	0 ^a
Conflict Frequency T2	1 ^a	1 ^a
Conflict Frequency T3	1 ^a	2 ^a
Negative Sibling Quality T1	1 ^a	
Negative Sibling Quality T2	.97 (.15) ^b	
Negative Sibling Quality T3	.44 (.11) ^b	
<i>Intercepts</i>		
Parent-Adolescent Conflict	2.58 (.13) ^b	
Sibling Relationship Quality	.11 (.21) ^b	
<i>Growth Rate (Slope)</i>		-.18 (.08) ^b
<i>Time-Invariant Covariate:</i>		
<i>Birth Order Effect on Growth Factors</i>		
Birth Order on Conflict	.00 (.08) ^b	
Birth Order on Sibling Quality	.12 (.10) ^b	
Birth Order on Slope	-.00 (.05) ^b	
<i>Covariance between Growth Factors</i>		
Conflict Intercept & Conflict Slope	-.10* (.04) ^b	
Conflict Intercept & Sibling Intercept	.16** (.04) ^b	
Sibling Intercept & Conflict Slope	-.05* (.03) ^b	
<i>Δ in Growth Trajectory</i>		
Conflict & Sib Quality T1		-.02 (.04) ^b
Conflict & Sib Quality T2		.06* (.04) ^b
Conflict & Sib Quality T3		-.01 (.03) ^b
<i>Residual Variances</i>		
Conflict Frequency T1	.14 (.06) ^b	
Conflict Frequency T1	.32 (.03) ^b	
Conflict Frequency T1	.33 (.07) ^b	
Negative Sibling Quality T1	.22 (.08) ^b	
Negative Sibling Quality T2	.41 (.08) ^b	
Negative Sibling Quality T3	.56 (.06) ^b	

Note. +p<.10. *p<.05 **p<.01. ^a= Parameter fixed in the model; ^b = Parameter estimate with standard error in parentheses

Table 11. Model selection chart of Adolescent Reported Parent-Adolescent Conflict Intensity Compensation Model

Model	Model comparison	$\chi^2(df; p)$	CFI	TLI	RMSEA (90 % CL)	AIC	BIC
M1: Unconditional Linear Growth Trajectory	--	2.55 (1; .11)	.98	.94	.08 (.00, .19)	1048.15	1077.17
M2: Conditional Linear Growth Trajectory	M1 < M2	11.05 (6; .08)	.98	.94	.06 (.00, .11)	2602.55	2678.73
M3: Conditional Non-Linear Growth Trajectory	M2 < M3*	6.88 (5; .22)	.99	.98	.04 (.00, .10)	2600.06	2679.86
M4: Conditional Time-Invariant Covariate	M3 > M4	14.05 (9; .12)	.98	.95	.05 (.00, .09)	2607.58	2694.64
M5: Conditional Time-Invariant Covariate & Multigroup Analysis	M4 < M5	28.99 (22; .14)	.97	.94	.05 (.00, .09)	2590.56	2750.17

Notes. *Non-linear model was a better fit, but contained a negative residual variance, rendering the model invalid.

Model comparison controlling for sibling relationship quality positivity in parent-adolescent conflict. Model 5 is the final model.

Table 12. Parameter Estimates in the Two-Factor Shift Model for Adolescent Intensity Compensation

	Initial Status	Growth Rate
<i>Factor Loadings on Growth Factors</i>		
Conflict Intensity T1	1 ^a	0 ^a
Conflict Intensity T2	1 ^a	1 ^a
Conflict Intensity T3	1 ^a	2 ^a
Positive Sibling Quality T1	1 ^a	
Positive Sibling Quality T2	.75 (.10) ^b	
Positive Sibling Quality T3	.64 (.15) ^b	
<i>Intercepts</i>		
Parent-Adolescent Conflict	1.74 (.10) ^b	
Sibling Relationship Quality	.32 (.31) ^b	
<i>Growth Rate (Slope)</i>		-.09 (.07) ^b
<i>Time-Invariant Covariate:</i>		
<i>Birth Order Effect on Growth Factors</i>		
Birth Order on Conflict	-.01 (.06) ^b	
Birth Order on Sibling Quality	.09 (.10) ^b	
Birth Order on Slope	.01 (.04) ^b	
<i>Covariance between Growth Factors</i>		
Conflict Intercept & Conflict Slope	-.04 (.03) ^b	
Conflict Intercept & Sibling Intercept	-.04 (.03) ^b	
Sibling Intercept & Conflict Slope	.02 (.02) ^b	
<i>Δ in Growth Trajectory</i>		
Conflict & Sib Quality T1		.04 (.03) ^b
Conflict & Sib Quality T2		-.04 ⁺ (.02) ^b
Conflict & Sib Quality T3		-.02 (.03) ^b
<i>Residual Variances</i>		
Conflict Intensity T1	.11 (.04) ^b	
Conflict Intensity T1	.14 (.02) ^b	
Conflict Intensity T1	.13 (.05) ^b	
Positive Sibling Quality T1	.11 (.07) ^b	
Positive Sibling Quality T2	.37 (.06) ^b	
Positive Sibling Quality T3	.48 (.06) ^b	

Note. ⁺p<.10. *p<.05 **p<.01. ^a= Parameter fixed in the model; ^b = Parameter estimate with standard error in parentheses

Table 13. Model selection chart of Adolescent Reported Parent-Adolescent Conflict Frequency Compensation Model

Model	Model comparison	$X^2(df; p)$	CFI	TLI	RMSEA (90 % CL)	AIC	BIC
M1: Unconditional Linear Growth Trajectory	--	.28 (1; .60)	1.00	1.00	.00 (.00, .13)	1375.08	1404.10
M2: Conditional Linear Growth Trajectory	M1 < M2	3.67 (6; .72)	1.00	1.00	.00 (.00, .06)	2921.52	2997.11
M3: Conditional Non-Linear Growth Trajectory	M2 > M3	3.43 (5; .63)	1.00	1.00	.00 (.00, .07)	2923.25	3003.06
M4: Conditional Time-Invariant Covariate	M3 > M4	6.59 (9; .68)	1.00	1.00	.00 (.00, .05)	2926.51	3013.58
M5: Conditional Time-Invariant Covariate & Multigroup Analysis	M4 < M5	15.36 (22; .84)	1.00	1.00	.00 (.00, .04)	2922.93	3082.54

Notes. Model comparison controlling for sibling relationship quality positivity in parent-adolescent conflict. Model 5 is the final model.

Table 14. Parameter Estimates in the Two-Factor Shift Model for Adolescent Frequency Compensation

	Initial Status	Growth Rate
<i>Factor Loadings on Growth Factors</i>		
Conflict Frequency T1	1 ^a	0 ^a
Conflict Frequency T2	1 ^a	1 ^a
Conflict Frequency T3	1 ^a	2 ^a
Positive Sibling Quality T1	1 ^a	
Positive Sibling Quality T2	.75 (.10) ^b	
Positive Sibling Quality T3	.64 (.15) ^b	
<i>Intercepts</i>		
Parent-Adolescent Conflict	2.70 (.14) ^b	
Sibling Relationship Quality	.31 (.29) ^b	
<i>Growth Rate (Slope)</i>		-.21 (.08) ^b
<i>Time-Invariant Covariate:</i>		
<i>Birth Order Effect on Growth Factors</i>		
Birth Order on Conflict	.00 (.08) ^b	
Birth Order on Sibling Quality	.09 (.10) ^b	
Birth Order on Slope	.01 (.05) ^b	
<i>Covariance between Growth Factors</i>		
Conflict Intercept & Conflict Slope	-.07* (.03) ^b	
Conflict Intercept & Sibling Intercept	.05 (.04) ^b	
Sibling Intercept & Conflict Slope	-.01 (.03) ^b	
<i>Δ in Growth Trajectory</i>		
Conflict & Sib Quality T1		.05 (.03) ^b
Conflict & Sib Quality T2		.01 (.02) ^b
Conflict & Sib Quality T3		-.05 (.03) ^b
<i>Residual Variances</i>		
Conflict Frequency T1	.21 (.05) ^b	
Conflict Frequency T2	.27 (.04) ^b	
Conflict Frequency T3	.12 (.06) ^b	
Positive Sibling Quality T1	.11 (.07) ^b	
Positive Sibling Quality T2	.37 (.06) ^b	
Positive Sibling Quality T3	.48 (.06) ^b	

Note. ^ap<.10. ^{*}p<.05 ^{**}p<.01. ^a= Parameter fixed in the model; ^b= Parameter estimate with standard error in parentheses

Table 15. Model selection chart of Mother Reported Parent-Adolescent Conflict Frequency Compensation Model

Model	Model comparison	$\chi^2(df; p)$	CFI	TLI	RMSEA (90 % CL)	AIC	BIC
M1: Unconditional Linear Growth Trajectory	--	1.17 (1; .28)	1.00	.99	.02 (.00, .16)	1393.22	1422.24
M2: Conditional Linear Growth Trajectory	M1 < M2	7.70 (6; .26)	.99	.98	.03 (.00, .08)	2948.14	3024.32
M3: Conditional Non-Linear Growth Trajectory	M2 > M3	7.24 (5; .20)	.99	.98	.04 (.00, .10)	2949.50	3029.30
M4: Conditional Time-Invariant Covariate	M3 > M4	10.77 (9; .29)	.99	.98	.03 (.00, .09)	2953.21	3040.27
M5: Conditional Time-Invariant Covariate & Multigroup Analysis	M4 < M5	17.70 (22; .72)	1.00	1.00	.00 (.00, .05)	2955.88	3115.50

Notes. Model comparison controlling for sibling relationship quality positivity in parent-adolescent conflict. Model 5 is the final model.

Table 16. Parameter Estimates in the Two-Factor Shift Model for Mother Frequency Compensation

	Initial Status	Growth Rate
<i>Factor Loadings on Growth Factors</i>		
Conflict Frequency T1	1 ^a	0 ^a
Conflict Frequency T2	1 ^a	1 ^a
Conflict Frequency T3	1 ^a	2 ^a
Positive Sibling Quality T1	1 ^a	
Positive Sibling Quality T2	.75 (.10) ^b	
Positive Sibling Quality T3	.64 (.15) ^b	
<i>Intercepts</i>		
Parent-Adolescent Conflict	2.70 (.14) ^b	
Sibling Relationship Quality	.31 (.29) ^b	
<i>Growth Rate (Slope)</i>		-.21 (.08) ^b
<i>Time-Invariant Covariate:</i>		
<i>Birth Order Effect on Growth Factors</i>		
Birth Order on Conflict	.00 (.08) ^b	
Birth Order on Sibling Quality	.09 (.10) ^b	
Birth Order on Slope	.01 (.05) ^b	
<i>Covariance between Growth Factors</i>		
Conflict Intercept & Conflict Slope	-.07* (.03) ^b	
Conflict Intercept & Sibling Intercept	.05 (.04) ^b	
Sibling Intercept & Conflict Slope	-.01 (.03) ^b	
<i>Δ in Growth Trajectory</i>		
Conflict & Sib Quality T1		.05 (.03) ^b
Conflict & Sib Quality T2		.01 (.02) ^b
Conflict & Sib Quality T3		-.05 (.03) ^b
<i>Residual Variances</i>		
Conflict Frequency T1	.12 (.06) ^b	
Conflict Frequency T1	.33 (.04) ^b	
Conflict Frequency T1	.33 (.07) ^b	
Positive Sibling Quality T1	.13 (.06) ^b	
Positive Sibling Quality T2	.36 (.06) ^b	
Positive Sibling Quality T3	.47 (.06) ^b	

Note. * p<.10. **p<.05 ***p<.01. ^a= Parameter fixed in the model; ^b = Parameter estimate with standard error in parentheses

Figure 1.

Figure 1. Conceptual model used to investigate the trajectory of mother-adolescent intensity or frequency of conflict over time. Models also included time-variant (i.e. positive or negative sibling relationship quality over time) and time-invariant predictors (i.e. sibling birth order) as well as a multi-group comparison of sibling gender composition.

Note* PAC= Parent-Adolescent Conflict; SRQ= Sibling Relationship Quality; T1-T3= Time1-Time3.

Figure 2. Longitudinal Subsample of Individual Growth Trajectories for Spillover of Adolescent Conflict Intensity

Note. Visual of individual trajectories of adolescent reported parent-adolescent conflict either increasing or decreasing when controlling for negative sibling relationship quality over time. An average mean line (in blue) is drawn to denote the average trajectory of the sample.

Figure 3. Latent Growth Curve of Adolescent Reported Conflict Intensity over Time

Note. Visual of separate mean trajectories of adolescent reported parent-adolescent conflict by sibling gender composition when controlling for negative sibling relationship quality over time.

Figure 4. Longitudinal Subsample of Individual Growth Trajectories for Spillover of Mother Conflict Frequency

Note. Visual of individual trajectories of mother reported parent-adolescent conflict (either increasing or decreasing) when controlling for positive sibling relationship quality over time. An average mean line (in blue) is drawn to denote the average trajectory of the sample.

Figure 5. Latent Growth Curve of Mother Reported Conflict Frequency over Time

Note. Visual of separate mean trajectories of mother reported parent-adolescent conflict by sibling gender composition when controlling for negative sibling relationship quality over time.

Figure 6. Longitudinal Subsample of Individual Growth Trajectories for Compensation of Adolescent Conflict Intensity

Note. Visual of individual trajectories of adolescent reported parent-adolescent conflict (either increasing or decreasing) when controlling for positive sibling relationship quality over time. An average mean line (in blue) is drawn to denote the average trajectory of the sample.

Figure 7. Latent Growth Curve of Adolescent Reported Conflict Intensity over Time

Note. Visual of separate mean trajectories of adolescent reported parent-adolescent conflict by sibling gender composition when controlling for positive sibling relationship quality over time.

Figure 8. Longitudinal Subsample of Individual Growth Trajectories for Compensation of Adolescent Conflict Frequency

Note. Visual of individual trajectories of adolescent reported parent-adolescent conflict (either increasing or decreasing) when controlling for positive sibling relationship quality over time. An average mean line (in blue) is drawn to denote the average trajectory of the sample.

Figure 9. Latent Growth Curve of Adolescent Reported Conflict Frequency over Time

Note. Visual of separate mean trajectories of adolescent reported parent-adolescent conflict by sibling gender composition when controlling for positive sibling relationship quality over time.

Figure 10. Longitudinal Subsample of Individual Growth Trajectories for Compensation of Mother Conflict Frequency

Note. Visual of individual trajectories of mother reported parent-adolescent conflict (either increasing or decreasing) when controlling for positive sibling relationship quality over time. An average mean line (in blue) is drawn to denote the average trajectory of the sample.

Figure 11. Latent Growth Curve of Mother Reported Conflict Frequency over Time

Note. Visual of separate mean trajectories of mother reported parent-adolescent conflict by sibling gender composition when controlling for positive sibling relationship quality over time.

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